ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT

AND

SPECIAL STUDIES REPORT

2009

Los Angeles County
Department of Public Health

Public Health
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Los Angeles County Department of Public Health
Acute Communicable Disease Control Program
Annual Morbidity Report
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● EXECUTIVE SUMMARY ●

In Los Angeles County (LAC), more than 85 diseases and conditions, as well as unusual disease occurrences and outbreaks, are reportable by law. Acute Communicable Disease Control Program (ACDC) is the lead program for the surveillance and investigation of most communicable diseases—responsibilities exclude tuberculosis, sexually transmitted diseases, and HIV/AIDS; selected vaccine-preventable diseases are monitored by the Immunization Program. Surveillance is primarily passive, with reports submitted via facsimile, mail, or telephone by providers and hospitals. Electronic reporting from hospitals via a secure web-based application has steadily increased since its inception in 2005; nearly every hospital infection preventionist in addition to correctional health providers and several large clinics are now capable of on-line reporting. Electronic laboratory reporting has been in place since 2002 and has expanded to more than twenty clinical and reference laboratories that report an estimated 60 percent of all mandated laboratory reports.

ACDC Mission

To prevent and control communicable disease in Los Angeles County utilizing the tools of surveillance, outbreak response, education and preparedness activities.

ACDC also sets policy and develops procedures for LAC Department of Public Health (DPH) activities related to infectious and communicable disease prevention and control. Our program interprets and enforces state and federal laws and regulations, and interfaces with other jurisdictions, programs and agencies responsible for public health. ACDC frequently provides consultation to the medical community on issues of communicable and infectious diseases and education to medical professionals.

ACDC has several sections, units and special projects, each with unique goals and objectives for the surveillance and control of communicable disease. ACDC team members work to decrease morbidity from acute communicable diseases through surveillance to detect outbreaks and monitor trends. ACDC activities include working with:

- foodborne and waterborne illnesses, with special interest in *Listeria*, norovirus, *Salmonella* and toxigenic *E. coli*
- vectorborne and zoonotic diseases such as West Nile virus, typhus, and plague as well as meningococcal disease and other causes of encephalitis and meningitis
- sub-acute healthcare facilities (e.g., skilled nursing facilities, dialysis centers) for disease prevention, infection control, and outbreak investigations;

Los Angeles County: A Description of Our Community

LAC is one of the nation's largest counties, covering over 4,000 square miles. While LAC enjoys fairly temperate, year-round weather, it encompasses a wide variety of geographic areas including mountain ranges, arid deserts, and over 80 miles of ocean coastline. Accordingly, one challenge of disease surveillance, response and control is responding to its enormous size. LAC presently has the largest population (nearly 10 million) of any county in the US and is exceeded by only eight states. LAC is densely populated, with over one-fourth of the state's population. LAC is home to approximately 100 hospitals with 74 emergency departments, more than 30,000 licensed physicians, over 450 sub-acute healthcare facilities, and about 25 thousand retail food purveyors.

Another challenge is the extensive diversity of our population coupled with a high level of immigration. Nearly half of our residents are Hispanic (48%), around one-third white (30%), and around one in ten are Asian (13%) or black (9%). Residents report over 90 languages as their primary spoken language. There is also substantial economic diversity within our county; while LAC is world renowned for its areas of wealth and privilege, there is also considerable poverty. The 2000 US census recorded over 1.5 million residents (nearly 16% of LAC's population) living in poverty.

LAC is a major port of entry for immigrants to the US. According to the 2007 Los Angeles County Health Survey, 32% of respondents stated they were born outside of the US. According the US Department of Homeland Security Yearbook of Immigration Statistics 2007, California remains to be the residence of the largest number of legal immigrants to the US. The population is also highly mobile. In terms of air travel alone, each year roughly 55 million travelers come through the Los Angeles International airport (over 40 million domestic and 14 million international flights yearly)—making it the nation's 3rd busiest airport.

- antimicrobial-resistant bacterial agents such as *Streptococcus pneumoniae*, *Staphylococcus aure*us, *Clostridium difficile*, *Enterococcus*, *Acinetobacter*, and *Klebsiella*.
- assisting hospitals with outbreak investigations, and consulting on infection control issues;
- influenza (including pandemic influenza) and other respiratory pathogens through a variety of case-based, aggregate, and virologic parameters
- LAC DPH Community Health Services (CHS) for outbreak investigations in community settings, providing guidance, support and consultation on infection prevention and control
- selected vaccine-preventable diseases for surveillance, outbreak investigation and control
- healthcare providers to enhance preparedness and response through strengthened communications, collaboration, and consolidation of resources; ACDC engages infection preventionists, emergency departments, and laboratories in these efforts
- Automated Disease Surveillance System to enhance surveillance and epidemiology capacity, and strengthen laboratory capacity to identify and respond to unusual occurrences and possible terrorist incidents; activities include syndromic surveillance and electronic laboratory reporting
- many programs of the California Department of Public Health, including the Center for Infectious Diseases and the Center for Environmental Health
- the Varicella Surveillance Project, a research project examining the incidence of varicella and zoster, as well as immunization coverage levels and the impact of immunization on this chronic infection
- LAC Department of Coroner to identify infectious disease related deaths.

Other ACDC team members support and work with the disease surveillance units to:

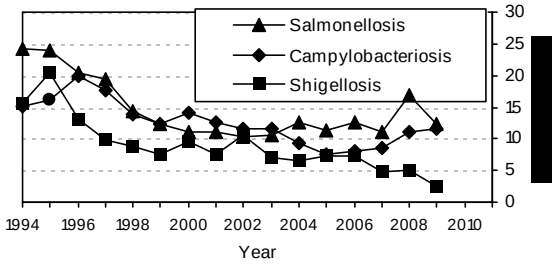
- provide epidemiologic consultation and support, as well as assist with special projects, data maintenance, epidemiologic analysis, data presentation, and geographic information system (GIS)
- plan and evaluate cross-cutting ACDC activities with strategic planning and consequential epidemiology concept (application of public health research); establish and maintain performance measures
- train and educate internal and external partners in response to potential or actual disease which may be the result of bioterrorism.

Additional information about ACDC and DPH is available at:
http://publichealth.lacounty.gov/acd/index.htm
http://publichealth.lacounty.gov

Foodborne Diseases

Diseases spread by food and food sources make up much many of the investigations and activities conducted by ACDC and CHS. Overall, foodborne diseases declined since the mid-1990's and have stabilized at lower rates as in Figure 1 (see individual chapters on campylobacteriosis, *E. coli* O157:H7, listeriosis, salmonellosis, shigellosis, typhoid fever, and vibriosis for more details). The declining trend in reported cases is most evident with the bacterial disease shigellosis. The rate of salmonellosis returned to a stable level of about 12 cases per 100,000 as it has been for most of the past eight years while the campylobacteriosis rate continued to increase over the past year. These findings are similar to national trends depicting sustained decreases with occasional upsurges among many foodborne illnesses, particularly those of bacterial origin.[1] While the underlying causes for these local and national trends are not known, the implementation of control measures at several levels are believed to be important factors in the reduction of food and water-related illnesses. On a national level, these measures include the expansion of federal food safety and

Figure 1
Foodborne Disease
Incidence Rates by Year
LAC and US, 1994–2009



[1] CDC, Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food---10 States, 2009. MMWR 2010; 59(14); 418-422. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5914a2.htm.

inspection services as well as increased attention to fresh produce safety. Locally, a highly publicized restaurant grading system in operation in LAC since 1998 may have also advanced food safety through education for food handlers and the public regarding best practices to reduce foodborne disease.

In 2009, the LAC salmonellosis crude rate dropped to 12.3 per 100,000 (Figure 1), similar to the average annual rate for the years 2003-2007 (12.2 per 100,000). A very large 2008 outbreak of salmonellosis raised the rate substantially for that year (see 2008 Special Studies Report). Nationally, the incidence of salmonellosis cases has also been decreasing, but at a slower rate than it has for LAC in the previous 10 years.[2] Although many food items and both potable and recreational water sources have been implicated in the transmission of *Salmonella*, salmonellosis is most commonly associated with eggs, poultry, and fresh produce. Occasionally, an infected food worker can be the source of salmonellosis outbreaks. Another prominent source is reptiles, either by direct contact or through surfaces or other people exposed to reptiles. In 2009, over 9% of reported LAC salmonellosis cases had contact with turtles, lizards or snakes—a slight improvement that may be due to the ACDC-led Reptile-Associated Salmonellosis Workgroup community interventions.

While the overall incidence of most foodborne diseases has been decreasing, they continue to account for considerable morbidity and mortality—thousands of preventable infections continue to occur yearly.

ACDC investigated 18 disease outbreaks in 2009 that were determined to be foodborne, in which at least 170 persons were affected. Seven of the outbreaks were caused by *Salmonella*, six by norovirus, four by bacterial toxins, and one by campylobacteria. While the overall incidence of most foodborne diseases has been decreasing, they continue to account for considerable morbidity and mortality—thousands of preventable infections occur yearly. The majority of people affected by these illnesses improves without treatment and suffers no complications; however, some infections may become invasive, especially among children, the elderly and those with certain chronic medical conditions (e.g., the immunocompromised), leading to hospitalization and death. In LAC, foodborne diseases were a contributing factor for at least 12 deaths during 2008. Accordingly, further efforts to improve food quality and to educate food industry and the public about proper food storage, handling, and preparation are needed.

Waterborne Diseases

Diseases such as amebiasis, cryptosporidiosis, and giardiasis have the potential to be waterborne and could infect large numbers of persons; more commonly they are spread person to person by fecal contamination of hands, food, and drink. No recreational waterborne disease outbreaks occurred in 2009; the last known such outbreak occurred in 1988 which was a swimming pool-associated cryptosporidiosis outbreak. In 2005, a drinking water dispenser probably contaminated by the maintenance worker transmitted *Giardia* to 41 members of a gym. In 2007, hepatitis A was transmitted to eight patrons of a neighborhood bar by a contaminated ice machine. Waterborne parasitic disease reports have steadily declined over the past ten years, staying below or consistent with state incidence rates. From 2006 to 2009, surveillance data reflects a growing proportion of reported amebiasis and giardiasis cases among immigrants in LAC.

Invasive Bacterial Diseases

In February 2008 severe community acquired *Staphylococcus aureus* infection was made a reportable disease by State mandate. Twenty-seven cases that resulted in ICU admission or death were reported in 2009. From interviews with patients or their family members (in the case of death), it was found that diabetes and intravenous drug use were significant risk factors for acquiring such infections. Counter to the popular reports in the press focusing on children with “superbug” infections due to methicillin-resistant *Staphylococcus aureus (*MRSA), those at highest risk for illness were aged 65 years and more. However, since only three hospitals reported 41% of the cases, substantial under-reporting was likely.

[2] CDC. Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food --- 10 States, 2009; MMWR 2010 ; 59(14);418-422. Available at:.http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5914a2.htm.

Risk factors for invasive group A streptococcal disease (IGAS) were similar to those for community acquired *Staphylococcus aureus,* including diabetes and intravenous drug use. However, the rate of IGAS fell to the lowest level since ACDC has been monitoring it. It is unknown if the true rate dropped or if reporting was artificially decreased because of the distraction caused by pandemic influenza during 2009. ACDC contributed to an article describing co-infections with IGAS and pandemic influenza.[3]

Viral Hepatitis

The rate of hepatitis A continued to be extremely low, following the 2005-2006 outbreak throughout LAC. Surveillance for acute hepatitis C remains difficult as there is no one laboratory test to identify acute cases. Regardless, ten cases were identified in 2009, of which half may have been nosocomially acquired according to our investigations. See the 2009 Special Studies Reports for an overview of these investigations. ACDC continues to aggressively follow up all potential cases of nosocomial hepatitis B and C.

Influenza

In April of 2009 a new strain of human influenza was first identified in both the US and Mexico. By June, the new strain, pandemic H1N1 (pH1N1), had spread across the globe and the WHO declared a pandemic. The influenza surveillance team, augmented by staff from inside and outside ACDC, worked hard to surveil and describe the epidemiology of pH1N1 in LAC. See the 2009 Special Report on hospitalizations due to pH1N1 and Influenza Watch for a summary of pH1N1 in LAC.

Vaccine Preventable Diseases

National and international vaccine preventable disease (VPD) outbreaks have been increasing in frequency in recent years, and 2009 marked a peak year in the resurgence of VPD incidence internationally. However, LAC did not experience any outbreaks.

Increased measles and pertussis incidence was noted worldwide. Mumps outbreaks were noted in multiple countries, particularly in a religious group in Europe that quickly led to an on-going large scale outbreak on the East Coast of the US.

Vaccine Preventable Diseases

- *2009 marked a peak in the resurgence of VPD incidence internationally.*
- *Increased pertussis morbidity in 2009 in LAC may be due to the cyclical nature of the disease.*

Because of this international resurgence and the high risk of exposure to VPDs during global travel, immunizations against measles, mumps, rubella, pertussis, diphtheria, and hepatitis A are strongly recommended at least two weeks prior to travel. In addition, unvaccinated infants six months of age and older should be vaccinated with MMR if they are traveling out of the country.

The year 2009 marked an increase in the number of identified pertussis cases in LAC, compared to the previous two years. This occurrence is most likely due to the cyclical epidemiology of pertussis, in which increased pertussis morbidity (without any direct epidemiological links) occurs every three to five years. The last peak year of incidence in LAC was in 2005 with 439 cases identified. In LAC, significantly high peak incidence years are also preceded by high incidence rates in the immediate prior year. It is anticipated that 2010 will be another peak incidence year in LAC due to the increased pertussis rate in 2009. The mean age of pertussis cases has also been shifting upwards nationally, with more cases identified among adults and adolescents.

[3] Jean C, Louie JK, Glaser CA, Harriman K, Hacker JK, Aranki F, Bancroft E, Farley S, Ginsberg M, Hernandez LB, Sallenave CS, Radner AB. Invasive group A streptococcal infection concurren t with 2009 H1N1 influenza. Clin Infect Dis 15;50(10):e59-62.

Increased VPD morbidity coincides with an alarming trend among parents to reject, for personal belief reasons, vaccines for their children; personal belief exemption rates in LAC kindergarten schools have increased steadily over the last ten years and now comprise over 2% of the population. The percentage of pertussis cases less than 18 years of age with personal belief school vaccine exemptions increased 20% from 2008 to 2009.

Vaccine coverage levels in LAC remain high (over 80% in children) for disease-specific vaccine antigens. These high levels generally are preventing outbreaks and curbing VPD morbidity in the general community. However, coverage levels remain low for those populations who are now considered the primary reservoir of disease (i.e., adolescents and adults) and often the source of infection for susceptible and high-risk individuals (i.e., infants, pregnant women, and immune-compromised persons). According to the MMWR published in August 2010, in 2009 the national Tdap (tetanus, diphtheria, and acellular pertussis) vaccine coverage level for adolescents 13-17 years of age was just 55.6% and in California was 53.1%.[4]

Although high childhood immunization coverage levels have helped LAC keep its VPD morbidity levels low compared to other regions, a multi-pronged effort incorporating innovative strategies must be continued in order to educate, dispel myths, and increase vaccination coverage levels among hard-to-reach populations (e.g., international travelers and parents who are opting out of vaccinations for their children) since they are now becoming the primary reservoirs for VPD resurgence worldwide.

Healthcare Associated Infections and Outbreaks

Sixteen outbreaks were reported from LAC acute care hospitals, a decrease of 43% from 2008. Thirty-eight percent (n=6) of reported outbreaks in 2009 were caused by a multidrug-resistant organisms such as *Acinetobacter baumannii*, methicillin-resistant *Staphylococcus aureus* (*MRSA*) and *Clostridium difficile*. Nine outbreaks (56%) occurred in neonatal intensive care units (NICU), adult ICUs or sub-acute units in hospitals.

Healthcare associated infections (HAI) have generated a great deal of attention in the US in recent years, especially the issue of public reporting and transparency. California passed legislation that mandates healthcare facility reporting of selected conditions and practices, and establishes a statewide HAI advisory committee to monitor implementation of these laws to reduce and prevent HAI. The ACDC Hospital Outreach Unit (HOU) participates in the state advisory committee and works with the California Department of Public Health (CDPH) and other public health organizations to make recommendations related to the prevention and control of HAIs, including compliance with HAI regulations and public reporting of HAI associated process and outcome measures.

In 2009, through the American Recovery and Reinvestment Act, Congress allocated $40 million to states to increase their capacity and supplement existing programs for surveillance and prevention of HAI. CDPH received federal grant funds for rapid expansion of CDPH HAI prevention efforts, including surveillance and reporting. Using this money CDPH augmented its HAI program with eight expert infection preventionists, assigning one to work with the HOU in LAC.

The HOU incorporates five liaison public health nurses (PHN), two program specialist PHNs, an epidemiology analyst, and a medical epidemiologist who interface with infection preventionists at 102 licensed acute care hospitals in LAC to promote disease reporting and implementation of hospital surveillance to enhance detection of potential critical communicable disease situations. The team identifies and responds to potential risks and threats during hospital outbreaks and assists with investigations. A quarter of hospitals in LAC invite HOU staff to their infection control committee meetings, demonstrating additional integration of public health goals into the hospital setting. The HOU has expanded to include non-hospital healthcare settings, such as acute psychiatric hospitals, large clinics, and correctional medical services. Team members continue to strengthen communication and collaboration between Public Health and the medical community on a variety of topics.

[4] National, State, and Local Area Vaccination Coverage Among Adolescents Aged 13-17 Year—United States, 2009; MMWR 2010 ; 59(32);1018-1023. Available at:.http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5932a3.htm?s_cid=mm5932a3_x.

Sub-acute Healthcare Facilities

In 2009, the total number of reported outbreaks in sub-acute healthcare facilities increased by 90% over 2008 to 166. Outbreaks of gastroenteritis were the most frequently documented type (63, 38%), with 34 of these due to laboratory-confirmed norovirus. Scabies was the second most frequently documented outbreak with 59 outbreaks. A Scabies Task Force consisting of ACDC Sub-acute Care Unit, HOU and CHS compiled Guidelines for the Prevention and Treatment of Scabies; these were made available to DPH staff in Community Health Services and Health Facility Licensing, and distributed to over 300 skilled nursing facilities (SNFs).

ACDC Sub-acute Unit conducted respiratory outbreak training in the fall of 2009. Training emphasized the importance of outbreak management in the SNF setting to include specimen collection, vaccination of staff and residents, and provision of timely prophylaxis. Nineteen respiratory outbreaks were documented in 2009 compared to just six in 2008. Of these, five were due to pandemic H1N1 virus and one was due to an un-typed influenza virus.

Automated Disease Surveillance

Automated Disease Surveillance

The year 2009 was time for consolidating gains and building toward future accomplishments. Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complemented traditional disease surveillance activities and was one of the tools used for pandemic H1N1 influenza surveillance.

The achievements of ACDC automated disease surveillance in 2009 were consolidating gains and building toward future accomplishments as well as the continued integration of early detection system activities into routine public health operations. Emergency department syndromic surveillance, which enables detecting major trends from baseline patterns of illness that may potentially identify bioterrorist-related activity or natural disease outbreaks, was expanded with the addition of several local hospitals.

Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complemented traditional disease surveillance activities and is one of the tools used for influenza surveillance. In 2009, the near real-time syndromic surveillance data were used to monitor the H1N1 pandemic as well as heat related illness during the summer months and respiratory effects of poor air quality due to wildfires. Current hospital participation represents approximately 65% of all emergency department visits in the county and recruitment of additional hospitals is ongoing. Volume data from the ReddiNet® system for emergency department visits during influenza season strongly correlated with virologic test results. Nurse call line, coroner data, veterinary, 911 calls, and over-the-counter medications data also complement our early event detection systems.

vCMR (Visual Confidential Morbidity Report) is an advanced electronic reporting system for all communicable diseases. It manages the “life-cycle” of a disease incident investigation from the date of report to the final resolution. The system has been fully operational since May 2000. It features modules for diseases, outbreaks, foodborne illness reports, community reporting by hospital infection preventionists, and an extensive electronic laboratory reporting module.

vCMR is aligned with CDC-sponsored initiatives such as the Public Health Information Network (PHIN) and National Electronic Disease Surveillance System (NEDSS). The system was converted to a fully web-based application using Microsoft.NET technology and was successfully upgraded to provide greater configurability of the system. The following DPH programs access the vCMR application: Acute Communicable Disease Control; Environmental Health Food and Milk; Immunization Program; Community Health Services’ eight Service Planning Areas; Health Assessment and Epidemiology; Injury and Violence Prevention; and STD (laboratory reports only).

ELR (Electronic Laboratory Reporting): Automated electronic reporting of communicable diseases from laboratories to DPH has been shown to yield more complete and rapid reporting of disease. Results are sent as soon as they are available rather than days later. LAC began using ELR in 2002, and since early 2006 has pursued efforts to recruit and implement many additional public and private laboratories, with feeds from 21 laboratories in 2009.

Bioterrorism, Emergency Preparedness and Response Activities

The ACDC Bioterrorism Preparedness and Response team continues active participation and collaboration with the Consortium of Technical Responders (CTR), a multi-agency collaborative of agencies comprised of members from the LAPD, LAC Sheriff, DPH, Fire, Hazmat, US Customs and Border Patrol, California Highway Patrol, FBI, and US Postal Inspectors. The goal of CTR is to unify the technical response community in incidents involving the use of Chemical, Biological and Radiological Agents. In October 2009, ACDC presented to the CTR on public health investigations related to biological agents as well as medical intelligence and syndromic surveillance.

In July 2009, several ACDC physicians/subject matter experts, along with the Public Health Nurse/Medical Intelligence Analyst detailed to the Joint Regional Intelligence Center (JRIC), attended and participated in the 2-day regional conference on Advanced Joint Operations. The goal of the conference was to develop working protocols between public health and the FBI that permit recognition, joint assessment and response actions based on sensitive and classified threat information related to potential biological terrorism events.

Collaborative efforts continued in 2009 among numerous DPH Programs, LAC Department of Health Services, LAC Emergency Medical Services (EMS), and external response agencies and partners in the testing and exercising of plans for response to a Biohazard Detection System (BDS) signal at the United States Postal Service Processing and Distribution Centers in LAC. In 2009, LAC DPH participated in one BDS full-scale exercise which provided the opportunity to exercise, test and evaluate the readiness and preparedness of elements such as, notification, deployment of public health staff to assume ICS roles and functions, delivery of medication from the cache, laboratory testing of sample cartridge, a functional point of dispensing (POD) at the USPS facility, deployment of the mobile DPH Command Center, and real-time notification and response after regular work hours.

In addition to participation with surveillance activities during the 2009 HIN1 pandemic emergency, the Training Unit was actively involved with the training/refresher and skills check of licensed staff in ACDC in preparation for the point of dispensing (PODs) clinics for H1N1 vaccines throughout LAC.

During 2009, the Response Team continued to respond as indicated to the field or hospital for the assessment, investigation and evaluation of suspected biological incidents in collaboration with the technical advisory group (TAG) or emergency preparedness and response program.

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LOS ANGELES COUNTY
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Disease Summaries Contributors

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- Cryptosporidiosis..…… . …Patricia Marquez, MPH
- Encephalitis……..…….....Rachel Civen, MD, MPH
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- Giardiasis……..…Patricia Marquez, MPH
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- Streptococcus, Group A Invasive Disease (IGAS)…… ..... Melissa Higdon, MPH
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PUBLICATIONS AND PRESENTATIONS
2009

Publications

Aller RD. Pathology's contributions to disease surveillance: sending our data to public health officials and encouraging our clinical colleagues to do so. *Arch Pathol Lab Med.* Jun 2009;133(6):926-932.

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Presentations and Abstracts

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OutbreakNet Conference 2009.
"Utilization of a Web-Based Survey to Investigate a Large University Outbreak "

Peterson A, Guevara RE, Terashita D. (2009) A case-control study of distance to new construction as a risk factor for coccidioidomycosis in Antelope Valley, CA, 2004-2006. (Poster presentation at the Coccidioidomycosis Study Group 53rd Annual Meeting, April 4).

OVERVIEW

ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
ANNUAL MORBIDITY REPORT
OVERVIEW
2009

PURPOSE

The Acute Communicable Disease Control Program (ACDC) Annual Morbidity Report of the Los Angeles County Department of Public Health (DPH) is compiled to:

1. summarize annual morbidity from several acute communicable diseases occurring in Los Angeles County (LAC);
2. identify patterns of disease as a means of directing future disease prevention efforts;
3. identify limitations of the data used for the above purposes and to identify means of improving that data; and
4. serve as a resource for medical, public health, and other healthcare authorities at county, state and national levels.

Note: The ACDC Annual Morbidity Report does not include information on tuberculosis, sexually transmitted diseases, or HIV and AIDS. Information regarding these diseases is available from their respective departments (see the LAC DPH website for more information at http://www.publichealth.lacounty.gov/index.htm).

LOS ANGELES COUNTY DEMOGRAPHIC DATA

Los Angeles County (LAC) population estimates used for this report are created by the Population Estimates and Projections System (PEPS) provided to the LAC Public Health by Urban Research.[1] The LAC population is based on both estimates and projections that are adjusted when real relevant numbers become available (e.g., DMV records, voters' registry, school enrollment and immigration records, etc.).

National and California state counts of reportable diseases were obtained from the Centers for Disease Control and Prevention (CDC) Final 2009 Reports of Nationally Notifiable Infectious Diseases.[2] This report also includes United States (US) Census population estimates—these were used to calculate national and California rates of disease.

Cities of Long Beach and Pasadena are separate reporting jurisdictions, as recognized by the California Department of Public Health, and as such these two cities maintain their own disease reporting systems. Therefore, disease episodes occurring among residents of Long Beach and Pasadena have been excluded from LAC morbidity data, and their populations subtracted from LAC population data. Exceptions to this rule are noted in the text when they occur.

DATA SOURCES

Data on occurrence of communicable diseases in LAC were obtained through passive and sometimes active surveillance. Every healthcare provider or administrator of a health facility or clinic, and anyone in charge of a public or private school, kindergarten, boarding school, or preschool knowing of a **case or suspected case** of a communicable disease is required to report it to the local health department as specified by the California Code of Regulations (Section 2500). Immediate reporting by telephone is also required for any **outbreak** or **unusual incidence** of infectious disease and any **unusual disease** not listed in Section 2500. Laboratories have separate requirements for reporting certain communicable diseases

[1] Urban Research, LA County ISD. Population Estimates July 1, 2009. Prepared by Walter R. McDonald & Associates, Inc. (WRMA), released 4/26/2010.
[2] The 2009 CDC report is not yet available at the time of the preliminary publishing of this report, therefore, 2008 data remain until 2009 data is available.

(Section 2505). Healthcare providers must also give detailed instructions to household members in regard to precautionary measures to be taken for preventing the spread of disease (Section 2514).

1. Passive surveillance relies on physicians, laboratories, and other healthcare providers to report diseases of their own accord to the DPH using the Confidential Morbidity Report (CMR) form, electronically, by telephone, or by facsimile.

2. Active surveillance entails ACDC staff regularly contacting hospitals, laboratories and other healthcare providers in an effort to identify all cases of a given disease.

DATA DESCRIPTION AND LIMITATIONS

Data in this report utilizes the following data descriptions, however, the report should be interpreted with caution of the notable limitations.

1. Underreporting
   The proportion of cases that are not reported varies for each disease. Evidence indicates that for some diseases as many as 98% of cases are not reported.

2. Reliability of Rates
   All vital statistics rates, including morbidity rates, are subject to random variation. This variation is inversely related to the number of events (observations, cases) used to calculate the rate. The smaller the frequency of occurrence of an event, the less stable its occurrence from observation to observation. As a consequence, diseases with only a few cases reported per year can have highly unstable rates. The observation and enumeration of these “rare events” is beset with uncertainty. The observation of zero events is especially hazardous.

   To account for these instabilities, all rates in the ACDC Annual Morbidity Report based on less than 19 events are considered “unreliable”. This translates into a relative standard error of the rate of 23% or more, which is the cut-off for rate reliability used by the National Center for Health Statistics.

   In the Annual Morbidity Report, rates of disease for groups (e.g., Hispanic versus non-Hispanic) are said to differ significantly only when two criteria are met: 1) group rates are reliable and 2) the 95% confidence limits for these rates do not overlap. Confidence limits are calculated only those rates which are reliable.

3. Case Definitions
   To standardize surveillance, CDC case definition for infectious diseases under public surveillance[3] is used with some exceptions as noted in the text of the individual diseases. Since verification by a laboratory test is required for the diagnosis of some diseases, cases reported without such verification may not be true cases. Therefore, an association between a communicable disease and a death or an outbreak possibly may not be identified.

4. Onset Date versus Report Date
   Slight differences in the number of cases and rates of disease for the year may be observed in subsequent annual reports. Any such disparities are likely to be small.

5. Population Estimates

   Estimates of the LAC population are subject to many errors. Furthermore, the population of LAC is in constant flux. Though not accounted for in census data, visitors and other non-residents may have an effect on disease occurrences.

[3] CDC. Case definitions for infectious conditions under public health surveillance. MMWR 1997; 46(RR10):1-55. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/00047449.htm

6. Place of Acquisition of Infections
   Some cases of diseases reported in LAC may have been acquired outside of the county. This may be especially true for many of the diseases common in Hispanic and Asian populations. Therefore, some disease rates more accurately reflect the place of diagnosis than the location where an infection was acquired.

7. Health Districts and Service Planning Areas

   Since 1999, Los Angeles County is divided into eight "Service Planning Areas" (SPAs) for purposes of healthcare planning and provision of health services: SPA 1 Antelope Valley, SPA 2 San Fernando, SPA 3 San Gabriel, SPA 4 Metro, SPA 5 West, SPA 6 South, SPA 7 East, and SPA 8 South Bay. Each SPA is organized further into health districts (HDs) (see SPA map in this report). Due to variations in Community Health Services staffing, investigating District personnel can be different than the standard District of residence. Approximately 5% of County census tracts have been shifted in such a manner. For the purpose of this publication, case or outbreak location is consistently matched to the official District/SPA of record.

8. Race/Ethnicity Categories
   - **Asian** – person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.
   - **Black** – person having origins in any of the black racial groups of Africa.
   - **Hispanic/Latino** – person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
   - **White** – person having origins in any of the original peoples of Europe, North Africa, or the Middle East.

STANDARD REPORT FORMAT

1. Crude data
   - **Number of Cases**: For most diseases, this number reflects new cases of the disease with an onset in the year of the report. If the onset was unknown, the date of diagnosis was used.
   - **Annual Incidence Rates in LAC**: Number of new cases in the year of report divided by LAC census population (minus Long Beach and Pasadena) multiplied by 100,000.
   - **Annual Incidence Rates in the US and California**: Incidence rates for the US and California were taken from the previously cited CDC publication, Morbidity and Mortality Weekly Report (MMWR). The MMWR records diseases by date of report rather than date of onset.
   - **Mean Age at Onset**: Arithmetic average age of all cases.
   - **Median Age at Onset**: The age that represents the midpoint of the sequence of all case ages.
   - **Range of Ages at Onset**: Ages of the youngest and oldest cases in the year of the report. For cases under one year of age, less than one (<1) was used.

2. Description
   This includes the causative agent, mode of transmission, common symptoms, potential severe outcomes, susceptible groups, and/or vaccine-preventability; and other significant information (e.g., prevention and control methods) related to the disease.

3. Trends and Highlights
   This provides a synopsis or the highlights of disease activity in the year of the report. This section may highlight trends, seasonality, significance related age, sex, race/ethnicity, and/or location of the disease.

4. Table
   This is a main table for each disease chapter that includes numbers of reported cases, percentage, and rates per 100,000 by age group, race/ethnicity, and SPA of the reporting year and four years prior to the reporting year.

5. Figures

Figures include disease incidence rates of the Los Angeles County, California (CA) and/or US. Some diseases may not included CA or US rates as the jurisdiction does not maintain surveillance of that particular disease. In separate figures, incidence rates or percent cases are expressed by age group, race/ethnicity, SPA, and/or month of onset. Some disease chapters have other type of figures or tables depending on the significance of that particular disease (e.g., percent cases by serotype, vaccination rates). When stratified data are presented in figures and/or tables these following facts are to be considered.

- **Seasonality**: Number of cases that occurred during each month of the reporting year.
- **Age**: Annual rate of disease for individual age groups. Race-adjusted rates are presented for some diseases.
- **Sex**: Male-to-female rate ratio of cases.
- **Race/Ethnicity**: Annual rate of disease for the five major racial groups. Cases of unknown race are excluded; thus, race-specific rates may be underestimates. Age-adjusted rates are presented for some diseases.
- **Location**: Location presented most often is the health district or SPA of residence of cases. Note that "location" rarely refers to the site of disease acquisition. Age-adjusted rates by location are presented for some diseases.

Los Angeles County Demographic Data
2009

Table A. Los Angeles County* population by year, 2004–2009

Year	Population	% change
2004	9,506,371	
2005	9,580,462	0.8%
2006	9,644,738	0.7%
2007	9,689,462	0.5%
2008	9,728,653	0.4%
2009	9,767,825	0.4%

* Does not include cities of Pasadena and Long Beach.

Table B. Los Angeles County* population by age group, 2009

Age (in years)	Population	%
<1	137,225	1.4%
1–4	561,365	5.8%
5–14	1,366,083	14.0%
15–34	2,833,360	29.0%
35–44	1,487,534	15.2%
45–54	1,369,276	14.0%
55–64	951,253	9.7%
65+	1,061,729	10.9%
Total	**9,767,825**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table C. Los Angeles County* population by sex, 2009

Sex	Population	%
Male	4,842,999	49.6%
Female	4,924,826	50.4%
Total	**9,767,825**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table D. Los Angeles County* population by race, 2009

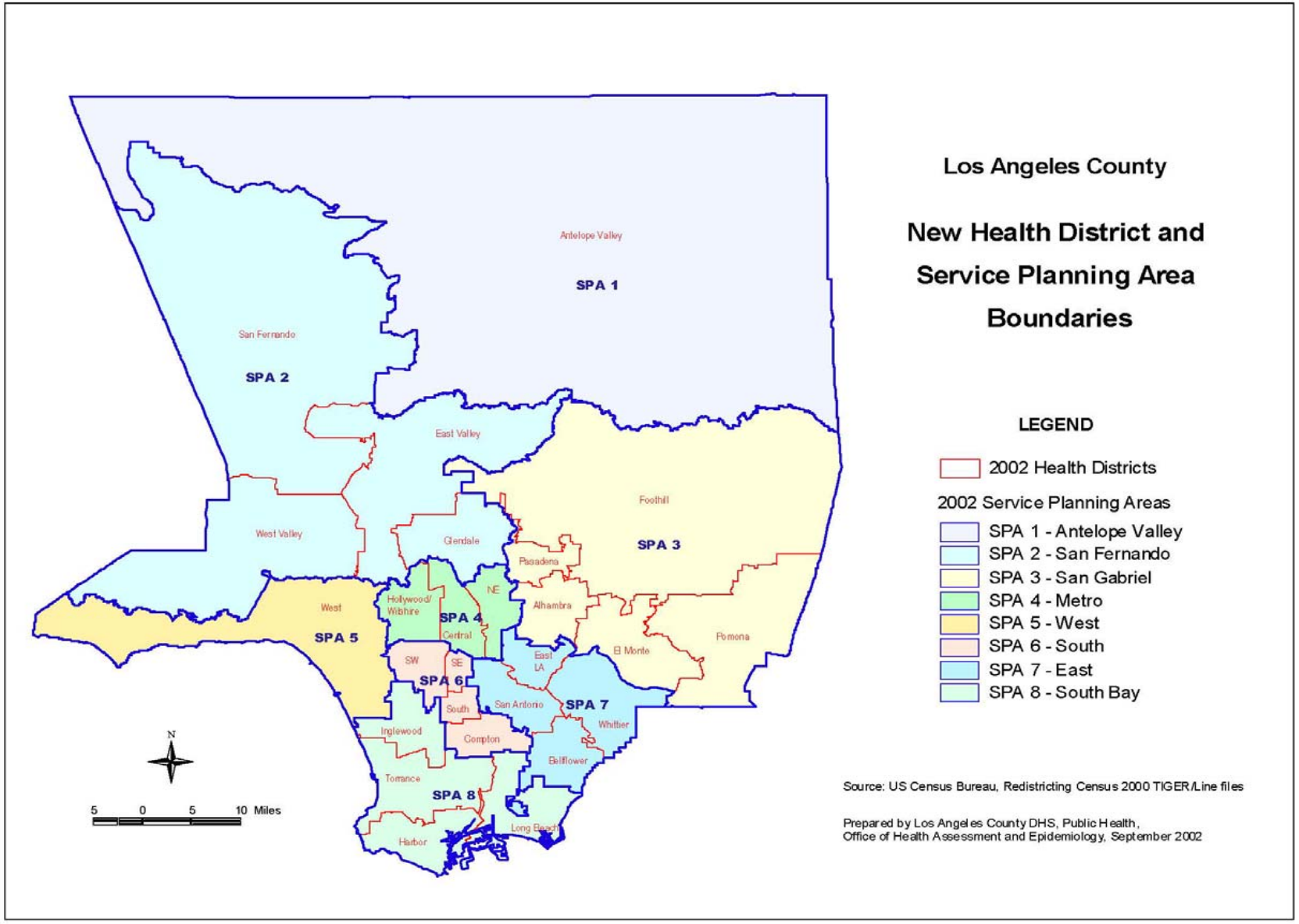
Race	Population	%
Asian	1,300,017	13.3%
Black	851,406	8.7%
Latino	4,675,192	47.9%
White	2,915,775	29.8%
Other**	25,435	0.3%
Total	**9,767,825**	**100.0%**

* Does not include cities of Pasadena and Long Beach.
** Includes American Indian, Alaskan Native, Eskimo and Aleut.

Table E. Los Angeles County*
population by health district and SPA, 2009

Health District	Population
SPA1	368,037
Antelope Valley	368,037
SPA 2	2,214,739
East Valley	470,216
Glendale	355,368
San Fernando	479,428
West Valley	909,727
SPA 3	1,731,354
Alhambra	363,363
El Monte	479,476
Foothill	313,908
Pomona	574,607
SPA 4	1,245,071
Central	365,745
Hollywood/Wilshire	531,334
Northeast	347,992
SPA 5	651,412
West	651,412
SPA 6	1,051,257
Compton	289,419
South	193,463
Southeast	185,555
Southwest	382,820
SPA 7	1,382,455
Bellflower	370,281
East Los Angeles	221,857
San Antonio	453,361
Whittier	336,956
SPA 8	1,123,500
Inglewood	435,012
Harbor	216,807
Torrance	471,681
Total	9,767,825

* Pasadena and Long Beach are separate health jurisdictions and as such are excluded from this table.


Los Angeles County
New Health District and Service Planning Area Boundaries
LEGEND
2002 Health Districts
2002 Service Planning Areas
SPA 1 - Antelope Valley
SPA 2 - San Fernando
SPA 3 - San Gabriel
SPA 4 - Metro
SPA 5 - West
SPA 6 - South
SPA 7 - East
SPA 8 - South Bay
Antelope Valley
SPA 1
San Fernando
SPA 2
East Valley
Foothill
SPA 3
West Valley
Glendale
Pasadena
NE
Hollywood/ Wilshire
SPA 4
Central
Alhambra
West
SPA 5
SW
SE
SPA 6
East LA
El Monte
Pomona
South
San Antonio
SPA 7
Whittier
Inglewood
Compton
Bellflower
Torrance
SPA 8
Harbor
Long Beach
N
5 0 5 10 Miles
Source: US Census Bureau, Redistricting Census 2000 TIGER/Line files
Prepared by Los Angeles County DHS, Public Health,
Office of Health Assessment and Epidemiology, September 2002

The following abbreviations and acronyms may be found throughout this report.

Table F. List of Acronyms

95%CI	95 percent confidence interval	**HCV**	Hepatitis C virus
ACDC	Acute Communicable Disease Control	**HD**	Health District
AIDS	Acquired Immunodeficiency Syndrome	**Hib**	*Haemophilus influenzae*, type b
ALT	Alanine aminotransferase	**HIV**	Human Immunodeficiency Virus
AR	Attack rate	**IFA**	Immunofluorescent Antibody
CA	California	**IgG**	Immunoglobulin G
CDC	Centers for Disease Control and Prevention	**IgM**	Immunoglobulin M
CDPH	California Department of Public Health	**LAC**	Los Angeles County
CHS	Community Health Services	**MMR**	Mumps-Measles-Rubella vaccine
CMR	Confidential morbidity report	**MMWR**	Morbidity and Mortality Weekly Report
CSF	Cerebral spinal fluid	**MSM**	Men who have sex with men
CSTE	Council of State and Territorial Epidemiologists	**N/A**	Not available
DPH	Department of Public Health	**OR**	Odds ratio
DTaP	Diphtheria-tetanus-acellular pertussis	**PCP**	*Pneumocystis carinii pneumonia*
DTP	Diphtheria-tetanus-pertussis vaccine	**PCR**	Polymerase Chain Reaction
EHS	Environmental Health Services	**PFGE**	Pulsed Field Gel Electrophoresis
EIA	Enzyme Immunoassay	**PHBPP**	Perinatal Hepatitis B Prevention Program
GI	Gastrointestinal	**RNA**	Ribonucleic Acid
GE	Gastroenteritis	**RR**	Rate ratio or relative risk
HAART	Highly Active Antiretroviral Therapy	**SNF**	Skilled nursing facility
HAV	Hepatitis A virus	**sp. or spp.**	Species
HBIG	Hepatitis B Immunoglobulin	**SPA**	Service Planning Area
HBsAg	Hepatitis B surface antigen	**US**	United States
HBV	Hepatitis B virus	**VCMR**	Visual confidential morbidity report (software)

LOS ANGELES COUNTY HEALTH DISTRICTS

AH	Alhambra	**FH**	Foothill	**SE**	Southeast
AV	Antelope Valley	**GL**	Glendale	**SF**	San Fernando
BF	Bellflower	**HB**	Harbor	**SO**	South
CE	Central	**HW**	Hollywood/Wilshire	**SW**	Southwest
CN	Compton	**IW**	Inglewood	**TO**	Torrance
EL	East Los Angeles	**NE**	Northeast	**WE**	West
EV	East Valley	**PO**	Pomona	**WV**	West Valley
EM	El Monte	**SA**	San Antonio	**WH**	Whittier

TABLES OF NOTIFIABLE DISEASES

Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2004-2009

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2004	2005	2006	2007	2008	2009		
Amebiasis	114	114	94	122	115	107	112	130
Botulism	3	8	2	1	5	1	4	9
Brucellosis	4	8	5	3	3	4	5	8
Campylobacteriosis[b]	884	725	775	825	1072	1135	856	1092
Cholera	0	0	0	0	0	0	0	0
Coccidioidomycosis	133	214	196	145	228	171	183	257
Cryptosporidiosis	56	45	48	50	41	51	48	58
Cysticercosis	8	15	11	7	6	9	9	16
Dengue	5	10	2	3	0	2	4	11
E. *coli* O157:H7	18	13	12	12	16	18	14	19
E. *coli* Other Stec	-	-	6	13	11	20	-	-
Encephalitis	133	72	46	65	89	51	81	139
Foodborne Outbreaks	40	32	37	21	18	16	30	47
Giardiasis	320	313	376	441	355	354	361	451
Haemophilus Influenzae Type B	2	3	5	1	0	2	2	6
Hansen's Disease (Leprosy)	9	2	2	5	1	3	4	10
Hepatitis A	321	480	364	78	80	66	265	579
Hepatitis B	72	57	62	55	66	41	62	74
Hepatitis C[b]	5	3	4	3	5	8	4	6
Hepatitis Unspecified[b]	0	4	7	10	4	19	5	12
Kawasaki Syndrome	42	56	75	52	55	70	56	77
Legionellosis[b]	15	31	24	40	59	66	34	63
Listeriosis, Nonperinatal	21	25	25	21	20	15	22	27
Listeriosis, Perinatal	6	3	12	6	2	5	6	13
Lyme Disease	0	7	16	9	9	4	8	18
Malaria	51	45	33	26	30	24	37	56
Measles	1	0	1	0	1	1	1	2
Meningitis, Viral	807	527	373	395	597	399	540	848
Meningococcal Infections	28	37	46	24	30	21	33	48
Mumps	5	10	10	5	7	7	7	12
Pertussis	156	439	150	69	80	156	179	443
Psittacosis	0	0	1	0	0	1	0	1
Q-fever	4	0	1	2	2	0	2	4
Relapsing Fever	0	0	2	0	0	0	0	2
Rheumatic Fever, Acute	1	0	0	0	1	1	0	1
Rubella	0	1	0	0	1	0	0	1
Salmonellosis	1205	1085	1217	1081	1638	1194	1245	1646
Shigellosis	625	710	524	463	498	259	564	742
Strongyloidiasis	0	0	0	0	0	0	0	0
Tetanus	2	0	4	0	2	0	2	5
Trichinosis	0	0	1	0	0	0	0	1
Tularemia	0	0	0	0	0	0	0	0
Typhoid Fever, Case	13	12	17	17	14	17	15	19
Typhoid Fever, Carrier	3	4	3	1	4	1	3	5
Typhus Fever	8	9	10	17	18	9	12	21
Vibrio	26	14	18	13	18	26	18	27
West Nile Virus	309	43	16	43	170	25	116	332

[a] The normal distribution assumption may not apply to some rare diseases.

[b] 2009 data over 95% upper limit.

Table H. Annual Incidence Rates of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2004-2009

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2004	2005	2006	2007	2008	2009
Amebiasis	1.20	1.19	0.97	1.26	1.18	1.10
Botulism	0.03	0.08	0.02	0.01	0.05	0.01
Brucellosis	0.04	0.08	0.05	0.03	0.03	0.04
Campylobacteriosis	9.30	7.57	8.04	8.51	11.02	11.62
Cholera	-	-	-	-	-	-
Coccidioidomycosis	1.40	2.23	2.03	1.50	2.34	1.75
Cryptosporidiosis	0.59	0.47	0.50	0.52	0.42	0.52
Cysticercosis	0.08	0.16	0.11	0.07	0.06	0.09
Dengue	0.05	0.10	0.02	0.03	-	0.02
E. *coli* O157:H7	0.19	0.14	0.12	0.12	0.16	0.18
E. *coli* Other Stec	-	-	0.06	0.13	0.11	0.21
Encephalitis	1.40	0.75	0.48	0.67	0.91	0.52
Giardiasis	3.37	3.27	3.90	4.55	3.65	3.62
Haemophilus Influenzae Type B	0.02	0.03	0.05	0.01	-	0.02
Hansen's Disease (Leprosy)	0.09	0.02	0.02	0.05	0.01	0.03
Hepatitis A	3.38	5.01	3.77	0.80	0.82	0.68
Hepatitis B	0.76	0.59	0.64	0.57	0.68	0.42
Hepatitis C	0.05	0.03	0.04	0.02	0.05	0.08
Hepatitis Unspecified	-	0.04	0.07	0.10	0.04	0.19
Kawasaki Syndrome	0.44	0.58	0.78	0.54	0.57	0.72
Legionellosis	0.16	0.32	0.25	0.41	0.61	0.68
Listeriosis, Nonperinatal	0.22	0.26	0.26	0.22	0.21	0.15
Listeriosis, Perinatal[a]	4.25	2.14	8.47	4.23	1.45	4.60
Lyme Disease	-	0.07	0.17	0.09	0.09	0.04
Malaria	0.54	0.47	0.34	0.27	0.31	0.25
Measles	0.01	-	0.01	-	0.01	0.01
Meningitis, Viral	8.49	5.50	3.87	4.08	6.14	4.08
Meningococcal Infections	0.29	0.39	0.48	0.25	0.31	0.21
Mumps	0.05	0.10	0.10	0.05	0.07	0.07
Pertussis	1.64	4.58	1.56	0.71	0.82	1.60
Psittacosis	-	-	0.01	-	-	0.01
Q-fever	0.04	-	0.01	0.02	0.02	-
Relapsing Fever	-	-	0.02	-	-	-
Rheumatic Fever, Acute	0.01	-	-	-	0.01	0.01
Rubella	-	0.01	-	-	0.01	-
Salmonellosis	12.68	11.34	12.62	11.16	16.84	12.22
Shigellosis	6.57	7.41	5.43	4.78	5.12	2.65
Strongyloidiasis	-	-	-	-	-	-
Tetanus	0.02	-	0.04	-	0.02	-
Trichinosis	-	-	0.01	-	-	-
Tularemia	-	-	-	-	-	-
Typhoid Fever, Case	0.14	0.13	0.18	0.18	0.14	0.17
Typhoid Fever, Carrier	0.03	0.04	0.03	0.01	0.04	0.01
Typhus Fever	0.08	0.09	0.10	0.18	0.19	0.09
Vibrio	0.27	0.15	0.19	0.13	0.19	0.27
West Nile Virus	3.25	0.45	0.17	0.44	1.75	0.26

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 live births.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table I. Five –Year Average of Notifiable Diseases by Month of Onset Los Angeles County, 2005-2009

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	8.0	7.8	7.8	6.8	8.4	8.0	7.4	9.6	6.8	8.4	9.2	9.0	110.4
Botulism	0.0	0.2	0.2	0.2	0.0	0.2	0.4	0.4	0.4	0.0	1.4	0.0	3.4
Brucellosis	0.4	0.2	0.0	1.0	0.4	0.6	0.4	0.4	0.2	0.2	0.4	0.4	4.6
Campylobacteriosis	66.6	44.4	49.2	65.4	71.4	90.4	99.4	80.2	75.4	60.8	60.4	45.8	906.4
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coccidioidomycosis	17.2	14.6	16.0	12.0	13.2	12.6	14.2	16.6	18.2	14.6	20.6	17.2	190.8
Cryptosporidiosis	3.0	3.0	3.0	4.0	3.0	2.6	4.6	5.6	5.8	3.8	3.4	2.8	47.0
Cysticercosis	0.4	0.8	1.6	1.0	1.4	1.0	1.2	0.2	0.4	0.8	0.0	0.2	9.6
Dengue	0.0	0.0	0.0	0.0	0.0	0.2	0.4	1.2	0.6	1.0	0.0	0.0	3.4
E. *coli* O157:H7	0.8	0.4	0.2	0.2	1.6	1.6	2.0	2.6	2.4	1.8	0.2	0.4	14.2
E. *coli* Other Stec[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Encephalitis	3.8	3.0	6.0	3.8	3.4	3.4	6.4	9.6	11.0	4.2	3.0	2.0	64.6
Giardiasis	24.4	24.0	25.8	28.0	25.4	26.4	32.6	37.0	36.8	32.4	23.8	25.4	367.8
Haemophilus Influenzae Type B	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.6	2.2
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	24.4	20.6	13.8	11.8	12.6	9.2	7.0	13.4	23.2	27.8	28.2	21.0	213.6
Hepatitis B	4.8	6.2	4.6	4.2	5.6	5.4	4.0	3.8	4.4	4.6	5.8	2.6	56.2
Hepatitis C	0.0	0.0	0.6	0.0	0.4	0.6	0.4	0.8	0.2	0.8	0.4	0.2	4.4
Hepatitis Unspecified	0.6	0.2	0.0	0.2	0.2	0.4	0.4	0.2	0.0	0.2	0.0	0.4	8.8
Kawasaki Syndrome	5.6	6.4	5.4	7.8	4.6	3.8	4.6	2.6	3.0	4.6	4.8	5.8	59.0
Legionellosis	3.2	2.6	3.6	3.0	3.2	4.0	3.2	4.0	2.4	4.2	5.0	5.6	44.0
Listeriosis, Nonperinatal	0.8	2.0	1.0	1.4	1.2	2.6	2.4	3.0	3.4	1.6	0.2	1.0	21.2
Listeriosis, Perinatal	0.2	0.0	0.2	0.4	0.4	0.4	1.0	1.2	0.8	0.6	0.4	0.0	5.6
Lyme Disease	0.2	0.4	0.0	0.2	0.2	2.4	3.8	1.0	0.4	0.4	0.0	0.0	9.0
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	0.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Meningitis, Viral	26.6	19.4	21.2	26.8	27.4	32.6	60.0	66.8	59.8	42.8	30.0	24.0	458.2
Meningococcal Infections	5.6	5.2	2.8	3.2	2.0	3.0	1.6	1.6	1.6	1.2	2.0	1.8	31.6
Mumps	0.6	1.0	0.4	1.0	0.6	0.2	1.0	1.6	0.2	0.2	0.4	0.6	7.8
Pertussis	12.6	11.8	13.4	12.4	16.6	13.6	19.4	21.6	17.4	15.2	12.0	12.6	178.6
Psittacosis	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Q-fever	0.2	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.2	0.0	0.0	0.0	1.0
Relapsing Fever	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4
Rheumatic Fever, Acute	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4
Rubella	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Salmonellosis	61.6	49.2	56.6	68.4	94.0	99.4	147.4	145.4	112.8	207.6	88.2	75.0	1242.8
Shigellosis	30.8	16.2	19.0	19.4	32.6	33.6	66.2	78.4	77.6	56.6	32.2	21.0	490.8
Strongyloidiasis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	0.2	0.2	0.0	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.0	1.2
Trichinosis	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Tularemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Typhoid Fever, Case	1.6	2.4	0.2	1.2	1.0	2.0	1.2	1.2	2.0	1.0	1.2	0.4	15.4
Typhoid Fever, Carrier	0.2	0.2	0.4	0.0	0.6	0.0	0.4	0.0	0.0	0.2	0.2	0.4	2.6
Typhus Fever	1.6	0.2	0.4	0.2	1.0	1.0	2.0	1.8	1.2	1.4	1.0	0.8	12.6
Vibrio	0.0	0.4	1.4	0.6	1.0	1.2	4.4	3.6	1.8	1.8	0.8	0.2	17.8
West Nile Virus	0.0	0.0	0.0	0.0	0.2	1.0	8.4	21.2	22.4	4.4	0.6	0.0	59.2

[a] Not applicable.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2009

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	0	1	6	33	23	22	14	8	107
Botulism	0	0	0	0	0	1	0	0	1
Brucellosis	0	1	0	1	0	1	1	0	4
Campylobacteriosis	30	138	146	316	119	137	100	143	1135
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	0	0	3	30	38	30	33	37	171
Cryptosporidiosis	0	4	4	16	13	4	6	4	51
Cysticercosis	0	0	1	4	1	3	0	0	9
Dengue	0	0	0	0	1	0	1	0	2
E. *coli* O157:H7	0	5	3	5	2	0	1	2	18
E. *coli* Other Stec	0	9	2	4	1	1	1	2	20
Encephalitis	0	4	17	10	2	7	2	8	51
Giardiasis	1	46	40	85	67	43	41	30	354
Haemophilus Influenzae Type B	0	0	0	0	0	1	1	0	2
Hansen's Disease (Leprosy)	0	0	0	0	0	2	1	0	3
Hepatitis A	0	0	1	34	10	6	5	10	66
Hepatitis B	0	0	0	12	7	16	4	2	41
Hepatitis C	0	0	0	1	2	3	1	1	8
Hepatitis Unspecified	0	0	0	4	4	6	4	1	19
Kawasaki Syndrome	9	50	11	0	0	0	0	0	70
Legionellosis	0	0	0	2	3	11	14	36	66
Listeriosis, Nonperinatal	0	0	1	1	0	2	1	10	15
Listeriosis, Perinatal[b]	0	0	0	4	1	0	0	0	5
Lyme Disease	0	0	1	0	2	0	1	0	4
Malaria	0	3	0	6	2	5	7	1	24
Measles	0	0	0	0	1	0	0	0	1
Meningitis, Viral	53	14	71	148	42	34	18	19	399
Meningococcal Infections	1	1	1	10	0	4	4	0	21
Mumps	0	2	0	4	0	0	0	1	7
Pertussis	79	10	18	20	9	12	5	3	156
Psittacosis	0	0	0	0	0	0	1	0	1
Q-fever	0	0	0	0	0	0	0	0	0
Relapsing Fever	0	0	0	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	1	0	0	0	0	1
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	89	229	195	271	110	101	76	123	1194
Shigellosis	4	34	47	67	51	33	12	11	259
Strongyloidiasis	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	0	0	0	0	0
Trichinosis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid Fever, Case	0	0	3	6	3	4	1	0	17
Typhoid Fever, Carrier	0	0	1	0	0	0	0	0	1
Typhus Fever	0	0	2	1	0	4	2	0	9
Vibrio	0	1	0	11	4	5	3	2	26
West Nile Virus	0	0	0	5	0	10	4	6	25

[a] Totals include cases with unknown age.

[b] Mother's age.

Table K. Incidence Rates of Selected Notifiable Diseases by Age Group
Los Angeles County, 2009

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	-	0.2	0.4	1.2	1.5	1.6	1.5	0.8
Botulism	-	-	-	-	-	0.1	-	-
Brucellosis	-	0.2	-	-	-	0.1	0.1	-
Campylobacteriosis	21.9	24.6	10.7	11.2	8.0	10.0	10.5	13.5
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	-	-	0.2	1.1	2.6	2.2	3.5	3.5
Cryptosporidiosis	-	0.7	0.3	0.6	0.9	0.3	0.6	0.4
Cysticercosis	-	-	0.1	0.1	0.1	0.2	-	-
Dengue	-	-	-	-	0.1	-	0.1	-
E. *coli* O157:H7	-	0.9	0.2	0.2	0.1	-	0.1	0.2
E. *coli* Other Stec	-	1.6	0.1	0.1	0.1	0.1	0.1	0.2
Encephalitis	-	0.7	1.2	0.4	0.1	0.5	0.2	0.8
Giardiasis	0.7	8.2	2.9	3.0	4.5	3.1	4.3	2.8
Haemophilus Influenzae Type B	-	-	-	-	-	0.1	0.1	-
Hansen's Disease (Leprosy)	-	-	-	-	-	0.1	0.1	-
Hepatitis A	-	-	0.1	1.2	0.7	0.4	0.5	0.9
Hepatitis B	-	-	-	0.4	0.5	1.2	0.4	0.2
Hepatitis C	-	-	-	-	0.1	0.2	0.1	0.1
Hepatitis Unspecified	-	-	-	0.1	0.3	0.4	0.4	0.1
Kawasaki Syndrome	6.6	8.9	0.8	-	-	-	-	-
Legionellosis	-	-	-	0.1	0.2	0.8	1.5	3.4
Listeriosis, Nonperinatal	-	-	0.1	-	-	0.1	0.1	0.9
Listeriosis, Perinatal[a]	-	-	-	3.8	4.0	-	-	-
Lyme Disease	-	-	0.1	-	0.1	-	0.1	-
Malaria	-	0.5	-	0.2	0.1	0.4	0.7	0.1
Measles	-	-	-	-	0.1	-	-	-
Meningitis, Viral	38.6	2.5	5.2	5.2	2.8	2.5	1.9	1.8
Meningococcal Infections	0.7	0.2	0.1	0.4	-	0.3	0.4	-
Mumps	-	0.4	-	0.1	-	-	-	0.1
Pertussis	57.6	1.8	1.3	0.7	0.6	0.9	0.5	0.3
Psittacosis	-	-	-	-	-	-	0.1	-
Q-fever	-	-	-	-	-	-	-	-
Relapsing Fever	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	0.0	-	-	-	-
Rubella	-	-	-	-	-	-	-	-
Salmonellosis	64.9	40.8	14.3	9.6	7.4	7.4	8.0	11.6
Shigellosis	2.9	6.1	3.4	2.4	3.4	2.4	1.3	1.0
Strongyloidiasis	-	-	-	-	-	-	-	-
Tetanus	-	-	-	-	-	-	-	-
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	-	-	0.2	0.2	0.2	0.3	0.1	-
Typhoid Fever, Carrier	-	-	0.1	-	-	-	-	-
Typhus Fever	-	-	0.1	-	-	0.3	0.2	-
Vibrio	-	0.2	-	0.4	0.3	0.4	0.3	0.2
West Nile Virus	-	-	-	0.2	-	0.7	0.4	0.6

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 live births.

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table L. Number of Cases of Selected Notifiable Diseases by Race/Ethnicity Los Angeles County, 2009

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	2	0	37	43	1	24
Botulism	0	0	0	1	0	0
Brucellosis	0	0	2	0	0	2
Campylobacteriosis	42	15	156	81	9	832
Cholera	0	0	0	0	0	0
Coccidioidomycosis	11	27	67	56	2	8
Cryptosporidiosis	1	8	10	16	1	15
Cysticercosis	0	0	8	1	0	0
Dengue	0	0	1	1	0	0
E. *coli* O157:H7	1	0	4	12	0	0
E. *coli* Other Stec	2	0	6	13	0	0
Encephalitis	5	2	22	9	1	12
Giardiasis	13	25	102	129	4	81
Haemophilus Influenzae Type B	0	1	0	1	0	0
Hansen's Disease (Leprosy)	2	0	0	0	0	1
Hepatitis A	18	2	21	24	0	1
Hepatitis B	5	11	12	11	0	2
Hepatitis C	1	0	1	6	0	0
Hepatitis Unspecified	0	0	0	0	0	19
Kawasaki Syndrome	15	5	39	8	3	0
Legionellosis	7	14	13	32	0	0
Listeriosis, Nonperinatal	0	1	7	7	0	0
Listeriosis, Perinatal[b]	2	0	3	0	0	0
Lyme Disease	0	0	0	4	0	0
Malaria	3	8	9	2	0	2
Measles	0	0	0	1	0	0
Meningitis, Viral	21	23	208	80	4	63
Meningococcal Infections	0	4	9	7	0	1
Mumps	3	1	2	1	0	0
Pertussis	10	6	100	39	1	0
Psittacosis	0	1	0	0	0	0
Q-fever	0	0	0	0	0	0
Relapsing Fever	0	0	0	0	0	0
Rheumatic Fever, Acute	1	0	0	0	0	0
Rubella	0	0	0	0	0	0
Salmonellosis	103	75	620	367	10	19
Shigellosis	6	17	154	69	0	13
Strongyloidiasis	0	0	0	0	0	0
Tetanus	0	0	0	0	0	0
Trichinosis	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0
Typhoid Fever, Case	9	0	8	0	0	0
Typhoid Fever, Carrier	0	0	1	0	0	0
Typhus Fever	1	0	1	7	0	0
Vibrio	1	0	8	15	0	2
West Nile Virus	1	0	5	16	0	3

[a]Other includes Native American and any additional racial group that cannot be categorized as Asian, Black, Hispanic, and White.
[b]Mother's race.

Table M. Incidence Rates of Selected Notifiable Diseases by Race/Ethnicity Los Angeles County, 2009

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.2	-	0.8	1.5
Botulism	-	-	-	-
Brucellosis	-	-	-	-
Campylobacteriosis	3.2	1.8	3.3	2.8
Cholera	-	-	-	-
Coccidioidomycosis	0.8	3.2	1.4	1.9
Cryptosporidiosis	0.1	0.9	0.2	0.5
Cysticercosis	-	-	0.2	-
Dengue	-	-	-	-
E. *coli* O157:H7	0.1	-	0.1	0.4
E. *coli* Other Stec	0.2	-	0.1	0.4
Encephalitis	0.4	0.2	0.5	0.3
Giardiasis	1.0	2.9	2.2	4.4
Haemophilus Influenzae Type B	-	0.1	-	-
Hansen's Disease (Leprosy)	0.2	-	-	-
Hepatitis A	1.4	0.2	0.4	0.8
Hepatitis B	0.4	1.3	0.3	0.4
Hepatitis C	0.1	-	-	0.2
Hepatitis Unspecified	-	-	-	-
Kawasaki Syndrome	1.2	0.6	0.8	0.3
Legionellosis	0.5	1.6	0.3	1.1
Listeriosis, Nonperinatal	-	0.1	0.1	0.2
Listeriosis, Perinatal[a]	13.2	-	3.7	-
Lyme Disease	-	-	-	0.1
Malaria	0.2	0.9	0.2	0.1
Measles	-	-	-	-
Meningitis, Viral	1.6	2.7	4.4	2.7
Meningococcal Infections	-	0.5	0.2	0.2
Mumps	0.2	0.1	-	-
Pertussis	0.8	0.7	2.1	1.3
Psittacosis	-	0.1	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	0.1	-	-	-
Rubella	-	-	-	-
Salmonellosis	7.9	8.8	13.3	12.6
Shigellosis	0.5	2.0	3.3	2.4
Strongyloidiasis	-	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.7	-	0.2	-
Typhoid Fever, Carrier	-	-	-	-
Typhus Fever	0.1	-	-	0.2
Vibrio	0.1	-	0.2	0.5
West Nile Virus	0.1	-	0.1	0.5

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 live births.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table N. Number of Cases and Annual Incidence Rate of Selected Notifiable Diseases by Sex
Los Angeles County, 2009

Disease	Male		Female	
	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	72	1.5	35	0.7
Botulism	1	0.0	0	-
Brucellosis	2	0.0	2	0.0
Campylobacteriosis	610	12.6	492	10.0
Cholera	0	-	0	-
Coccidioidomycosis	106	2.2	63	1.3
Cryptosporidiosis	34	0.7	16	0.3
Cysticercosis	3	0.1	6	0.1
Dengue	1	0.0	1	0.0
E. *coli* O157:H7	8	0.2	10	0.2
E. *coli* Other Stec	9	0.2	11	0.2
Encephalitis	28	0.6	20	0.4
Giardiasis	235	4.9	116	2.4
Haemophilus Influenzae Type B	1	0.0	1	0.0
Hansen's Disease (Leprosy)	0	-	3	0.1
Hepatitis A	35	0.7	31	0.6
Hepatitis B	30	0.6	11	0.2
Hepatitis C	2	0.0	6	0.1
Hepatitis Unspecified	10	0.2	9	0.2
Kawasaki Syndrome	38	0.8	32	0.6
Legionellosis	42	0.9	24	0.5
Listeriosis, Nonperinatal	9	0.2	6	0.1
Listeriosis, Perinatal[a]	0	-	5	7.9
Lyme Disease	2	0.0	2	0.0
Malaria	15	0.3	9	0.2
Measles	1	0.0	0	-
Meningitis, Viral	212	4.4	182	3.7
Meningococcal Infections	13	0.3	8	0.2
Mumps	5	0.1	2	0.0
Pertussis	69	1.4	87	1.8
Psittacosis	1	0.0	0	-
Q-fever	0	-	0	-
Relapsing Fever	0	-	0	-
Rheumatic Fever, Acute	0	-	1	0.0
Rubella	0	-	0	-
Salmonellosis	544	11.2	643	13.1
Shigellosis	162	3.3	97	2.0
Strongyloidiasis	0	-	0	-
Tetanus	0	-	0	-
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	9	0.2	8	0.2
Typhoid Fever, Carrier	1	0.0	0	-
Typhus Fever	5	0.1	4	0.1
Vibrio	20	0.4	6	0.1
West Nile Virus	21	0.4	4	0.1

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 live births.

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-1. Selected Notifiable Diseases
SPA 1. Antelope Valley Area
Los Angeles County, 2009

Disease	Frequency Antelope	Rate (Cases per 100,000)[b] Antelope
Amebiasis	2	0.5
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	32	8.7
Cholera	0	-
Coccidioidomycosis	45	12.2
Cryptosporidiosis	5	1.4
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	1	0.3
E. *coli* Other Stec	0	-
Encephalitis	3	0.8
Giardiasis	5	1.4
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	2	0.5
Hepatitis B	0	-
Hepatitis C	1	0.3
Hepatitis Unspecified	0	-
Kawasaki Syndrome	2	0.5
Legionellosis	0	-
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	1	0.3
Measles	0	-
Meningitis, Viral	46	12.5
Meningococcal Infections	1	0.3
Mumps	1	0.3
Pertussis	9	2.4
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	40	10.9
Shigellosis	5	1.4
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	2	0.5
West Nile Virus	12	3.3

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-2. Selected Notifiable Diseases
SPA 2. San Fernando Area
Los Angeles County, 2009

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**EV**	**GL**	**SF**	**WV**	**TOTAL**	**EV**	**GL**	**SF**	**WV**	**TOTAL**
Amebiasis	4	32	1	12	49	0.9	9.0	0.2	1.3	2.2
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	1	2	-	-	0.2	0.1	0.1
Campylobacteriosis	53	47	66	126	292	11.3	13.2	13.8	13.9	13.2
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	7	3	19	23	52	1.5	0.8	4.0	2.5	2.3
Cryptosporidiosis	2	0	6	4	12	0.4	-	1.3	0.4	0.5
Cysticercosis	1	0	0	0	1	0.2	-	-	-	0.0
Dengue	0	0	2	0	2	-	-	0.4	-	0.1
E. *coli* O157:H7	0	0	3	2	5	-	-	0.6	0.2	0.2
E. *coli* Other Stec	0	0	1	3	4	-	-	0.2	0.3	0.2
Encephalitis	1	0	2	8	11	0.2	-	0.4	0.9	0.5
Giardiasis	16	58	30	34	138	3.4	16.3	6.3	3.7	6.2
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	1	0	1	-	-	0.2	-	0.0
Hepatitis A	3	4	6	9	22	0.6	1.1	1.3	1.0	1.0
Hepatitis B	2	1	0	1	4	0.4	0.3	-	0.1	0.2
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	0	2	8	2	12	-	0.6	1.7	0.2	0.5
Legionellosis	3	2	1	8	14	0.6	0.6	0.2	0.9	0.6
Listeriosis, Nonperinatal	0	0	1	3	4	-	-	0.2	0.3	0.2
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	1	0	0	0	1	0.2	-	-	-	0.0
Malaria	1	1	0	4	6	0.2	0.3	-	0.4	0.3
Measles	0	1	0	0	1	-	0.3	-	-	0.0
Meningitis, Viral	30	10	16	32	88	6.4	2.8	3.3	3.5	4.0
Meningococcal Infections	2	1	0	2	5	0.4	0.3	-	0.2	0.2
Mumps	0	0	0	1	1	-	-	-	0.1	0.0
Pertussis	2	4	5	10	21	0.4	1.1	1.0	1.1	0.9
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	87	37	72	120	316	18.5	10.4	15.0	13.2	14.3
Shigellosis	19	4	8	15	46	4.0	1.1	1.7	1.6	2.1
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	1	2	4	0.2	-	0.2	0.2	0.2
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	0	1	0	0	1	-	0.3	-	-	0.0
Vibrio	4	0	2	0	6	0.9	-	0.4	-	0.3
West Nile Virus	3	0	1	5	9	0.6	-	0.2	0.5	0.4

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-3. Selected Notifiable Diseases
SPA 3. San Gabriel Area
Los Angeles County, 2009

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**AH**	**EM**	**FH**	**PO**	**TOTAL**	**AH**	**EM**	**FH**	**PO**	**TOTAL**
Amebiasis	2	2	4	1	9	0.6	0.4	1.3	0.2	0.5
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	0	0	-	-	-	-	-
Campylobacteriosis	34	39	28	56	157	9.4	8.1	8.9	9.7	9.1
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	2	5	5	4	16	0.6	1.0	1.6	0.7	0.9
Cryptosporidiosis	2	1	2	0	5	0.6	0.2	0.6	-	0.3
Cysticercosis	0	2	1	0	3	-	0.4	0.3	-	0.2
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	1	1	-	-	-	0.2	0.1
E. *coli* Other Stec	1	1	1	0	3	0.3	0.2	0.3	-	0.2
Encephalitis	6	2	1	1	10	1.7	0.4	0.3	0.2	0.6
Giardiasis	6	6	7	8	27	1.7	1.3	2.2	1.4	1.6
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	3	3	1	1	8	0.8	0.6	0.3	0.2	0.5
Hepatitis B	2	0	2	2	6	0.6	-	0.6	0.3	0.3
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	2	0	0	2	4	0.6	-	-	0.3	0.2
Kawasaki Syndrome	2	6	2	2	12	0.6	1.3	0.6	0.3	0.7
Legionellosis	2	1	4	0	7	0.6	0.2	1.3	-	0.4
Listeriosis, Nonperinatal	0	1	1	0	2	-	0.2	0.3	-	0.1
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	0	1	1	-	-	-	0.2	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	8	8	18	29	63	2.2	1.7	5.7	5.0	3.6
Meningococcal Infections	0	1	0	0	1	-	0.2	-	-	0.1
Mumps	0	0	0	1	1	-	-	-	0.2	0.1
Pertussis	3	9	5	7	24	0.8	1.9	1.6	1.2	1.4
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	30	43	50	56	179	8.3	9.0	15.9	9.7	10.3
Shigellosis	1	8	3	11	23	0.3	1.7	1.0	1.9	1.3
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	2	0	0	3	0.3	0.4	-	-	0.2
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	2	0	2	1	5	0.6	-	0.6	0.2	0.3
Vibrio	0	1	2	0	3	-	0.2	0.6	-	0.2
West Nile Virus	0	0	1	1	2	-	-	0.3	0.2	0.1

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-4. Selected Notifiable Diseases
SPA 4. Metro Area
Los Angeles County, 2009

	Frequency				Rate (Cases per 100,000)[b]			
Disease	**CE**	**HW**	**NE**	**TOTAL**	**CE**	**HW**	**NE**	**TOTAL**
Amebiasis	4	9	5	18	1.1	1.7	1.4	1.4
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	50	71	37	158	13.7	13.4	10.6	12.7
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	5	2	6	13	1.4	0.4	1.7	1.0
Cryptosporidiosis	3	7	1	11	0.8	1.3	0.3	0.9
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	0	0	0	-	-	-	-
E. *coli* Other Stec	0	2	1	3	-	0.4	0.3	0.2
Encephalitis	3	3	1	7	0.8	0.6	0.3	0.6
Giardiasis	13	25	8	46	3.6	4.7	2.3	3.7
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	0	6	0	6	-	1.1	-	0.5
Hepatitis B	3	8	2	13	0.8	1.5	0.6	1.0
Hepatitis C	0	1	1	2	-	0.2	0.3	0.2
Hepatitis Unspecified	1	0	1	2	0.3	-	0.3	0.2
Kawasaki Syndrome	3	4	3	10	0.8	0.8	0.9	0.8
Legionellosis	1	7	1	9	0.3	1.3	0.3	0.7
Listeriosis, Nonperinatal	0	3	0	3	-	0.6	-	0.2
Listeriosis, Perinatal[a]	0	0	2	2	-	-	2.5	0.7
Lyme Disease	0	0	0	0	-	-	-	-
Malaria	0	0	0	0	-	-	-	-
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	4	7	7	18	1.1	1.3	2.0	1.4
Meningococcal Infections	2	0	0	2	0.5	-	-	0.2
Mumps	0	0	0	0	-	-	-	-
Pertussis	4	8	6	18	1.1	1.5	1.7	1.4
Psittacosis	0	0	0	0	-	-	-	-
Q-fever	0	0	0	0	-	-	-	-
Relapsing Fever	0	0	0	0	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	-	-	-	-
Rubella	0	0	0	0	-	-	-	-
Salmonellosis	39	66	33	138	10.7	12.4	9.5	11.1
Shigellosis	22	40	12	74	6.0	7.5	3.4	5.9
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	0	2	2	-	-	0.6	0.2
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	0	2	1	3	-	0.4	0.3	0.2
Vibrio	0	3	1	4	-	0.6	0.3	0.3
West Nile Virus	1	0	0	1	0.3	-	-	0.1

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-5. Selected Notifiable Diseases
SPA 5. West Area
Los Angeles County, 2009

	Frequency	Rate (Cases per 100,000)[b]
Disease	**West**	**West**
Amebiasis	8	1.2
Botulism	1	0.2
Brucellosis	0	-
Campylobacteriosis	151	23.2
Cholera	0	-
Coccidioidomycosis	11	1.7
Cryptosporidiosis	4	0.6
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	3	0.5
E. *coli* Other Stec	6	0.9
Encephalitis	0	-
Giardiasis	43	6.6
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	8	1.2
Hepatitis B	1	0.2
Hepatitis C	2	0.3
Hepatitis Unspecified	0	-
Kawasaki Syndrome	5	0.8
Legionellosis	13	2.0
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	1	0.2
Malaria	4	0.6
Measles	0	-
Meningitis, Viral	22	3.4
Meningococcal Infections	2	0.3
Mumps	2	0.3
Pertussis	17	2.6
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	107	16.4
Shigellosis	22	3.4
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	3	0.5
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	5	0.8
West Nile Virus	1	0.2

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-6. Selected Notifiable Diseases
SPA 6. South Area
Los Angeles County, 2009

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**CN**	**SO**	**SE**	**SW**	**TOTAL**	**CN**	**SO**	**SE**	**SW**	**TOTAL**
Amebiasis	2	0	1	1	4	0.7	-	0.5	0.3	0.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	0	1	-	-	0.5	-	0.1
Campylobacteriosis	25	23	23	43	114	8.6	11.9	12.4	11.2	10.8
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	7	4	0	4	15	2.4	2.1	-	1.0	1.4
Cryptosporidiosis	2	0	1	2	5	0.7	-	0.5	0.5	0.5
Cysticercosis	0	1	1	0	2	-	0.5	0.5	-	0.2
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
E. *coli* Other Stec	0	0	0	0	0	-	-	-	-	-
Encephalitis	1	2	2	2	7	0.3	1.0	1.1	0.5	0.7
Giardiasis	10	9	6	4	29	3.5	4.7	3.2	1.0	2.8
Haemophilus Influenzae Type B	1	0	0	0	1	0.3	-	-	-	0.1
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	3	3	0	2	8	1.0	1.6	-	0.5	0.8
Hepatitis B	4	3	0	3	10	1.4	1.6	-	0.8	1.0
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	1	0	1	-	-	0.5	-	0.1
Kawasaki Syndrome	2	2	7	5	16	0.7	1.0	3.8	1.3	1.5
Legionellosis	4	1	1	4	10	1.4	0.5	0.5	1.0	1.0
Listeriosis, Nonperinatal	1	0	1	0	2	0.3	-	0.5	-	0.2
Listeriosis, Perinatal[a]	0	0	0	1	1	-	-	-	1.1	0.4
Lyme Disease	0	0	0	1	1	-	-	-	0.3	0.1
Malaria	0	0	0	4	4	-	-	-	1.0	0.4
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	19	13	5	8	45	6.6	6.7	2.7	2.1	4.3
Meningococcal Infections	1	0	2	2	5	0.3	-	1.1	0.5	0.5
Mumps	0	0	0	1	1	-	-	-	0.3	0.1
Pertussis	4	5	3	12	24	1.4	2.6	1.6	3.1	2.3
Psittacosis	0	0	0	1	1	-	-	-	0.3	0.1
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	31	26	23	54	134	10.7	13.4	12.4	14.1	12.7
Shigellosis	13	1	6	21	41	4.5	0.5	3.2	5.5	3.9
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	1	1	2	-	-	0.5	0.3	0.2
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	0	0	0	0	0	-	-	-	-	-
Vibrio	0	0	0	0	0	-	-	-	-	-
West Nile Virus	0	0	0	0	0	-	-	-	-	-

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-7. Selected Notifiable Diseases
SPA 7. East Area
Los Angeles County, 2009

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**BF**	**EL**	**SA**	**WH**	**TOTAL**	**BF**	**EL**	**SA**	**WH**	**TOTAL**
Amebiasis	5	2	4	1	12	1.4	0.9	0.9	0.3	0.9
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	0	1	-	-	0.2	-	0.1
Campylobacteriosis	26	16	33	29	104	7.0	7.2	7.3	8.6	7.5
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	4	0	2	3	9	1.1	-	0.4	0.9	0.7
Cryptosporidiosis	3	0	0	0	3	0.8	-	-	-	0.2
Cysticercosis	1	0	0	1	2	0.3	-	-	0.3	0.1
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	2	0	1	1	4	0.5	-	0.2	0.3	0.3
E. *coli* Other Stec	0	0	2	0	2	-	-	0.4	-	0.1
Encephalitis	2	1	4	2	9	0.5	0.5	0.9	0.6	0.7
Giardiasis	7	3	9	7	26	1.9	1.4	2.0	2.1	1.9
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	4	0	2	0	6	1.1	-	0.4	-	0.4
Hepatitis B	0	0	1	1	2	-	-	0.2	0.3	0.1
Hepatitis C	0	0	1	0	1	-	-	0.2	-	0.1
Hepatitis Unspecified	1	0	0	0	1	0.3	-	-	-	0.1
Kawasaki Syndrome	0	2	3	1	6	-	0.9	0.7	0.3	0.4
Legionellosis	2	2	0	4	8	0.5	0.9	-	1.2	0.6
Listeriosis, Nonperinatal	0	0	0	2	2	-	-	-	0.6	0.1
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	1	0	0	0	1	0.3	-	-	-	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	12	8	22	20	62	3.2	3.6	4.9	5.9	4.5
Meningococcal Infections	0	0	0	2	2	-	-	-	0.6	0.1
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	5	6	5	6	22	1.4	2.7	1.1	1.8	1.6
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	1	0	0	1	-	0.5	-	-	0.1
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	49	27	55	21	152	13.2	12.2	12.1	6.2	11.0
Shigellosis	4	8	15	6	33	1.1	3.6	3.3	1.8	2.4
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	0	0	0	0	0	-	-	-	-	-
Vibrio	0	1	0	1	2	-	0.5	-	0.3	0.1
West Nile Virus	0	0	0	0	0	-	-	-	-	-

[a] Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b] Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-8. Selected Notifiable Diseases
SPA 8. South Bay Area
Los Angeles County, 2009

	Frequency				Rate (Cases per 100,000)[b]			
Disease	**HB**	**IW**	**TO**	**TOTAL**	**HB**	**IW**	**TO**	**TOTAL**
Amebiasis	1	1	1	3	0.5	0.2	0.2	0.3
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	21	37	62	120	9.7	8.5	13.1	10.7
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	1	6	2	9	0.5	1.4	0.4	0.8
Cryptosporidiosis	0	0	4	4	-	-	0.8	0.4
Cysticercosis	1	0	0	1	0.5	-	-	0.1
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	2	0	2	4	0.9	-	0.4	0.4
E. *coli* Other Stec	1	0	1	2	0.5	-	0.2	0.2
Encephalitis	0	2	0	2	-	0.5	-	0.2
Giardiasis	2	12	22	36	0.9	2.8	4.7	3.2
Haemophilus Influenzae Type B	0	0	1	1	-	-	0.2	0.1
Hansen's Disease (Leprosy)	0	1	1	2	-	0.2	0.2	0.2
Hepatitis A	1	0	5	6	0.5	-	1.1	0.5
Hepatitis B	0	4	0	4	-	0.9	-	0.4
Hepatitis C	0	1	1	2	-	0.2	0.2	0.2
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Kawasaki Syndrome	1	3	3	7	0.5	0.7	0.6	0.6
Legionellosis	1	2	2	5	0.5	0.5	0.4	0.4
Listeriosis, Nonperinatal	0	1	1	2	-	0.2	0.2	0.2
Listeriosis, Perinatal[a]	0	2	0	2	-	2.0	-	0.8
Lyme Disease	0	0	1	1	-	-	0.2	0.1
Malaria	1	5	1	7	0.5	1.1	0.2	0.6
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	7	19	27	53	3.2	4.4	5.7	4.7
Meningococcal Infections	2	0	1	3	0.9	-	0.2	0.3
Mumps	1	0	0	1	0.5	-	-	0.1
Pertussis	7	2	12	21	3.2	0.5	2.5	1.9
Psittacosis	0	0	0	0	-	-	-	-
Q-fever	0	0	0	0	-	-	-	-
Relapsing Fever	0	0	0	0	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	-	-	-	-
Rubella	0	0	0	0	-	-	-	-
Salmonellosis	29	44	55	128	13.4	10.1	11.7	11.4
Shigellosis	2	7	5	14	0.9	1.6	1.1	1.2
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	2	1	3	-	0.5	0.2	0.3
Typhoid Fever, Carrier	0	1	0	1	-	0.2	-	0.1
Typhus Fever	0	0	0	0	-	-	-	-
Vibrio	0	0	3	3	-	-	0.6	0.3
West Nile Virus	0	0	0	0	-	-	-	-

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especiallly hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

DISEASE SUMMARIES

AMEBIASIS

CRUDE DATA	
Number of Cases	107
Annual Incidence[a]	
LA County	1.1
California[b]	1.1
United States[c]	N/A
Age at Diagnosis	
Mean	40
Median	40
Range	2-78

[a]Cases per 100,000 population.
[b]Calculated from Monthly Summary Report Selected Reportable Diseases. California Department of Public Health, December 2009.
[c]Not notifiable.

DESCRIPTION

Amebiasis is caused by the protozoan parasite *Entamoeba histolytica*. Cysts shed in human feces may contaminate food or drinking water or be transferred sexually, on hands, or fomites. Incubation period is 1 to 4 weeks. Recreational waters, such as pools, may also serve as transmission vehicles, since cysts are relatively chlorine-resistant. While intestinal disease is often asymptomatic, symptoms may range from acute abdominal pain, fever, chills, and bloody diarrhea to mild abdominal discomfort with diarrhea alternating with constipation. Extraintestinal infection occurs when organisms become bloodborne, leading to amebic abscesses in the liver, lungs or brain. Complications include colonic perforation. There is no vaccine.

Many case reports without foreign travel history may represent infection with the non-pathogenic *Entamoeba dispar*; specific testing is rarely performed.

Proper hand hygiene before meals and after using the restroom is a major way to prevent infection and transmission of amebiasis. Persons who care for diapered/incontinent children and adults should ensure that they properly wash their hands. Individuals with diarrheal illness should avoid swimming in recreational waters for at least two weeks after symptoms have ceased.

2009 TRENDS AND HIGHLIGHTS

- The incidence rate of amebiasis remained relatively stable in 2009 with 1.1 cases per 100,000 population in 2009 and 1.2 cases per 100,000 reported in 2008.
- The 45-54 year old age group had the highest incidence rate, 1.6 cases per 100,000 and the 15 to 34 year old group had the largest proportion of cases (33, 31%) reported (Figure 2).
- Consistent with past years, white cases accounted for the greatest proportion of cases (43, 40%) (Figure 3).
- Service Planning Area (SPA) 2 had the highest incidence rate of all the SPAs, 2.2 per 100,000 residents followed by SPA 4, 1.4 per 100,000) (Figure 4).
- The peak case reporting occurred in November, differing from the previous five-year average in which cases peaked in August (Figure 5).
- The male to female case ratio in 2009 was 2:1. Incidence rates were 1.5 per 100,000 for males and 0.7 per 100,000 for females.
- The most frequently reported risk factor included: immigration to the US (53, 50%), swimming in recreational waters (17, 16%), and travel to another country (17, 16%), particularly to Latin American countries (13, 76%).

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=114)			2006 (N=94)			2007 (N=122)			2008 (N=115)			2009 (N=107)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0
1-4	2	1.8	0.3	0	0.0	0.0	6	4.9	1.0	1	0.9	0.2	1	0.9	0.2
5-14	14	12.3	0.9	5	5.3	0.3	11	9.0	0.8	8	7.0	0.6	6	5.6	0.4
15-34	31	27.2	1.1	28	29.8	1.0	30	24.6	1.1	37	32.2	1.3	33	30.8	1.2
35-44	31	27.2	2.1	26	27.7	1.7	30	24.6	2.0	26	22.6	1.7	23	21.5	1.5
45-54	26	22.8	2.0	18	19.1	1.4	22	18.0	1.7	22	19.1	1.6	22	20.5	1.6
55-64	5	4.4	0.6	9	9.6	1.0	13	10.7	1.5	12	10.4	1.3	14	13.1	1.5
65+	5	4.4	0.5	8	8.5	0.8	9	7.4	0.9	9	7.8	0.9	8	7.5	0.8
Unknown	0	0.0		0	0.0		1	0.8		0	0.0				
Race / Ethnicity															
Asian	5	4.4	0.4	10	10.6	0.8	8	6.6	0.6	7	6.1	0.5	2	1.9	0.2
Black	7	6.1	0.8	2	2.1	0.2	10	8.2	1.2	3	2.6	0.4	0	0.0	0.0
Hispanic	46	40.4	1.0	32	34.0	0.7	44	36.1	1.0	36	31.3	0.8	37	34.6	0.8
White	47	41.2	1.6	39	41.5	1.4	50	41.0	1.7	56	48.7	1.9	43	40.2	1.5
Other	2	1.8	7.1	2	2.1	7.0	8	6.6	38.4	4	3.5	16.2	1	0.9	
Unknown	7	6.1		9	9.6		2	1.6		9	7.8		24	22.5	
SPA															
1	0	0.0	0.0	2	2.1	0.6	6	4.9	1.7	1	0.9	0.3	2	1.9	0.5
2	30	26.3	1.4	39	41.5	1.8	51	41.8	2.4	52	45.2	2.4	49	45.8	2.2
3	6	5.3	0.4	6	6.4	0.3	14	11.5	0.8	14	12.2	0.8	9	8.4	0.5
4	37	32.5	3.0	17	18.1	1.3	16	13.1	1.3	17	14.8	1.3	18	16.8	1.4
5	17	14.9	2.7	12	12.8	1.9	9	7.4	1.4	6	5.2	0.9	8	7.5	1.2
6	9	7.9	0.9	4	4.3	0.4	8	6.6	0.8	11	9.6	1.0	4	3.7	0.4
7	9	7.9	0.7	7	7.4	0.5	11	9.0	0.8	7	6.1	0.5	12	11.2	0.9
8	6	5.3	0.5	7	7.4	0.6	6	4.9	0.5	7	6.1	0.6	3	2.8	0.3
Unknown	0	0.0		0	0.0		1	0.8		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Amebiasis
CA and LAC, 1999-2009 (N=107)

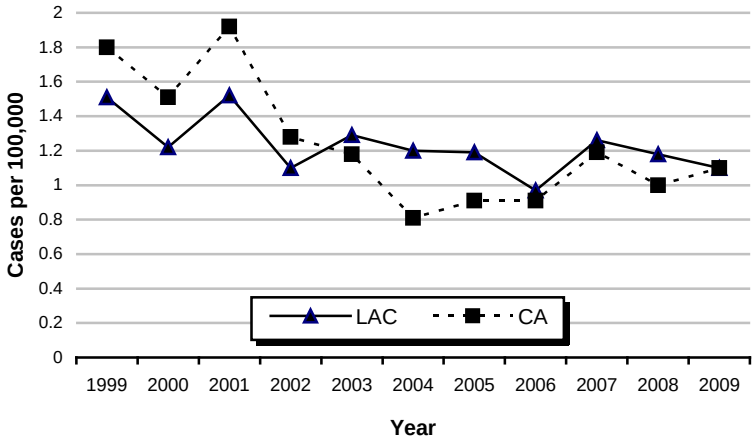


Figure 2. Incidence Rates of Amebiasis by Age Group
LAC, 2009 (N=107)

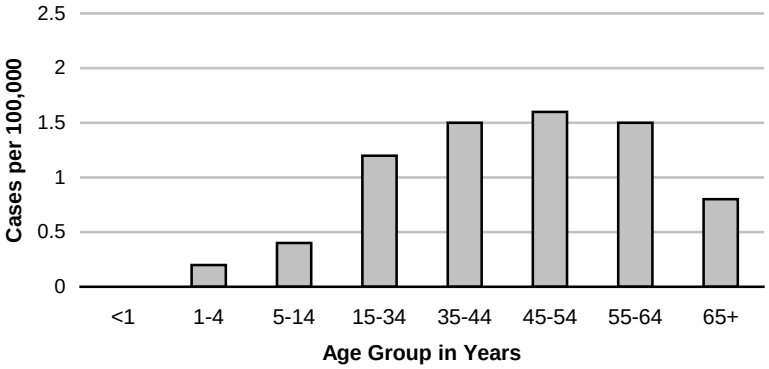
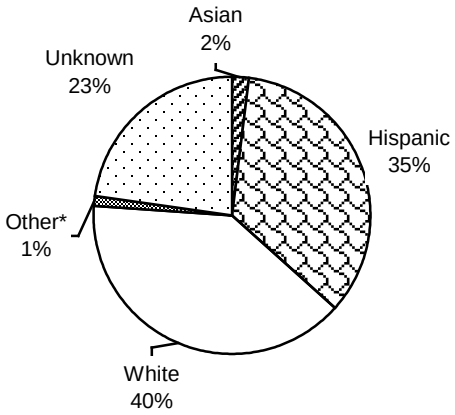


Figure 3. Percent Cases of Amebiasis by Race/Ethnicity
LAC, 2009 (N=107)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, and white.

Figure 4. Incidence Rates of Amebiasis by SPA
LAC, 2009 (N=107)

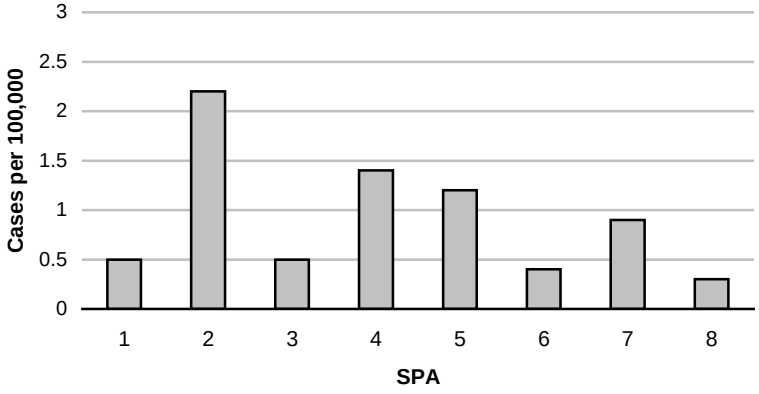
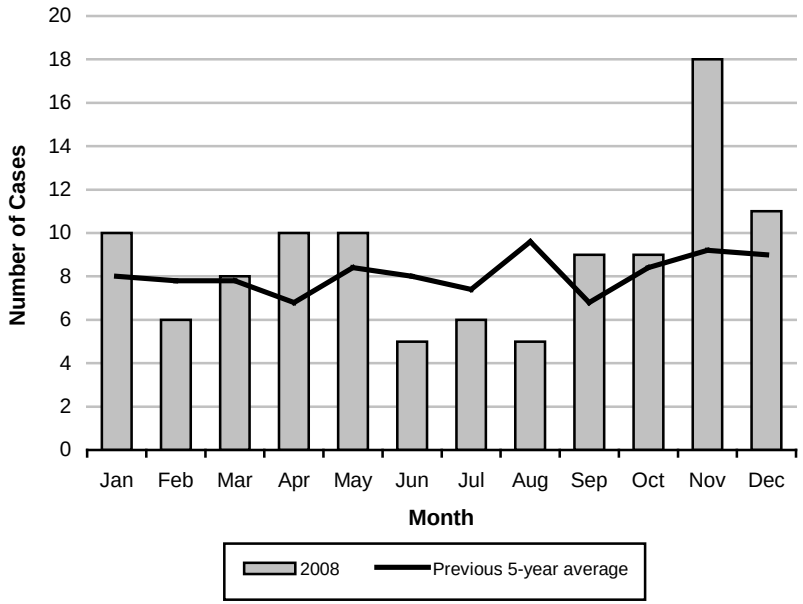
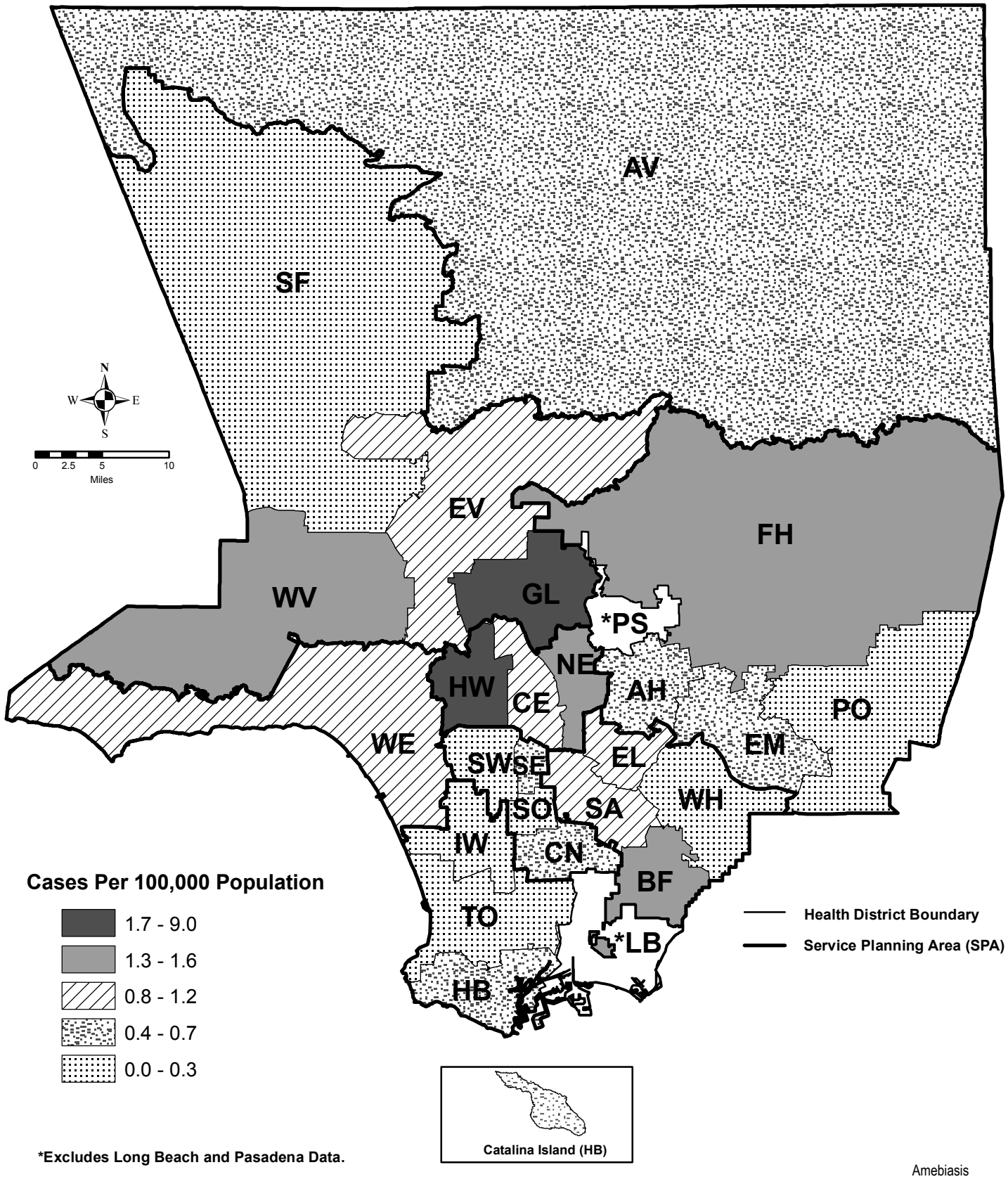


Figure 5. Reported Amebiasis Cases by Month of Onset
LAC, 2009 (N=107)



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1135
Annual Incidence[a]	
LA County	11.62
California	N/A
United States	N/A
Age at Diagnosis	
Mean	33.2
Median	30
Range	0-94

[a]Cases per 100,000 population.

DESCRIPTION

Campylobacteriosis is a bacterial disease caused by Gram-negative bacilli transmitted through ingestion of organisms in undercooked poultry or other meat, contaminated food, water or raw milk, or contact with infected animals. The incubation period is two to five days. Common symptoms include watery or bloody diarrhea, fever, abdominal cramps, myalgia, and nausea. Species include *C. jejuni, C. upsaliensis, C. coli* and *C. fetus*. Sequelae include Guillain-Barré syndrome and Reiter syndrome, both of which are rare.

To reduce the likelihood of contracting campylobacteriosis, all food derived from animal sources should be thoroughly cooked, particularly poultry. Cross contamination may be avoided by making sure utensils, counter tops, cutting boards and sponges are cleaned or do not come in contact with raw poultry or meat or their juices. Hands should be thoroughly washed before, during and after food preparation. The fluids from raw poultry or meat should not be allowed to drip on other foods in the refrigerator or in the shopping cart. It is especially important to wash hands and avoid cross contamination of infant foods, bottles and eating utensils. It is recommended to consume only pasteurized milk, milk products or juices. In addition, it is important to wash hands after coming in contact with any animal or its environment.

2009 TRENDS AND HIGHLIGHTS

- There was a 5.8% increase in the incidence of campylobacteriosis from the previous year (Figure 1).
- The highest rates continued to be among children aged 1 to 4 years (24.6 per 100,000) followed by infants aged <1 year (21.9 per 100,000) (Figure 2).
- Service Planning Area (SPA) 5 had the highest rate (22.9 per 100,000) which is consistent with previous years (Figure 3).
- No outbreaks of campylobacteriosis were reported in 2009.
- In 2009, routine interviews of campylobacter were discontinued, however, surveillance continues to assess for clusters and foodborne illness reports (FBI).

Reported Campylobacteriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=725)			2006 (N=775)			2007 (N=827)			2008 (N=1072)			2009 (N=1135)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	31	4.3	22.0	21	2.7	14.5	25	3.0	16.9	42	3.9	30.1	30	2.6	21.9
1-4	81	11.2	14.0	91	11.7	15.7	108	13.1	18.7	137	12.8	24.2	138	12.1	24.6
65-14	87	12.0	5.9	97	12.5	6.6	109	13.2	7.6	152	14.2	10.8	146	12.8	10.7
15-34	203	28.0	7.2	207	26.7	7.4	237	28.7	8.4	285	26.6	9.9	316	27.8	11.2
35-44	111	15.3	7.4	105	13.5	7.0	78	9.4	5.2	129	12.0	8.5	119	10.4	8.0
45-54	82	11.3	6.4	81	10.5	6.2	100	12.1	7.6	127	11.8	9.4	137	12.0	10.0
55-64	56	7.7	6.7	68	8.8	7.8	69	8.3	7.8	90	8.4	9.9	100	8.8	10.5
65+	74	10.2	7.7	105	13.5	10.7	101	12.2	10.0	110	10.3	10.8	143	12.6	13.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		6	0.5	0
Race / Ethnicity															
Asian	65	9.0	5.2	92	11.9	7.2	86	10.4	6.7	100	9.3	7.7	42	3.7	3.2
Black	24	3.3	2.8	34	4.4	4.0	39	4.7	4.6	31	2.9	3.6	15	1.32	1.8
Hispanic	318	43.9	7.0	336	43.4	7.3	364	44.0	7.9	542	50.6	11.6	156	13.7	3.3
White	302	41.7	10.4	302	39.0	10.5	314	38.0	10.8	373	34.8	12.8	81	7.1	2.8
Other	4	0.6	14.2	4	0.5	14.0	3	0.4	14.4	0	0.0	0.0	9	0.7	0
Unknown	12	1.7		7	0.9		21	2.5		26	2.4		832	73.0	0
SPA															
1	19	2.6	5.6	25	3.2	7.2	22	2.7	6.1	27	2.5	7.4	32	2.8	8.7
2	201	27.7	9.4	217	28.0	10.1	209	25.3	9.7	271	25.3	12.4	292	25.7	13.2
3	105	14.5	6.1	92	11.9	5.3	122	14.8	7.1	154	14.4	8.9	157	13.8	9.1
4	77	10.6	6.2	98	12.6	7.8	68	8.2	5.4	99	9.2	7.8	158	13.9	12.7
5	107	14.8	16.8	119	15.4	18.7	115	13.9	17.9	155	14.5	24.0	151	13.3	23.2
6	54	7.4	5.2	63	8.1	6.0	68	8.2	6.5	122	11.4	11.6	114	10.0	10.8
7	81	11.2	5.9	94	12.1	6.8	108	13.1	7.8	127	11.8	9.2	104	8.8	9.1
8	81	11.2	7.3	65	8.4	5.8	95	11.5	8.5	117	10.9	10.4	114	10.0	10.8
Unknown	0	0.0		2	0.3		20	2.4		0	0.0		13	1.1	0

*Rates calculated based on less than 19 cases or events are considered unreliable. Data provided in section race/ethnicity is incompleted.

Figure 1. Reported Campylobacteriosis Rates by Year
LAC, 2000-2009 (N=1135)

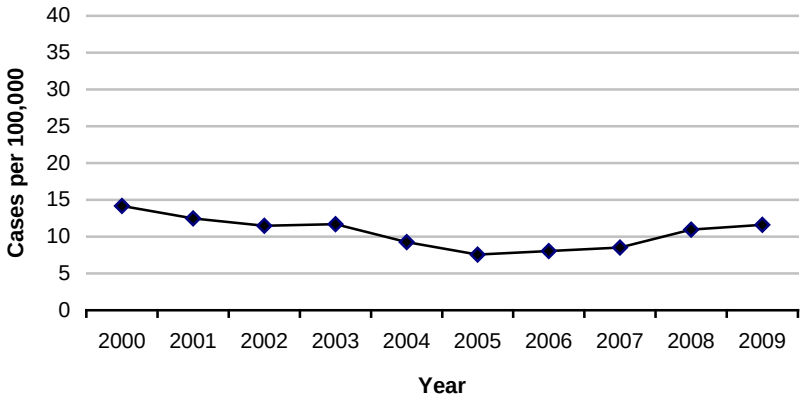


Figure 2. Reported Campylobacteriosis Rates by Age Group
LAC, 2009 (N=1135)

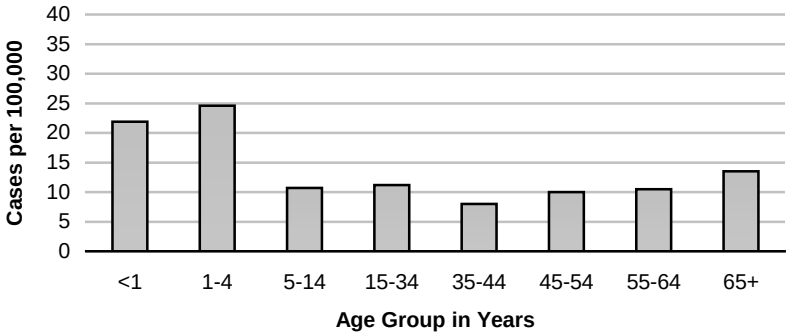
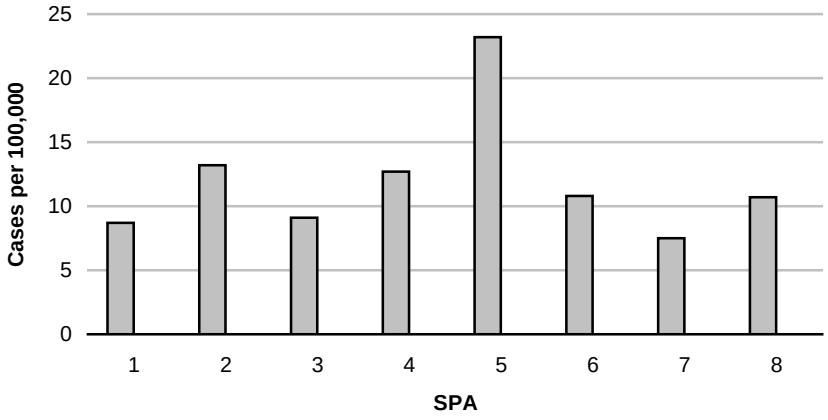
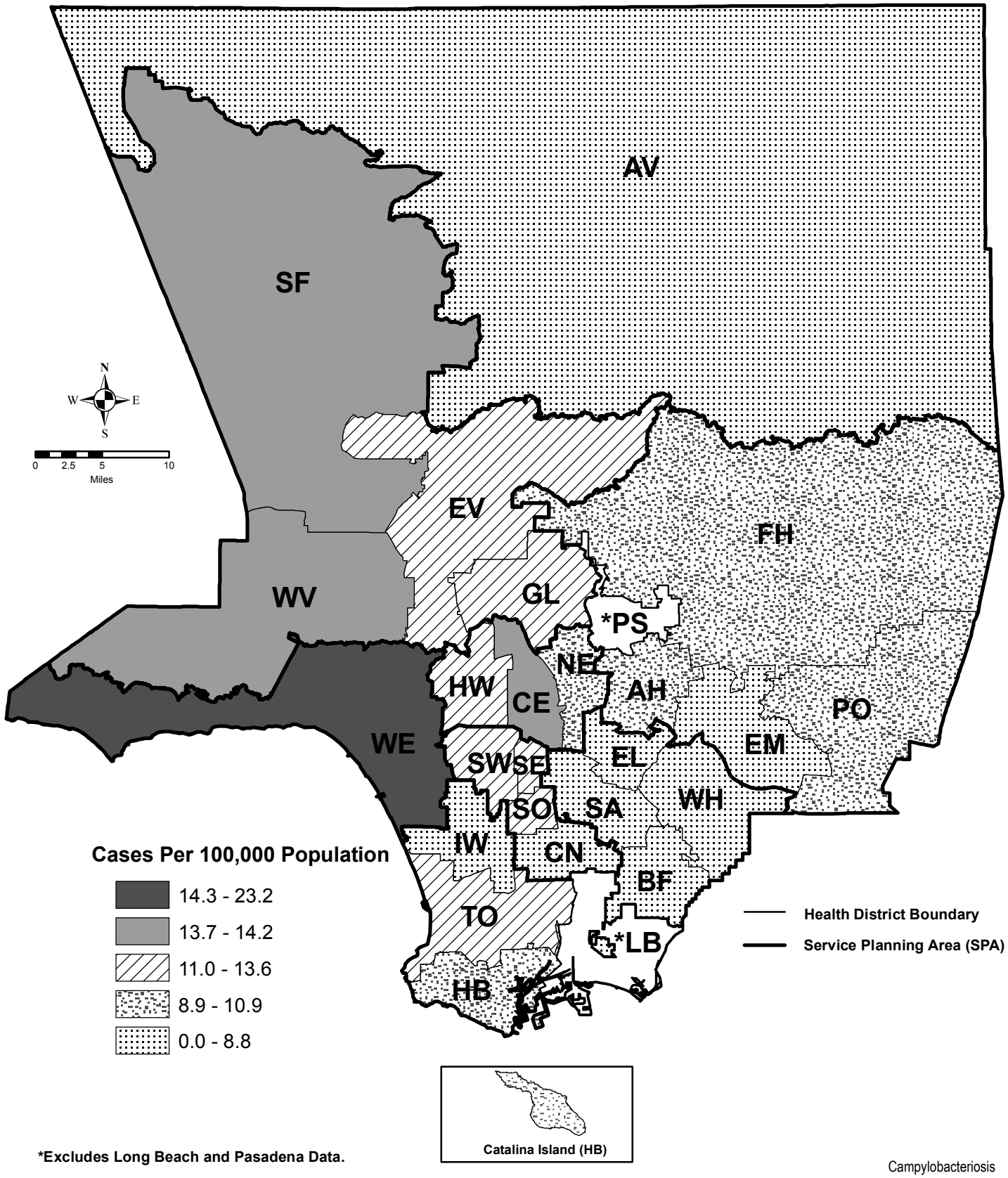


Figure 3. Reported Campylobacteriosis Rates by SPA
LAC, 2009 (N=1135)



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	171
Annual Incidence[a]	
LA County	1.8
California[b]	7.1
United States[b]	2.5
Age at Diagnosis	
Mean	50
Median	50
Range	5-93

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease, MMWR 58(31);856-857;859-869.

DESCRIPTION

Coccidioidomycosis, or valley vever, is a fungal disease transmitted through the inhalation of *Coccidioides immitis* spores that are carried in dust. Environmental conditions conducive to an increased occurrence of coccidioidomycosis are as follows: arid to semi-arid regions, dust storms, low altitude, hot summers, warm winters, and sandy, alkaline soils. It is endemic in the southwestern US and parts of Mexico and South America. Southern California is a known endemic area. Most infected individuals exhibit no symptoms or have mild respiratory illness, but a few individuals develop severe illness such as pneumonia, meningitis, or dissemination to other parts of the body. Among the wide range of clinical presentations, only the most severe cases are usually diagnosed and reported to the health department. Laboratory diagnosis is made by identifying the fungus through microscopic examination, culture, serologic testing or DNA probe. Blacks, Filipinos, pregnant women, the very young (age <5 years), the elderly, and immunocompromised individuals are at high risk for severe disease. Currently no safe and effective vaccine or drug to prevent coccidioidomycosis exists. Prevention lies mainly in dust control (e.g., planting grass in dusty areas, putting oil on roadways, wetting down soil, air conditioning homes, wearing masks or respirators). Other options may be to warn people at high risk for severe disease not to travel to endemic areas when conditions are most dangerous for exposure. Recovery from the disease confers lifelong immunity to reinfection and is rationale for the development of a vaccine for the prevention of symptomatic or serious forms of the disease. Increasing construction, a growing naïve population in the endemic area, and the lack of a highly effective drug treatment validate need for prevention efforts. There is a current State initiative that funds a consortium that is working to develop a vaccine against coccidioidomycosis.

The University of Arizona has launched a three year (2007-2010) human clinical drug trial involving 60 patients with primary valley fever pneumonia. The clinical trial for, "Nikkomycin Z, discovered in the 1970s, continues to be a promising investigational treatment for valley fever. More information is available at http://www.vfce.arizona.edu/.

2009 TRENDS AND HIGHLIGHTS

- Overall, the Los Angeles County incidence rate for coccidioidomycosis has increased in the last ten years (Figure 1).
- Cases occurred primarily in adults with the greatest number of reported cases in ages 35 to 44 and 65+ years. The greatest incidence rate was in the 55-64 and 65+ age groups, 3.5 cases per 100,000 (Figure 2) in comparison to previous years where the predominant age group was in the younger age groups.
- Hispanics had the highest percentage of cases with 39.2% (n=67) in 2009 as compared to other racial groups (Figure 3). However, the incidence rate for blacks 3.2 cases per 100,000 (n=27) was highest as compared to other racial groups, which is consistent with previous years.
- Service Planning Area (SPA) 1 (Antelope Valley Health District) reported the highest incidence rate of coccidioidomycosis in LAC, 12.2 per 100,000 (n=45), which has been decreasing over the previous years (Figure 4).
- Cases occurred year round, which is consistent with previous years (Figure 5).
- The case fatality rate is 12.9% in 2009; there were two cases of disseminated coccidiomycosis in LAC.

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=214)			2006 (N=196)			2007 (N=145)			2008 (N=228)			2009 (N=171)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	1	0.5	0.7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	1	0.5	0.2	1	0.7	0.2	0	0.0	0.0	0	0.0	0.0
5-14	3	1.4	0.2	3	1.5	0.2	4	2.8	0.3	6	2.6	0.4	3	1.8	0.2
15-34	52	24.3	1.9	51	26.0	1.8	27	18.6	1.0	41	18.0	1.5	30	17.5	1.1
35-44	50	23.4	3.3	30	15.3	2.0	30	20.7	2.0	33	14.5	2.2	38	22.2	2.6
45-54	49	22.9	3.9	42	21.4	3.2	37	25.5	2.8	58	25.4	4.3	30	17.5	2.2
55-64	27	12.6	3.2	32	16.3	3.7	26	17.9	2.9	38	16.7	4.1	33	19.3	3.5
65+	33	15.4	3.4	36	18.4	3.7	20	13.8	2.0	52	22.8	5.0	37	21.6	3.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	15	7.0	1.2	15	7.7	1.2	10	6.9	0.8	27	11.8	2.1	11	6.4	0.8
Black	28	13.1	3.3	27	13.8	3.2	22	15.2	2.6	37	16.2	4.3	27	15.8	3.2
Hispanic	70	32.7	1.5	68	34.7	1.5	52	35.9	1.1	86	37.7	1.8	67	39.2	1.4
White	96	44.9	3.3	75	38.3	2.6	56	38.6	1.9	62	27.2	2.1	56	32.7	1.9
Other	0	0.0	0.0	3	1.5	10.5	1	0.7	4.8	1	0.4	4.1	2	1.2	
Unknown	5	2.3		8	4.1		4	2.8		15	6.6		8	4.7	
SPA															
1	79	36.9	23.2	67	34.2	19.3	51	35.2	14.2	52	22.8	14.2	45	26.3	12.2
2	76	35.5	3.6	57	29.1	2.7	47	32.4	2.2	62	27.2	2.8	52	30.4	2.3
3	13	6.1	0.8	11	5.6	0.6	9	6.2	0.5	21	9.2	1.2	16	9.4	0.9
4	10	4.7	0.8	14	7.1	1.1	8	5.5	0.6	20	8.8	1.6	13	7.6	1.0
5	4	1.9	0.6	9	4.6	1.4	1	0.7	0.2	9	3.9	1.4	11	6.4	1.7
6	10	4.7	1.0	16	8.2	1.5	0	0.0	0.0	24	10.5	2.3	15	8.8	1.4
7	16	7.5	1.2	9	4.6	0.7	12	8.3	0.9	21	9.2	1.5	9	5.3	0.7
8	5	2.3	0.5	12	6.1	1.1	8	5.5	0.7	13	5.7	1.2	9	5.3	0.8
Unknown	1	0.5		1	0.5		9	6.2		6	2.6				

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates of Coccidioidomycosis
US, CA and LAC, 1999-2009**

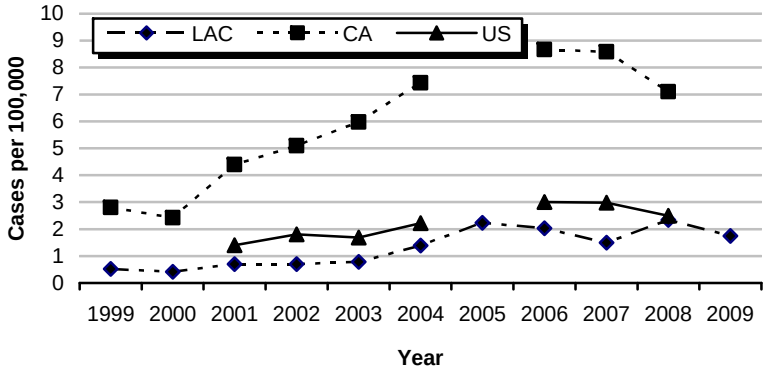


**Figure 2. Incidence Rates of Coccidioidomycosis by Age Group
LAC, 2009 (N=171)**

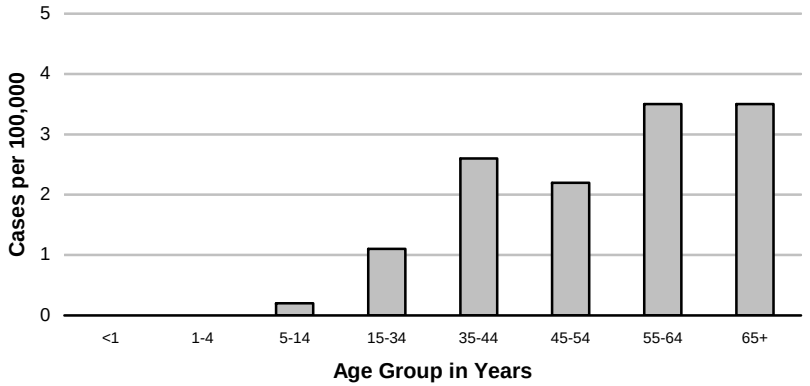


**Figure 3. Percent Cases of Coccidioidomycosis
by Race/Ethnicity, LAC, 2009 (N=171)**

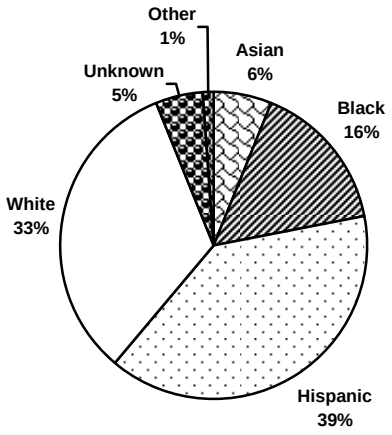


**Figure 4. Incidence Rates of Coccidioidomycosis by SPA
LAC, 2009 (N=171)**

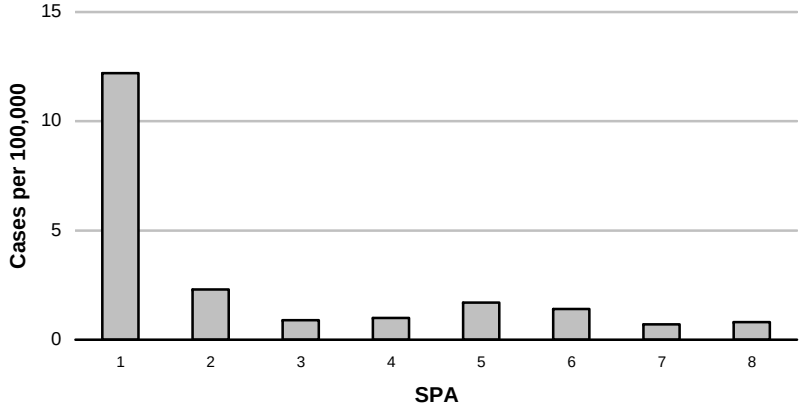


Figure 5. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2009 (N=171)

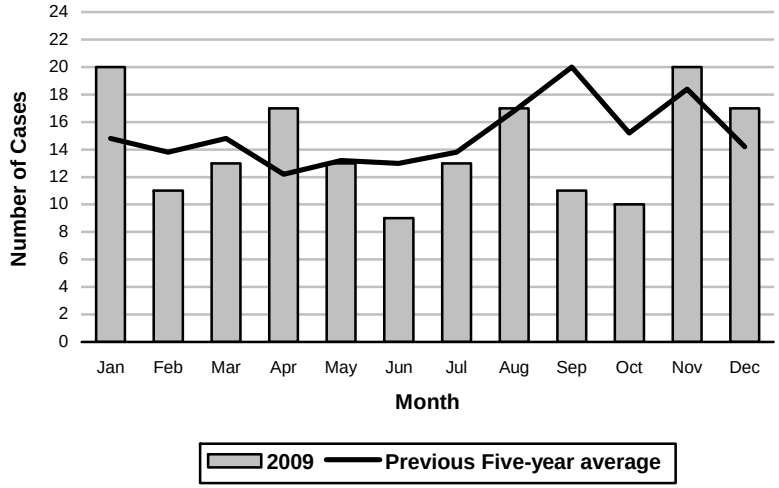
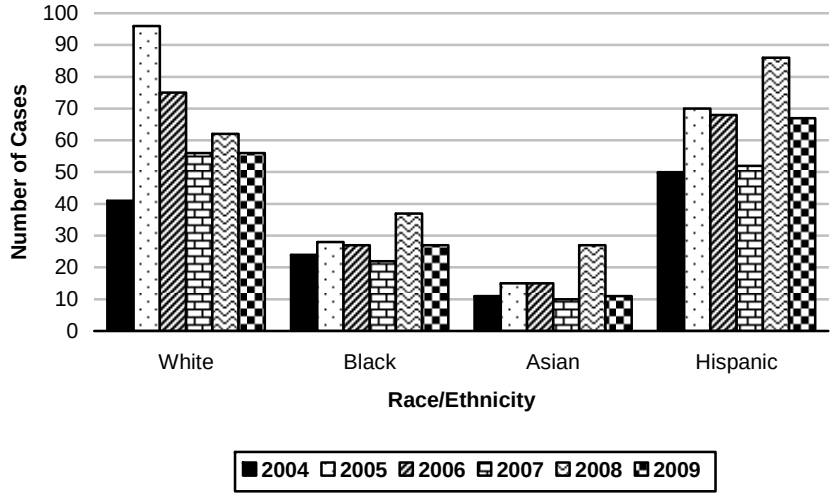
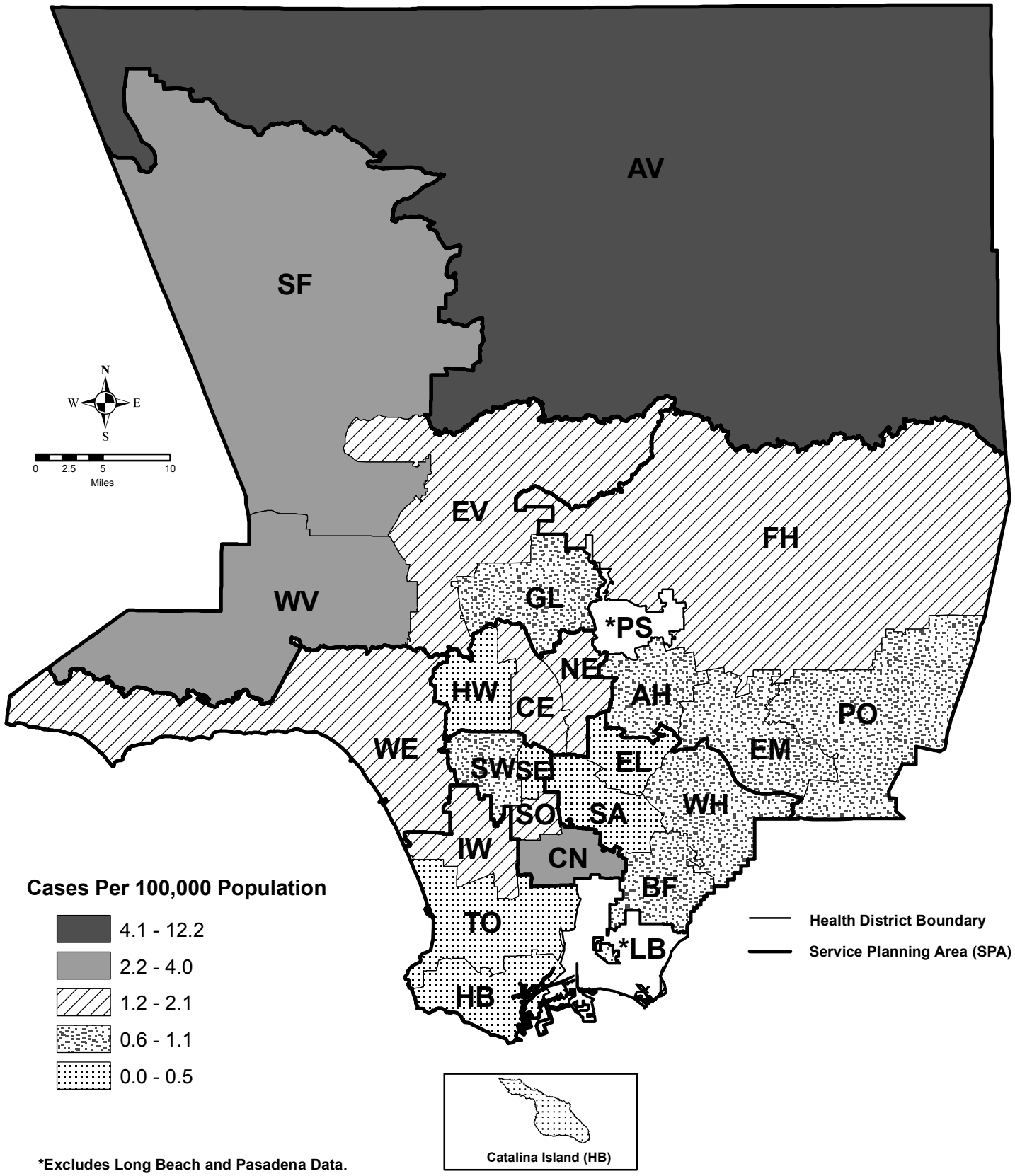


Figure 6. Coccidioidomycosis Cases by Race/Ethnicity LAC, 2004-2009



Map 3. Coccidiodomycosis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases[a]	51
Annual Incidence	
LA County	0.52
California[b]	0.75
United States[b]	3.02
Age at Diagnosis	
Mean	37
Median	37
Range	1-94 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Cryptosporidiosis is fecal-orally transmitted when cysts of the parasite *Cryptosporidium spp.* are ingested. Common causes include unprotected sexual contact, particularly among men who have sex with men (MSM), and ingestion of contaminated recreational or untreated water. The usual incubation period is two to ten days with typical symptoms of watery diarrhea, abdominal cramps, and low-grade fever; however, asymptomatic infection is also common. Symptoms last up to two weeks in healthy individuals. Those who have a weakened immune system may experience prolonged illness. Immunocompromised individuals (e.g., HIV/AIDS patients, cancer patients, transplant patients), young children and pregnant women are at risk for more severe illness.

Proper hand hygiene before meals and after using the restroom is a major way to prevent infection and transmission of cryptosporidiosis. It is also important for individuals who come in contact with diapered/incontinent children and adults to ensure they are properly washing their hands. Persons with diarrhea should not go swimming in order to prevent transmission to others. Persons should avoid drinking untreated water that may be contaminated. Lastly, it is important to avoid fecal exposure during sexual activity.

2009 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases increased slightly from 0.4 cases per 100,000 in 2008 to 0.5 cases per 100,000 in 2009 (Figure 1).
- The 35 to 44 year old age group had the highest incidence rate of cryptosporidiosis, 0.9 cases per 100,000 (Figure 2). The 15 to 34 year age group had the largest proportion of cases reported (n=16, 31%).
- Blacks had the highest incidence rate among the race/ethnicity groups, 0.9 cases per 100,000. Whites (n=16, 31%) accounted for the greatest proportion of reported cases (Figure 3).
- Service Planning Area (SPA) 1 had the highest incidence rate (1.4 cases per 100,000) of any of the SPAs. SPA 2 and 4 reported the largest proportion of cases (Figure 4).
- The number of cases reported peaked in April and again in September and October. Previous years have shown the number of cases peaks in late summer (Figure 5).
- The male to female ratio for 2009 was 2:1, consistent with previous years.
- The most frequently reported risk factor was contact with animals (n=23, 45%) with mostly dogs at home, followed by HIV positive status (n=14, 27%), especially among MSM (n=9, 64%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=45)			2006 (N=48)			2007 (N=50)			2008 (N=41)			2009 (N=51)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0
1-4	1	2.2	0.2	1	2.1	0.2	2	4.0	0.3	2	4.9	0.4	4	7.8	0.7
5-14	1	2.2	0.1	4	8.3	0.3	4	8.0	0.3	7	17.1	0.5	4	7.8	0.3
15-34	10	22.2	0.4	7	14.6	0.3	15	30.0	0.5	10	24.4	0.3	16	31.4	0.6
35-44	20	44.4	1.3	22	45.8	1.5	13	26.0	0.9	15	36.6	1.0	13	25.5	0.9
45-54	7	15.6	0.6	5	10.4	0.4	10	20.0	0.8	4	9.8	0.3	4	7.8	0.3
55-64	4	8.9	0.5	6	12.5	0.7	1	2.0	0.1	1	2.4	0.1	6	11.8	0.6
65+	2	4.4	0.2	3	6.3	0.3	5	10.0	0.5	2	4.9	0.2	4	7.8	0.4
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	1	2.0	0.1	1	2.4	0.1	1	2.0	0.1
Black	10	22.2	1.2	8	16.7	0.9	7	14.0	0.8	5	12.2	0.6	8	15.7	0.9
Hispanic	16	35.6	0.4	20	41.7	0.4	8	16.0	0.2	10	24.4	0.2	10	9.6	0.2
White	15	33.3	0.5	16	33.3	0.6	29	58.0	1.0	12	29.3	0.4	16	31.4	0.5
Other	0	0.0	0.0	2	4.2	7.0	2	4.0	9.6	2	4.9	8.1	1	2.0	
Unknown	4	8.9		2	4.2		3	6.0		11	26.8		15	29.4	
SPA															
1	0	0.0	0.0	4	8.3	1.2	3	6.0	0.8	2	4.9	0.5	5	9.8	1.4
2	10	22.2	0.5	13	27.1	0.6	19	38.0	0.9	14	34.1	0.6	12	23.5	0.5
3	4	8.9	0.2	3	6.3	0.2	3	6.0	0.2	0	0.0	0.0	5	9.8	0.3
4	18	40.0	1.4	13	27.1	1.0	7	14.0	0.6	12	29.3	0.9	11	21.6	0.9
5	3	6.7	0.5	2	4.2	0.3	7	14.0	1.1	5	12.2	0.8	4	7.8	0.6
6	4	8.9	0.4	3	6.3	0.3	1	2.0	0.1	1	2.4	0.1	5	9.8	0.5
7	4	8.9	0.3	8	16.7	0.6	3	6.0	0.2	3	7.3	0.2	3	5.9	0.2
8	2	4.4	0.2	1	2.1	0.1	7	14.0	0.6	4	9.8	0.4	4	7.8	0.4
Unknown	0	0.0		1	2.1		0	0.0		0	0.0				

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Cryptosporidiosis US, CA and LAC, 1999-2009

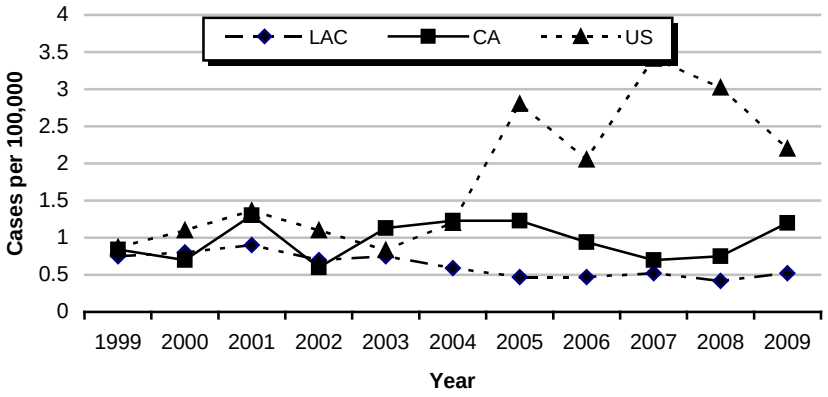


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2009 (N=51)

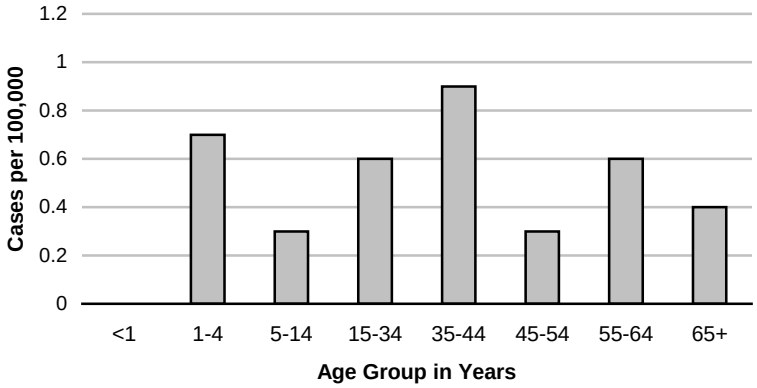
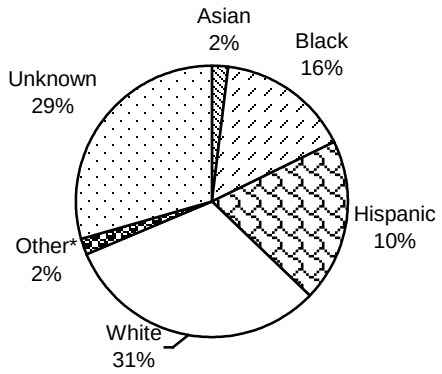


Figure 3. Percent Cases of Cryptosporidiosis by Race/Ethnicity LAC, 2009 (N=51)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, and white.

Figure 4. Incidence Rates of Cryptosporidiosis by SPA LAC, 2009 (N=51)

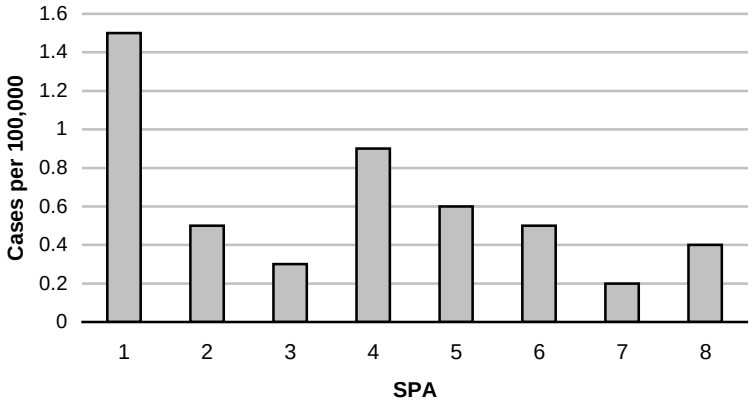


Figure 5. Reported Cryptosporidiosis Cases by Month of Onset LAC, 2009 (N=51)

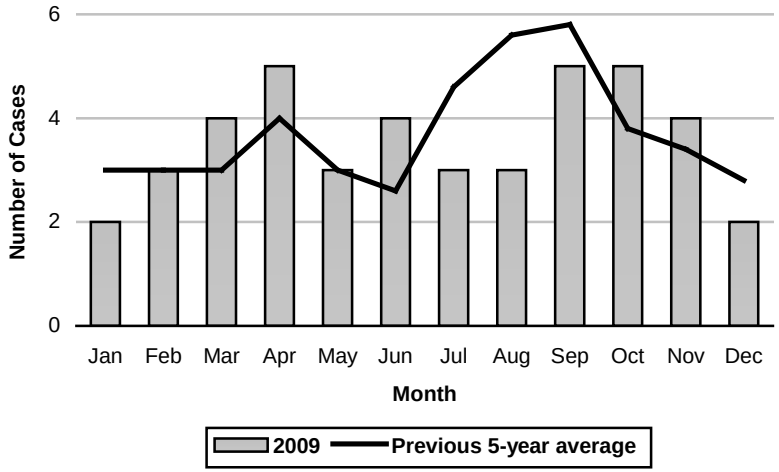
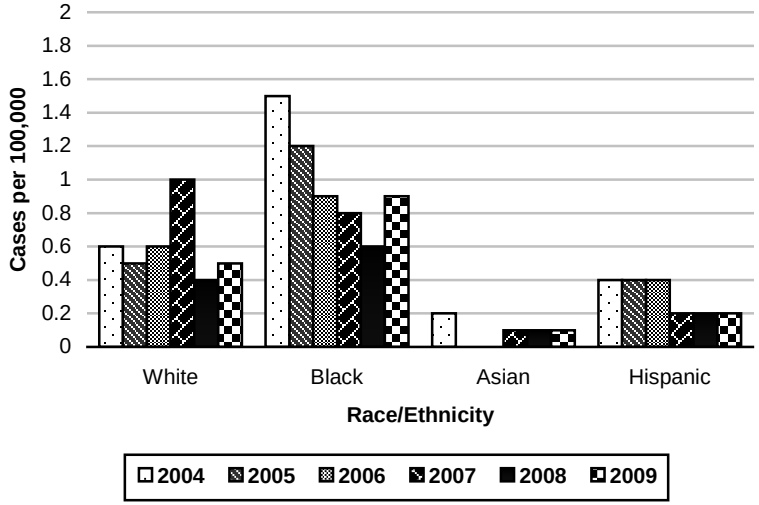


Figure 6. Cryptosporidiosis Incidence by Race/Ethnicity LAC, 2004-2009



ENCEPHALITIS

CRUDE DATA	
Number of Cases	51
Annual Incidence[a]	
LA County	0.52
California	N/A
United States	N/A
Age at Diagnosis	
Mean	30 years
Median	15 years
Range	1 -82 years

[a]Cases per 100,000 population.

DESCRIPTION

Encephalitis, an inflammation of parts of the brain, spinal cord and meninges, causes headache, stiff neck, fever and altered mental status. It can result from infection with a number of different agents including viral, parasitic, fungal, rickettsial, and bacterial pathogens as well as chemical agents. Public health surveillance is limited to cases with suspected or confirmed viral etiology, which includes primary and post-infectious encephalitis but excludes individuals with underlying human immunodeficiency virus (HIV) infection. Of special concern is arboviral (mosquito-borne) encephalitis, which can be prevented by personal protection and mosquito control (See West Nile virus chapter). Arthropod-borne viruses (i.e., arboviruses) are viruses that are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, ticks, and certain mites and gnats). All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman vertebrate primary host and a primary arthropod vector. Arboviral encephalitides have a global distribution. The five main viral agents of encephalitis in the United States are West Nile virus (WNV), eastern equine encephalitis (EEE) virus, western equine encephalitis (WEE) virus, St. Louis encephalitis (SLE) virus and La Crosse (LAC) virus, all of which are transmitted by mosquitoes.

Prevention measures for arboviral infections consist of personal protection, screens on windows, avoiding mosquito-infested areas, especially at dusk when most mosquitoes are active, wearing protective clothing and use of insect repellants containing DEET, oil of eucalyptus, and picaridin. Elimination of standing water and proper maintenance of ponds and swimming pools decrease the available sites for hatching and maturation of mosquito larvae. Five local mosquito abatement districts monitor and control populations of these insects, especially in areas used by the public.

2009 TRENDS AND HIGHLIGHTS

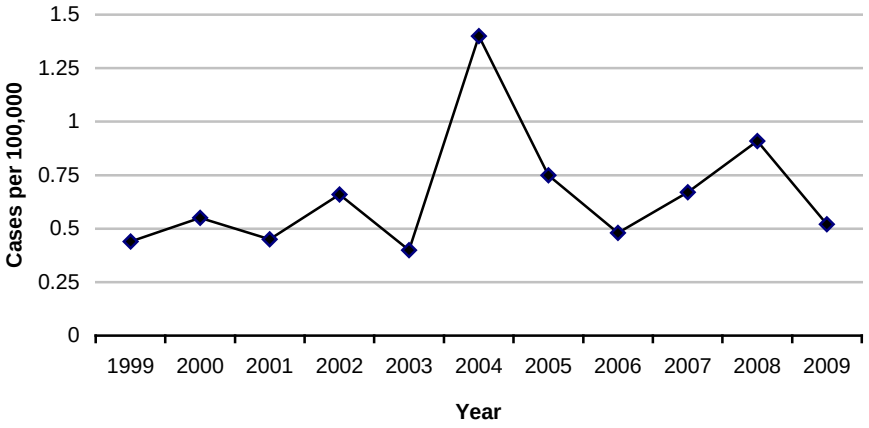
- Encephalitis cases reports included: cases reported from the California Encephalitis Project (http://ceip.us/encephalitis.htm), those reported by acute care medical facilities through local confidential morbidity reporting system.
- Fifty-one cases of encephalitis of probable viral etiology were reported in 2009. This is a 43% decrease in 2009 encephalitis cases compared to 2008 when 89 cases were reported. The overall decrease in the number of encephalitis cases is most likely related to the decrease in all WNV-associated infections in 2009 compared to previous seasons from 2005 to 2008 (Figure 4). In 2008, 45 cases of WNV –associated encephalitis were reported compared to only six cases in 2009.
- The most frequent underlying etiology for encephalitis cases was WNV infection accounting for six (12%) cases.
- Twenty-five (49%) encephalitis cases were reported to LAC from the California Encephalitis Project. Despite a thorough work-up, twenty-four (96%) cases had no definitive infectious disease etiology identified. Only one case had presumed underlying etiology of mycoplama infection.
- The greatest incidence of encephalitis was in the 5-14 year old group (1.2 cases per 100,000) followed by those 65 years and older (0.8 cases per 100,000 population).

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=70)			2006 (N=46)			2007 (N=65)			2008 (N=89)			2009 (N=51)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	4.3	2.1	2	4.3	1.4	3	4.6	2.0	4	4.5	2.9	0	0	-
1-4	6	8.6	1.0	8	17.4	1.4	6	9.2	1.0	8	9.0	1.4	4	7.8	0.7
5-14	19	27.1	1.3	8	17.4	0.5	13	20.0	0.9	14	15.7	1.0	17	33.4	1.2
15-34	11	15.7	0.4	15	32.6	0.5	15	23.1	0.5	4	4.5	0.1	10	19.6	0.4
35-44	7	10.0	0.5	3	6.5	0.2	2	3.1	0.1	1	1.1	0.1	2	3.9	0.1
45-54	7	10.0	0.6	4	8.7	0.3	6	9.2	0.5	11	12.4	0.8	7	13.7	0.5
55-64	1	1.4	0.1	1	2.2	0.1	7	10.8	0.8	14	15.7	1.5	2	3.9	0.2
65+	15	21.4	1.6	5	10.9	0.5	10	15.4	1.0	33	37.1	3.2	8	15.7	0.8
Unknown	1	1.4		0	0.0		3	4.6		0	0.0		1	2.0	0
Race / Ethnicity															
Asian	11	15.7	0.9	4	8.7	0.3	7	10.8	0.5	3	3.4	0.2	5	9.8	0.4
Black	5	7.1	0.6	8	17.4	0.9	5	7.7	0.6	5	5.6	0.6	2	3.9	0.2
Hispanic	32	45.7	0.7	20	43.5	0.4	31	47.7	0.7	40	44.9	0.9	22	43.2	0.5
White	22	31.4	0.8	12	26.1	0.4	19	29.2	0.7	38	42.7	1.3	9	17.6	0.3
Other	0	0.0	0.0	1	2.2	3.5	0	0.0	0.0	1	1.1	4.1	1	2.0	-
Unknown	0	0.0		1	2.2		3	4.6		2	2.2		12	23.5	-
SPA															
1	3	4.3	0.9	5	10.9	1.4	3	4.6	0.8	3	3.4	0.8	3	5.9	0.8
2	21	30.0	1.0	8	17.4	0.4	20	30.8	0.9	9	10.1	0.4	11	21.7	0.5
3	6	8.6	0.4	12	26.1	0.7	7	10.8	0.4	25	28.1	1.4	10	19.6	0.6
4	6	8.6	0.5	3	6.5	0.2	5	7.7	0.4	10	11.2	0.8	7	13.7	0.6
5	2	2.9	0.3	1	2.2	0.2	1	1.5	0.2	0	0.0	0.0	0	0.0	-
6	3	4.3	0.3	1	2.2	0.1	6	9.2	0.6	3	3.4	0.3	7	13.7	0.7
7	12	17.1	0.9	8	17.4	0.6	6	9.2	0.4	16	18.0	1.2	9	17.6	0.7
8	13	18.6	1.2	8	17.4	0.7	13	20.0	1.2	9	10.1	0.8	2	3.9	0.2
Unknown	4	5.7		0	0.0		4	6.2		14	15.7		2	3.9	

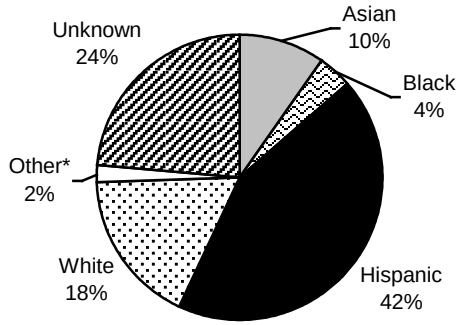
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis
LAC, 1999-2009 (N=51)



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity
LAC, 2009 (N=51)



* Other includes Native American and any additional racial group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 3. Incidence Rates of Encephalitis by SPA
LAC, 2009 (N=51)

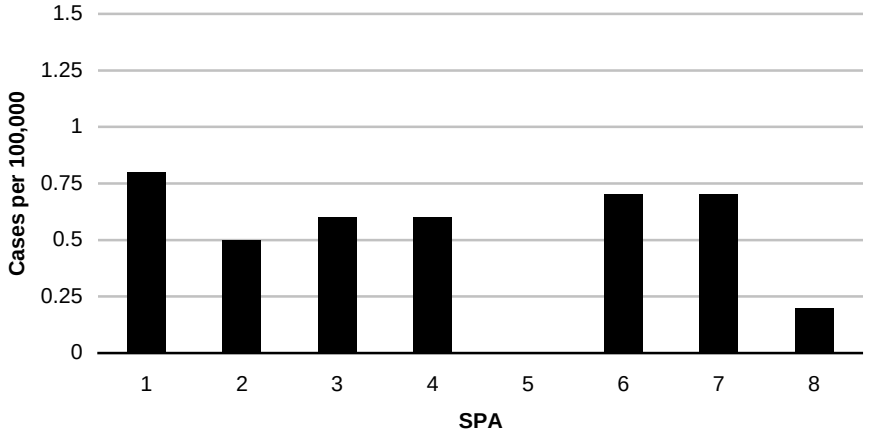


Figure 4. Reported Encephalitis Cases by Month of Onset
LAC, 2009 (N=51)

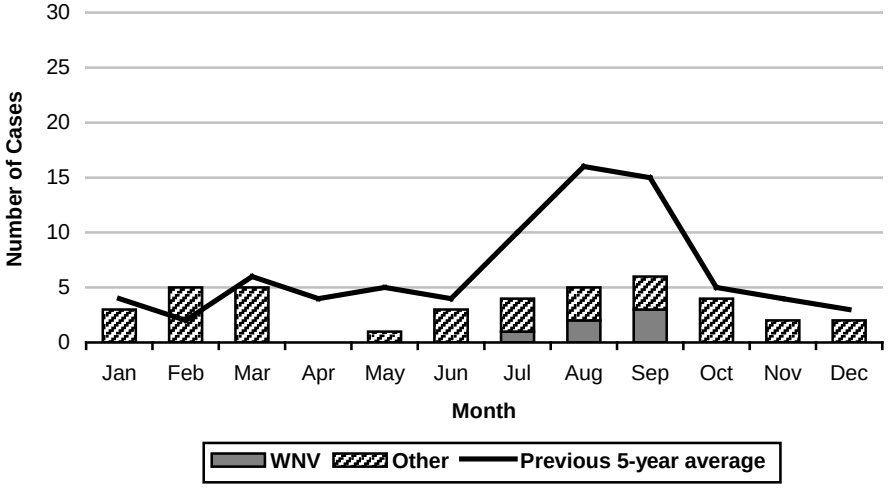
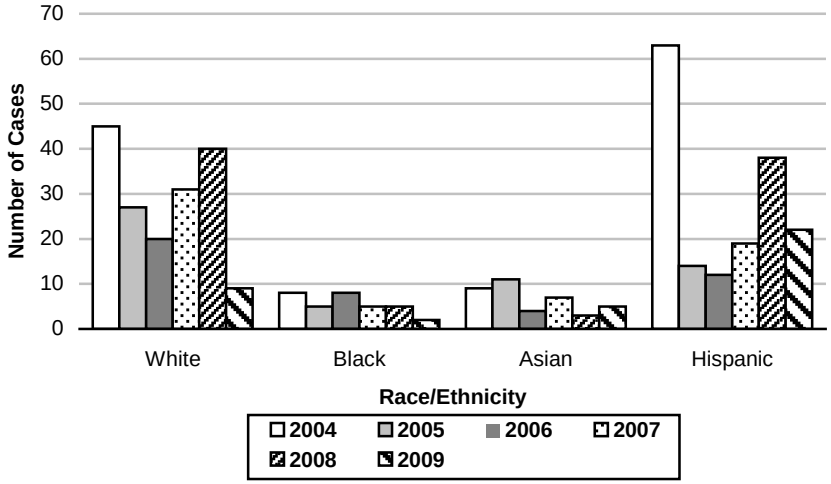
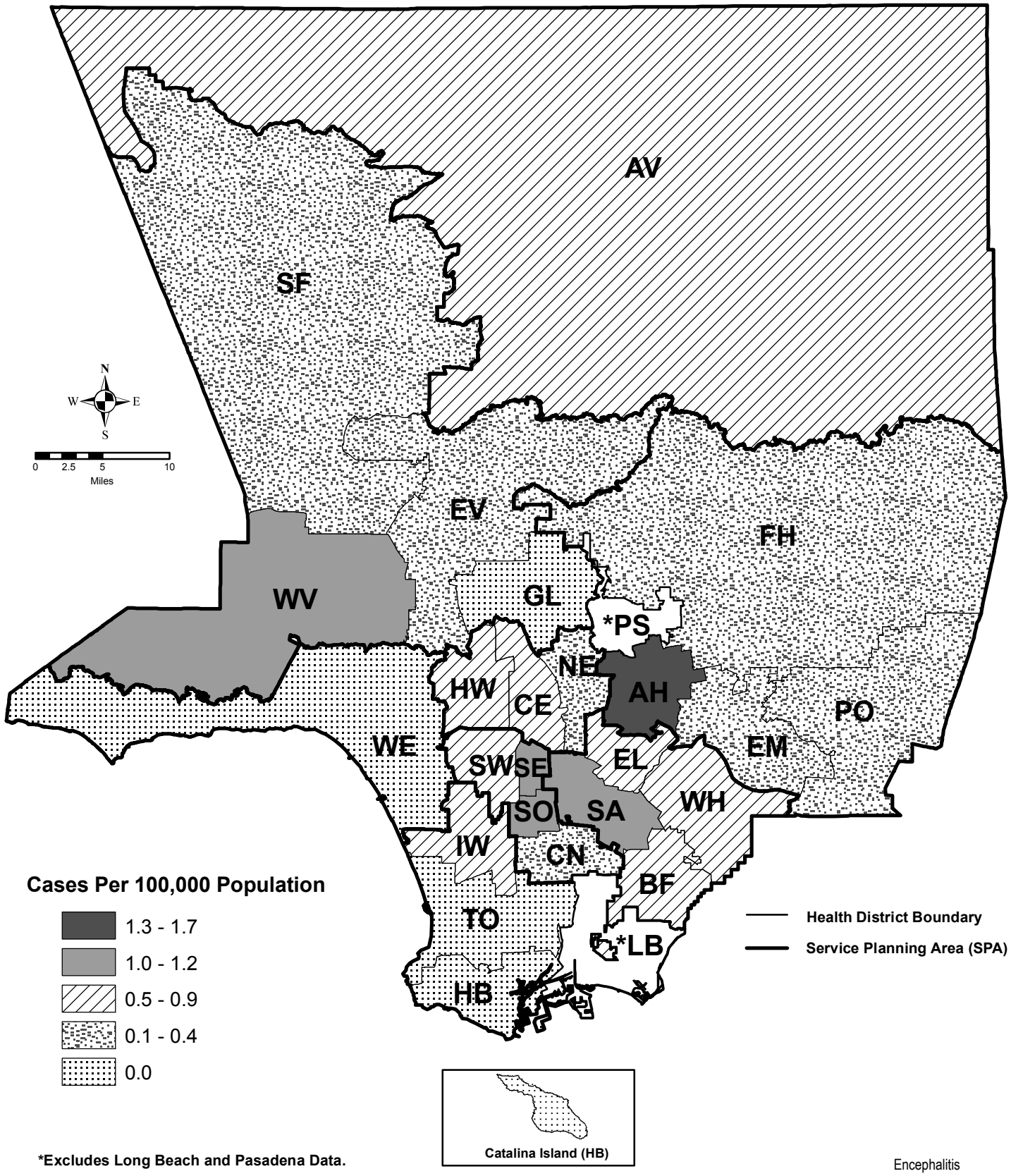


**Figure 5. Reported Encephalitis Cases by Race/Ethnicity
LAC, 2004-2009**



Map 4. Encephalitis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC, & HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	O157:H7	Other Serotypes
Number of Cases	18	20
Annual Incidence[a]		
LA County	0.18[b]	0.21
California	N/A	N/A
United States	N/A	N/A
Age at Diagnosis		
Mean	24.7	23.6
Median	17	8
Range	0-78	1-95

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.

DESCRIPTION

Escherichia coli is a Gram-negative bacillus with numerous serotypes, several of which produce shiga toxin, called STEC. Gastrointestinal infection with a shiga toxin-producing serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is two to eight days. These organisms naturally occur in the gut of many animals; likely modes of transmission to humans from animals include foodborne (e.g., undercooked ground beef; raw milk; fresh produce and unpasteurized juice contaminated with feces), direct exposure to animals and their environments, and exposure to recreational water contaminated with animal or human feces. Person-to-person transmission such as between siblings or within a daycare center is also well described.

The most common STEC serotype in the US is *E. coli* O157:H7, but several other serotypes cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All positive STEC broths or isolates are confirmed and serotyped by the Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder consisting of hemolytic anemia, kidney failure, and thrombocytopenia. It is diagnosed clinically and is most frequently associated with infection due to *E. coli* O157:H7 but may also be caused by other serotypes. Children younger than five years of age are at highest risk for HUS. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after STEC infection.

Increased public education to prevent STEC infection is important. Information should focus on safe food handling practices, proper hygiene, and identifying high-risk foods and activities both in the home and while eating out. To avoid infection, beef products should be cooked thoroughly. Produce, including pre-washed products, should be thoroughly rinsed prior to eating. In addition, one should drink only treated water and avoid swallowing water during swimming or wading. Careful handwashing is essential, especially before eating and after handling raw beef products or coming in contact with or being around animals. Strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

2009 TRENDS AND HIGHLIGHTS

- There was a 12.5% (n=18) increase in the frequency of confirmed *E. coli* O157:H7 cases in 2009 (Figure1).
- The number of confirmed cases reported as other STEC (non-O157:H7) increased by 61.5% (n=20) compared to 2009. They included eight different serotypes with serotypes O103 and O111 being predominant.
- Three HUS cases were reported which all were laboratory confirmed with *E. coli* O157:H7.
- No outbreaks of STEC were identified.
- For serotype O157:H7, the highest number of cases reported was among children aged 1-4 years (n=5) and 15-34 years (n=5) (Figure 2); and continues to be observed among whites (n=13) (Figures 3, 6).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=9) (Figure2); and continues to be among whites (n=12) (Figures 3, 7).

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2005-2009

	2005 (N=13)			2006 (N=12)			2007 (N=12)			2008 (N=16)			2009 (N=18)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	6.3	0.7	0	0	0
1-4	2	15.4	0.3	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9
5-14	4	30.8	0.3	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2
15-34	5	38.5	0.2	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2
35-44	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1
45-54	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1
65+	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1
Black	0	0.0	0.0	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6	0	0	0
Hispanic	1	7.7	0.0	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1
White	12	92.3	0.4	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		1	8.3		0	0.0		0	0.0		0	0	0
SPA															
1	1	7.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.3
2	1	7.7	0.0	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2
3	1	7.7	0.1	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1
4	1	7.7	0.1	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2	0	0	0
5	2	15.4	0.3	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5
6	1	7.7	0.1	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0	0	0	0
7	2	15.4	0.1	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0	4	22.2	03
8	4	30.8	0.4	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

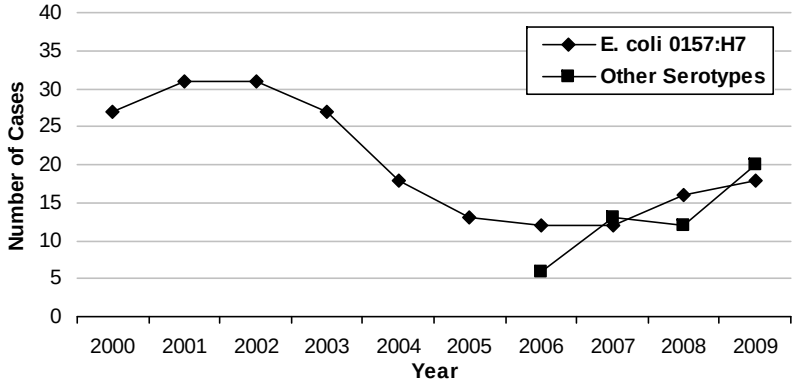
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2005-2009

	2005 (N=0)			2006 (N=6)			2007 (N=13)			2008 (N=12)			2009 (N=20)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1				0	0	0	0	0	0	0	0	0	0	0	0
1-4				1	14.2	0.2	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6
5-14				0	0	0	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1
15-34				1	28.6	0	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1
35-44				1	14.2	0.1	0	0	0	0	7.1	0	1	4.7	0.1
45-54				1	14.2	0.1	2	20	0.2	1	7.1	0.1	1	4.7	0.1
55-64				1	14.2	0.1	0	0	0	0	0	0	1	4.7	0.1
65+				1	14.2	0.1	0	0	0	2	14.2	0.2	2	9.5	0.2
Unknown				0	0	0	0	0	0	0	0	0	0	0	0
Race / Ethnicity															
Asian				0	0	0	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2
Black				0	0	0	0	0	0	1	7.1	0.1	0	0	0
Hispanic				3	42.9	0.1	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1
White				3	57.1	0.1	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4
Other				0	0	0	0	0	0	0	0	0	0	0	0
Unknown				0	0	0	0	0	0	0	0	0	0	0	0
SPA															
1				0	14.2	0	0	0	0	1	14.2	0.3	0	0	0
2				0	0	0	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2
3				2	28.6	0.1	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2
4				1	14.2	0.1	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2
5				0	0	0	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9
6				0	0	0	0	6.6	0	0	0	0	0	0	0
7				1	14.2	0.1	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1
8				2	28.6	0.2	6	33.3	0.5	0	0	0	2	9.5	0.2
Unknown				0	0	0	0	0	0	0	0	0	0	0	0

*Data not available for 2005. Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Number Cases of Shiga Toxin-producining *E. coli*
LAC, 1999-2009



*Other STEC data not avalaible before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2009

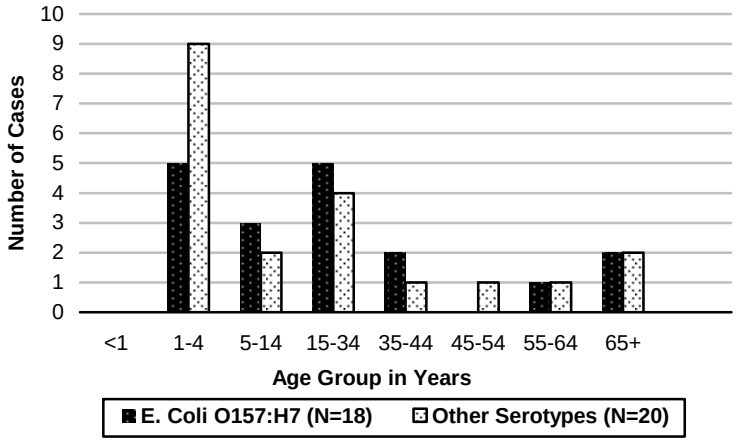


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2009

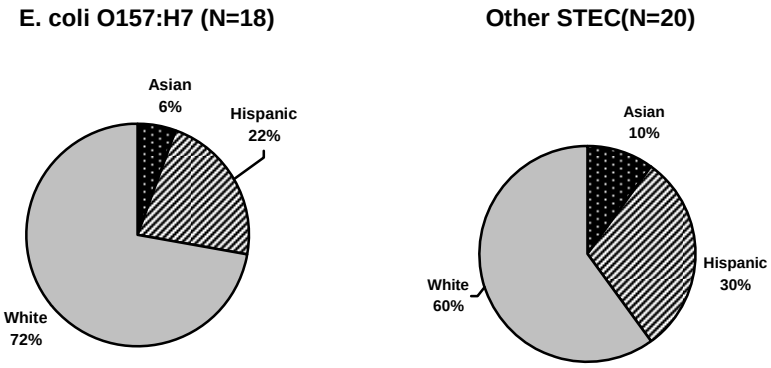


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2009

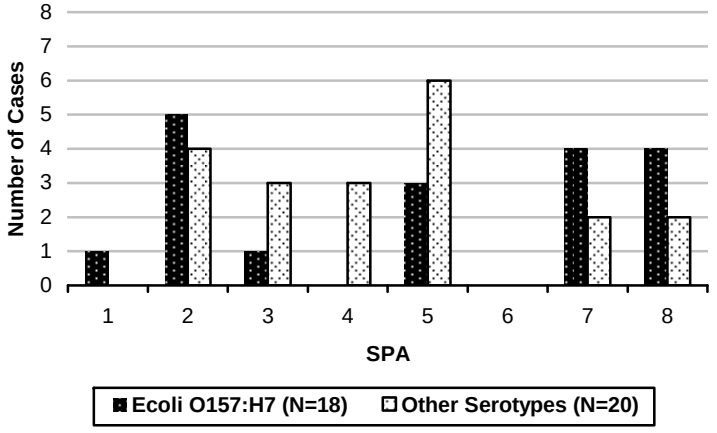


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2009

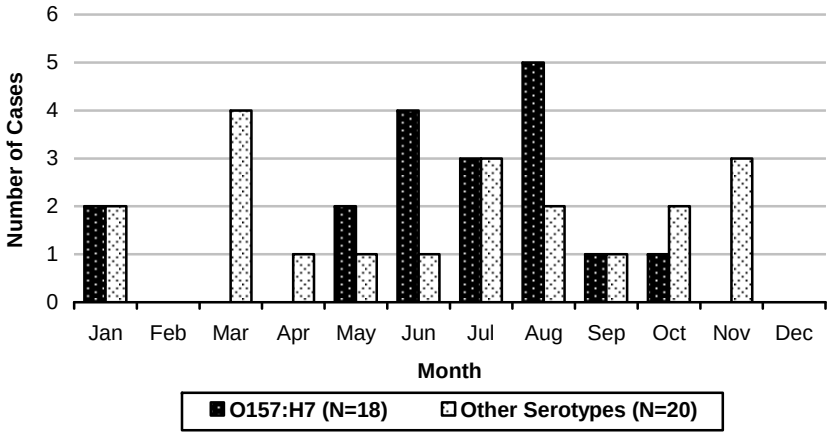


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2005-2009

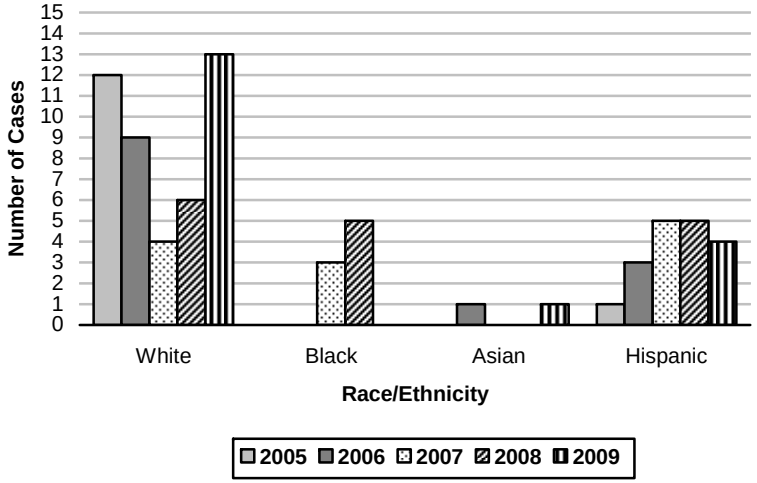
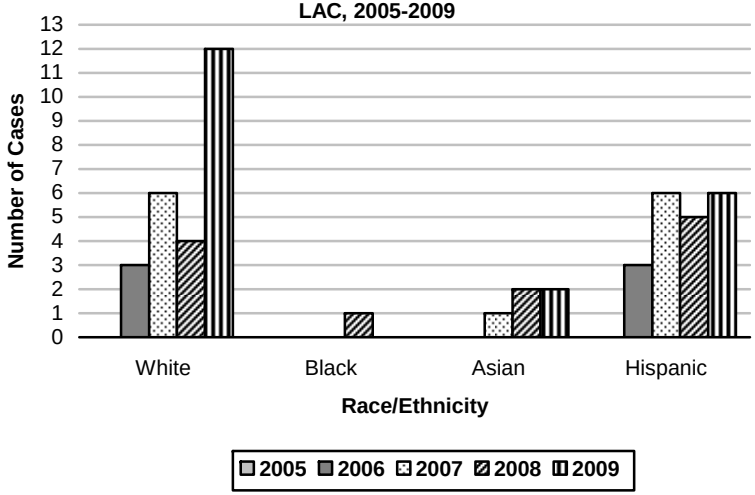


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2005-2009



GIARDIASIS

CRUDE DATA	
Number of Cases	354
Annual Incidence[a]	
LA County	3.62
California	4.86
United States	5.72
Age at Diagnosis	
Mean	34
Median	36
Range	<1-88

[a]Cases per 100,000 population.

DESCRIPTION

Giardiasis is an intestinal infection caused by the zoonotic protozoan parasite *Giardia intestinalis* (previously *G. lamblia*). *Giardia* cysts shed in animal or human feces may contaminate food or drinking water or be transferred on hands or fomites; recreational waters such as lakes and pools may also serve as vehicles of transmission. Incubation time can range from 3 to 25 days or longer, but the median is 7-10 days. While often asymptomatic, symptoms can include sulfurous burps, chronic diarrhea, frequent loose and pale greasy stools, bloating, cramps, fatigue, and weight loss. Complications are rare, but may include malabsorption of fats and fat-soluble vitamins. Children in day care represent a reservoir of disease in developed countries. There is no vaccine.

To prevent transmission of giardiasis, individuals should wash their hands before eating, after using the toilet, and after changing diapers.

Public water should be filtered if exposed to human or animal fecal contamination. Persons ill with diarrhea should avoid swimming. Fecal exposure during sexual activity should also be avoided.

2009 TRENDS AND HIGHLIGHTS

- Giardiasis incidence remained stable in 2008 and 2009 (3.6 cases per 100,000) (Figure 1).
- The highest age-specific incidence rate occurred among children aged one to four years, 8.2 cases per 100,000; the greatest proportion of cases was reported among the 15 to 34 year age group (85, 24%) (Figure 2).
- Whites continue to have higher race/ethnicity specific incidence rates, 4.4 cases per 100,000, compared to groups from other race/ethnicity (Figure 3).
- Service Planning Area (SPA) 5 had the highest incidence rate of giardiasis with 6.6 cases per 100,000 followed by SPA 2 (6.2 per 100,000) (Figure 4).
- The cases reported in 2009 had two peaks, one in early May and a second in the summer months. This differs from the previous five-year average where cases tended to peak only in the summer months (Figure 5).
- The male to female case ratio was 2:1
- Risk factors for LAC giardiasis cases remained consistent with prior years. The most frequently reported risk factor was immigration to the US (n=106, 30%); half of immigrant cases were from Iran. Contact with animals (n=100, 28%), and travel to another country were also frequently reported (n=70, 20%), with Mexico the most frequently reported country (n=16, 23%).

Reported Giardiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=313)			2006 (N=376)			2007 (N=441)			2008 (N=355)			2009 (N=354)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	1.0	2.1	0	0.0	0.0	3	0.7	2.0	4	1.1	2.9	1	0.3	0.7
1-4	37	11.8	6.4	47	12.5	8.1	61	13.8	10.6	45	12.7	7.9	46	13.0	8.2
5-14	56	17.9	3.8	66	17.6	4.5	66	15.0	4.6	41	11.5	2.9	40	11.3	2.9
15-34	62	19.8	2.2	105	27.9	3.8	126	28.6	4.5	96	27.0	3.3	85	24.0	3.0
35-44	58	18.5	3.8	66	17.6	4.4	76	17.2	5.1	63	17.7	4.2	67	19.0	4.5
45-54	42	13.4	3.3	47	12.5	3.6	62	14.1	4.7	62	17.5	4.6	43	12.1	3.1
55-64	31	9.9	3.7	29	7.7	3.3	30	6.8	3.4	27	7.6	3.0	41	11.6	4.3
65+	23	7.3	2.4	15	4.0	1.5	17	3.9	1.7	17	4.8	1.7	30	8.5	2.8
Unknown	1	0.3		1	0.3			0.0			0.0		1	0.3	
Race / Ethnicity															
Asian	20	6.4	1.6	36	9.6	2.8	33	7.5	2.6	21	5.9	1.6	13	3.7	1.0
Black	17	5.4	2.0	26	6.9	3.1	24	5.4	2.8	16	4.5	1.9	25	7.1	2.9
Hispanic	101	32.3	2.2	137	36.4	3.0	133	30.2	2.9	106	29.9	2.3	102	28.8	2.2
White	149	47.6	5.1	149	39.6	5.2	195	44.2	6.7	167	47.0	5.7	129	36.4	4.4
Other	4	1.3	14.2	7	1.9	24.5	13	2.9	62.4	5	1.4	20.3	4	1.1	
Unknown	22	7.0		21	5.6		43	9.8		40	11.3		81	22.9	
SPA															
1	9	2.9	2.6	11	2.9	3.2	4	0.9	1.1	8	2.3	2.2	5	1.4	1.4
2	94	30.0	4.4	124	33.0	5.8	170	38.5	7.9	161	45.4	7.4	138	39.0	6.2
3	43	13.7	2.5	46	12.2	2.7	45	10.2	2.6	34	9.6	2.0	27	7.6	1.6
4	48	15.3	3.8	57	15.2	4.5	63	14.3	5.0	36	10.1	2.8	46	13.0	3.7
5	34	10.9	5.3	44	11.7	6.9	57	12.9	8.9	37	10.4	5.7	43	12.1	6.6
6	23	7.3	2.2	34	9.0	3.3	26	5.9	2.5	27	7.6	2.6	29	8.2	2.8
7	30	9.6	2.2	30	8.0	2.2	42	9.5	3.0	25	7.0	1.8	26	7.3	1.9
8	32	10.2	2.9	27	7.2	2.4	32	7.3	2.9	26	7.3	2.3	36	10.2	3.2
Unknown	0	0.0		3	0.8		2	0.5		1	0.3		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Giardiasis
LAC, CA and US, 1999-2009

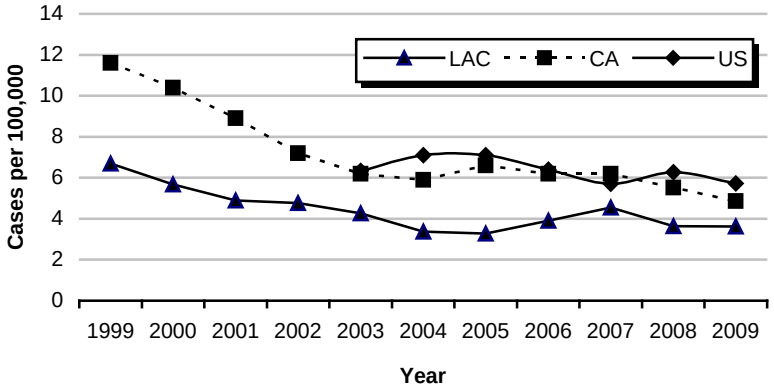


Figure 2. Incidence Rates of Giardiasis by Age Group
LAC, 2009 (N=354)

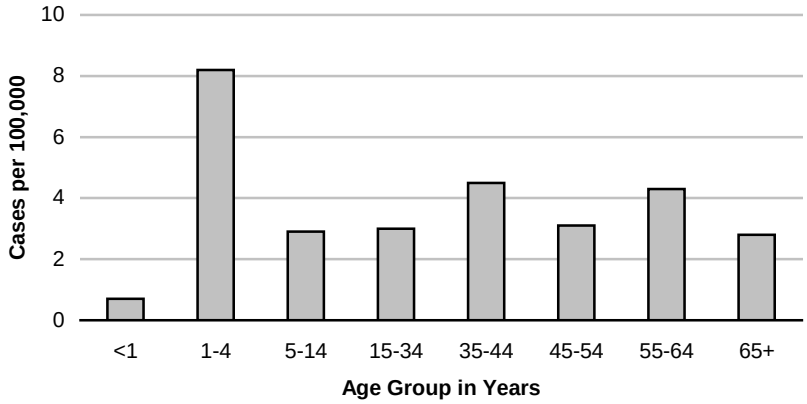


Figure 3. Percent Cases of Giardiasis by Race/Ethnicity
LAC, 2009 (N=354)

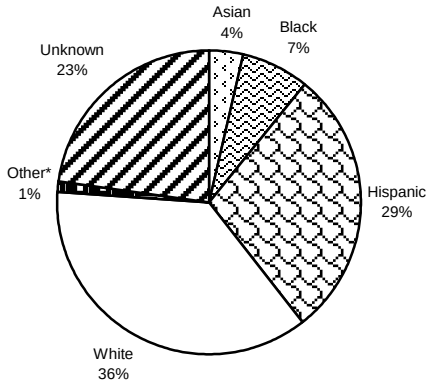
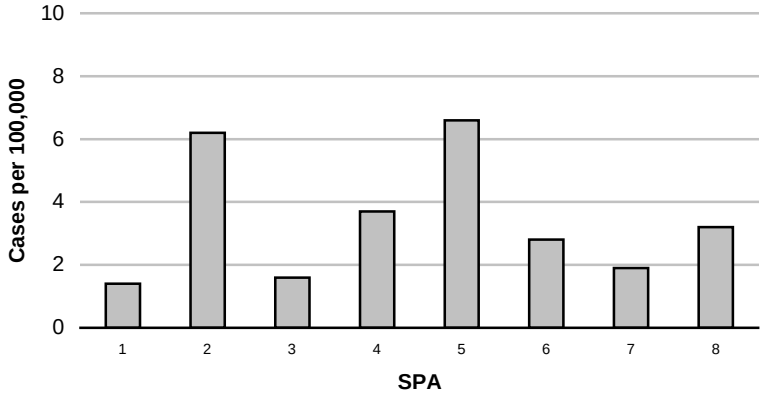


Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2009 (N=354)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, and white.

Figure 5. Reported Giardiasis Cases by Month of Onset
LAC, 2009 (N=354)

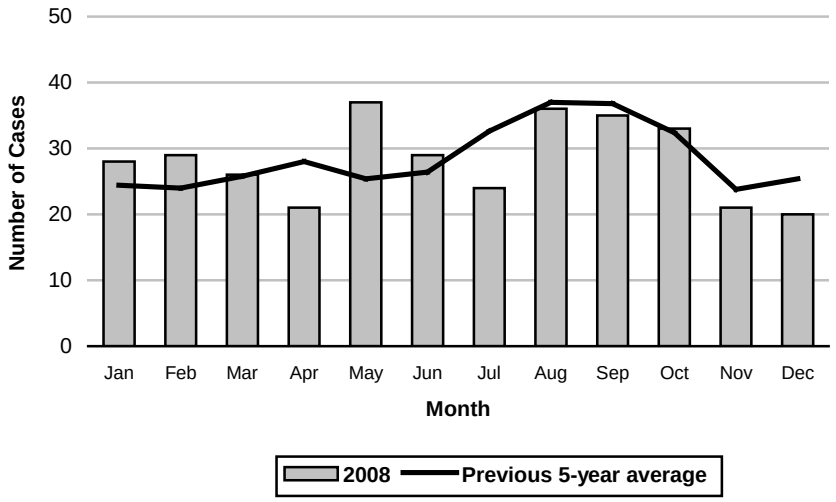
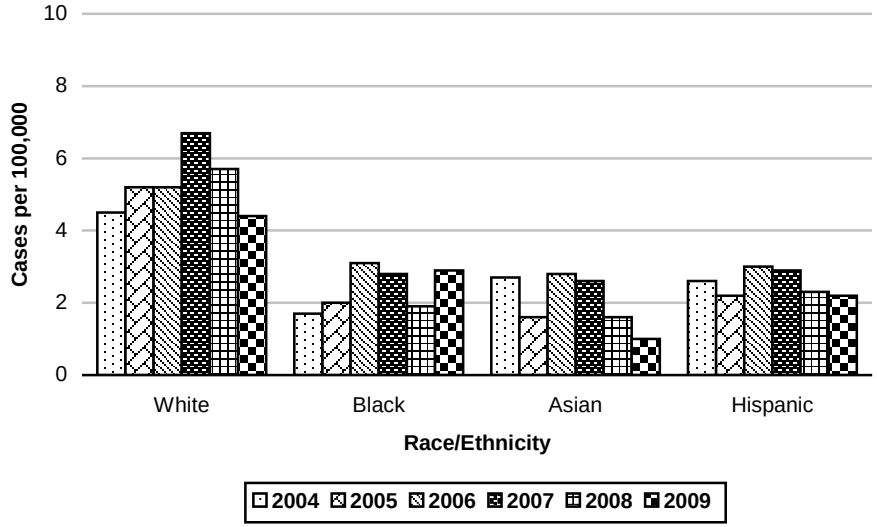
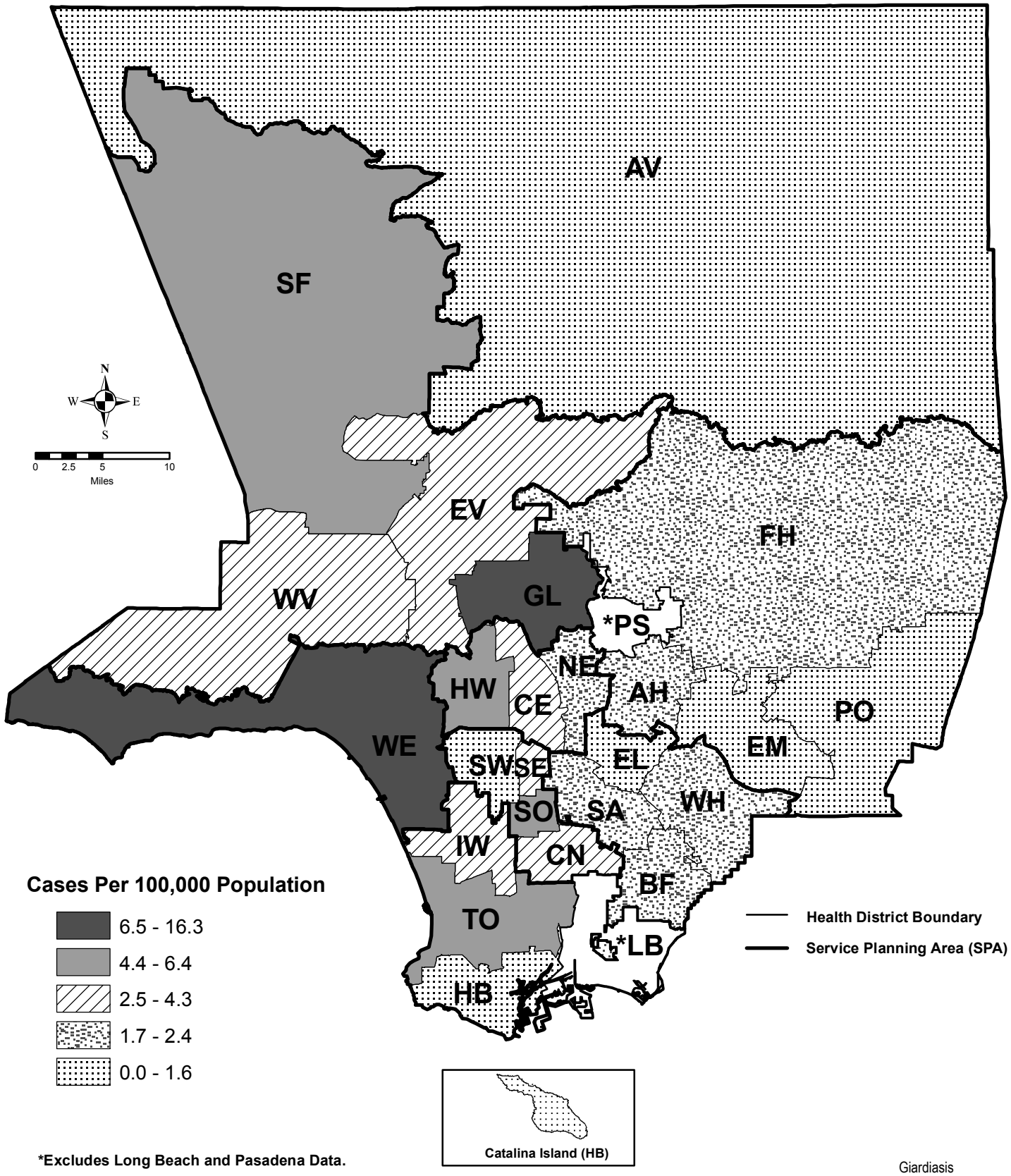


Figure 6. Giardiasis Incidence by Race/Ethnicity
LAC, 2004-2009



Map 5. Giardiasis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	69
Annual Incidence[a] LA County California United States	0.71
Age at Diagnosis Mean Median Range	 53.5 years 61.0 years <1 – 99 years

[a]Cases per 100,000 population.

DESCRIPTION

Haemophilus influenzae is a Gram-negative coccobacillus that can cause both invasive and non-invasive disease. Invasive disease includes meningitis, sepsis, pneumonia, cellulitis, and septic arthritis. Transmission is via respiratory secretions of infected individuals. There are six encapsulated, typeable strains (a–f), as well as unencapsulated, nontypeable strains. *H. influenzae* serotype B (Hib) is the only serotype that is vaccine-preventable and for which chemoprophylaxis is effective. Thus, determining the serotype on laboratory specimens for all suspect cases is critical. *H. influenzae* invasive disease primarily affects infants and elderly persons, as well as immunocompromised individuals. Since June 2007, the only cases of invasive *H. influenzae* investigated in LAC are those in persons less than 15 years of age.

Immunization Recommendations:

- Prior to the introduction of the Hib conjugate vaccine in 1990, most cases of invasive disease in children were caused by serotype B.
- All infants, including those born prematurely, can receive a primary series of conjugate Hib vaccine beginning at 2 months of age. The number of doses (2 or 3) depends on the brand of vaccine used.
- A booster dose is recommended at 12-15 months regardless of which brand of vaccine is used for the primary series. In 2008, a vaccine shortage resulted in CDC interim guidelines calling for a temporary deferral of the booster dose except to children in special high risk groups. However, as of July 2009, increasing vaccine supply led to the CDC's recommendation that the booster dose be reinstated.
- Individuals older than 59 months of age do not need Hib vaccination unless they have a health condition that puts them at increased risk for invasive Hib disease.

2009 TRENDS AND HIGHLIGHTS

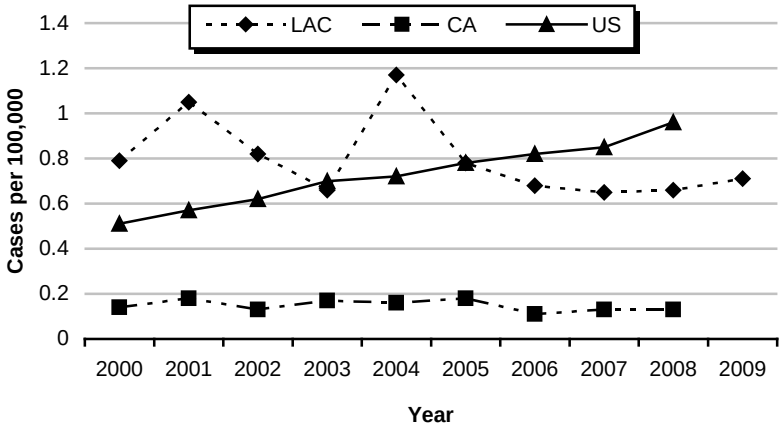
- Two serotype B cases were identified (Figures 6, 7, 8). Neither of the cases had a documented history of Hib vaccination.
- As in previous years, the highest incidence rates occurred in the <1 and 65+ age groups (Figure 2). The two serotype B cases were in the 45-64 age range (Figure 7).
- None of the cases were linked. Service Planning Area (SPA) 6 and SPA 7 reported the highest incidence rates (Figure 4). The two serotype B cases resided in SPA 6 and SPA 8.
- The highest incidence rates occurred in January, April, and December (Figure 5). The two serotype B cases had onsets in January and December. In the previous five years, a peak in incidence occurred in March. It is unknown why in 2009 the peak occurred in April (Figure 5).
- Similar to previous years, the majority of reported cases were among non-B (n=39) and unknown serotypes (n=28) (Figures 6, 7, 8). Of the 69 cases, 84% (n=58) were ≥15 years of age and were not investigated further. Data on race/ethnicity and location is missing for many of the cases.

Reported H. Influenzae Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=75)			2006 (N=66)			2007 (N=63)			2008 (N=64)			2009 (N=69)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	8	10.7	5.7	4	6.1	2.8	8	12.7	5.4	6	9.4	4.3	7	10.1	5.1
1-4	2	2.7	0.3	1	1.5	0.2	1	1.6	0.2	2	3.1	0.4	4	5.8	0.7
5-14	3	4.0	0.2	2	3.0	0.1	3	4.8	0.2	3	4.7	0.2	0	0.0	0.0
15-34	3	4.0	0.1	7	10.6	0.3	7	11.1	0.2	4	6.3	0.1	7	10.1	0.2
35-44	6	8.0	0.4	5	7.6	0.3	4	6.3	0.3	5	7.8	0.3	2	2.9	0.1
45-54	7	9.3	0.6	6	9.1	0.5	7	11.1	0.5	11	17.2	0.8	8	11.6	0.6
55-64	6	8.0	0.7	6	9.1	0.7	5	7.9	0.6	2	3.1	0.2	11	15.9	1.2
65+	40	53.3	4.2	35	53.0	3.6	28	44.4	2.8	31	48.4	3.0	30	43.5	2.8
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	4	5.3	0.3	3	4.5	0.2	1	1.6	0.1	3	4.7	0.2	3	4.4	0.2
Black	7	9.3	0.8	10	15.2	1.2	8	12.7	0.9	2	3.1	0.2	6	8.7	0.7
Hispanic	16	21.3	0.4	17	25.8	0.4	10	15.9	0.2	13	20.3	0.3	8	11.6	0.2
White	28	37.3	1.0	9	13.6	0.3	13	20.6	0.4	9	14.1	0.3	10	14.5	0.3
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	20	26.7		27	40.9		31	49.2		37	57.8		42	60.8	
SPA															
1	0	0.0	0.0	2	3.0	0.6	2	3.2	0.6	0	0.0	0.0	2	2.9	0.5
2	18	24.0	0.8	11	16.7	0.5	13	20.6	0.6	7	10.9	0.3	16	23.2	0.7
3	10	13.3	0.6	7	10.6	0.4	3	4.8	0.2	10	15.6	0.6	7	10.1	0.4
4	12	16.0	1.0	6	9.1	0.5	8	12.7	0.6	8	12.5	0.6	5	7.3	0.4
5	4	5.3	0.6	11	16.7	1.7	8	12.7	1.2	4	6.3	0.6	2	2.9	0.3
6	10	13.3	1.0	10	15.2	1.0	12	19.0	1.1	10	15.6	0.9	8	11.6	0.8
7	8	10.7	0.6	10	15.2	0.7	8	12.7	0.6	10	15.6	0.7	11	15.9	0.8
8	6	8.0	0.5	6	9.1	0.5	6	9.5	0.5	9	14.1	0.8	7	10.2	0.6
Unknown	7	9.3		3	4.5		3	4.8		6	9.4		11	15.9	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of *H. influenzae* Invasive Disease US, CA and LAC, 2000-2009*



*The incidence rates for CA only includes cases aged <30 years (2000-2006) and cases aged <15 years (2007-2009).

Figure 2. Incidence Rates of *H. influenzae* Invasive Disease by Age Group LAC, 2009 (N=69)

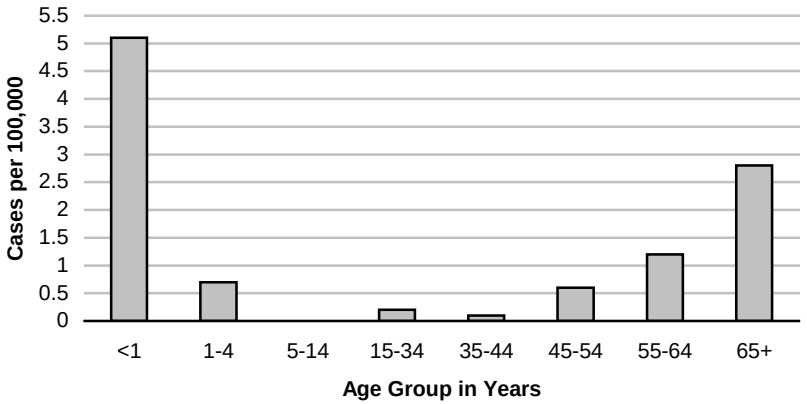
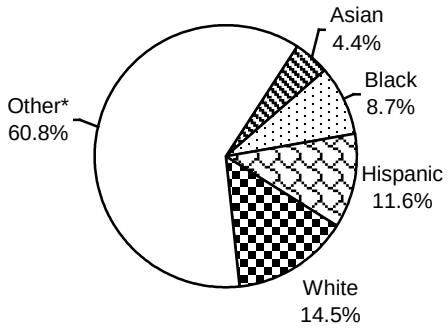


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2009 (N=69)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, white, and/or unknown.

Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2009 (N=69)

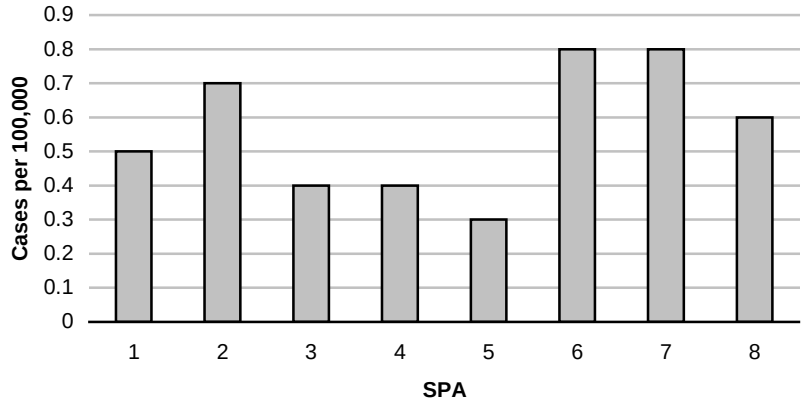


Figure 5. Reported *H. influenzae* Invasive Disease Cases by Month of Onset, LAC, 2009 (N=69)

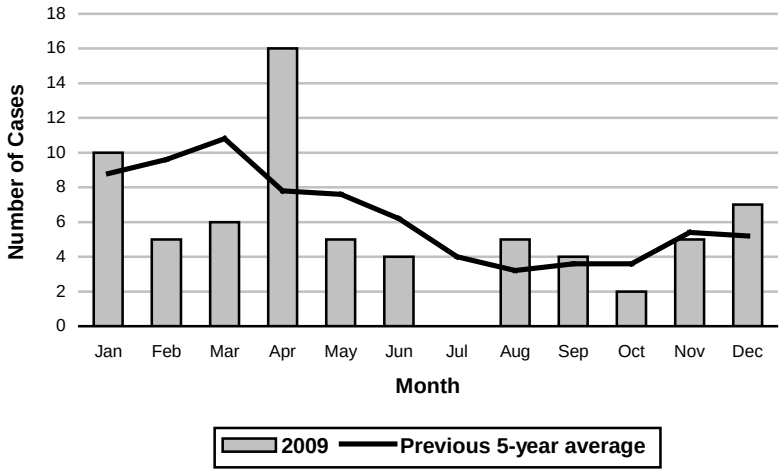


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 2000-2009

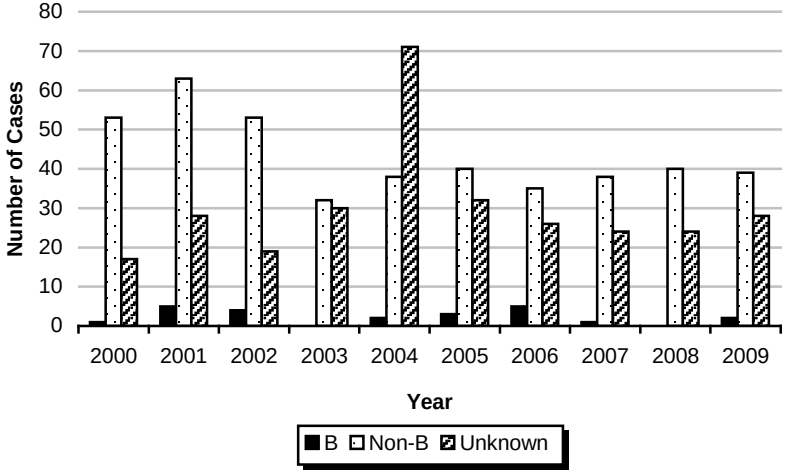


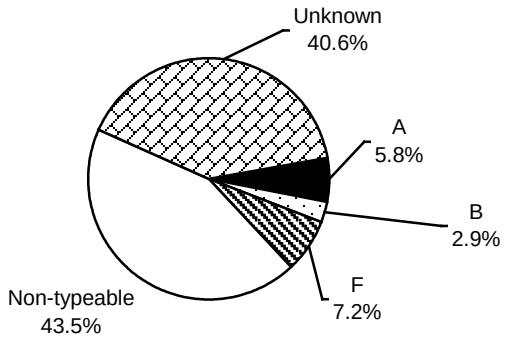
Figure 7. Reported *H. influenzae* Invasive Disease Cases by Serotype, 2009 (N=69) vs. Previous 5-Year Average

	B		Non-B		Unknown	
	2009	Previous 5-Year Average	2009	Previous 5-Year Average	2009	Previous 5-Year Average
Total Cases	2	2.2	39	38.2	28	35.4
Age at Onset (years)						
Mean	52.5	35.0	46.7	45.6	62.9	67.2
Median	52.5	31.1	55.0	48.5	69.0	70.1
Range	48 - 57	<1 – 73	<1 – 99	<1 – 99	1 – 98	<1 – 99
Case Fatality	0%	9.1%	2.6%[1]	4,7%	7.1%[2]	9.0%

[1] One death was reported. The case was <1 year of age, had multiple underlying medical conditions, and was hospitalized with bacteremia, respiratory distress syndrome, and septicemia.

[2] Two deaths were reported. One case was age 1 and causes of death were *Haemophilus* pneumonia, bronchopulmonary dysplasia, cosleeping, and subdural neomembrane. The other case was ≥15 years of age so no further investigation was conducted.

Figure 8. Percent Cases of *H. influenzae* Invasive Disease by Serotype LAC, 2009 (N=69)



HEPATITIS A

CRUDE DATA	
Number of Cases	66
Annual Incidence[a]	
LA County	0.68
California[b]	1.22
United States[b]	0.86
Age at Diagnosis	
Mean	39
Median	34
Range	14-90 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Hepatitis A virus (HAV), a RNA virus, is a vaccine-preventable disease transmitted fecal-orally, person-to-person, or through vehicles such as food. Signs and symptoms of acute hepatitis A include fever, malaise, dark urine, anorexia, nausea, and abdominal discomfort, followed by jaundice. Many cases, especially in children, are mild or asymptomatic. Sexual and household contacts of HAV-infected persons are at increased risk for getting the disease. The average incubation period is 28 days (range 15–50 days). Recovery usually occurs within one month. Infection confers life-long immunity.

ACDC uses the CDC/CSTE criteria for acute hepatitis A to standardize surveillance of this infection. The criteria include: 1) an acute illness with discrete onset of symptoms and 2) jaundice or elevated aminotransferase levels, and 3) appropriate laboratory tests to confirm laboratory criteria for acute hepatitis A diagnosis: IgM anti-HAV positive, or a case meets the clinical case definition and has an epidemiologic link with a person who has laboratory confirmed hepatitis A (i.e., a household or sexual contact of an infected person during the 15–50 days before the onset of symptoms).

2009 TRENDS AND HIGHLIGHTS

- The 2009 incidence rate of acute hepatitis A in Los Angeles County (LAC) was lower than the previous year (0.68 per 100,000 versus 0.82 per 100,000) (Figure 1).
- The 2009 incidence rate of acute hepatitis A in LAC was highest in those between the ages of 15-34 (1.2 per 100,000), followed by the 65+ age group (0.9 per 100,000) and the 35-44 age group (0.7 per 100,000) (Figure 2).
- The 2009 incidence rate of acute hepatitis A in LAC was highest in Asians (1.4 per 100,000) followed by whites (0.8 per 100,000), Hispanics (0.4 per 100,000) and blacks (0.2 per 100,000) (Figure 3).
- Of the eight Service Planning Areas (SPAs), three SPAs in 2009 had rates greater than the overall county mean rate of (0.68)--SPA 5 (1.2 per 100,000), SPA 2 (1.0 per 100,000) and SPA 6 (0.8 per 100,000) (Figure 4).
- Historically, there is an increase of hepatitis A cases in summer and autumn, and in 2009 there was also an increase in August, September and October (Figure 5).
- Risk factors were identified in 56% (n=34) of the 61 confirmed cases interviewed (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=27, 79%) was the most common risk factor reported, followed by eating raw shellfish (n=13, 38%), having a household member who traveled outside of the US in 3 months prior to onset of illness (n=11, 31%) and having contact with anyone who had hepatitis A viral infection (Figure 6).
- Twenty-four percent (n=16) of hepatitis A cases were hospitalized. The median age of those hospitalized was 37 years.

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=480)			2006 (N=364)			2007 (N=78)			2008 (N=80)			2009 (N=66)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	7	1.5	1.2	5	1.4	0.9	1	1.3	0.2	0	0.0	0.0	0	0	0
5-14	24	5.0	1.6	20	5.5	1.4	6	7.7	0.4	7	8.8	0.5	1	1.5	0.1
15-34	198	41.3	7.1	114	31.3	4.1	32	41.0	1.1	34	42.5	1.2	34	51.5	1.2
35-44	88	18.3	5.8	83	22.8	5.5	16	20.5	1.1	14	17.5	0.9	10	15.1	0.7
45-54	88	18.3	6.9	73	20.1	5.6	13	16.7	1.0	9	11.3	0.7	6	9.1	0.4
55-64	44	9.2	5.3	33	9.1	3.8	5	6.4	0.6	7	8.8	0.8	5	7.6	0.5
65+	30	6.3	3.1	36	9.9	3.7	5	6.4	0.5	9	11.3	0.9	10	15.1	0.9
Unknown	1	0.2		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	42	8.8	3.3	25	6.9	2.0	15	19.2	1.2	14	17.5	1.1	18	27.3	1.4
Black	49	10.2	5.8	64	17.6	7.6	5	6.4	0.6	6	7.5	0.7	2	3.0	0.2
Hispanic	135	28.1	3.0	124	34.1	2.7	33	42.3	0.7	36	45.0	0.8	21	31.8	0.4
White	203	42.3	7.0	125	34.3	4.3	24	30.8	0.8	23	28.8	0.8	24	36.4	0.8
Other	13	2.7	46.0	1	0.3	3.5	0	0.0	0.0	1	1.3	4.1	0	0	0
Unknown	38	7.9		25	6.9		1	1.3		0	0.0		1	1.5	
SPA															
1	11	2.3	3.2	3	0.8	0.9	5	6.4	1.4	3	3.8	0.8	2	3.0	0.5
2	78	16.3	3.7	58	15.9	2.7	16	20.5	0.7	17	21.3	0.8	22	33.3	1.0
3	56	11.7	3.3	57	15.7	3.3	17	21.8	1.0	17	21.3	1.0	8	12.1	0.5
4	130	27.1	10.4	79	21.7	6.3	9	11.5	0.7	7	8.8	0.5	6	9.1	0.5
5	45	9.4	7.1	24	6.6	3.8	5	6.4	0.8	10	12.5	1.5	8	12.1	1.2
6	30	6.3	2.9	37	10.2	3.6	8	10.3	0.8	2	2.5	0.2	8	12.1	0.8
7	50	10.4	3.6	33	9.1	2.4	12	15.4	0.9	15	18.8	1.1	6	9.1	0.4
8	58	12.1	5.2	45	12.4	4.0	5	6.4	0.4	7	8.8	0.6	6	9.1	0.5
Unknown	22	4.6		28	7.7		1	1.3		2	2.5				

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Hepatitis A
LAC, CA and US, 1999-2009

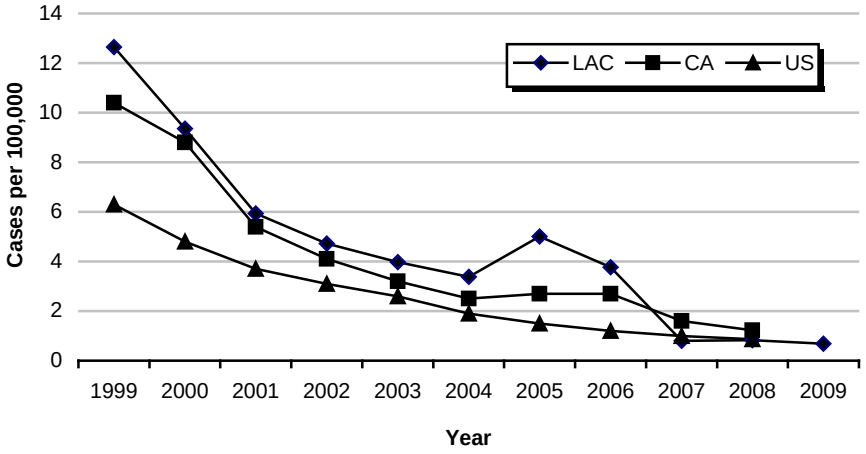


Figure 2. Incidence Rates of Hepatitis A by Age Group
LAC, 2009 (N=66)

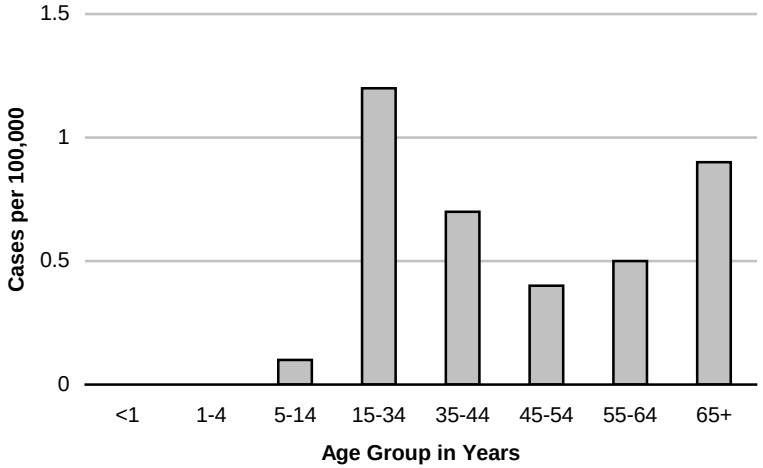


Figure 3. Hepatitis A Incidence Rates by Race/Ethnicity
LAC, 2005-2009

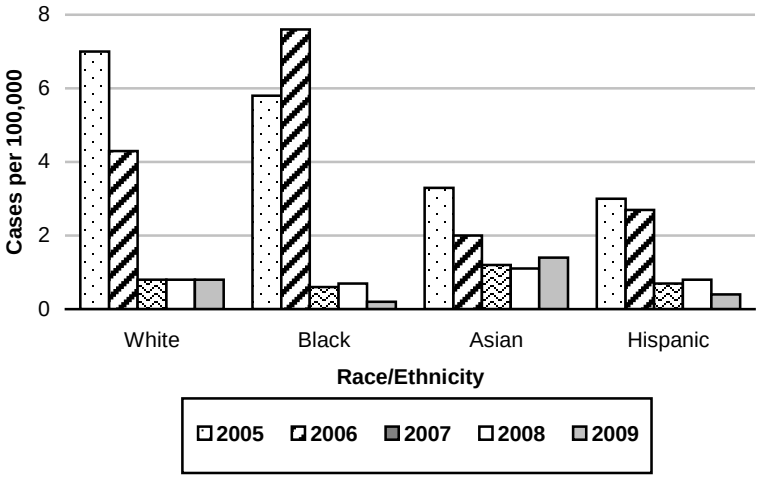
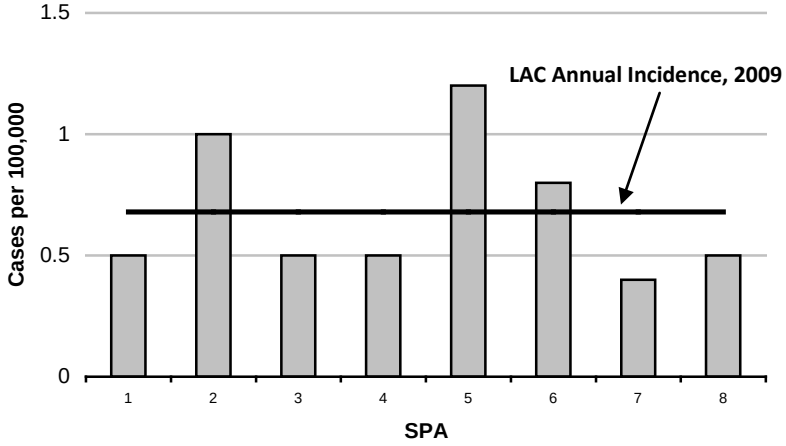


Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 2009 (N=66)



* Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Hepatitis A Cases by Month of Onset
LAC, 2009 (N=66)

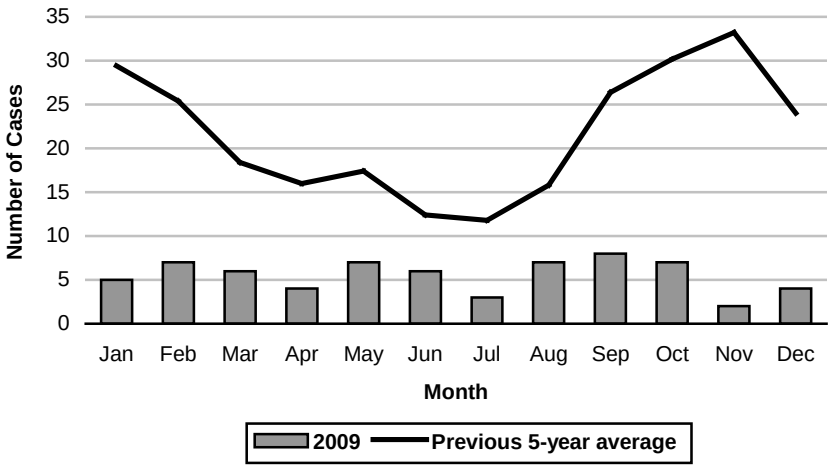
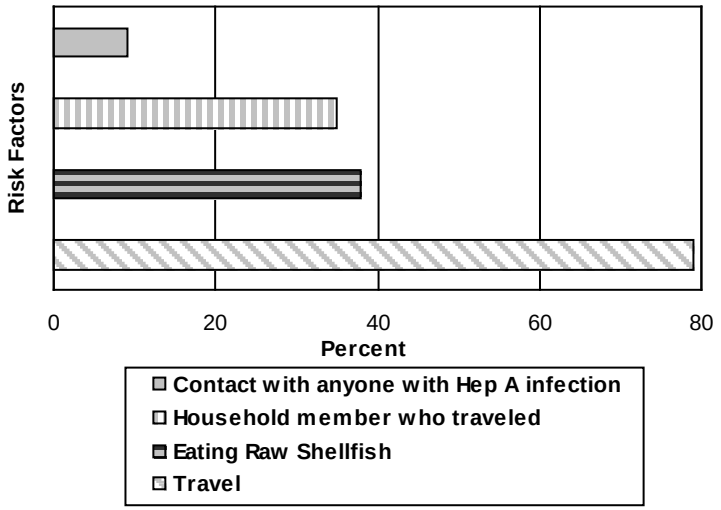
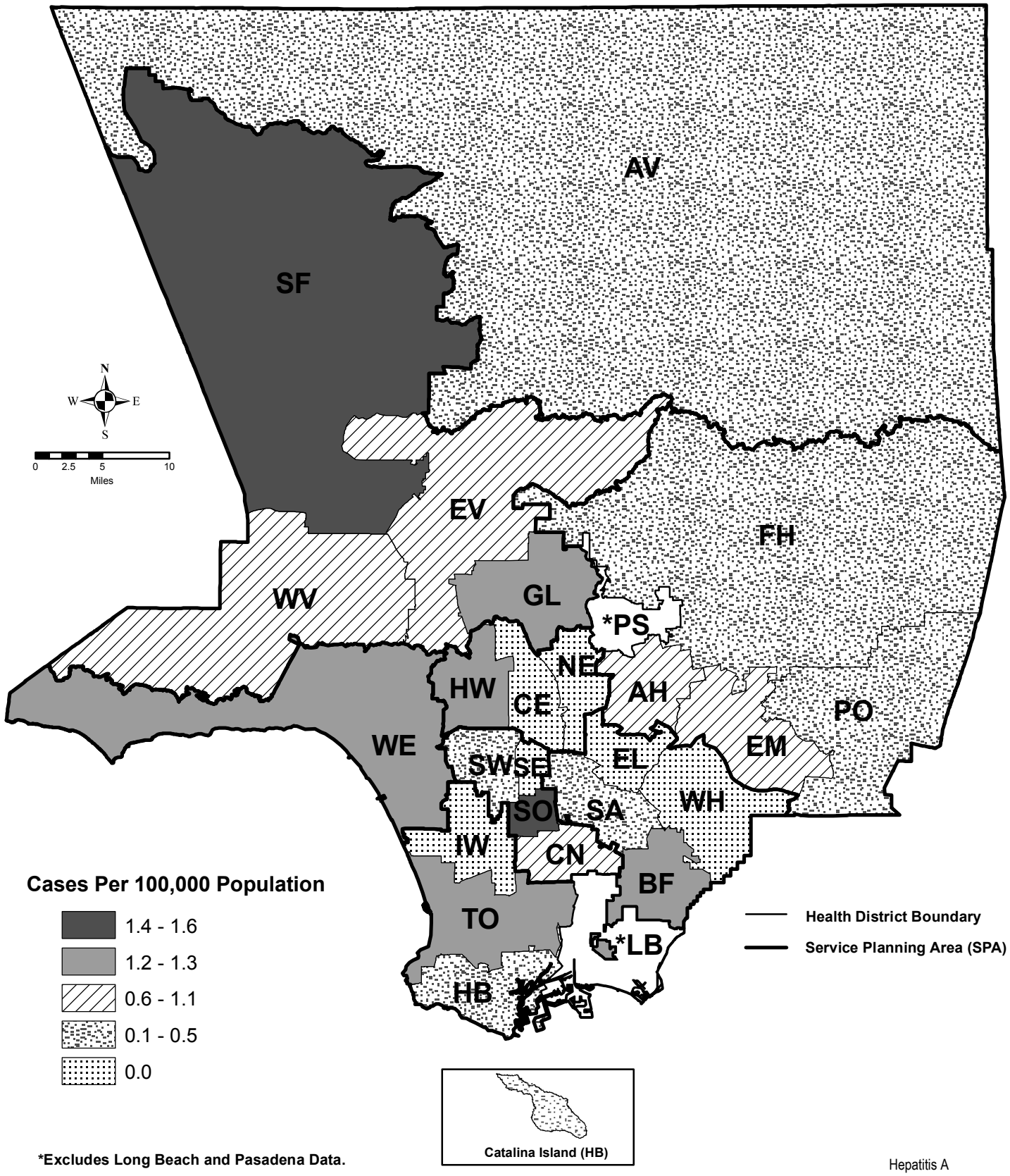


Figure 6. Hepatitis A Reported Risk Factors*
LAC, 2009 (n=36)



*Includes cases with multiple risk factors

Map 6. Hepatitis A
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	41
Annual Incidence[a]	
LA County	0.42
California[b]	0.83
United States[b]	1.34
Age at Diagnosis	
Mean	44
Median	45
Range	24-68 years

[a] Cases per 100,000 population

[b] Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Hepatitis B is a vaccine-preventable viral disease transmitted through parenteral or mucous membrane exposure (via sex or drugs) to the blood and other bodily fluids of individuals infected with the hepatitis B virus (HBV), a DNA-virus of the Hepadnaviridae family. It is also spread from mother to child at birth or soon after birth. Symptoms, which occur in less than half of those acutely infected, may be very mild and flu-like: anorexia, nausea, fatigue, abdominal pain, muscle or joint aches, jaundice and mild fever. Approximately 2–10% of adults infected with HBV are unable to clear the virus within six months and become chronic carriers. Death from cirrhosis or liver cancer is estimated to occur in 15–25% of those with chronic infection. Overall, hepatitis B is more prevalent and infectious than HIV.

For the purpose of surveillance, ACDC uses the CDC/CSTE criteria for acute hepatitis B. The criteria include: 1) discrete onset of symptoms and 2) jaundice *or* elevated aminotransferase levels, and 3) appropriate laboratory tests to confirm acute hepatitis B diagnosis (i.e., HBsAg positive or anti-HBc IgM positive, if done, and anti-HAV IgM negative, if done).

The absence of acute hepatitis B in children under age 19 is evidence of the successful immunization strategy to eliminate HBV transmission in LAC. This strategy includes: preventing perinatal HBV transmission by screening all pregnant women for HBsAg and providing immunoprophylaxis to infants of HBV-infected women, routine immunization of all infants, and catch-up vaccination of all previously unvaccinated children aged < 19 years. In addition, in LAC, hepatitis B vaccine is provided to high-risk groups at the Public Health Clinics at no charge.

New strategies are needed to reduce high-risk behaviors and provide resources for low-cost hepatitis B immunization, particularly for adults with the highest rates of transmission. Development and implementation of such strategies are possible through collaboration between public health, community-based organizations, and other agencies that serve target populations. Additionally, hepatitis education aims to eliminate, reduce, or mitigate high-risk behaviors in sexually active adults and those who use injection drugs; and to increase awareness and knowledge in the community.

2009 TRENDS AND HIGHLIGHTS

- The 2009 incidence rate of acute hepatitis B in Los Angeles County (LAC) has decreased from the previous year (0.42 per 100,000 versus 0.68 per 100,000) (Figure 1).
- The 2009 incidence rate of acute hepatitis B in LAC was highest in those between the ages of 45 to 54 years (1.2 per 100,000), followed by the 35 to 44 year age group (0.5 per 100,000) (Figure 2).
- The male-to-female ratio was 2.7:1.
- The 2009 incidence rate of acute hepatitis B in LAC was highest in blacks (1.3 per 100,000) followed by Asians (0.4 per 100,000), whites (0.4 per 100,000) and Hispanics (0.3 per 100,000) (Figure 3).
- Of the eight Service Planning Areas (SPAs), two SPAs in 2009 had rates greater than the overall county mean rate (0.42)--SPA 4 (1.0 per 100,000) and SPA 6 (1.0 per 100,000) (Figure 4),
- Risk factors were identified in 75% (n=24) of the 32 confirmed cases interviewed by a public health nurse (including some cases with multiple risk factors). Of those with identified risk factors, the most common were having multiple sexual partners (n=11, 46%) followed by MSM (n=9, 38%), and recent dental work (n=5, 21%) (Figure 5).

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=57)			2006 (N=62)			2007 (N=55)			2008 (N=66)			2009 (N=41)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
15-34	18	31.6	0.6	20	32.3	0.7	9	16.4	0.3	18	27.3	0.6	12	29.3	0.4
35-44	21	36.8	1.4	21	33.9	1.4	21	38.2	1.4	14	21.2	0.9	7	17.1	0.5
45-54	10	17.5	0.8	15	24.2	1.2	12	21.8	0.9	13	19.7	1.0	16	39.0	1.2
55-64	2	3.5	0.2	3	4.8	0.3	3	5.5	0.3	14	21.2	1.5	4	9.7	0.4
65+	6	10.5	0.6	3	4.8	0.3	9	16.4	0.9	7	10.6	0.7	2	4.9	0.2
Unknown	0	0.0		0	0.0		1	1.8		0	0.0		0	0	
Race / Ethnicity															
Asian	8	14.0	0.6	10	16.1	0.8	7	12.7	0.5	7	10.6	0.5	5	12.2	0.4
Black	12	21.1	1.4	4	6.5	0.5	11	20.0	1.3	15	22.7	1.8	11	26.8	1.3
Hispanic	19	33.3	0.4	26	41.9	0.6	16	29.1	0.3	16	24.2	0.3	12	29.3	0.3
White	16	28.1	0.6	21	33.9	0.7	19	34.5	0.7	22	33.3	0.8	11	26.8	0.4
Other	0	0.0	0.0	0	0.0	0.0	2	3.6	9.6	1	1.5	4.1	0	0	0
Unknown	2	3.5		1	1.6		0	0.0		5	7.6		2	4.9	
SPA															
1	1	1.8	0.3	2	3.2	0.6	1	1.8	0.3	2	3.0	0.5	0	0	0
2	10	17.5	0.5	15	24.2	0.7	13	23.6	0.6	9	13.6	0.4	4	9.8	0.2
3	4	7.0	0.2	6	9.7	0.3	4	7.3	0.2	6	9.1	0.3	6	14.6	0.3
4	14	24.6	1.1	16	25.8	1.3	14	25.5	1.1	7	10.6	0.5	13	31.7	1.0
5	5	8.8	0.8	3	4.8	0.5	5	9.1	0.8	9	13.6	1.4	1	2.4	0.2
6	7	12.3	0.7	6	9.7	0.6	9	16.4	0.9	22	33.3	2.1	10	24.4	1.0
7	8	14.0	0.6	6	9.7	0.4	4	7.3	0.3	6	9.1	0.4	2	4.9	0.1
8	8	14.0	0.7	6	9.7	0.5	5	9.1	0.4	4	6.1	0.4	4	9.8	0.4
Unknown	0	0.0		2	3.2		0	0.0		1	1.5		1	2.4	

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates of Acute Hepatitis B
LAC, CA and US, 1999-2009**

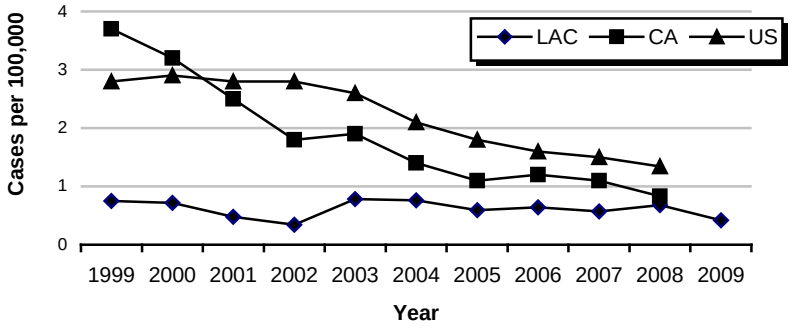
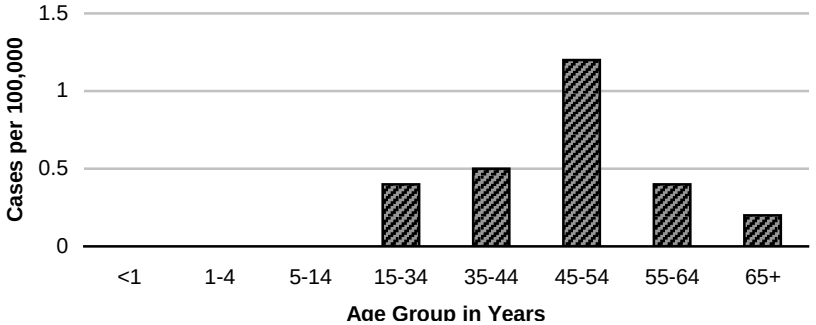


**Figure 2. Incidence Rates of Acute Hepatitis B by Age Group
LAC, 2009 (N=41)**



* Rates bases on fewer than 20 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence Rates by Race/Ethnicity
LAC, 2005-2009**

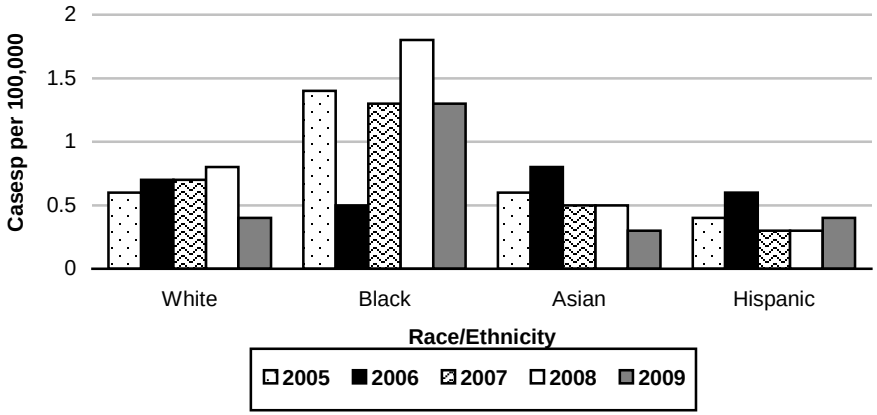


**Figure 4. Incidence Rates of Acute Hepatitis B by SPA
LAC, 2009 (N=41)**

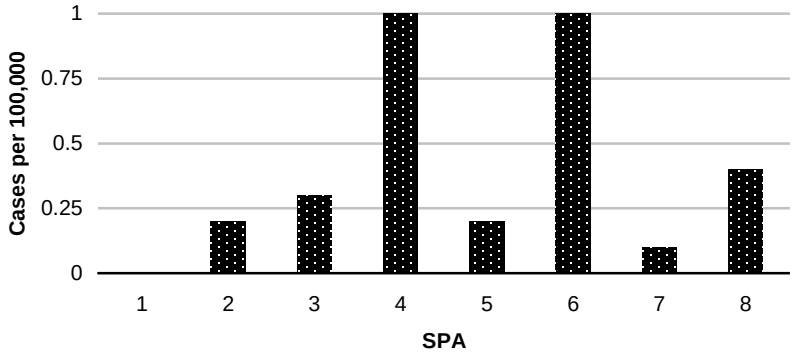
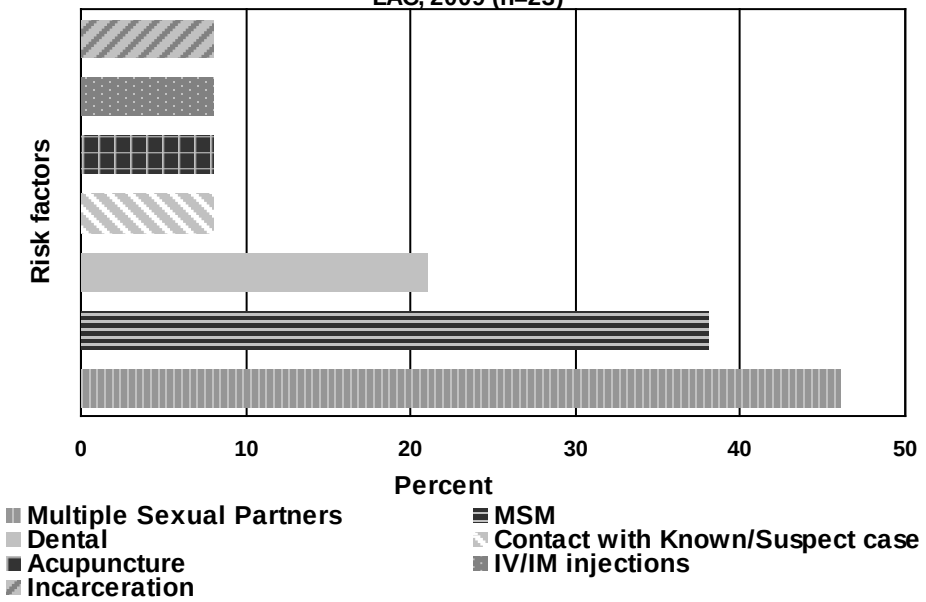


Fig. 5. Hepatitis B Reported Risk Factors*
LAC, 2009 (n=23)



*Includes cases with multiple risk factors

HEPATITIS B, PERINATAL

CRUDE DATA	
Infants Born to HBsAg+ Mothers	773
HBsAg+ Infants	2
Incidence of Exposure[a]	
LA County	5.6
Maternal Age at Diagnosis	
Mean	31.6 years
Median	32 years
Range	15-46 years
Infant Age at Diagnosis	
Mean	12.5 months
Median	12.5 months
Range	12-13 months

[a]Number of infants born to HBsAg-positive mothers per 1000 live births in 2008.

DESCRIPTION

Hepatitis B is a vaccine-preventable disease transmitted through parenteral or mucous membrane exposure to blood and other body fluids of individuals infected with the hepatitis B virus (HBV). It is also transmitted from mother to infant during birth. In Los Angeles County (LAC), it is estimated that over 40% of infants born to hepatitis B surface antigen (HBsAg) positive women will become infected without prophylaxis. An estimated 90% of infants who become infected by perinatal transmission develop chronic HBV infection and up to 25% will die from chronic liver disease as adults. Post-exposure prophylaxis with hepatitis B vaccine and hepatitis B immune globulin (HBIG) administered 12 to 24 hours after birth, followed by completion of a 3-dose vaccine series, has been demonstrated to be 85 to 95% effective in preventing acute and chronic HBV infection in infants born to mothers who are positive for both HBsAg and hepatitis B e-antigen. Post-vaccination serologic (PVS) testing is recommended at age 9–18 months after completing immunoprophylaxis to verify vaccine success or failure. The LAC Immunization Program's Perinatal Hepatitis B Prevention Program (PHBPP) conducts enhanced case management of HBsAg-positive pregnant women, their newborns, and household and sexual contacts (SC). Household contacts (HHC) are defined as an individual(s) with anticipated continuous household exposure for greater than one year (often limited to nuclear family).

2009 TRENDS AND HIGHLIGHTS

- In 2009, 773 infants (including 13 twins) were born to 760 HBsAg+ women.
- In 2009, the incidence of exposure increased by 8% from 5.2 to 5.6 per 1000 infants born in 2008 (Figure 1).
- Over 68.4% (n=520) of women screened for HBsAg were between 15 and 34 years of age.
- As consistent with previous years, in 2009, the majority of HBsAg+ women were Asian (n=557, 73.3%) followed by white (n=110, 14.5%), Other unknown (n=44, 5.8%), black (n=35, 4.6%), and Pacific Islanders (n=14, 1.8%) (Figures 2 and 3).
- The majority of HBsAg+ women reside in Service Planning Area (SPA) 3 (n=355, 46.7%), which has a large Asian population (Figure 4).
- The majority of infants received the first dose of Hepatitis B vaccine and HBIG within 12 hours of birth (Figure 5).
- In 2009, 15.9 % (n=123) of infants born to HBsAg+ women received post-vaccination serology (PVS) testing to determine immunity to hepatitis B after receipt of one dose of HBIG and completion of the three dose hepatitis B vaccination series. PVS results for two infants were HBsAg +, indicating infection (Figure 6).
- The majority of HHCs 39% were among the age groups 0-10 years (n=438) and 31-40 years (n=326, 29%) (Figure 7).
- Of the household contacts screened (n=175, 16%), 6 % (n=11) were infected, 69% (n=120), were immune, and 25% (n=44) were susceptible to hepatitis B. The Hepatitis B vaccine series was recommended for those who were susceptible (Figure 8).

Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Maternal Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=762)			2006 (N=803)			2007 (N=774)			2008 (N=778)			2009 (N=760)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	1	0.1	0.1	0	0.0	0.0	0	0.0	0.0
15-34	572	75.1	20.4	613	76.3	22.0	567	73.3	20.1	550	70.7	19.2	520	58.4	18.4
35-44	187	24.5	12.4	190	23.7	12.6	206	26.6	13.7	225	28.9	14.9	237	31.2	10.7
45-54	3	0.4	0.2	0	0.0	0.0	0	0.0	0.0	3	0.4	0.2	3	0.4	0.2
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	619	81.2	49.2	627	78.1	49.3	636	82.2	49.5	611	78.5	46.9	570	75.0	43.8
Black	35	4.6	4.1	30	3.7	3.6	28	3.6	3.3	32	4.1	3.7	33	4.0	3.9
Hispanic	70	9.2	1.5	90	11.2	1.9	70	9.0	1.5	71	9.1	1.5	76	10.0	1.6
White	35	4.6	1.2	51	6.4	1.8	29	3.7	1.0	30	3.9	1.0	40	5.0	1.4
Other	3	0.4	10.6	4	0.5	14.0	11	1.4	52.8	34	4.4	137	41	5.0	1.6
Unknown	0	0.0		1	0.1		0	0.0		0	0.0		0	0.0	
SPA															
1	8	1.0	2.3	6	0.7	1.7	8	1.0	2.2	4	0.5	1.1	6	0.8	1.6
2	100	13.1	4.7	99	12.3	4.6	100	12.9	4.6	96	12.3	4.4	117	15.4	5.3
3	361	47.4	21.1	396	49.3	23.0	392	50.6	22.7	394	50.6	22.7	355	46.7	20.5
4	81	10.6	6.5	97	12.1	7.7	88	11.4	7.0	96	12.3	7.5	83	10.9	6.7
5	36	4.7	5.7	37	4.6	5.8	33	4.3	5.2	37	4.8	5.7	32	4.2	4.9
6	38	5.0	3.7	41	5.1	3.9	33	4.3	3.2	43	5.5	4.1	38	5.0	3.6
7	62	8.1	4.5	58	7.2	4.2	54	7.0	3.9	55	7.1	4.0	50	6.6	3.6
8	76	10.0	6.9	56	7.0	5.0	66	8.5	5.9	50	6.4	4.4	75	9.9	6.7
Unknown	0	0.0		13	1.6		0	0.0		3	0.4		4	0.5	

*Rates calculated based on less than 19 cases or events are considered unreliable

Figure 1. Perinatal Hepatitis B Incidence of Exposure
LAC, 1999-2009

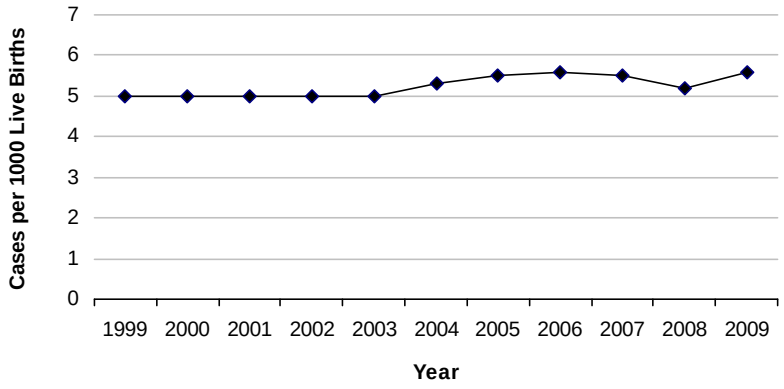
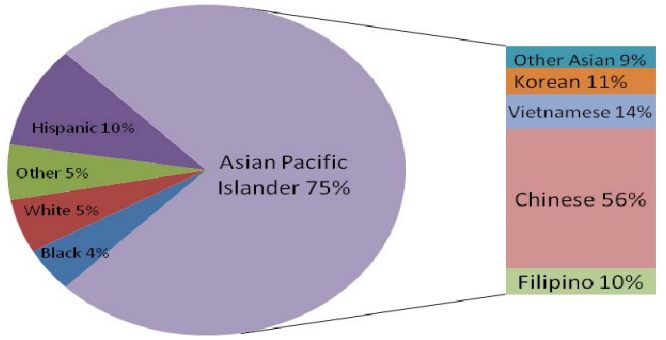


Figure 2.
Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2009 (N=760)



Other includes Native- American and any racial group that cannot be categorized as Asian, Black, Hispanic, and White or unknown. Other Asian is Asian-Indian, Cambodian non-Hmong, Thai, Lao, other Pacific Islander or unknown Asian.

Figure 3. Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2004-2009 (N=4610)

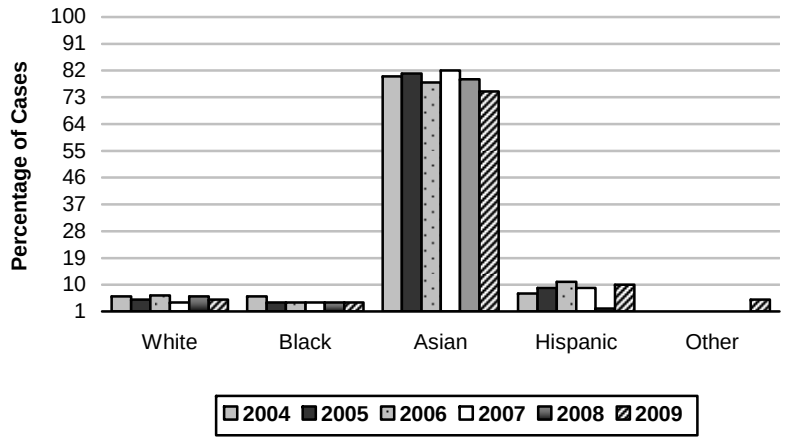


Figure 4. Perinatal Hepatitis B Maternal by SPA
LAC, 2009 (N=760)

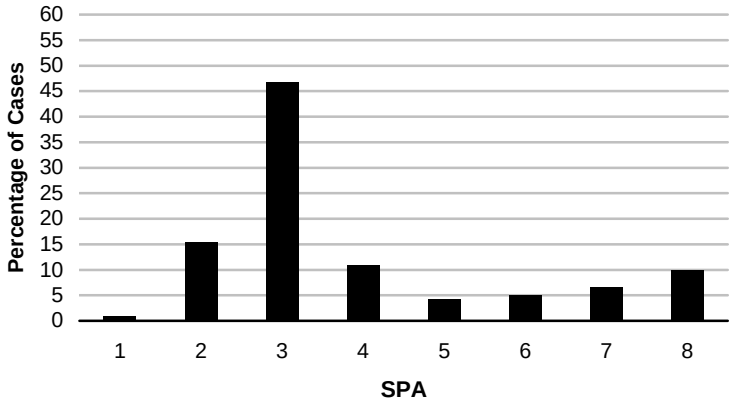


Figure 5. Perinatal Hepatitis B Summary of Infant Hepatitis B Immunoprophylaxis, LAC, 2009 (N=773)

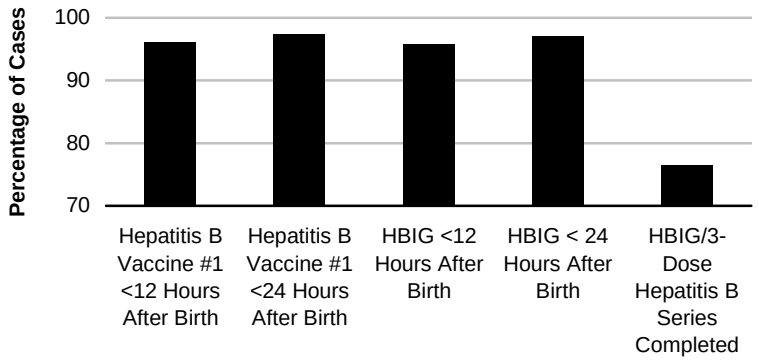
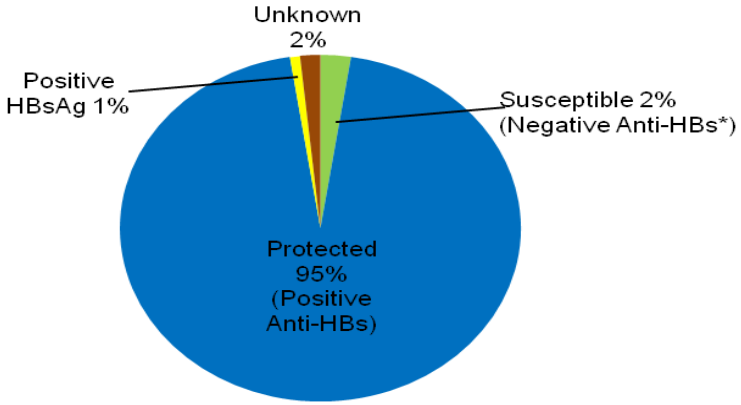


Figure 6. Perinatal Hepatitis B Infant Post Vaccination Serology Results LAC, 2009 (N=123)



*Antibody to Hepatitis B Surface Antigen

Figure 7. Perinatal Hepatitis B Household and Sexual Contacts Age Range, LAC, 2009 (N=1126)

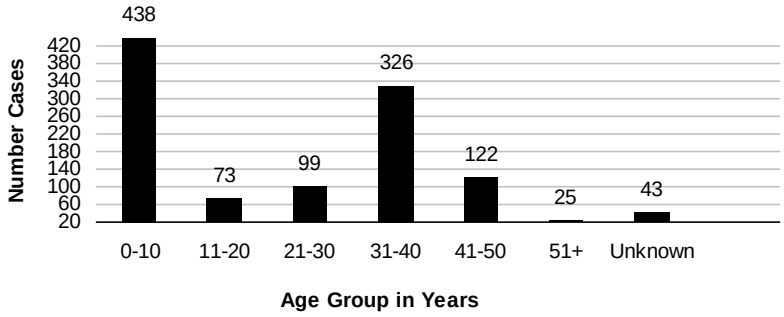
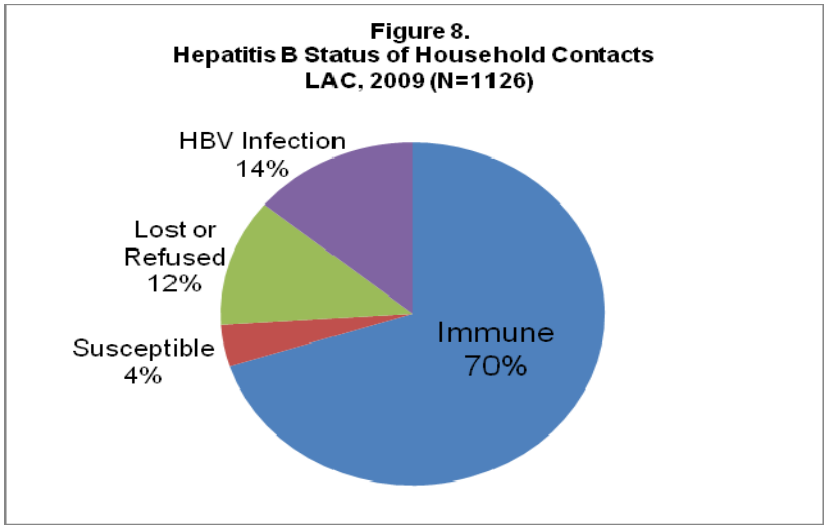


Figure 8. Hepatitis B Status of Household Contacts LAC, 2009 (N=1126)



HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	8
Annual Incidence	
LA County	0.08[a]
California[b]	0.08
United States[b]	0.29
Age at Diagnosis	
Mean	48
Median	48
Range	20-80 years

[a] Rates calculated based on less than 19 cases or events are considered unreliable.

[b] Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

The Hepatitis C virus (HCV) is the most common chronic bloodborne infection in the US. This RNA virus is predominantly transmitted through contact with contaminated blood and blood products via injection drug use.

Symptoms of acute infections can include jaundice, fatigue, anorexia, nausea, or vomiting; however, up to 85% of acute infections have mild or no symptoms. After acute infection, 15%-25% of persons appear to resolve their infection without sequelae as demonstrated by sustained absence of HCV RNA in serum and normalization of alanine aminotransferase (ALT) levels. Chronic HCV infection develops in 75%-85% of persons with persistent or fluctuating ALT elevations developing in 60%-70% of chronically infected persons. In the remaining 30%-40% of chronically infected persons, ALT levels are normal. Most studies have reported that medical complications occur decades after initial infection including cirrhosis, liver failure, and hepatic cancer.

Traditional risk factors include: anyone who has had a blood transfusion prior to 1989, IV drug users (IDU), hemodialysis patients, infants born to infected mothers, those with multiple sexual partners, healthcare workers who suffer needle-stick accidents, and people with tattoos or body-piercing. Sexual and perinatal transmission of HCV appears to occur much less frequently. Household or familial contact is not considered a risk factor for the transmission of hepatitis C. An estimated 30% have no identifiable risk of exposure. Health-care related transmission has been documented infrequently however; recognition of cases associated with nonhospital health-care settings has been increasing.

The reduction of high-risk behaviors is the primary recommendation for preventing transmission; especially, since there is no effective vaccine or post-exposure prophylaxis. Vaccines for hepatitis A and B do not provide immunity against hepatitis C. Educational efforts aimed at reducing high-risk behaviors (e.g., sharing injection drug equipment, engaging in unprotected sex) may help to reduce new hepatitis C cases

For the purpose of surveillance, ACDC uses the CDC/CSTE criteria for acute hepatitis C: discrete onset of symptoms and: 1) a positive HCV test (antibody test by EIA) confirmed by a more specific test (RIBA or detection of the HCV-RNA antigen by polymerase-chain reaction [PCR]) or an EIA signal to cutoff ratio of≥3.8; 2) serum ALT greater than 400; and 3) no evidence of either acute hepatitis A or B disease.

In the US in 2007, traditional risk factors, including IDU, were the most common risk factors identified, for acute infections. In Los Angeles County in 2009, the most common risk factors reported have been nosocomial (health-care related).

2009 TRENDS AND HIGHLIGHTS

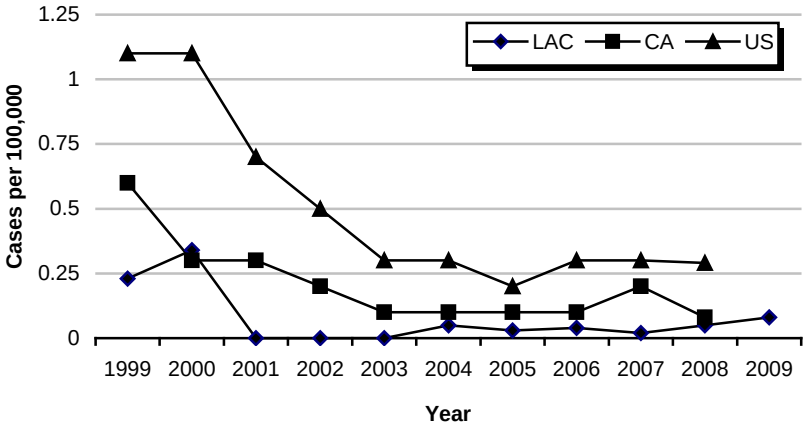
- 58 reported cases of hepatitis C were investigated in 2009 but only eight cases (14%) were found to meet the CDC/CSTE case criteria for acute hepatitis C (versus 5 cases in 2008)..
- The eight cases ranged in age from 20 to 80 years; both the median age and mean age was 48 years (Figure 2).
- The majority of cases were white (74%, n=6) (Figure 3).
- Risk factors were identified in 86% (n=6) of the confirmed cases interviewed, (including some with multiple risk factors). Of those with risk factors, receiving IM injections and/or IV infusions (n=4, 57%) and having a medical procedure (n=4, 57%) were the most common risk factors followed by having a dental procedure (n=3, 43%).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=3)			2006 (N=4)			2007 (N=3)			2008 (N=5)			2009 (N=8)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
15-34	1	33.3	0.0	0	0.0	0.0	2	66.7	0.1	1	20.0	0.0	1	12.5	0
35-44	1	33.3	0.1	2	50.0	0.1	0	0.0	0.0	1	20.0	0.1	2	25.0	0.1
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	40.0	0.1	3	37.5	0.2
55-64	1	33.3	0.1	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	1	12.5	0.1
65+	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	1	20.0	0.1	1	12.5	0.1
Unknown	0	0.0		0	0.0		1	33.3		0	0.0		0	0	
Race / Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	1	12.5	0.1
Black	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0	0
Hispanic	0	0.0	0.0	2	50.0	0.0	1	33.3	0.0	1	20.0	0.0	1	12.5	0
White	3	100.	0.1	1	25.0	0.0	1	33.3	0.0	3	60.0	0.1	6	75.0	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		1	33.3		0	0.0		0	0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	12.5	0.3
2	1	33.3	0.0	0	0.0	0.0	0	0.0	0.0	3	60.0	0.1	0	0	0
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	0	0	0
4	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	2	25.0	0.2
5	2	66.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	25.0	0.3
6	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0	0
7	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	1	12.5	0.1
8	0	0.0	0.0	2	50.0	0.2	0	0.0	0.0	1	20.0	0.1	2	25.0	0.2
Unknown	0	0.0		1	25.0		1	33.3		0	0.0		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Acute Hepatitis C
LAC, CA and US, 1999-2009



*Rates based on fewer than 19 cases are unreliable

Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2009 (N=8)

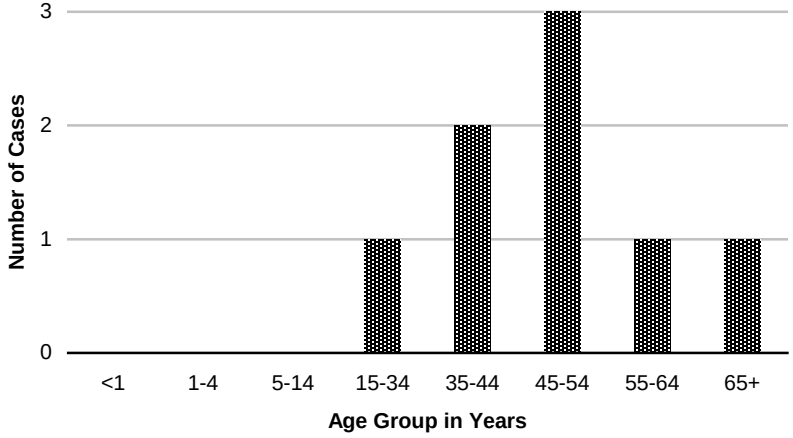
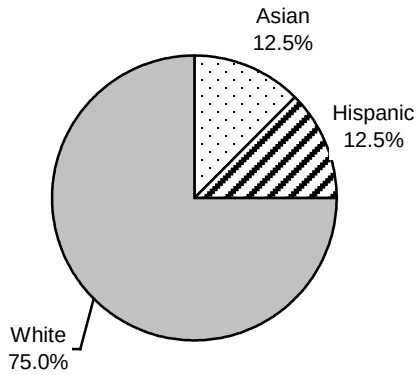


Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2009 (N=8)



KAWASAKI SYNDROME

CRUDE DATA	
Number of Cases	70
Annual Incidence[a]	
LA County	0.72
California[b]	N/A
Age at Diagnosis	
Mean	2.5
Median	2
Range	2 months – 9 years

[a]Cases per 100,000 population.
[b]Not notifiable.

DESCRIPTION

Kawasaki Syndrome (KS), also called mucocutaneous lymph node syndrome (MLNS), was first described by Dr. Tomisaku Kawasaki in Japan in 1967 and emerged in the US in the 1970s. Several regional outbreaks have been reported since 1976. This is an illness that affects children, usually under five years of age. It occurs more often in boys than girls (ratio of about 1.5:1). Clinical manifestations include an acute febrile illness and acute self-limited systemic vasculitis leading to vessel wall injury with potentially fatal complications affecting the heart and large arteries. In the US, it is a major cause of heart disease in children. Though the etiology is unknown, there are multiple theories including an infectious etiology with a possible autoimmune component. In the US, the mortality rate is approximately 1%.

CDC Case Definition

Fever lasting five or more days without any other reasonable explanation and must satisfy at least four of the following criteria:

- bilateral conjunctival injection;
- oral mucosal changes (erythema of lips or oropharynx, strawberry tongue, or drying or fissuring of the lips);
- peripheral extremity changes (edema, erythema, generalized or periungual desquamation)
- rash;
- cervical lymphadenopathy > 1.5 cm diameter.

Patients whose illness does not meet the CDC case definition but who have fever and coronary artery abnormalities are classified as having atypical or incomplete KS.

2009 TRENDS AND HIGHLIGHTS

- A total of 70 confirmed patients (incidence rate; 0.72 per 100,000) including ten with atypical KS met the CDC surveillance case definition in 2009, representing a 27% increase from 2008 (n=55) (Figure 1). Overall, incidence of KS has increased in LAC since 2006.
- Eighty-four percent (n=59) of confirmed cases were reported in children under five years old. Mean age was 2.5 years old, and the age range was from two months to nine years old. The highest incidence rate occurred in children one to four years old (8.9 per 100,000) followed by children ages <1 year (6.6 per 100,000) (Figure 2).
- The male to female ratio was 1.2:1. 54.3% (n=38) of confirmed cases were male, 45.7% (n=32) of confirmed cases were female.
- Hispanics had the highest number of cases (n=39, 55.7%) in 2009. However, the highest incidence rate occurred among Asians (1.2 per 100,000), which is consistent with previous years (Figure 3, 6).
- Service Planning Area (SPA) 6 had the highest incidence rates—1.5 per 100,000 and SPA 7 had lowest incident rates—0.4 per 100,000 , respectively (Figure 4).
- KS occurs year-round, but more cases are reported in winter and spring. In 2009, 15.7% (n=11) of confirmed cases were reported in April (Figure 5).
- There were no fatal or recurrent cases in 2009. Family history was reported in 1% (n=1) of confirmed cases (N=70)
- Of the confirmed cases (N=70), 48.6% (n=34) had cardiac complications including cardiac coronary aneurysms (5.9%, n=2), cardiac coronary artery dilatation (29.4%, n=10), and valvular abnormalities (50%, n=17).
- Of the confirmed cases (N=70), 99% (n=69) was treated with intravenous immune globulin (IVIG) and high doses of aspirin.

Reported Kawasaki Syndrome Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=56)			2006 (N=75)			2007 (N=52)			2008 (N=55)			2009 (N=70)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	9	16.1	6.4	18	24.0	12.4	9	17.3	6.1	10	18.2	7.0	9	12.9	6.6
1-4	38	67.9	6.6	50	66.7	8.6	35	67.3	6.1	32	58.2	5.6	50	71.4	8.9
5-14	9	16.1	0.6	7	9.3	0.5	8	15.4	0.6	13	23.6	0.9	11	15.7	0.8
15-34	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
35-44	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				
Race / Ethnicity															
Asian	19	33.9	1.5	25	33.3	2.0	13	25.0	1.0	17	30.9	1.2	15	21.4	1.2
Black	3	5.4	0.4	8	10.7	0.9	5	9.6	0.6	3	5.5	0.2	5	7.1	0.6
Hispanic	23	41.1	0.5	28	37.3	0.6	26	50.0	0.6	28	50.9	0.6	39	55.7	0.8
White	7	12.5	0.2	11	14.7	0.4	3	5.8	0.1	4	7.3	0.1	8	11.4	0.3
Other	4	7.1	14.2	3	4.0	10.5	3	5.8	14.4	3	5.5	12.2	3	40.0	-
Unknown	0	0.0		0	0.0		2	3.8		0	0.0		0	0	0
SPA															
1	2	3.6	0.6	1	1.3	0.3	1	1.9	0.3	1	1.8	0.3	2	2.3	0.5
2	13	23.2	0.6	14	18.7	0.7	8	15.4	0.4	11	20.0	0.5	12	17.1	0.5
3	12	21.4	0.7	13	17.3	0.8	10	19.2	0.6	8	14.5	0.5	12	17.0	0.7
4	12	21.4	1.0	10	13.3	0.8	6	11.5	0.5	9	16.4	0.7	10	14.3	0.8
5	2	3.6	0.3	3	4.0	0.5	3	5.8	0.5	3	5.5	0.3	5	7.1	0.8
6	3	5.4	0.3	8	10.7	0.8	6	11.5	0.6	4	7.3	0.4	16	22.9	1.5
7	5	8.9	0.4	9	12.0	0.7	10	19.2	0.7	13	23.6	0.9	6	8.6	0.4
8	7	12.5	0.6	17	22.7	1.5	8	15.4	0.7	6	10.9	0.5	7	10.0	0.6
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates of Kawasaki Syndrome
LAC, 1999-2009**

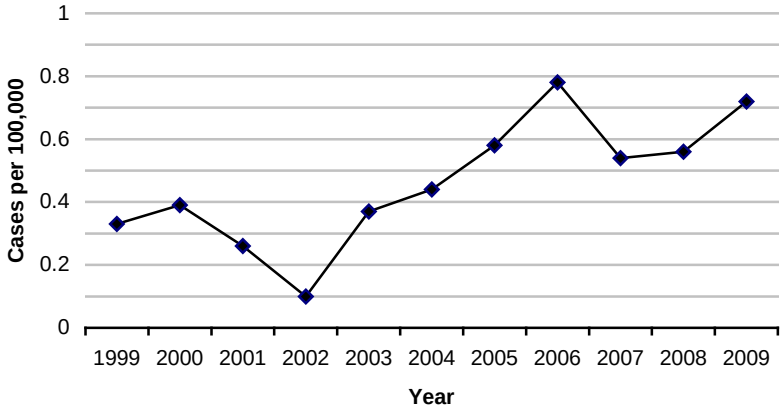


**Figure 2. Incidence Rates of Kawasaki Syndrome by Age Group
LAC, 2009 (N=70)**

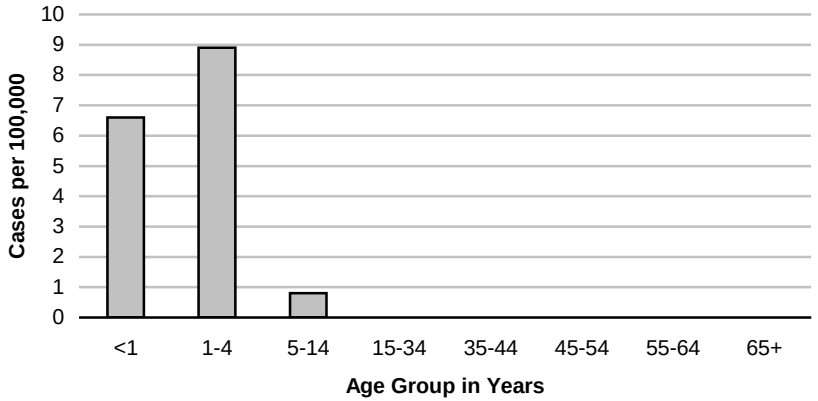
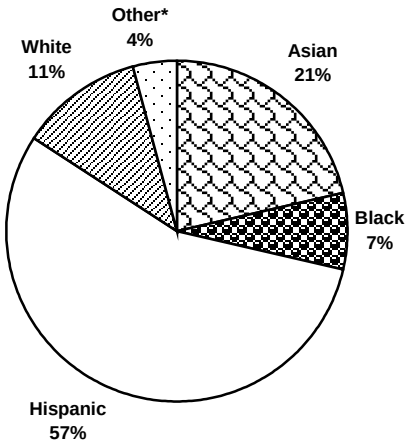


**Figure 3. Percent Cases of Kawasaki Syndrome
by Race/Ethnicity, LAC, 2009 (N=70)**



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, and white.

**Figure 4. Incidence Rates of Kawasaki Syndrome by SPA
LAC, 2009 (N=70)**

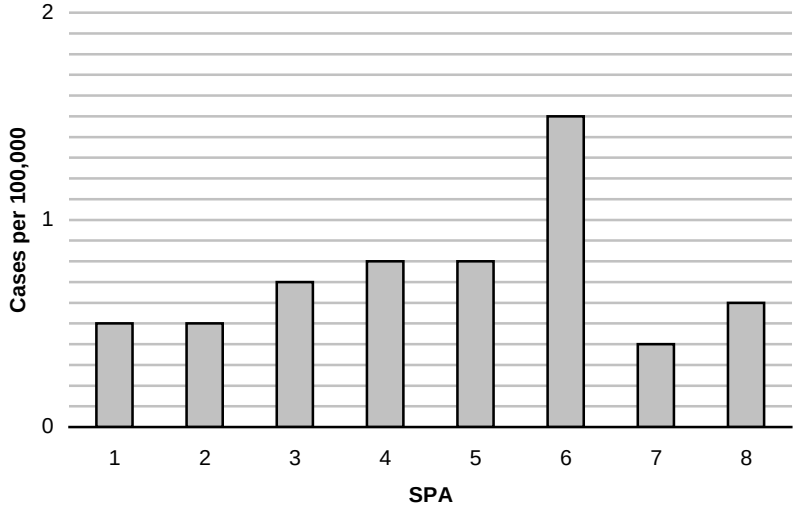


Figure 5. Reported Kawasaki Syndrome Cases by Month of Onset LAC, 2009 (N=70)

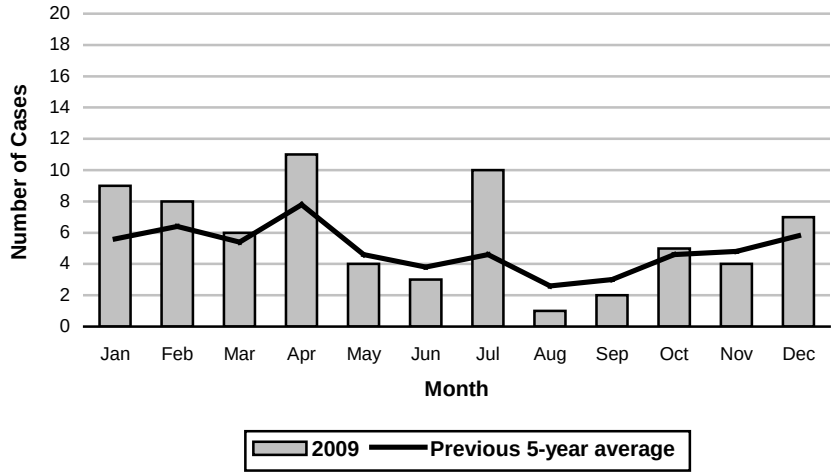
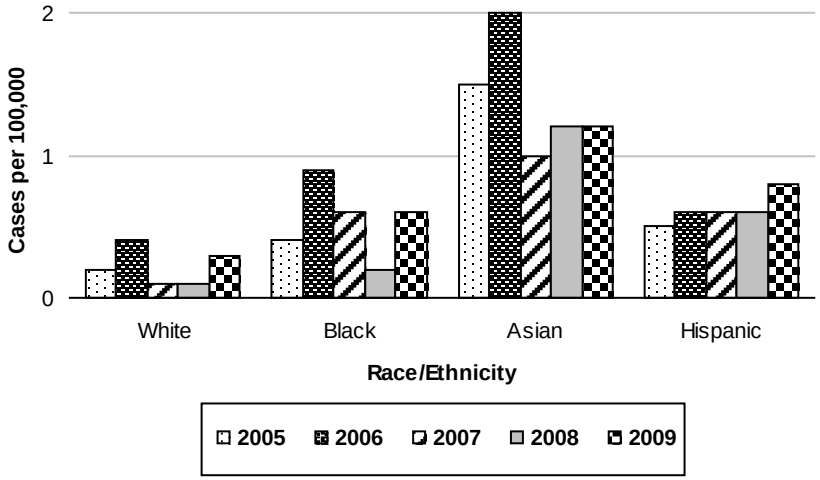
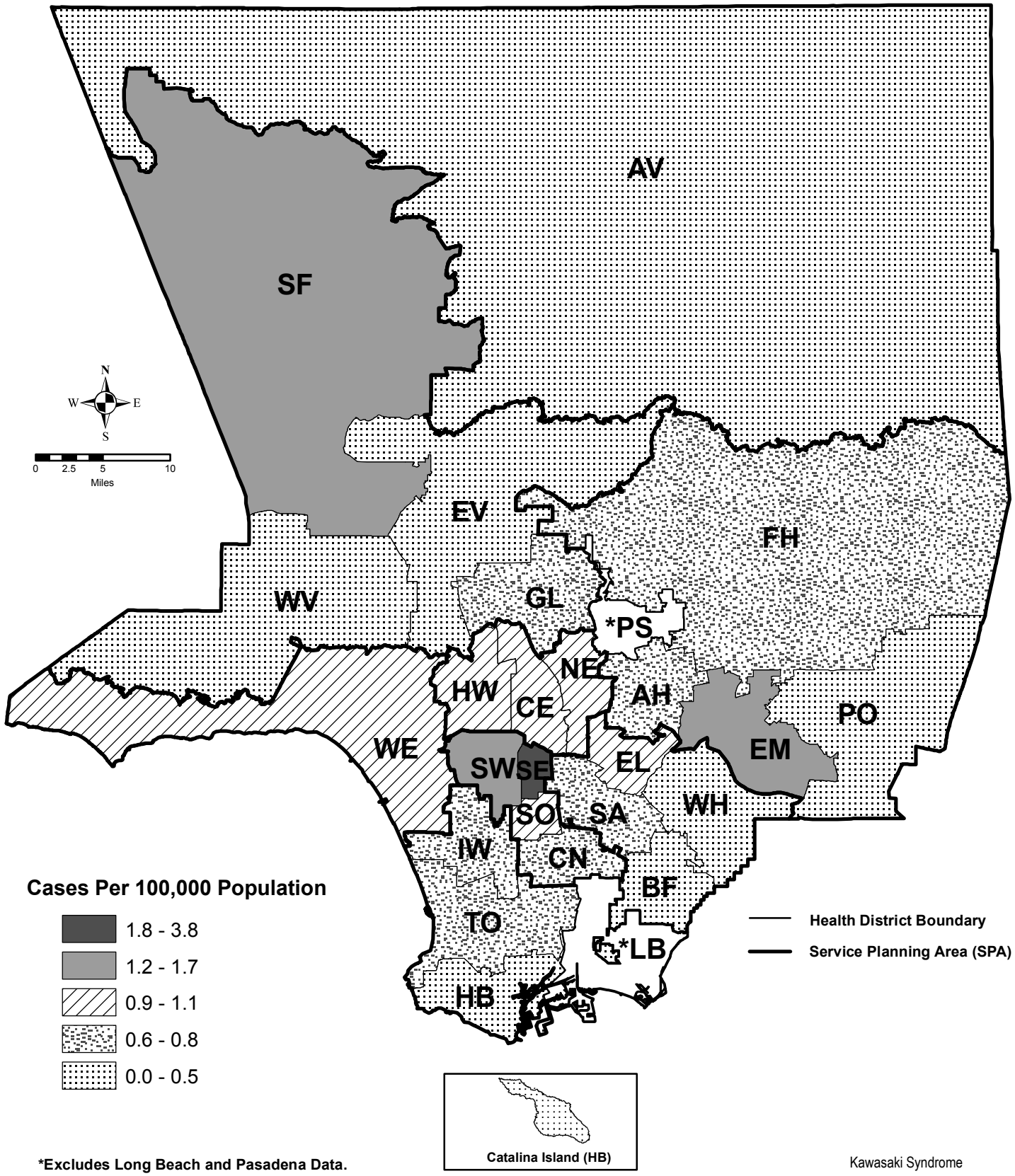


Figure 6. Kawasaki Syndrome Incidence by Race/Ethnicity LAC, 2005-2009



Map 7. Kawasaki
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

LEGIONELLOSIS

CRUDE DATA	
Number of Cases	66
Number of Deaths	3
Annual Incidence[a]	
LA County	0.68
California[b]	0.5
United States[b]	1.1
Age at Diagnosis	
Mean	65.9
Median	66
Range	32-93

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Legionellosis is a bacterial infection with two distinct clinical forms: 1) Legionnaires' disease (LD), the more severe form characterized by pneumonia, and 2) Pontiac fever, an acute-onset, self-limited flu-like illness without pneumonia. *Legionella* bacteria are common inhabitants of aquatic systems that thrive in warm environments. Ninety percent of cases of LD are caused by *Legionella pneumophila serogroup 1,* although at least 46 Legionella species and 70 serogroups have been identified. Transmission occurs through inhalation of aerosols containing the bacteria or by aspiration of contaminated water. Person-to-person transmission does not occur. The case fatality rate for LD ranges from 10% to 15%, but can be higher in outbreaks occurring in a hospital setting. People of any age may get LD, but the disease most often affects middle-aged and older persons, particularly those who are heavy smokers, have chronic lung disease, or whose immune systems are suppressed by illness or medication.

The implementation of water safety plans to control the risk of transmission of *legionella* to susceptible hosts in hospitals, hotels and public places with water related amenities remains the primary means of reducing LD. Plans include inspection of water source, distribution systems, and heat exchanger and cooling towers. Prevention strategies include instituting periodic disinfection, monitor/maintain cold and hot water systems, and setting temperatures to 50 degrees Celsius or higher to limit bacterial growth. Surveillance of LD is essential to monitor disease incidence. All healthcare acquired LD are investigated to determine outbreak situations. Early recognition and investigation is crucial for timely implementation of control measures.

2009 TRENDS AND HIGHLIGHTS

- LD incident rates continue to increase (Figure 1). Expanded electronic laboratory reporting and web-based confidential morbidity reporting may explain the increase since 2007.
- Most utilized method of diagnosis is by urine antigen, which is highly specific for *L. pneumophila* serogroup 1a, so other serogroups or species will not be detected. Culture confirmation is encouraged and will allow for strain typing during outbreaks.
- Four cases of Pontiac fever were reported.
- In 2009, an unusual number of LD occurrences led to enhanced surveillance, case finding and environmental investigations.
- The identification of two or more cases from a single exposure site within a six month period prompted three epidemiologic investigations: two different skilled nursing facilities (SNF) and a local fitness center (see 2009 ACDC Special Studies). Enhanced surveillance, retrospective case finding, and environmental inspection and sampling were performed. No additional cases were found, and no *legionella* bacteria were identified from the environment in any of these investigations.
- The case fatality rate has decreased from 10.2% in 2008 to 4.5% in 2009. A history of recent travel was reported in 3.0% of cases.
- Most affected age group in LAC is 65 and up (Figure 2)
- Service Planning Area (SPA) 5 sustained the high incidence since 2008 (2.0 per 100,000) followed by SPA 6 (1.0 per 100,000) (Figure 3).
- LAC cases were distributed throughout the year, with peak months being August-December. Current surveillance peaked in December as compared to August in 2008. (Figure 4).
- The highest incidence rate of cases occurred among blacks (1.6 per 100,000) followed by whites (1.1 per 100,000) (Figure 5).

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=31)			2006 (N=24)			2007 (N=40)			2008 (N=59)			2009 (N=66)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	1.7	0.7	0		
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0		
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0		
15-34	0	0.0	0.0	1	4.2	0.0	2	5.0	0.1	1	1.7	0.0	2	3.0	0.1
35-44	3	9.7	0.2	2	8.3	0.1	4	10.0	0.3	5	8.5	0.3	3	4.5	0.2
45-54	5	16.1	0.4	2	8.3	0.2	10	25.0	0.8	7	11.9	0.5	11	16.6	0.8
55-64	10	32.3	1.2	5	20.8	0.6	5	12.5	0.6	12	20.3	1.3	14	21.2	1.5
65+	13	41.9	1.3	14	58.3	1.4	19	47.5	1.9	33	55.9	3.2	36	54.5	3.4
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race / Ethnicity															
Asian	7	22.6	0.6	6	25.0	0.5	0	0.0	0.0	5	8.5	0.4	7	10.6	0.5
Black	2	6.5	0.2	3	12.5	0.4	6	15.0	0.7	11	18.6	1.3	14	21.2	1.6
Hispanic	10	32.3	0.2	5	20.8	0.1	12	30.0	0.3	13	22.0	0.3	13	19.6	0.3
White	12	38.7	0.4	10	41.7	0.3	22	55.0	0.8	30	50.8	1.0	32	48.4	1.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	1.7	0.3	0	0	0
2	4	12.9	0.2	3	12.5	0.1	8	20.0	0.4	18	30.5	0.8	14	21.2	0.6
3	6	19.4	0.4	4	16.7	0.2	6	15.0	0.3	9	15.3	0.5	7	10.6	0.4
4	1	3.2	0.1	7	29.2	0.6	7	17.5	0.6	7	11.9	0.5	9	13.6	0.7
5	1	3.2	0.2	1	4.2	0.2	7	17.5	1.1	8	13.6	1.2	13	19.6	2.0
6	2	6.5	0.2	0	0.0	0.0	7	17.5	0.7	4	6.8	0.4	10	15.1	1.0
7	6	19.4	0.4	7	29.2	0.5	4	10.0	0.3	4	6.8	0.3	8	12.1	0.6
8	1	3.2	0.1	1	4.2	0.1	1	2.5	0.1	8	13.6	0.7	5	7.5	0.4
Unknown	10	32.3		1	4.2		0	0.0		0	0.0				

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 2000-2009

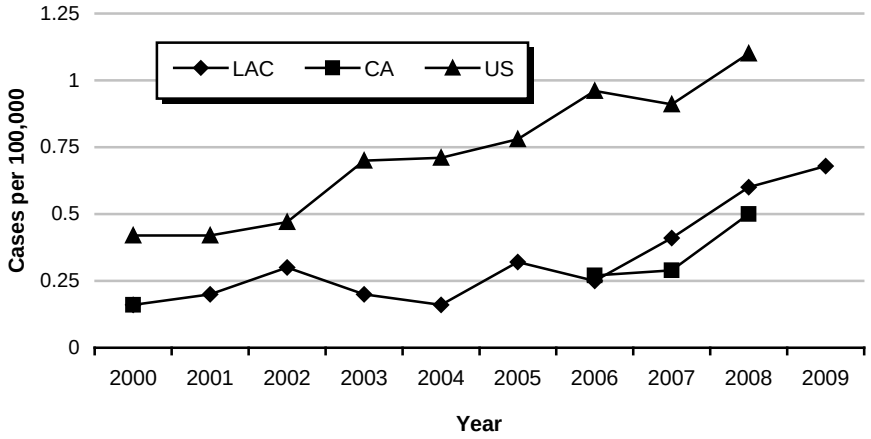


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2009 (N=66)

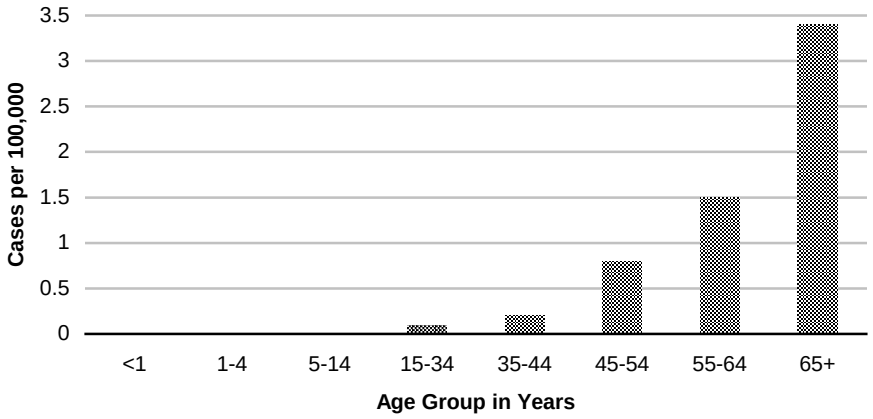


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2009 (N=66)

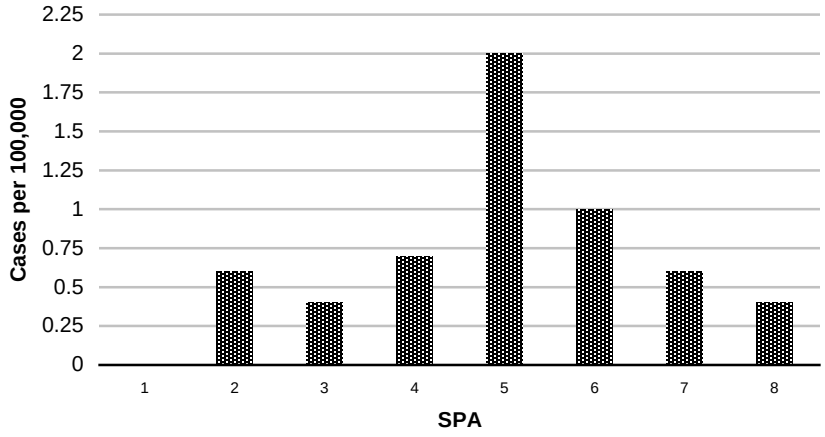


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2009 (N=66)

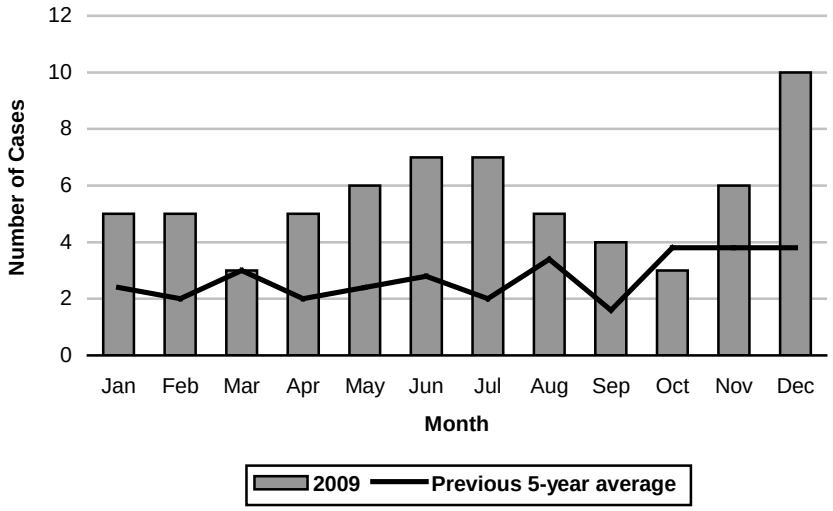
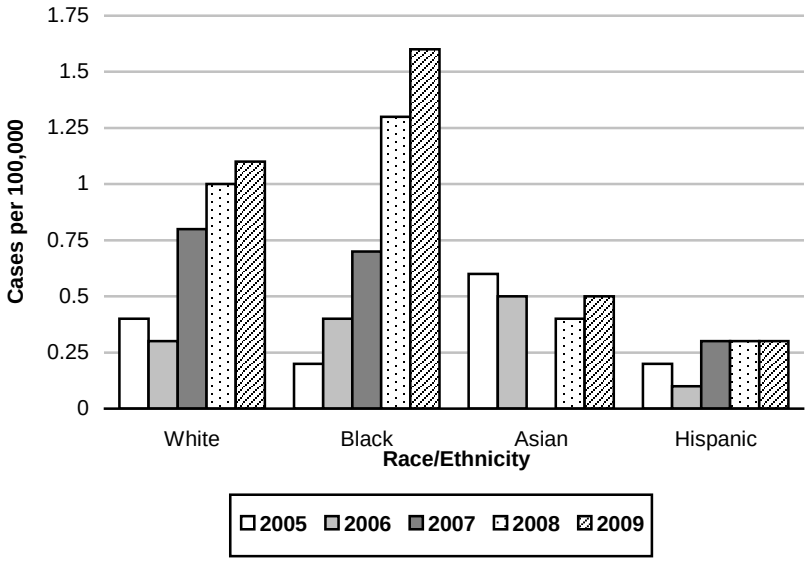
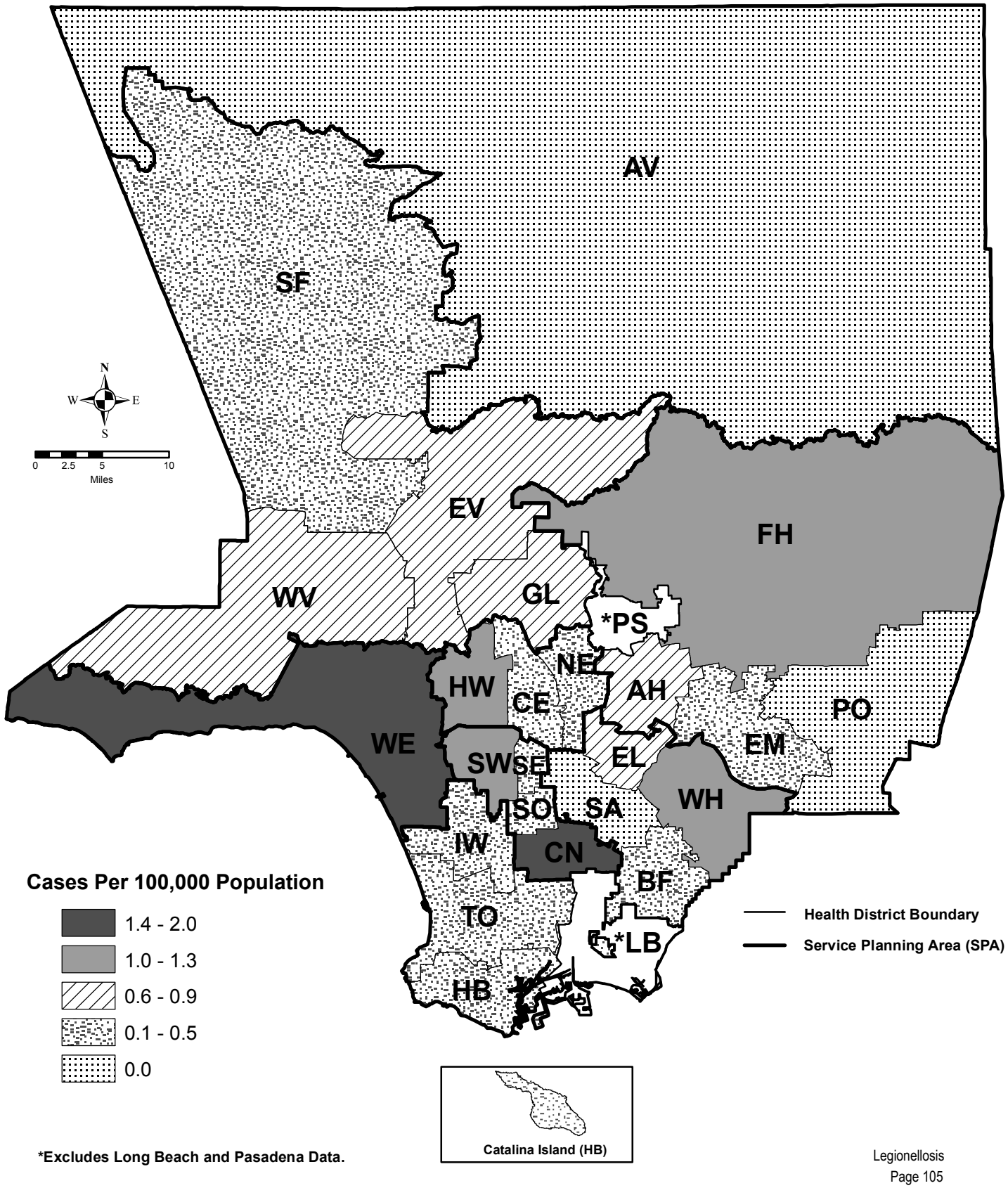


**Figure 5. Legionellosis Rates by Race/Ethnicity
LAC, 2005-2009**



Map 8. Legionellosis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	15
Annual Incidence[a]	
LA County	0.15
California	n/a
United States	n/a
Age at Diagnosis	
Mean	62
Median	67
Range	7-88

[a]Cases per 100,000 population.

DESCRIPTION

Listeriosis is a disease caused by infection with *Listeria monocytogenes*, a Gram-positive rod that is found in soil throughout the environment. Listeriosis is often caused by ingestion of foods contaminated with *L. monocytogenes.* Foods often associated with *Listeria* contamination include raw fruits and vegetables, cold cuts and deli meats and unpasteurized dairy products. The disease affects primarily persons of advanced age, pregnant women, newborns, and adults with weakened immune systems. On rare occasions, people without these risk factors have also contracted listeriosis. Symptoms of listeriosis include: fever, muscle aches, and sometimes nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage or stillbirth, premature delivery, or infection of the newborn.

In general, listeriosis may be prevented by thoroughly cooking raw food from animal sources, such as beef, pork, or poultry; washing raw fruits and vegetables thoroughly before eating; and keeping uncooked meats separate from raw produce and cooked foods. Avoiding unpasteurized milk or foods made from unpasteurized milk and washing hands, knives, and cutting boards after handling uncooked foods also may prevent listeriosis.

Persons at high risk for listeriosis include the elderly, those with cancer, HIV, diabetes, weakened immune systems, and those on immunosuppressive therapy. These individuals should follow additional recommendations: avoid soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese. Hard cheeses, processed cheeses, cream cheese, cottage cheese, or yogurt need not be avoided altogether; however, individuals with severely compromised immune systems and/or several disease risk factors should avoid them.

Leftover foods or ready-to-eat foods, such as hot dogs and deli meats, should be cooked until steaming hot before eating. Finally, although the risk of listeriosis associated with foods from deli counters is relatively low, immunocompromised persons should avoid these foods or thoroughly reheat cold cuts before eating.

2009 TRENDS AND HIGHLIGHTS

- In previous year, Asians comprised almost one-third of all nonperinatal listeriosis cases; however, in 2009, there are no cases of nonperinatal listeriosis among Asians. Cases were nearly evenly divided among whites (47%) and Hispanics (46%), with blacks comprising the remaining 7% of cases (Figure 3). Despite increased prevalence of conditions (such as diabetes, respiratory and cardiovascular disease) that predispose to contracting listeriosis, blacks consistently make up a small proportion of listeriosis cases (5%). Regionally there is greater incidence of listeriosis in Service Planning Area (SPA) 2 compared to other SPAs in LAC (Figure 4). Distribution of cases is fairly even across the other SPAs.
- Historically the occurrence of listeriosis cases peaks in August and September (Figure 5). Listeriosis cases in 2009 also peaked in August and September, but a rise in cases during June deviated from the previous 5-year trend.
- Nonperinatal listeriosis disproportionately affects the elderly and immunocompromised. The median age of nonperinatal cases is 67 years, consistently reflecting advanced age as a risk factor for listeriosis.

Reported Listeriosis, nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=25)			2006 (N=25)			2007 (N=21)			2008 (N=20)			2009 (N=15)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	2	8.0	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	2	8.0	0.1	0	0.0	0.0	0	0.0	0.0	1	5.0	0.1	1	6.7	0.1
15-34	0	0.0	0.0	2	8.0	0.1	0	0.0	0.0	1	5.0	0.0	1	6.7	0.0
35-44	0	0.0	0.0	1	4.0	0.1	0	0.0	0.0	1	5.0	0.1	0	0.0	0.0
45-54	5	20.0	0.4	4	16.0	0.3	6	28.6	0.5	1	5.0	0.1	2	13.3	0.1
55-64	6	24.0	0.7	6	24.0	0.7	6	28.6	0.7	5	25.0	0.5	1	6.7	0.1
65+	10	40.0	1.0	12	48.0	1.2	9	42.9	0.9	11	55.0	1.1	10	66.7	0.9
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	4	16.0	0.3	3	12.0	0.2	3	14.3	0.2	6	30.0	0.5	0	0.0	0.0
Black	2	8.0	0.2	1	4.0	0.1	0	0.0	0.0	1	5.0	0.1	1	6.7	0.1
Hispanic	5	20.0	0.1	8	32.0	0.2	8	38.1	0.2	5	25.0	0.1	7	46.7	0.1
White	14	56.0	0.5	13	52.0	0.5	10	47.6	0.3	8	40.0	0.3	7	46.7	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	8	32.0	0.4	7	28.0	0.3	6	28.6	0.3	3	15.0	0.1	4	26.7	0.2
3	5	20.0	0.3	8	32.0	0.5	4	19.0	0.2	6	30.0	0.3	2	13.3	0.1
4	0	0.0	0.0	5	20.0	0.4	1	4.8	0.1	3	15.0	0.2	3	20.0	0.2
5	4	16.0	0.6	4	16.0	0.6	4	19.0	0.6	1	5.0	0.2	0	0.0	0.0
6	3	12.0	0.3	1	4.0	0.1	3	14.3	0.3	2	10.0	0.2	2	13.3	0.2
7	3	12.0	0.2	0	0.0	0.0	3	14.3	0.2	3	15.0	0.2	2	13.3	0.1
8	2	8.0	0.2	0	0.0	0.0	0	0.0	0.0	2	10.0	0.2	2	13.3	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Reported Cases of Nonperinatal Listeriosis
LAC, 2000-2009**

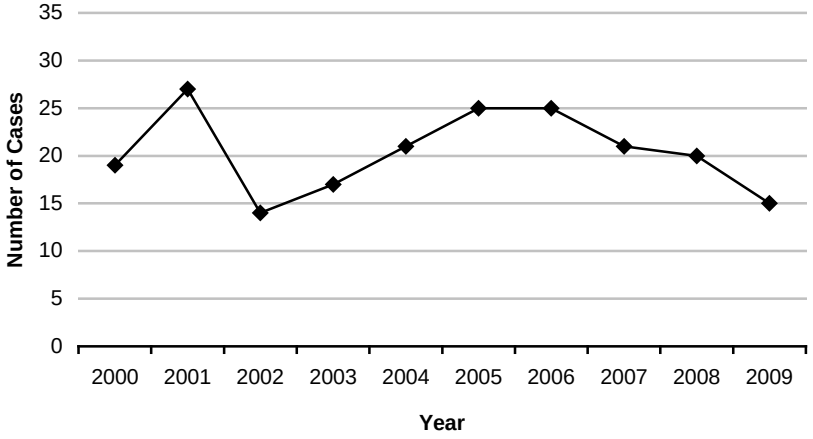


**Figure 2. Reported Cases of Nonperinatal Listeriosis
by Age Group, LAC, 2009 (N=15)**

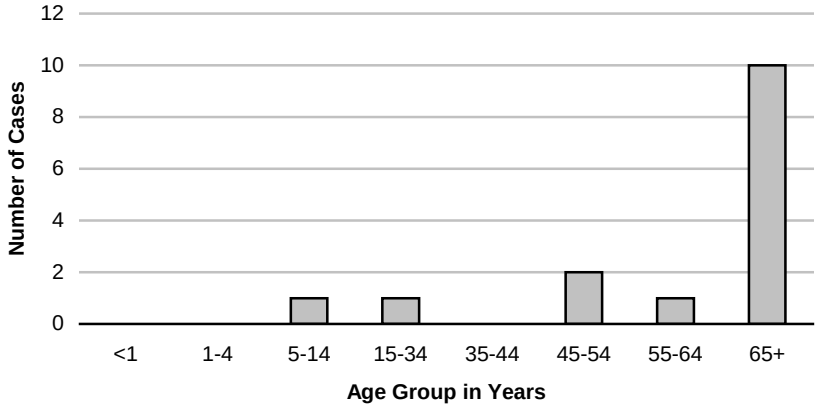


**Figure 3. Percent Cases of Nonperinatal Listeriosis
by Race/Ethnicity, LAC, 2009 (N=15)**

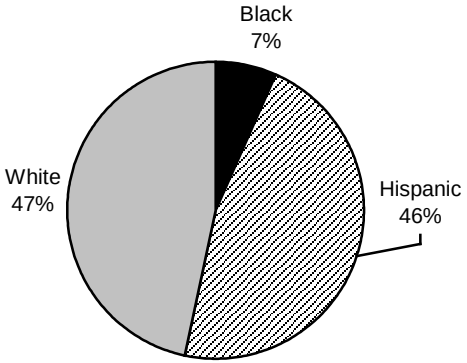


**Figure 4. Reported Cases of Nonperital Listeriosis by SPA
LAC, 2009 (N=15)**

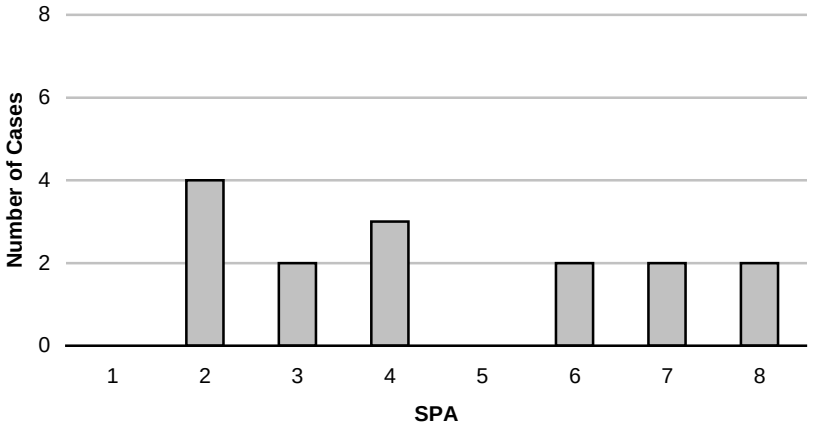
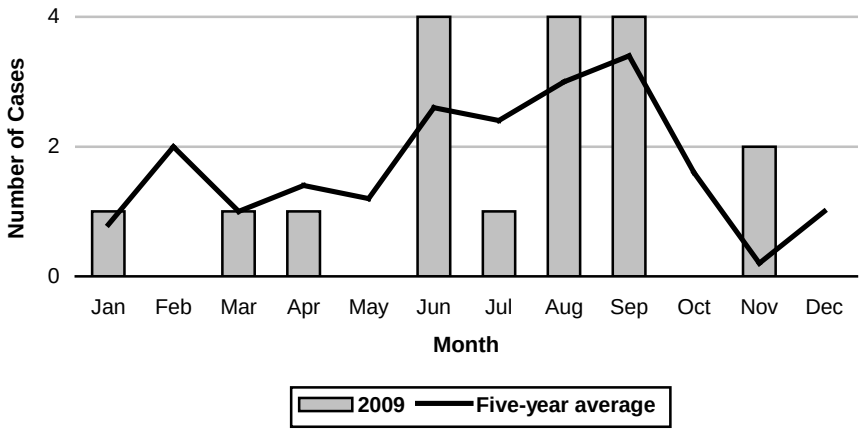


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset LAC, 2009 (N=15)



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	5
Annual Incidence[a]	
LA County	4.6 [b]
California	N/A
United States	N/A
Age at Diagnosis	
Mean	30
Median	30
Range	23 - 35

[a] Cases per 100,000 live births.
[b] Rates calculated based on less than 19 cases or events are considered unreliable.

DESCRIPTION

Listeriosis is a disease caused by infection with *Listeria monocytogenes*, a Gram-positive rod that is found in soil throughout the environment. Listeriosis is often caused by ingestion of foods contaminated with *L. monocytogenes.* Foods often associated with *Listeria* contamination include raw fruits and vegetables; undercooked meat, such as beef, pork, poultry, and pâté; cold cuts from deli counters; and unpasteurized dairy products—milk, milk products and soft cheeses (Mexican-style, Brie, feta, blue-veined, Camembert).

The disease affects primarily persons of advanced age, pregnant women, newborns, and adults with weakened immune systems. On rare occasions, people without these risk factors have also contracted listeriosis. Symptoms of listeriosis include: fever, muscle aches, and sometimes nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage, stillbirth, premature delivery, or infection of the newborn.

Pregnant women should avoid foods associated with *Listeria*, particularly cheeses sold by street vendors or obtained from relatives/friends in other countries, where food processing quality assurance is unknown.

Additionally fruits and vegetables should be thoroughly washed. Uncooked meats should be stored separately from vegetables, cooked foods, and ready-to-eat foods. Hands, utensils, and cutting boards should be washed after handling uncooked foods. Leftover foods or ready-to-eat foods, such as hot dogs, should be cooked until steaming hot before eating.

Finally, although the risk of listeriosis associated with foods from deli counters is relatively low, it is recommended that pregnant women avoid these foods or thoroughly reheat cold cuts before eating.

Prevention strategies for healthcare providers include education during prenatal checkups, outreach to Hispanic communities, and food safety notices at food and deli markets.

2009 TRENDS AND HIGHLIGHTS

- In 2009, there were five cases of perinatal listeriosis. Two cases were Asian expectant mothers, and three cases were Hispanic expectant mothers. Two cases were pregnant with twins. One case ended with a stillbirth.
- Maternal ages ranged from 23 to 35 years.
- The number of perinatal listeriosis cases in 2009 is consistent within the range of incidence of listeriosis over the past ten years, excluding an aberrant increase in 2006 (Figure 1).
- Hispanic women had the highest number of cases of perinatal listeriosis as previous years, however, 2009 is remarkable for the relatively high proportion of cases among Asian expectant mothers (Figure 2).

Reported Perinatal Listeriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=3)			2006 (N=12)			2007 (N=6)			2008 (N=2)			2009 (N=5)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	2	66.7	0.1	8	66.7	0.3	5	83.3	0.2	2	100.	0.1	4	80.0	3.8
35-44	1	33.3	0.1	3	25.0	0.2	1	16.7	0.1	0	0.0	0.0	1	20.0	4.0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		1	8.3		0	0.0		0	0.0		0	0.0	0.0
Race / Ethnicity															
Asian	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0	2	40.0	13.2
Black	0	0.0	0.0	3	25.0	0.4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	2	66.7	0.0	7	58.3	0.2	5	83.3	0.1	2	100.	0.0	3	60.0	3.7
White	1	33.3	0.0	1	8.3	0.0	1	16.7	0.0	0	0.0	0.0	0	0.0	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
SPA															
1	0	0.0	0.0	1	8.3	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	1	8.3	0.0	1	16.7	0.0	0	0.0	0.0	0	0.0	0.0
3	0	0.0	0.0	2	16.7	0.1	0	0.0	0.0	1	50.0	0.1	0	0.0	0.0
4	1	33.3	0.1	3	25.0	0.2	2	33.3	0.2	0	0.0	0.0	2	40.0	0.7
5	1	33.3	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	1	33.3	0.1	2	16.7	0.2	1	16.7	0.1	0	0.0	0.0	1	20.0	0.4
7	0	0.0	0.0	2	16.7	0.1	1	16.7	0.1	1	50.0	0.1	0	0.0	0.0
8	0	0.0	0.0	1	8.3	0.1	1	16.7	0.1	0	0.0	0.0	2	40.0	0.8
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Reported Cases of Perinatal Listeriosis
LAC, 1999-2009

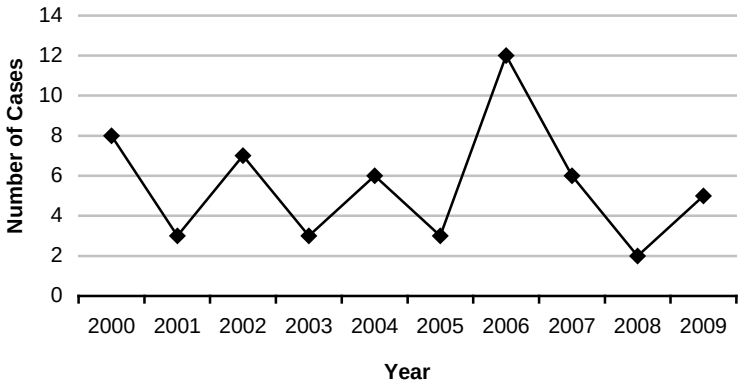


Figure 2. Perinatal Listeriosis Incidence by Race/Ethnicity
LAC, 2005-2009

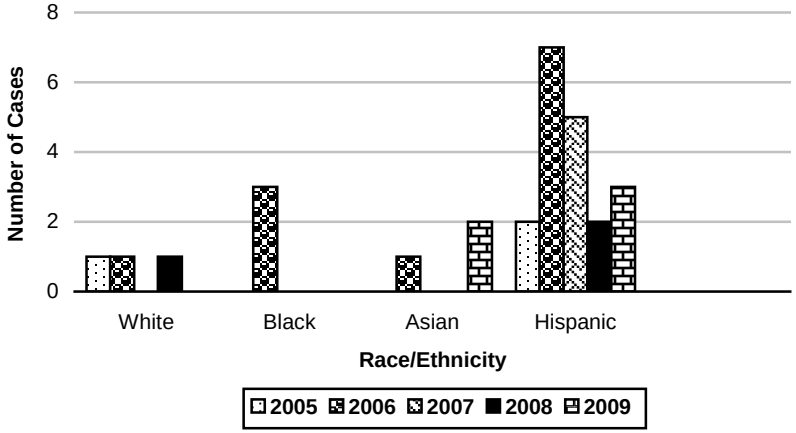
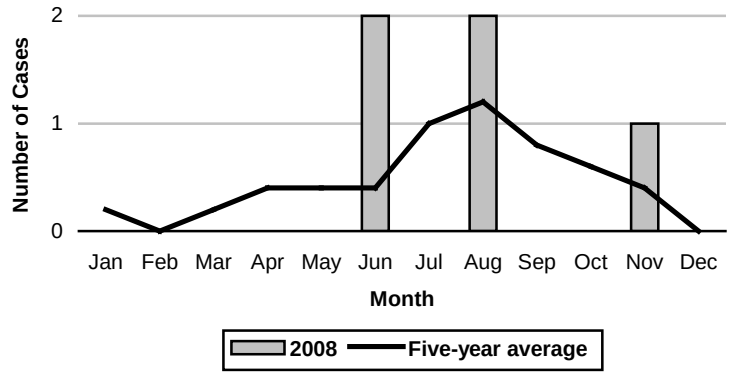


Figure 3. Reported Perinatal Listeriosis Cases
by Month of Onset, LAC, 2009 (N=5)



LYME DISEASE

CRUDE DATA	
Number of Cases	4
Annual Incidence[a]	
LA County	0.04 [b]
California[c]	0.2
United States[c]	9.6
Age at Diagnosis	
Mean	35.8
Median	38
Range	7-56

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Lyme disease (LD) is caused by a bacterium, *Borrelia burgdorferi*, which is transmitted to humans by the bite of *Ixodes* ticks; the vector in the Pacific coast states is the western blacklegged tick (*Ixodes pacificus*). This disease is rarely acquired in Los Angeles County (LAC), and most reported cases have been acquired outside of LAC from known endemic regions in the United States (US). The most common clinical presentation is a distinctive circular rash called erythema migrans (EM). If there is no rash, other early symptoms such as fever, body aches, headaches, and fatigue are often unrecognized as indicators of LD. If untreated, patients may develop late stage symptoms such as aseptic meningitis, cranial neuritis, cardiac arrhythmias and arthritis of the large joints. Early disease is treated with a short course of oral antibiotics, while late symptom manifestations may require longer treatment with oral or intravenous antibiotics. Currently, there is no vaccine.

For purposes of surveillance, the Centers for Disease Control and Prevention (CDC) requires a confirmed case of LD to have documented EM diagnosed by a healthcare provider that is at least 5cm in diameter or at least one late manifestation of LD with supporting laboratory results. Laboratory criteria for case confirmation include the isolation of *B. burgdorferi* from a clinical specimen or demonstration of diagnostic IgM or IgG to *B. burgdorferi* in serum or cerebral spinal fluid. If indicated, a coalition of several public health and medical organizations recommends a two-step serologic testing procedure for LD: an initial enzyme immunoassay (EIA) or immunofluorescent antibody (IFA) screening test, and if positive or equivocal, followed by IgM and IgG Western immunoblotting[1].

Avoiding tick bite exposure is the primary means of preventing Lyme disease. The risk of acquiring infection with LD increases when the tick has attached to the body for at least 24 hours. Tips for preventing exposure to tick bites include checking the body regularly for prompt removal of attached ticks; wearing light-colored clothing so that ticks can be easily seen; wearing long pants and long-sleeved shirts and tucking pants into boots or socks, and tucking shirts into pants; using tick repellant and treating clothing with products containing permethrin; staying in the middle of trails when hiking to avoid contact with bushes and grasses where ticks are most common; and checking for and controlling ticks on pets.

2009 TRENDS AND HIGHLIGHTS

- Even as the national incidence increases (from 6.3 per 100,000 in 2000 to 9.6 per 100,000 in 2008), the incidence in LAC (0.04 per 100,000) has remained relatively stable and well below the national rate (Figures 1 and 2).
- All cases in 2009 (n=4) reported a travel history to an endemic area outside of LAC.
- One case (25%) recalled a tick bite prior to onset of rash.
- Onset of symptoms continues to be limited to the summer months of June through August (Figure 3).

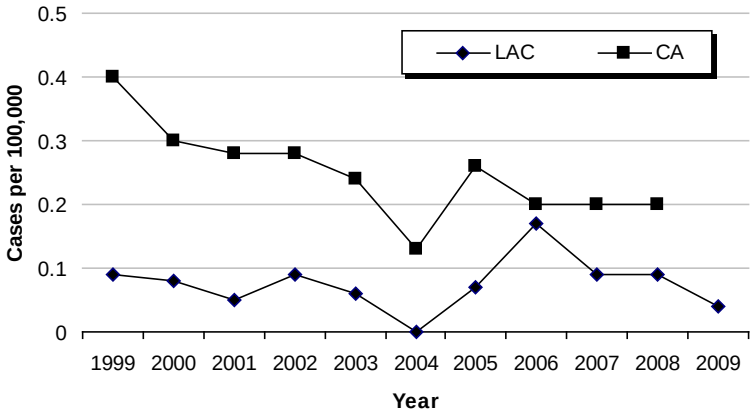
[1]Notice to Readers: Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. MMWR August 11, 1995/44(31);590-591, http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=7)			2006 (N=17)			2007 (N=8)			2008 (N=9)			2009 (N=4)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	22.2	0.4	0	0	0
5-14	1	14.3	0.1	3	17.6	0.2	2	25.0	0.1	1	11.1	0.1	1	25.0	0.1
15-34	2	28.6	0.1	7	41.2	0.3	3	37.5	0.1	1	11.1	0.0	0	0	0
35-44	1	14.3	0.1	2	11.8	0.1	0	0.0	0.0	1	11.1	0.1	2	50.0	0.1
45-54	1	14.3	0.1	2	11.8	0.2	2	25.0	0.2	3	33.3	0.2	0	0	0
55-64	1	14.3	0.1	1	5.9	0.1	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1
65+	1	14.3	0.1	1	5.9	0.1	1	12.5	0.1	1	11.1	0.1	0	0	0
Unknown	0	0.0		1	5.9		0	0.0		0	0.0		0	0	
Race / Ethnicity															
Asian	1	14.3	0.1	1	5.9	0.1	1	12.5	0.1	0	0.0	0.0	0	0	0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Hispanic	4	57.1	0.1	1	5.9	0.0	1	12.5	0.0	0	0.0	0.0	0	0	0
White	0	0.0	0.0	13	76.5	0.5	3	37.5	0.1	9	100.	0.3	4	100	0.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	2	28.6		2	11.8		3	37.5		0	0.0		0	0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
2	2	28.6	0.1	6	35.3	0.3	2	25.0	0.1	2	22.2	0.1	1	25.0	0.0
3	0	0.0	0.0	0	0.0	0.0	1	12.5	0.1	0	0.0	0.0	0	0	0
4	1	14.3	0.1	5	29.4	0.4	2	25.0	0.2	1	11.1	0.1	0	0	0
5	2	28.6	0.3	2	11.8	0.3	2	25.0	0.3	4	44.4	0.6	1	25.0	0.2
6	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1
7	0	0.0	0.0	1	5.9	0.1	1	12.5	0.1	0	0.0	0.0	0	0	0
8	2	28.6	0.2	1	5.9	0.1	0	0.0	0.0	2	22.2	0.2	1	25.0	0.1
Unknown	0	0.0		1	5.9		0	0.0		0	0.0		0	0	

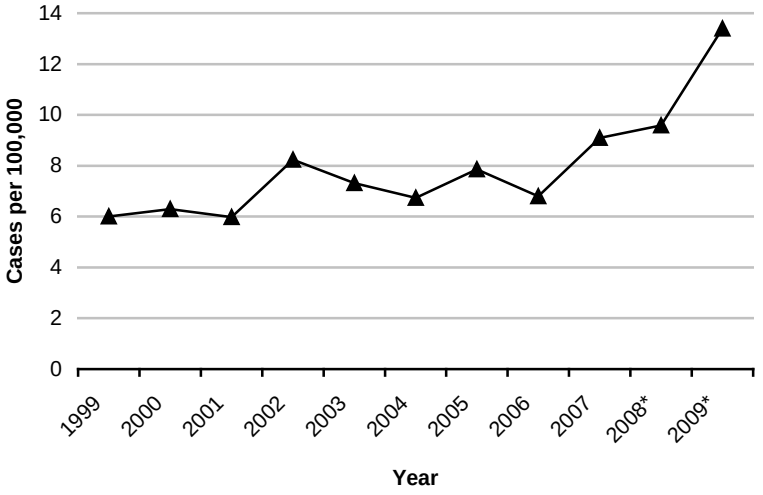
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Lyme Disease
LAC* and CA, 1999-2009



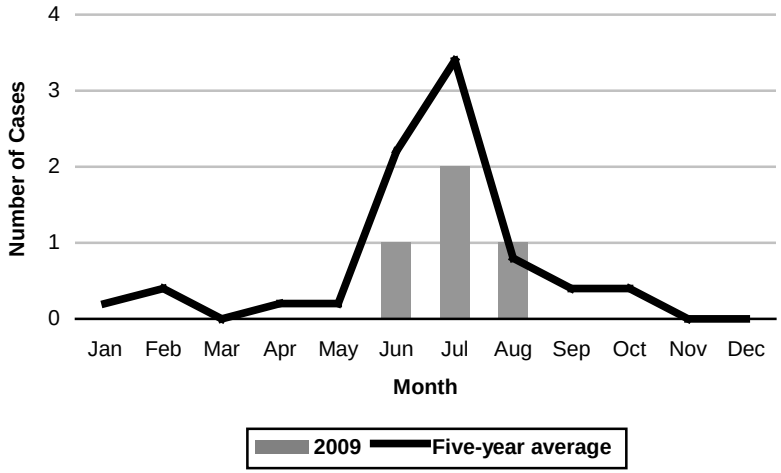
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Incidence Rates of Lyme Disease
US, 1999-2009



*Includes probable cases.

Figure 3. Reported Lyme Disease Cases by Month of Onset
LAC, 2009



MALARIA

CRUDE DATA	
Number of Cases	24
Annual Incidence[a]	
LA County	0.25
California[b]	0.34
United States[b]	0.42
Age at Diagnosis	
Mean	40.8 years
Median	48 years
Range	1-69 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Human malaria is a febrile illness caused by infection with one or more species of the protozoan parasite, *Plasmodium* (usually *P. vivax*, *P. falciparum, P. malariae, P. ovale*, and occasionally other *Plasmodium sp.*). Transmission occurs by the bite of an infected *Anopheles* mosquito and mainly in tropical and subtropical areas of the world. The disease is characterized by episodes of chills and fever every 2 to 3 days. *P. falciparum* poses the greatest risk of death because it invades red blood cells of all stages and is often drug-resistant. The more severe symptoms of *P. falciparum* include jaundice, shock, renal failure, and coma. *P. knowlesi*, a parasite of Asian macaques, has been documented as a cause of human infections, including some deaths, in Southeast Asia. The first case in a US traveler was identified in 2008. An additional species similar to *P. ovale*, but has yet to be named, has also been recently discovered as a human pathogen.

For the purpose of surveillance, confirmation of malaria requires the demonstration of parasites in thick or thin blood smears, regardless of whether the person experienced previous episodes of malaria.

Before the 1950s malaria was endemic in the southeastern US. Now, it is usually acquired outside the continental US through travel and immigration. Although there is no recent documentation of malaria being transmitted locally, a particular mosquito, *A. hermsi*, exists in southern California in rare numbers, and is capable of transmitting the parasite.

Prevention methods for malaria include avoiding mosquito bites or, once already infected, preventing the development of disease by using antimalarial drugs as prophylaxis. Travelers to countries where malaria is endemic should take precautions by taking the appropriate antimalarial prophylaxis as prescribed; using mosquito repellants, utilizing bednets, and wearing protective clothing as well as avoiding outdoor activities between dusk and dawn when mosquito activity is at its peak.

2009 TRENDS AND HIGHLIGHTS

- The number of reported cases (N=24) continues to decrease since 2003.
- Almost half of all cases (n=11) were caused by *P. falciparum*. One case, who reported travel to Colombia, was co-infected with both *P. malariae* and *P. ovale*.
- All cases reported a travel history to a country with endemic malaria. This year, travelers to Africa represented 54% of all cases and 91% of *P. falciparum* cases.
- Only five of eighteen US resident cases (28%) used prophylaxis during their travels, two of whom reported completing their regimen. A greater proportion of cases who traveled for work purposes reported using prophylaxis than those traveling for leisure (i.e., visiting friends and relatives).

Reported Malaria Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=45)			2006 (N=33)			2007 (N=26)			2008 (N=30)			2009 (N=24)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	2	6.1	0.3	0	0.0	0.0	0	0.0	0.0	3	12.5	0.5
5-14	3	6.7	0.2	2	6.1	0.1	2	7.7	0.1	1	3.3	0.1	0	0	0
15-34	21	46.7	0.7	8	24.2	0.3	11	42.3	0.4	12	40.0	0.4	6	25.0	0.2
35-44	8	17.8	0.5	7	21.2	0.5	3	11.5	0.2	6	20.0	0.4	2	8.3	0.1
45-54	10	22.2	0.8	11	33.3	0.8	5	19.2	0.4	7	23.3	0.5	5	20.8	0.4
55-64	2	4.4	0.2	1	3.0	0.1	5	19.2	0.6	4	13.3	0.4	7	29.2	0.7
65+	1	2.2	0.1	2	6.1	0.2	0	0.0	0.0	0	0.0	0.0	1	4.2	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race / Ethnicity															
Asian	7	15.6	0.6	5	15.2	0.4	7	26.9	0.5	4	13.3	0.3	3	12.5	0.2
Black	22	48.9	2.6	22	66.7	2.6	11	42.3	1.3	16	53.3	1.9	8	33.3	0.9
Hispanic	7	15.6	0.2	1	3.0	0.0	4	15.4	0.1	1	3.3	0.0	9	37.5	0.2
White	6	13.3	0.2	5	15.2	0.2	1	3.8	0.0	4	13.3	0.1	2	8.3	0.1
Other	1	2.2	3.5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	2	4.4		0	0.0		3	11.5		5	16.7		2	8.3	
SPA															
1	2	4.4	0.6	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3
2	11	24.4	0.5	5	15.2	0.2	10	38.5	0.5	8	26.7	0.4	6	25.0	0.3
3	5	11.1	0.3	4	12.1	0.2	2	7.7	0.1	3	10.0	0.2	1	4.2	0.1
4	8	17.8	0.6	5	15.2	0.4	4	15.4	0.3	2	6.7	0.2	0	0	0
5	3	6.7	0.5	3	9.1	0.5	2	7.7	0.3	3	10.0	0.5	4	16.7	0.6
6	7	15.6	0.7	8	24.2	0.8	3	11.5	0.3	5	16.7	0.5	4	16.7	0.4
7	3	6.7	0.2	2	6.1	0.1	1	3.8	0.1	1	3.3	0.1	1	4.2	0.1
8	6	13.3	0.5	6	18.2	0.5	2	7.7	0.2	6	20.0	0.5	7	29.2	0.6
Unknown	0	0.0		0	0.0		2	7.7		2	6.7		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Malaria
LAC, CA and US, 1999-2009

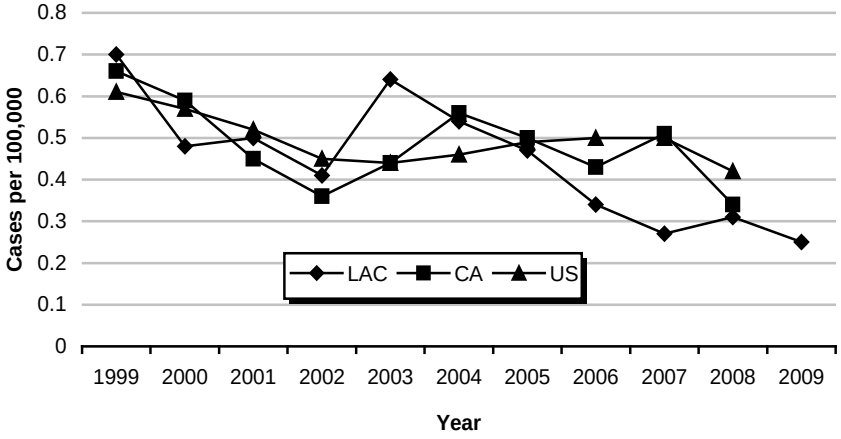


Figure 2. Incidence Rates of Malaria by Age Group
LAC, 2009 (N=24)

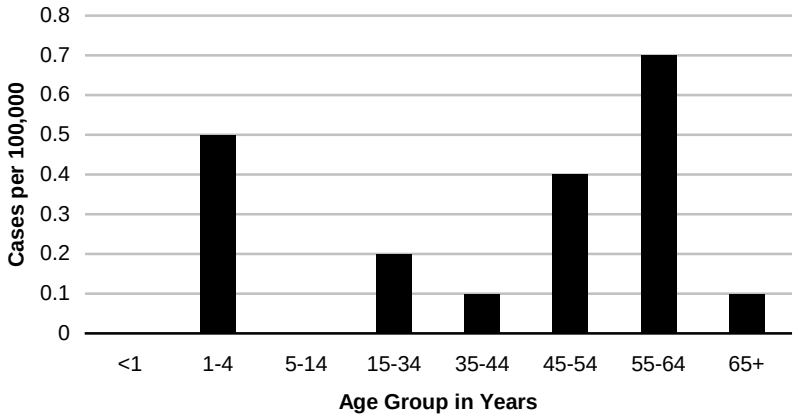


Figure 3. Percent Cases of Malaria by Race/Ethnicity
LAC, 2009 (N=24)

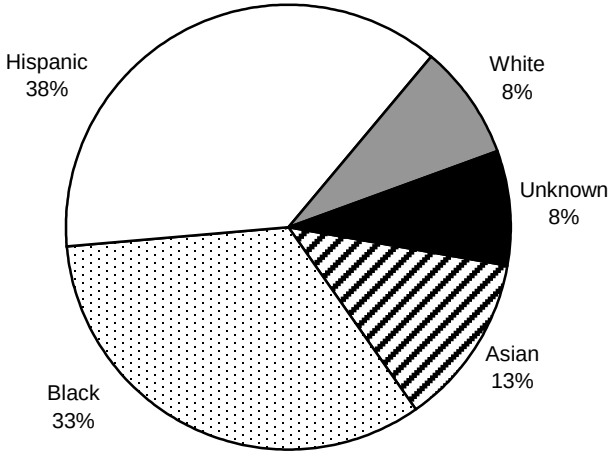


Figure 4. Number of Reported Malaria Cases by Race/Ethnicity
LAC, 2004-2009

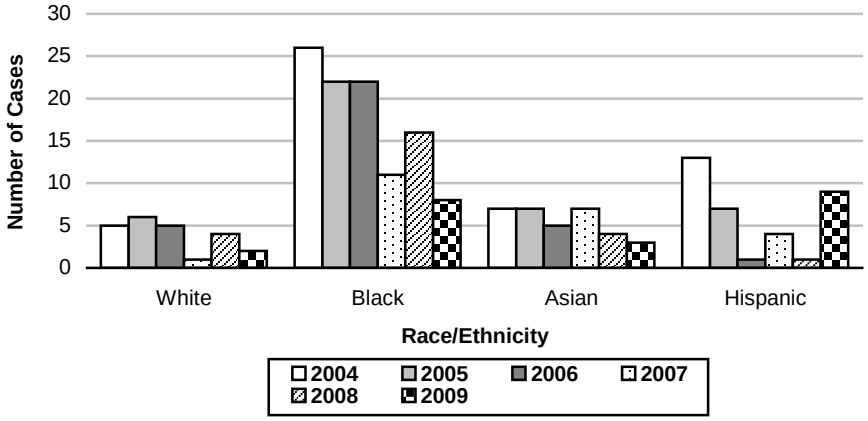


Figure 5. Percent Cases of Malaria by Species LAC, 2009

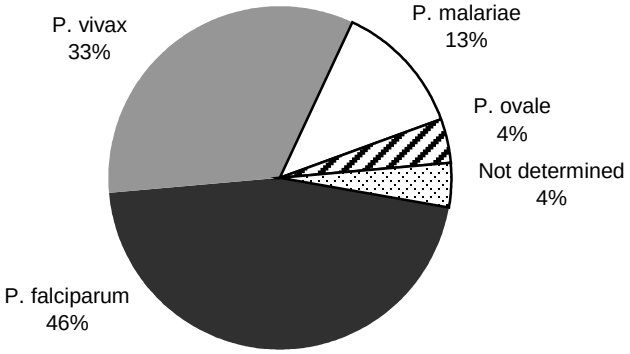


Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* species, 2009

Country of Acquisition	*P. falciparum*	*P. vivax*	*P. malariae*	*P. ovale*	Not Determined	Total
Africa	**10**	**0**	**2**	**1**	**0**	**13**
- Ghana	1	0	1*	0	0	2
- Ivory Coast	1*	0	0	0	0	1
- Kenya	1*	0	0	0	0	1
- Liberia	0	0	1	0	0	1
- Nigeria	4	0	0	1	0	5
- Senegal	1*	0	0	0	0	1
- Sierra Leone	1	0	0	0	0	1
- Uganda	1	0	0	0	0	1
Asia/Oceania	**1**	**2**	**0**	**0**	**1**	**4**
- India	0	2	0	0	0	2
- Indonesia	1	0	0	0	0	1
- Pakistan	0	0	0	0	1	1
Latin America	**0**	**6**	**1**	**0**	**0**	**7**
- Colombia	0	3*	1	0	0	4
- Guatemala	0	2	0	0	0	2
- Honduras	0	1	0	0	0	1
Overall Total	**11**	**8**	**3**	**1**	**1**	**24**

*Case traveled to additional endemic countries.

Table 2. Prophylaxis Use Among US Residents with Malaria, 2009

Reason for Travel	Total Cases (n)	Prophylaxis Use (n)	(%)
Pleasure	9	1	11
Work	6	3	33
Other/Unknown	3	1	33
Total	**18**	**5**	**28**

MEASLES

CRUDE DATA	
Number of Cases	1
Annual Incidence[a]	
LA County	0.01[b]
California[c]	0.05
United States[c]	0.05
Age at Diagnosis	
Mean	39 years
Median	39 years
Range	N/A

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31); 856-857; 859-869.

DESCRIPTION

Measles is a vaccine-preventable disease caused by a paramyxovirus and is transmitted by contact with respiratory droplets or by airborne spread. The clinical case definition for measles is a fever of at least 101°F, a generalized rash lasting at least three days, and either cough, coryza, or conjunctivitis. Severe complications are rare, but can include acute encephalitis and death from respiratory or neurologic complications. Immunocompromised individuals are more likely to develop complications. A case is confirmed by a positive IgM titer, a four-fold increase in acute and convalescent IgG titers, isolation of measles virus, or detection of viral RNA (RT-PCR).

Immunization Recommendations:

- Measles disease can be effectively prevented by Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV) vaccine.
- Usually, two doses of measles-containing vaccine are given via MMR or MMRV vaccine. The first dose is recommended at 12 months of age. The second dose can be given as early as four weeks after the first dose, but is usually given at ages 4 to 6 years.
- Vaccination is recommended for those born in 1957 or later who have no prior MMR vaccination, no serological evidence of measles immunity, or no documentation of physician-diagnosed measles. Proof of immunization with two MMR doses is recommended for health care workers, persons attending post-high school educational institutions, international travelers, as well as others who work or live in high-risk settings.
- Women should not become pregnant within 4 weeks of vaccination.
- Individuals who are severely immunocompromised for any reason should not be given MMR or MMRV vaccine.

2009 TRENDS AND HIGHLIGHTS

- During 2009, 71 measles cases were reported in the US, which is approximately half the number of cases reported in 2008 (n=140) (MMWR 2010; 59(25):769-796).
- Only one measles case was reported in Los Angeles County (LAC) (Figure 2). The case was unvaccinated. Rash onset was in May, which occurred within 18 days of recent travel from another state.
- In 2009, large measles outbreaks were reported in Africa, Europe, and Asia. As long as measles continues to circulate in other parts of the world, unvaccinated individuals will continue to be at risk for measles infection.

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=0)			2006 (N=1)			2007 (N=0)			2008 (N=1)			2009 (N=1)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	1	100.	0.2	0	0.0	0.0	1	100.	0.2	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
35-44	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100.	0.1
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	1	100.	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100.	0.0	0	0.0	0.0
White	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100.	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	1	100.	0.0	0	0.0	0.0	1	100.	0.0	1	100.	0.0
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
8	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Measles
LAC, CA and US, 2000-2009

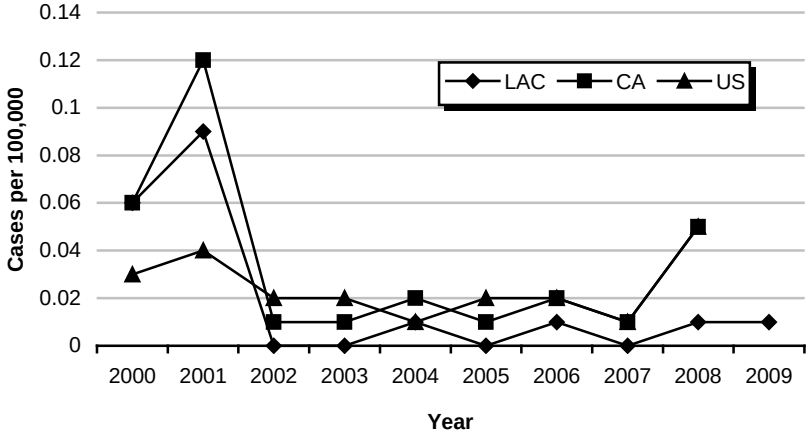


Figure 2. Reported Measles Cases
LAC, 2000-2009

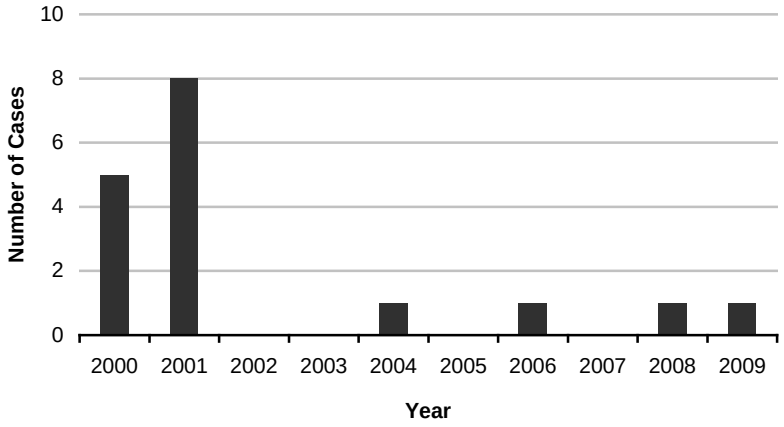


Figure 3. Reported Measles Cases by Month of Onset
LAC, 2009 vs. Previous Five-Year Average

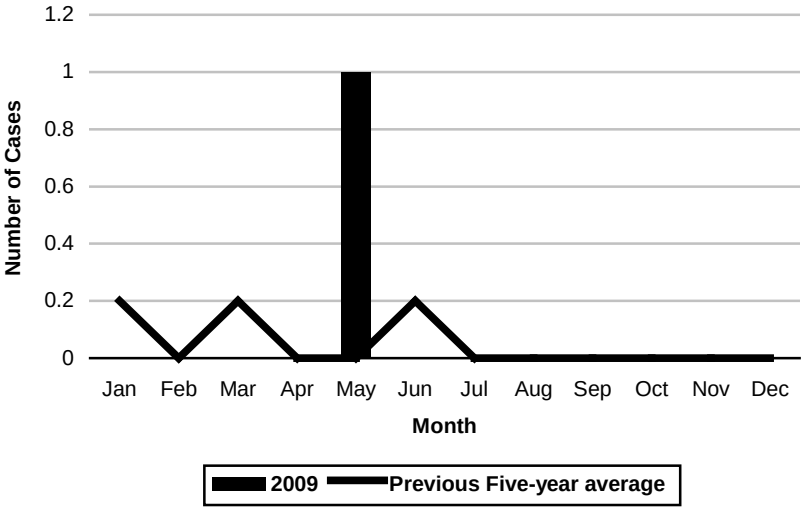


Figure 4. Vaccination Status of Reported Measles Cases
LAC, 2009

	Reported Cases	Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=0)
No.	1	0	0	1	0
%	100%	0%	0%	100%	0%

[1] Cases less than 12 months of age

[2] Cases12 months of age and older and who are up-to-date with the measles immunization recommendations for their age

[3] Cases12 months of age and older and who are not up-to-date with the measles immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving measles vaccines prior to disease onset.

MENINGITIS, VIRAL

CRUDE DATA	
Number of Cases	399
Annual Incidence[a]	
LA County	4.1
Age at Diagnosis	
Mean	25.0
Median	21
Range	0-87

[a]Cases per 100,000 population.

DESCRIPTION

Viruses are the major cause of aseptic meningitis syndrome, a term used to define any meningitis (infectious or noninfectious), particularly one with a cerebrospinal fluid lymphocytic pleocytosis, for which a cause is not apparent after initial evaluation and routine stains and cultures do not support a bacterial or fungal etiology. Viral meningitis can occur at any age but is most common among the very young. Symptoms are characterized by sudden onset of fever, severe headache, stiff neck, photophobia, drowsiness or confusion, nausea and vomiting and usually last from seven to ten days.

The most common cause of viral meningitis is nonpolio enteroviruses which are not vaccine-preventable and account for 85% to 95% of all cases in which a pathogen is identified. Transmission of enteroviruses may be by the fecal-oral, respiratory or other route specific to the etiologic agent. Other viral agents that can cause viral meningitis include herpes simplex virus, varicella-zoster virus, mumps virus, lymphocytic choriomeningitis virus, human immunodeficiency virus, adenovirus, parainfluenza virus type 3, influenza virus, measles virus and arboviruses, such as West Nile virus (WNV). In most cases, supportive measures are the usual treatments for viral meningitis and several are vaccine-preventable; recovery is usually complete and associated with low mortality rates. Antiviral agents are available for viral meningitis associated with herpes simplex and varicella-zoster viruses.

Good personal hygiene, especially hand washing and avoiding contact with oral secretions of others, is the most practical and effective preventive measure.

2009 TRENDS AND HIGHLIGHTS

- In 2009, viral/aseptic meningitis incidence decreased by 33% to 4.1 per 100,000 compared to 6.1 cases per 100,000 in 2008; 2009 incidence rates were consistent with 2006 and 2007.(Figure 1). The spike seen in 2008 (6.1 per 100,000) was most likely due to a pediatric enterovirus active surveillance project that ran from late 2007 through 2008.
- Infants <1 year of age had the highest age- specific incidence rate, 38.6 cases per 100,000, compared to other age groups.
- SPA 1 (Antelope Valley) continually carries the highest rates of viral meningitis in LAC (12.5 per 100,000 in 2009). The reasons for the trend are unknown. Though the population of Antelope Valley has a high proportion of infants <1 year old (1.7%), it is not the highest. Two percent of the SPA 6 population is <1 year old.
- Of the 54 cases (14%) in which an etiology was identified, 36 (67%) were caused by an enterovirus and 9 (17%) by WNV.
- One death was reported; the etiology was not determined.

Reported Viral Meningitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=530)			2006 (N=373)			2007 (N=395)			2008 (N=597)			2009 (N=399)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	73	13.8	51.8	71	19.0	49.0	75	19.0	50.7	80	13.4	57.3	53	13.3	38.6
1-4	23	4.3	4.0	14	3.8	2.4	11	2.8	1.9	24	4.0	4.2	14	3.5	2.5
5-14	91	17.2	6.1	47	12.6	3.2	45	11.4	3.1	148	24.8	10.5	71	17.8	5.2
15-34	147	27.7	5.2	111	29.8	4.0	120	30.4	4.3	164	27.5	5.7	148	37.1	5.2
35-44	91	17.2	6.0	53	14.2	3.5	58	14.7	3.9	52	8.7	3.4	42	10.5	2.8
45-54	49	9.2	3.9	42	11.3	3.2	42	10.6	3.2	44	7.4	3.3	34	8.5	2.5
55-64	31	5.8	3.7	23	6.2	2.6	14	3.5	1.6	29	4.9	3.2	18	4.5	1.9
65+	23	4.3	2.4	10	2.7	1.0	29	7.3	2.9	51	8.5	5.0	19	4.8	1.8
Unknown	2	0.4		2	0.5		1	0.3		5	0.8		0	0	
Race / Ethnicity															
Asian	41	7.7	3.3	29	7.8	2.3	30	7.6	2.3	37	6.2	2.8	21	5.3	1.6
Black	56	10.6	6.6	33	8.8	3.9	28	7.1	3.3	43	7.2	5.0	23	5.8	2.7
Hispanic	250	47.2	5.5	195	52.3	4.2	179	45.3	3.9	275	46.1	5.9	208	52.1	4.4
White	155	29.2	5.3	101	27.1	3.5	108	27.3	3.7	121	20.3	4.2	80	12.5	2.7
Other	3	0.6	10.6	5	1.3	17.5	6	1.5	28.8	20	3.4	81.1	4	1.0	
Unknown	25	4.7		10	2.7		44	11.1		101	16.9		63	15.8	
SPA															
1	41	7.7	12.0	45	12.1	12.9	35	8.9	9.8	69	11.6	18.8	46	11.5	12.5
2	98	18.5	4.6	72	19.3	3.4	84	21.3	3.9	80	13.4	3.7	88	22.1	4.0
3	106	20.0	6.2	78	20.9	4.5	63	15.9	3.6	86	14.4	5.0	63	15.8	3.6
4	42	7.9	3.4	23	6.2	1.8	16	4.1	1.3	24	4.0	1.9	18	4.5	1.4
5	11	2.1	1.7	10	2.7	1.6	13	3.3	2.0	29	4.9	4.5	22	5.5	3.4
6	40	7.5	3.9	31	8.3	3.0	42	10.6	4.0	79	13.2	7.5	45	11.3	4.3
7	118	22.3	8.6	59	15.8	4.3	73	18.5	5.3	131	21.9	9.5	62	15.5	4.5
8	64	12.1	5.8	52	13.9	4.7	63	15.9	5.6	90	15.1	8.0	53	13.3	4.7
Unknown	10	1.9		3	0.8		6	1.5		9	1.5		2	0.5	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Viral Meningitis LAC, 1999-2009

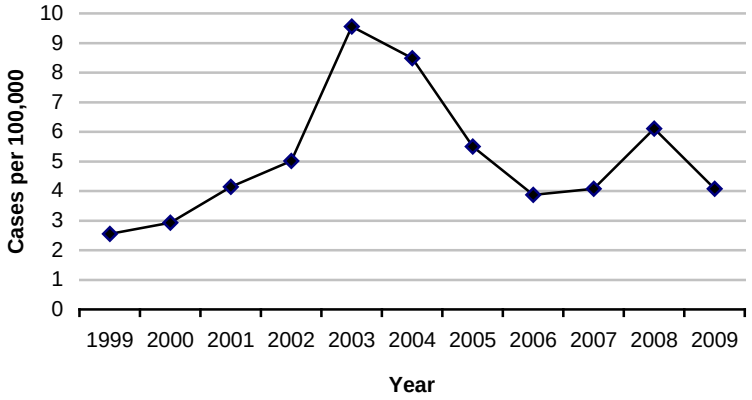


Figure 2. Incidence Rates of Viral Meningitis by Age Group LAC, 2009 (N=399)

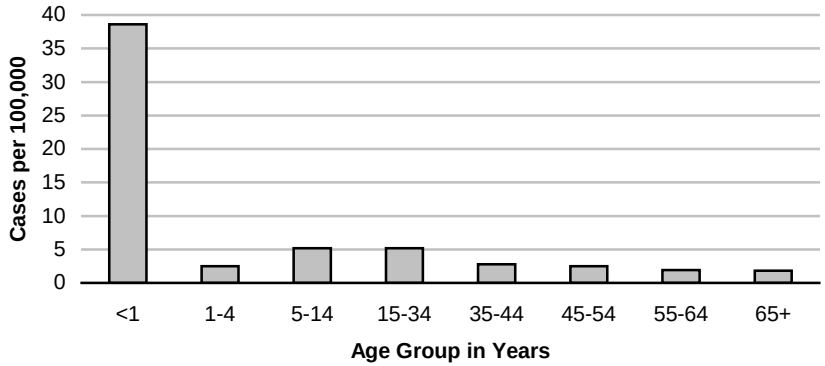


Figure 3. Percent Cases of Viral Meningitis by Race/Ethnicity, LAC, 2009 (N=399)

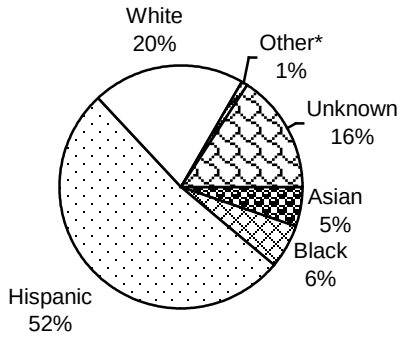
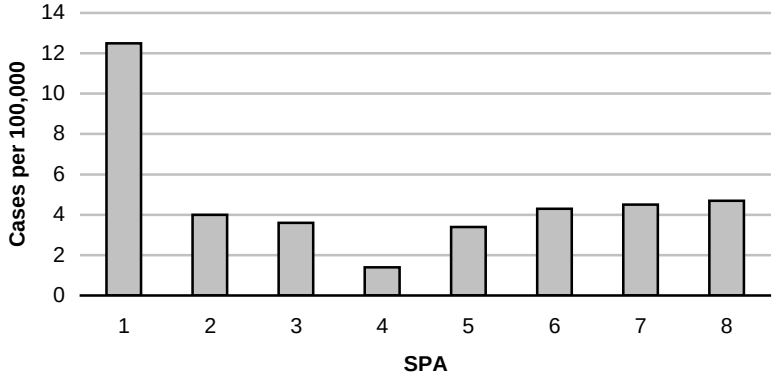


Figure 4. Incidence Rates of Viral Meningitis by SPA LAC, 2009 (N=399)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

**Figure 5. Reported Viral Meningitis Cases by Month of Onset
LAC, 2009 (N=399)**

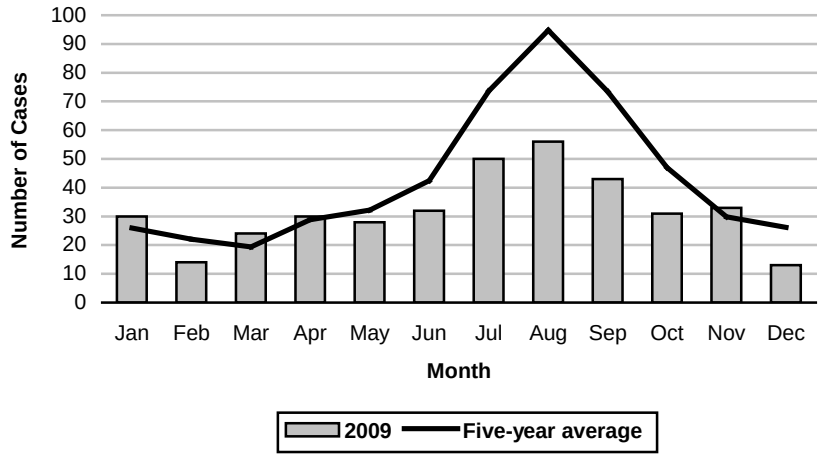
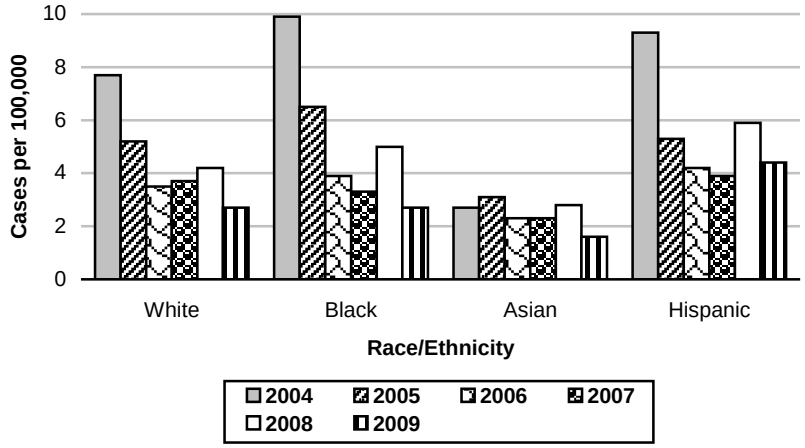
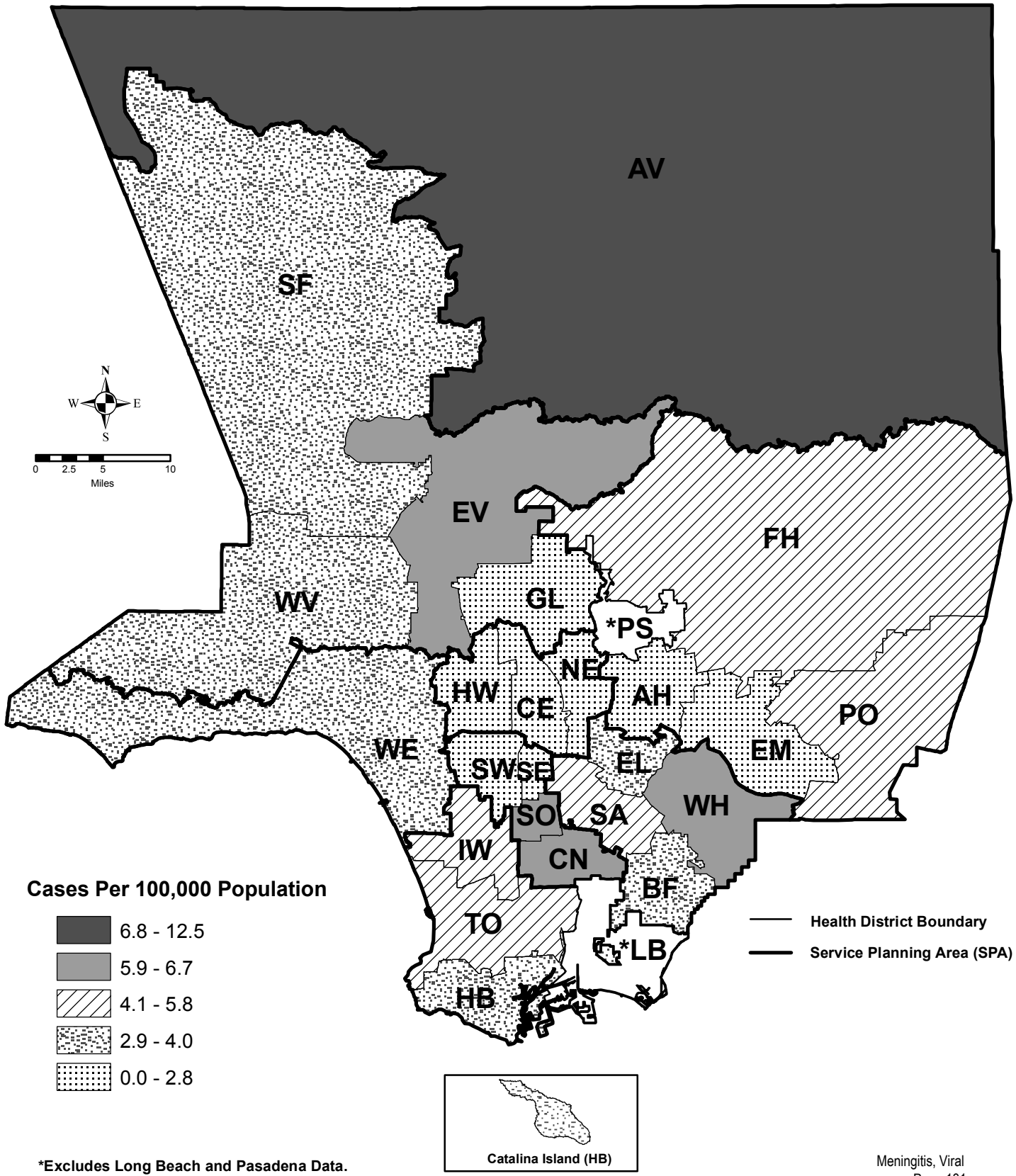


**Figure 6. Incidence Rates of Viral Meningitis by Race/Ethnicity
LAC, 2004-2009**



Map 9. Meningitis, Viral
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	21
Annual Incidence[a]	
LA County	0.21
California[b]	0.59
United States[b]	0.39
Age at Diagnosis	
Mean	32.5
Median	31
Range	0-62

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Meningococcal disease occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF) or meningococcemia, an infection of the bloodstream. It is transmitted through direct or droplet contact with nose or throat secretions of persons colonized in the upper respiratory tract with the *Neisseria meningitidis* bacterium. Common symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petechial rash and lethargy which can progress to overwhelming sepsis, shock and death within hours. Long-term sequelae include significant neurologic or orthopedic complications such as deafness or amputation. Meningococcal disease affects all age groups but occurs most often in infants. Of the 12 serogroups, only A, C, Y, and W-135 are vaccine-preventable.

For the purpose of surveillance, the LAC DPH defines reports of invasive meningococcal disease as confirmed when *N. meningitidis* has been isolated from a normally sterile site (e.g., blood or CSF). In the absence of a positive culture, reports are defined as probable in the setting of clinical symptoms consistent with invasive meningococcal disease and when there is evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

In 2004, a new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the US. This vaccine protects against serogroups A, C, Y, and W-135, the same serogroups as quadrivalent meningococcal polysaccharide vaccine meningococcal conjugated vaccine (MPSV4), but provides longer lasting immunity. MCV4 is recommended for use in persons aged 11 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. Generally, only a single dose of either vaccine is recommended. As of 2006, MCV4 is part of the childhood vaccination schedule and recommended for all children between ages 11-12 years. Additionally, unvaccinated college freshman who live in dormitories are at higher risk for meningococcal disease and should be vaccinated with MCV4.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of meningococcal disease among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). Because the rate of secondary disease for close contacts is highest during the first few days after onset of disease in the primary patient, antimicrobial chemoprophylaxis should be administered as soon as possible (ideally within 24 hours after the case is identified). Conversely, chemoprophylaxis administered greater than 14 days after onset of illness in the index case-patient is probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely handled by the LAC DPH, Community Health Services.

2009 TRENDS AND HIGHLIGHTS

- There were 19 (90%) confirmed cases: one (5%) from cerebrospinal fluid (CSF), 12 (63%) from blood, and six from both CSF and blood (32%); two cases were probable. Of the 16 (76%) cases that were serogrouped, three (19%) were identified as serogroup B, seven (38%) serogroup C, and six (44%) serogroup Y.
- The incidence of meningococcal disease in LAC (0.21 per 100,000) has been slowly declining since 2001 when it reached 0.64 per 100,000.
- Nearly 50% of cases (n=10) occurred among 15-34 year olds, the highest percentage of any age group in the last five years. The vaccination rate in this group is unknown as vaccination coverage data are poor (48% of cases have unknown status).
- Two deaths were documented (10%) in 2009, compared to four in 2008 (13%) and three in 2007(12%).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=37)			2006 (N=46)			2007 (N=24)			2008 (N=30)			2009 (N=21)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	8.1	2.1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7
1-4	2	5.4	0.3	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2
5-14	6	16.2	0.4	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1
15-34	12	32.4	0.4	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4
35-44	3	8.1	0.2	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3	0	0	0
45-54	3	8.1	0.2	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3
55-64	5	13.5	0.6	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4
65+	3	8.1	0.3	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	
Race / Ethnicity															
Asian	5	13.5	0.4	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1	0	0	0
Black	2	5.4	0.2	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5
Hispanic	21	56.8	0.5	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2
White	9	24.3	0.3	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		1	3.3		1	4.8	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3
2	7	18.9	0.3	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2
3	7	18.9	0.4	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1
4	9	24.3	0.7	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2
5	0	0.0	0.0	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3
6	5	13.5	0.5	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5
7	6	16.2	0.4	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1
8	3	8.1	0.3	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3
Unknown	0	0.0		2	4.3		0	0.0		0	0.0		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates of Meningococcal Disease
LAC and US, 1999-2009**

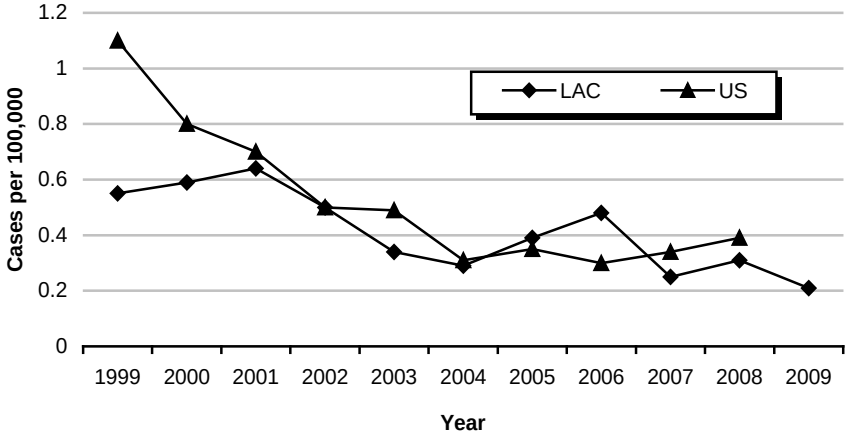


**Figure 2. Incidence Rates of Meningococcal Disease by Age Group
LAC, 2009 (N=21)**

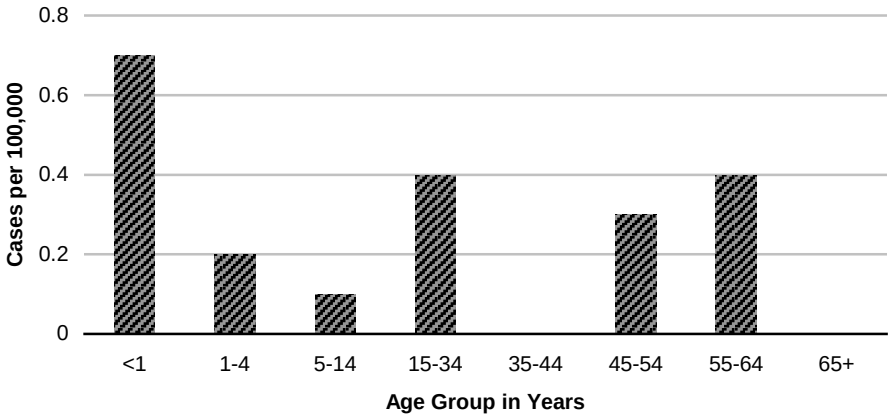


**Figure 3. Percent Cases of Meningococcal Disease
by Race/Ethnicity, LAC, 2009 (N=21)**

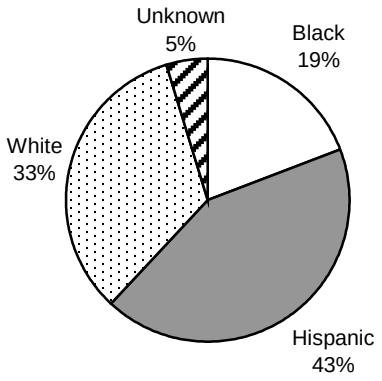


**Figure 4. Incidence Rates of Meningococcal Disease by SPA
LAC, 2009 (N=21)**

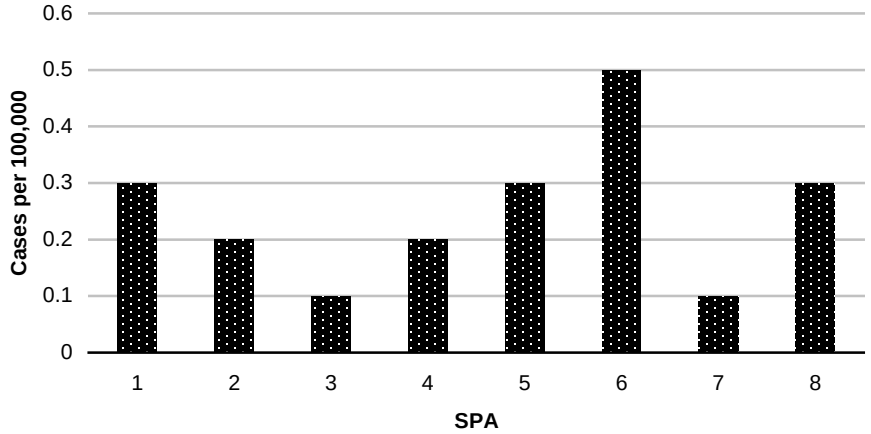


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2009 (N=21)

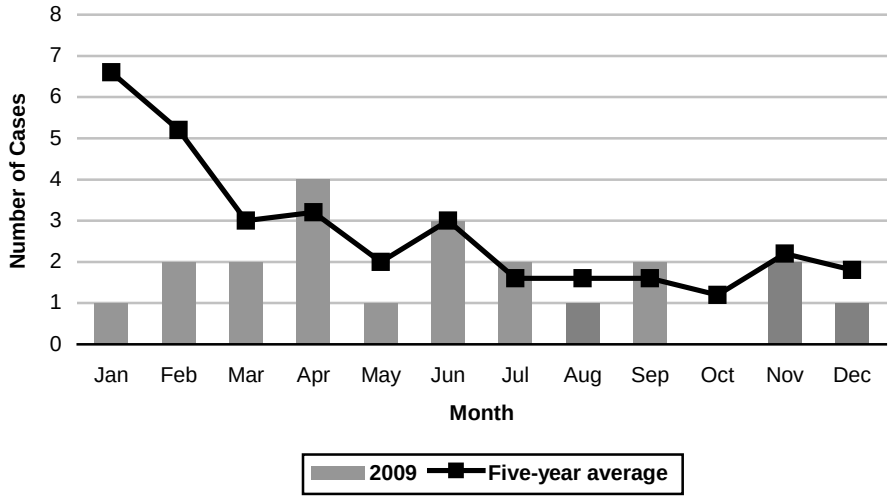


Figure 6. Reported Meningococcal Disease Cases by Race/Ethnicity, LAC, 2004-2009

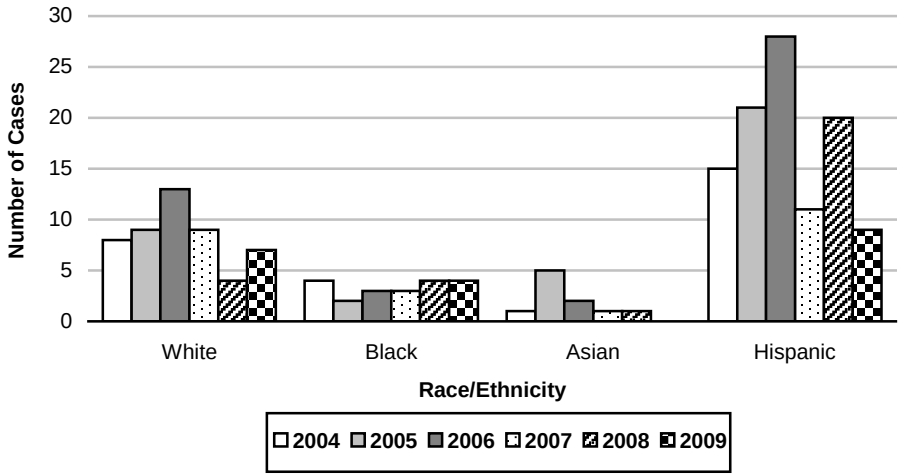
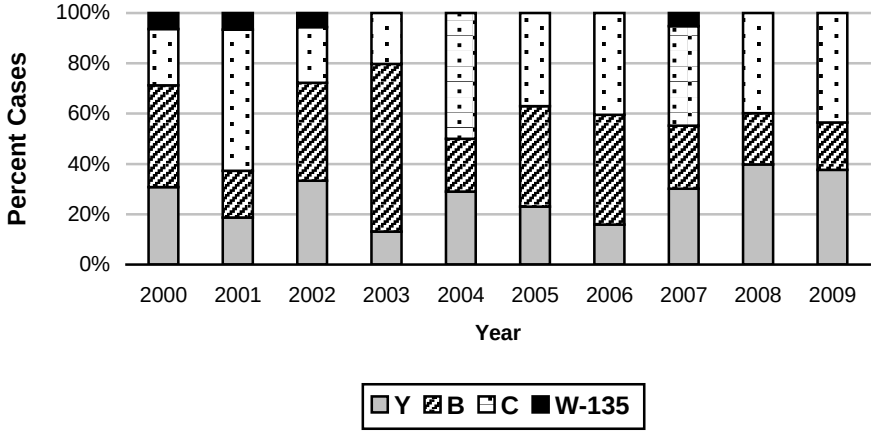


Figure 7. Meningococcal Disease by Serogroup LAC, 2000–2009



MUMPS

CRUDE DATA	
Number of Cases	7
Annual Incidence[a]	
LA County	0.07
California[b]	0.08
United States[b]	0.15
Age at Diagnosis	
Mean	26.0 years
Median	22.0 years
Range	2 – 67 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Diseases. MMWR 58(31); 856-857; 859-869.

DESCRIPTION

Mumps is a vaccine-preventable disease caused by an RNA paramyxovirus that is transmitted by direct contact with respiratory droplets from infected persons. The clinical case definition for mumps is an acute onset of unilateral or bilateral swelling of the parotid or other salivary glands lasting ≥2 days without other apparent cause. Complications include encephalitis, meningitis, orchitis, arthritis, and deafness. A case is confirmed by a positive IgM titer, a significant increase between acute and convalescent IgG titers, isolation of mumps virus, or detection of viral RNA (RT-PCR).

Immunization Recommendations:

- Mumps disease can be prevented by Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV) vaccine.
- Usually, two doses of mumps-containing vaccine are given via MMR or MMRV vaccine. The first dose is recommended at 12 months of age. The second dose can be given as early as four weeks after the first dose, but is usually given at ages 4 to 6 years.
- Vaccination is recommended for those born in 1957 or later who have no prior MMR vaccination, no serological evidence of mumps immunity, or no documentation of physician-diagnosed mumps. Proof of immunization with two MMR doses is recommended for health care workers, persons attending post-high school educational institutions, international travelers, as well as others who work or live in high-risk settings.
- Pregnant women and individuals who are severely immunocompromised for any reason should not be given MMR or MMRV vaccine.

2009 TRENDS AND HIGHLIGHTS

- The number of confirmed cases has remained relatively steady at five to ten cases per year since 2003 (Figure 2). Seven confirmed cases were identified in 2009.
- Similar to previous years, the majority of confirmed cases were adults (71.4%, n=5). (Figure 3). However, the mean and median ages of the cases in 2009 (mean=26.0 years, median=22.0 years) decreased by at least nine years compared to 2008 (mean=35.3 years, median=44.0 years). Reasons for this decrease are unknown.
- The majority of confirmed cases were Asian (Figure 4).
- None of the cases were linked to each other. SPA 5 reported two cases while SPA 1, SPA 2, SPA 3, SPA 6, and SPA 8 reported one case each (Figure 5).
- Only one of the confirmed cases had valid documentation of receiving mumps vaccine prior to disease onset (Figure 7). However, four (57.1%) of the confirmed cases reported a history of travel within 25 days of disease onset. Of the four cases, two had traveled to Korea and the Philippines, countries where mumps is endemic. Since mumps continues to be endemic globally and cases continue to be identified in LAC, more work needs to be done to increase mumps vaccination coverage to prevent further transmission.
- Since the CDC changed the probable case classifications in 2008, comparing 2009 cases with cases prior to 2008 would not be meaningful. No probable cases were reported in 2009.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=10)			2006 (N=10)			2007 (N=5)			2008 (N=7)			2009 (N=7)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	1	10.0	0.2	1	10.0	0.2	0	0.0	0.0	0	0.0	0.0	2	28.6	0.4
5-14	0	0.0	0.0	2	20.0	0.1	1	20.0	0.1	1	14.3	0.1	0	0.0	0.0
15-34	3	30.0	0.1	2	20.0	0.1	1	20.0	0.0	2	28.6	0.1	4	57.1	0.1
35-44	0	0.0	0.0	1	10.0	0.1	1	20.0	0.1	1	14.3	0.1	0	0.0	0.0
45-54	4	40.0	0.3	3	30.0	0.2	2	40.0	0.2	3	42.9	0.2	0	0.0	0.0
55-64	1	10.0	0.1	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	14.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0,0	
Race / Ethnicity															
Asian	4	40.0	0.3	3	30.0	0.2	3	60.0	0.2	1	14.3	0.1	3	42.8	0.2
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	14.3	0.1
Hispanic	1	10.0	0.0	3	30.0	0.1	2	40.0	0.0	3	42.9	0.1	2	28.6	0.0
White	4	40.0	0.1	3	30.0	0.1	0	0.0	0.0	3	42.9	0.1	1	14,3	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	1	10.0		1	10.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	20.0	0.3	1	14.3	0.3	1	14.3	0.3
2	2	20.0	0.1	4	40.0	0.2	1	20.0	0.0	2	28.6	0.1	1	14,3	0.0
3	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	1	14.3	0.1	1	14,3	0.1
4	2	20.0	0.2	2	20.0	0.2	0	0.0	0.0	1	14.3	0.1	0	0.0	0,0
5	5	50.0	0.8	2	20.0	0.3	0	0.0	0.0	2	28.6	0.3	2	28,6	0.3
6	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	0	0.0	0.0	1	14.3	0.1
7	0	0.0	0.0	2	20.0	0.1	1	20.0	0.1	0	0.0	0.0	0	0.0	0.0
8	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	14.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Confirmed Mumps LAC, CA and US, 2000-2009

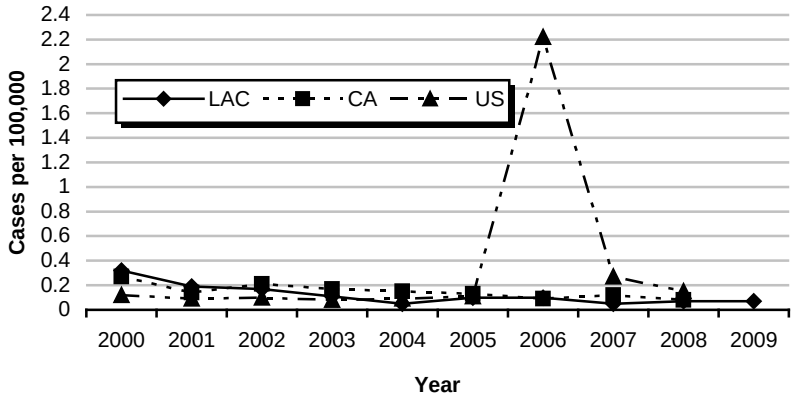


Figure 2. Reported Confirmed Mumps Cases LAC, 2000-2009

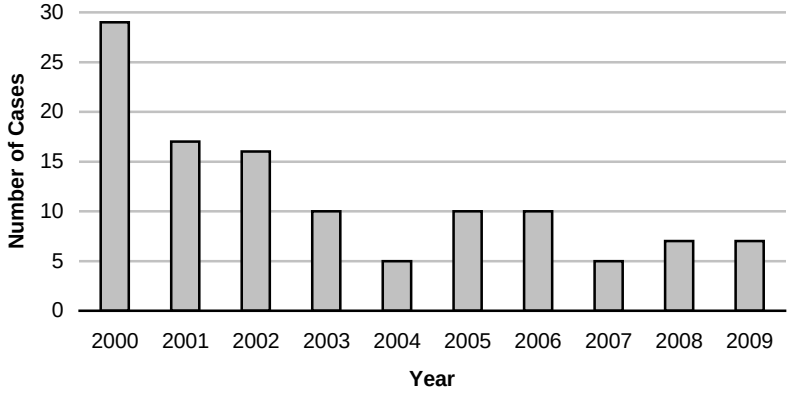


Figure 3. Reported Confirmed Mumps Cases by Age Group LAC, 2009 (N=7)

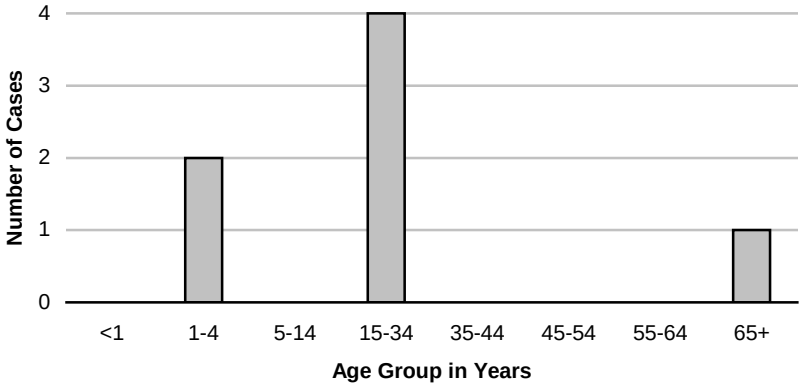
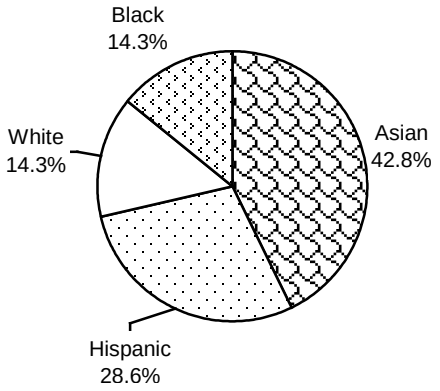


Figure 4. Percent Cases of Confirmed Mumps by Race/Ethnicity LAC, 2009 (N=7)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 5. Reported Confirmed Mumps Cases by SPA LAC, 2009 (N=7)

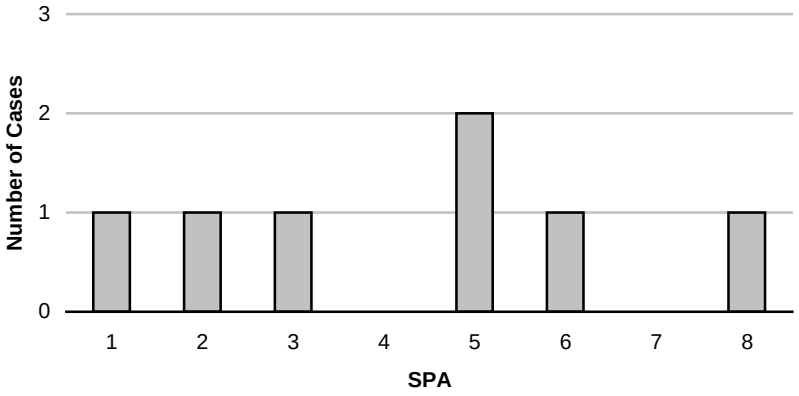


Figure 6. Reported Confirmed Mumps Cases by Month of Onset LAC, 2009 (N=7) vs. Previous Five-Year Average

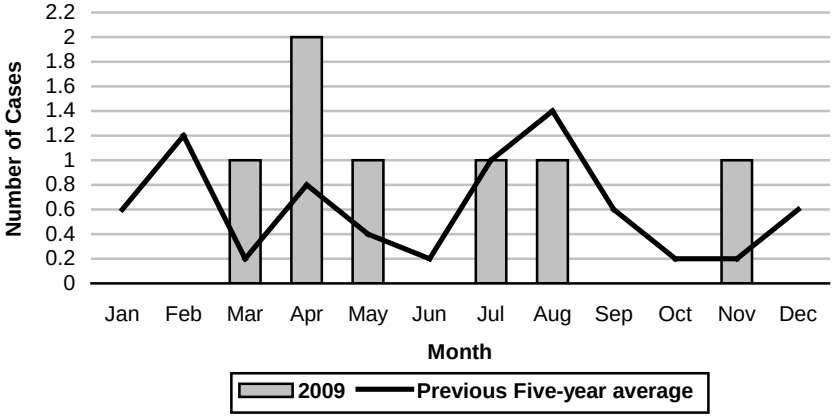


Figure 7. Vaccination Status of Reported Mumps Cases, LAC, 2009

	Reported Cases	Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=2)
No.	7	0	1	6	1
%	100%	0%	14.3%	85.7%	50%

[1]Cases less than 12 months of age.
[2]Cases12 months of age and older and who are up-to-date with the mumps immunization recommendations for their age.
[3]Cases12 months of age and older and who are not up-to-date with the mumps immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving mumps vaccines prior to disease onset.

Figure 8. Reported Mumps Cases by Case Classification LAC, 2009 vs. 2008

	Confirmed		Probable	
	2009	2008	2009	2008
Total Cases	7	7	0	2
Age at Onset (years)				
Mean	26.0	35.3	--	9.0
Median	22.0	44.0	--	9.0
Range	2.0 – 67.0	12.0 – 53.0	--	6.0 – 12.0

PERTUSSIS (WHOOPING COUGH)

CRUDE DATA	
Number of Cases	156
Annual Incidence[a]	
LA County	1.60
California[b]	1.46
United States[b]	4.40
Age at Diagnosis	
Mean	13.7 years
Median	10.5 months
Range	Birth – 73 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31); 856-857; 859-869.

DESCRIPTION

Pertussis, commonly known as whooping cough, is a vaccine-preventable disease spread by close contact with the respiratory secretions of infected individuals. The clinical case definition for pertussis is a cough lasting at least two weeks with paroxysms of coughing, inspiratory "whoop," or post-tussive vomiting, without other apparent causes. Complications include pneumonia, seizures, and encephalopathy. Infants under one year of age are at highest risk for developing severe complications. Pertussis is confirmed by either positive *Bordetella pertussis* culture or PCR.

Immunization Recommendations:

- A pertussis-containing vaccine should be administered at 2, 4, 6, 15-18 months, and 4-6 years of age to provide protection against the disease.
- Immunity conferred by the pertussis component of the DTP/DTaP vaccine decreases over time, with some vaccinated individuals becoming susceptible to pertussis 5-10 years following their last dose.
- In Spring 2005, two Tdap vaccines were licensed for use in adolescents and adults, one for persons aged 10 to 18 years (BOOSTRIX®, GlaxoSmithKline) and the other for persons aged 11 to 64 years (ADACEL®, Sanofi Pasteur).

2009 TRENDS AND HIGHLIGHTS

- Pertussis incidence has peaked every three to five years, with the last peak occurring in 2005. As expected, a peak in incidence occurred in 2009 with 156 cases (96 confirmed, 60 probable) reported (1.60 cases per 100,000) (Figure 1, Figure 2). Similar to previous years, infants less than one year of age accounted for the highest proportion of cases (50.7%) and incidence rate (57.6 cases per 100,000) (Figure 3). Cases appear to be increasing among adolescents and adults as evidenced by the fact that 31.4% (n=49) of the cases were over 14 years of age in 2009 compared to 22.6% (n=18) in 2008. Furthermore, the mean and median ages have increased by 4-5 years in 2009 (mean: 13.7 years, median: 10.5 months) compared to 2008 (mean: 9.4 years, median: 5.5 months).
- Similar to previous years, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5).
- For the third year in a row, SPA 5 reported the highest incidence rate. The higher number of children with personal beliefs exemptions (PBE) in SPA 5 compared to other SPAs may be a contributing factor. Of the 17 cases reported from SPA 5, two of the cases had PBEs. SPA 1 and SPA 6 also had high incidence rates (Figure 6). Household clusters were identified in SPA 2 (n=7), SPA 3 (n=5), SPA 4 (n=2), SPA 5 (n=3), SPA 6 (n=5), and SPA 8 (n=9).
- The fact that the only pertussis-related death in 2009 was in an infant that was less than two months of age underscores the need to vaccinate individuals of all ages in order to protect young children.
- 71.8% (n=112) of the cases were either too young to be vaccinated or were not up-to-date with the immunization recommendations for their age indicating that more work needs to be done to increase pertussis vaccination rates. Additionally, 5.5% (n=6) of the cases age less <18 years of age had a (PBE) school vaccine waivers (Figure 8).

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=439)			2006 (N=150)			2007 (N=69)			2008 (N=80)			2009 (N=156)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	180	41.0	127.	58	38.7	40.0	31	44.9	21.0	42	52.5	30.1	79	50.7	57.6
1-4	27	6.2	4.7	14	9.3	2.4	4	5.8	0.7	7	8.8	1.2	10	6.4	1.8
5-14	88	20.0	5.9	33	22.0	2.2	13	18.8	0.9	13	16.3	0.9	18	11.5	1.3
15-34	83	18.9	3.0	21	14.0	0.8	14	20.3	0.5	12	15.0	0.4	20	12.8	0.7
35-44	32	7.3	2.1	8	5.3	0.5	4	5.8	0.3	1	1.3	0.1	9	5.8	0.6
45-54	16	3.6	1.3	7	4.7	0.5	1	1.4	0.1	2	2.5	0.1	12	7.7	0.9
55-64	8	1.8	1.0	6	4.0	0.7	2	2.9	0.2	2	2.5	0.2	5	3.2	0.5
65+	5	1.1	0.5	3	2.0	0.3	0	0.0	0.0	1	1.3	0.1	3	1.9	0.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	14	3.2	1.1	8	5.3	0.6	8	11.6	0.6	4	5.0	0.3	10	6.4	0.8
Black	31	7.1	3.7	4	2.7	0.5	1	1.4	0.1	4	5.0	0.5	6	3.9	0.7
Hispanic	245	55.8	5.4	79	52.7	1.7	42	60.9	0.9	52	65.0	1.1	100	64,1	2.1
White	148	33.7	5.1	59	39.3	2.1	18	26.1	0.6	18	22.5	0.6	39	25.0	1.3
Other	1	0.2	3.5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.6	3.9
Unknown	0	0.0		0	0.0		0	0.0		2	2.5		0	0.0	
SPA															
1	46	10.5	13.5	12	8.0	3.5	1	1.4	0.3	2	2.5	0.5	9	5.8	2.4
2	113	25.7	5.3	32	21.3	1.5	16	23.2	0.7	12	15.0	0.5	21	13.5	0.9
3	50	11.4	2.9	21	14.0	1.2	8	11.6	0.5	4	5.0	0.2	24	15.4	1.4
4	37	8.4	3.0	14	9.3	1.1	9	13.0	0.7	17	21.3	1.3	18	11,5	1.4
5	31	7.1	4.9	11	7.3	1.7	8	11.6	1.2	10	12.5	1.5	17	10.9	2.6
6	61	13.9	5.9	17	11.3	1.6	9	13.0	0.9	9	11.3	0.9	24	15.4	2.3
7	39	8.9	2.8	27	18.0	2.0	8	11.6	0.6	13	16.3	0.9	22	14.1	1.6
8	62	14.1	5.6	16	10.7	1.4	10	14.5	0.9	13	16.3	1.2	21	13.5	1.9
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2000-2009

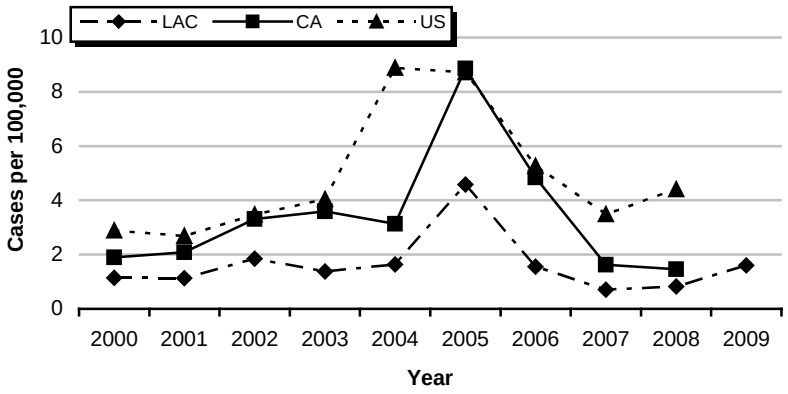


Figure 2. Reported Cases of Pertussis
LAC, 2000-2009

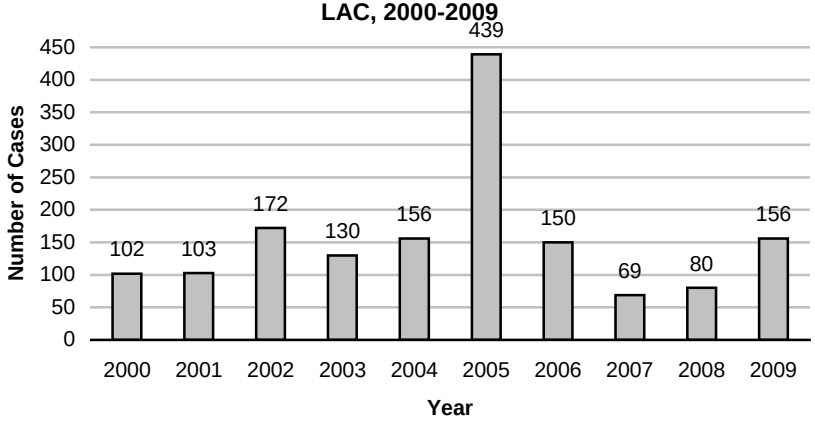


Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2009 (N=156)

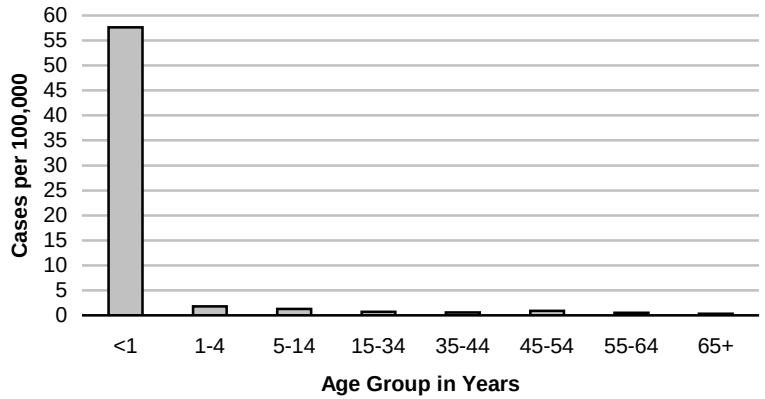
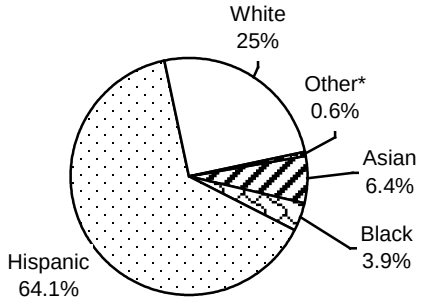
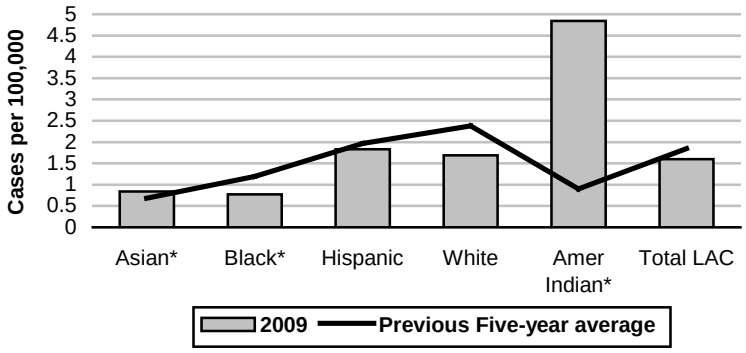


Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2009 (N=156)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, Black, Hispanic, or White.

Figure 5. Age-Adjusted Incidence Rates of Pertussis by Race/Ethnicity, LAC, 2009 (N=156) vs. Previous Five-Year Average



* Incidence rates based on <19 cases are considered unreliable.

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2009 (N=156)

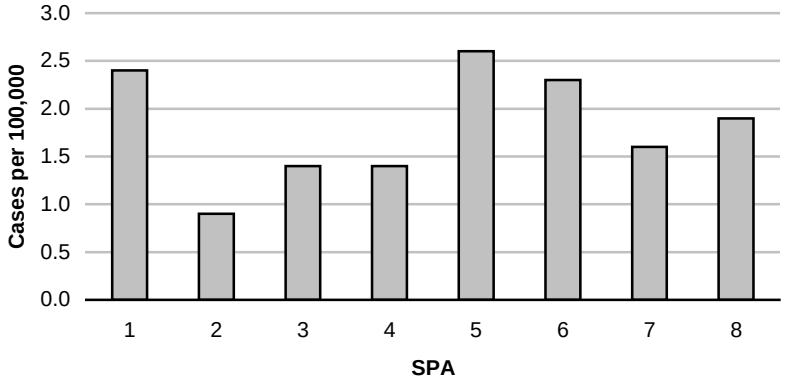


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2009 (N=156) vs. Previous Five-year Average

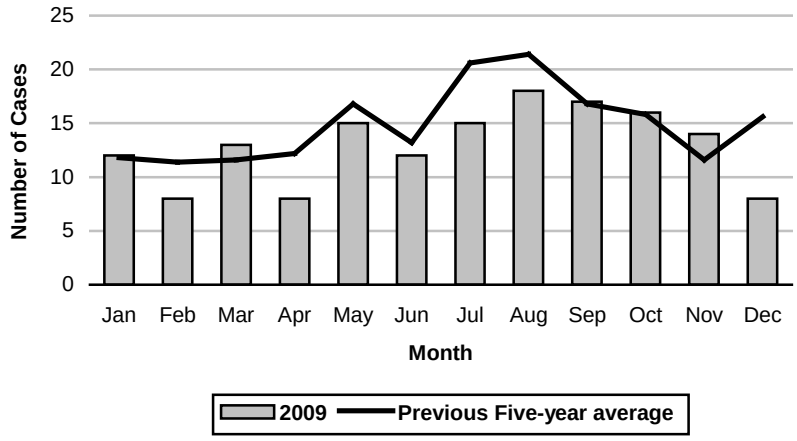
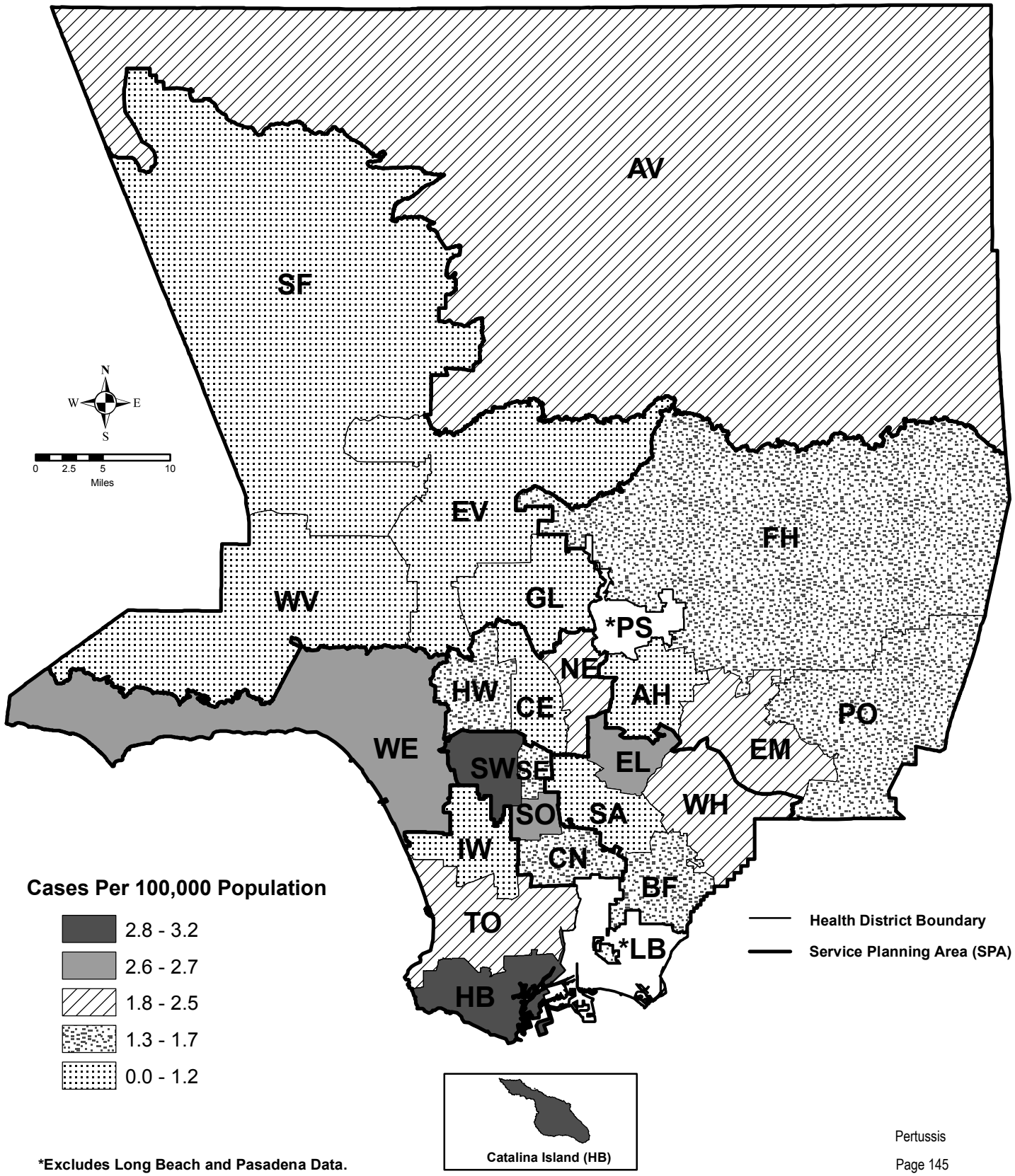


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2009

	Reported Cases	Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 years (n=110)
No.	156	42	44	70	6
%	100%	26.9%	28.2%	44.9%	5.5%

[1]Cases less than 2 months of age.
[2]Cases 2 months of age and older and who are up-to-date with the pertussis immunization recommendations for their age.
[3]Cases 2 months of age and older and who are not up-to-date with the pertussis immunization recommendations for their age. Includes cases that have unknown immunization status, have personal belief exemption school vaccine waivers, or have no valid documentation of receiving pertussis vaccines prior to disease onset.

Map 10. Pertussis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	786
Annual Incidence[a]	
LA County	8.0
California[b]	N/A
United States	--
Age at Diagnosis	
Mean	52
Median	55
Range	0 mos – 102 yrs

[a]Cases per 100,000 population.
[b]Not notifiable.

DESCRIPTION

Invasive pneumococcal disease (IPD) is a leading cause of illness in young children and causes considerable illness and death in the elderly. The infectious agent, *Streptococcus pneumoniae*, is spread by direct and indirect contact with respiratory discharge and can cause pneumonia, bacteremia, meningitis, and death. *S. pneumoniae* is one of the most common bacterial causes of community acquired pneumonia and otitis media (ear infections). However, these non-invasive forms of infection are not counted in LA County (LAC) surveillance. Therefore, the data presented in this report underestimate all disease caused by *S. pneumoniae* in LAC.

ACDC has followed IPD as a special antibiotic resistance surveillance project since late 1995 and added IPD to its list of reportable diseases in October 2002. Cases are defined as LAC residents with a positive isolate for *S. pneumoniae* collected from a normally sterile site (e.g., blood, cerebral spinal fluid).

Antibiotic susceptibility is determined by disk or dilution diffusion. Minimum inhibitory concentration (MIC) breakpoints utilized by participating laboratories are based on standards developed by the Clinical and Laboratory Standards Institute. For this report, an isolate of *S. pneumoniae* is considered nonsusceptible to an antibiotic if the results indicate intermediate or high-level resistance.

Two effective vaccines are available for pneumococcal disease. Heptavalent pneumococcal conjugate vaccine (Prevnar®) is recommended by the Advisory Committee on Immunization Practices (ACIP) for all children under two years, and for children up to five years at high risk of invasive pneumococcal infections.[1] The 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults ≥65 years and those over two years at high risk of IPD. For children aged two to five years at high risk of invasive pneumococcal infections, ACIP recommends the use of pneumococcal conjugate vaccine followed at least two months later by the 23-valent pneumococcal polysaccharide vaccine. This regimen provides protection against a broader range of serotypes, although supporting data are limited. While the current vaccines are still effective, the incidence rate for IPD has increased since 2006.

2009 TRENDS AND HIGHLIGHTS

- The incidence rate of IPD has been fairly stable with a range of 5.5 to 8.5 cases per 100,000 people since 2000 (Figure 1). This year's incidence rate, 8.0 cases (N=786) per 100,000 people, continued an upward trend since 2006, and was 29% higher than the average annual incidence rate of the previous five years (6.2 per 100,000).
- Mortality in 2009 was 10.7% (N=84). Average annual mortality for the previous five years was 6.8% However, disease outcome data were missing for 44-63% of the cases in 2004-2008, and 36% of cases (N=282) in 2009.
- Incidence rates among all age groups were the highest they have been since 2004 (Figure 2). The greatest increases were in 5 to 14 year olds (100%) and 15 to 34 year olds (69%).
- Cases aged 65 years and older have the highest incidence rate (26.2 per 100,000) of all age groups followed by those aged less than one year (Figure 2).
- All race/ethnic groups had higher annual incidence rates in 2009 when compared to the

[1] In February 2010, a 13-valent pneumococcal conjugate vaccine (Prevnar 13®) was licensed and replaces the heptavalent vaccine. The 13-valent vaccine prevents invasive infection caused by the serotypes contained in the heptavalent vaccine and six additional serotypes of *S. pneumoniae*.

previous four years (Figure 3). Asians had the greatest increase (87%) in 2009. However, the validity of comparisons across years is questionable as race data were missing for 29% to 46% of cases during 2004 to 2008. In 2009, race-ethnicity was missing for 252 cases (32%).

- Similar to previous years, the incidence rate in blacks was two to three times higher than the rate in other race/ethnic groups (Figure 3).
- As in previous years, Service Planning Area (SPA) 6 had the highest incidence rate of IPD (10.6 cases per 100,000; Figure 4).
- In contrast to previous years, SPA 4 had the second highest incidence rate in 2009. In 2004-2008, SPA 4 had the lowest average annual rate of IPD. In 2009, SPA 4 had a 68% increase in incidence rate compared to the previous five years.
- IPD peaked in December in 2009, similar to the previous five years (Figure 5).
- Compared to the average monthly incidence of the previous five years and the 2008 monthly incidence, the numbers of incident IPD cases in 2009 were substantially higher in November (77%), April (58%), October (54%), and May (46%) (Figure 5). These months correlated with increased H1N1 influenza incidence in LAC, specifically the emergence of the pandemic in April and May, and the sharp rise in H1N1 incidence during October and November.
- The percentage of isolates susceptible to penicillin increased compared to the previous five years (Figure 6). Susceptibility to cefotaxime, trimethoprim-sulfamethoxazole (TMP-SMZ), erythromycin, ceftriaxone, and the fluoroquinolones stayed the same or changed only slightly.
- In 2009, 78% (N=616) of cases were reported hospitalized (14% missing). In 2004-2008, 72% of cases were hospitalized (21% missing).
- Median length of hospital stay was 5 days (N=226; mean=8.4 and range=0 to 74 days). ACDC only started recording length of hospital stay after July 2009. Length of hospital stay was still missing for 71% (N=560) of hospitalized cases.

Reported Invasive Pneumococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=590)			2006 (N=533)			2007 (N=624)			2008 (N=662)			2009 (N=786)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	18	3.1	12.8	12	2.3	8.3	23	3.7	15.6	19	2.4	11.5	20	2.5	14.6
1-4	52	8.8	9.0	47	8.8	8.1	48	7.7	8.3	57	8.6	10.1	56	7.1	10.0
5-14	23	3.9	1.6	16	3.0	1.1	23	3.7	1.6	11	1.8	0.9	33	4.2	2.4
15-34	35	5.9	1.2	34	6.4	1.2	47	7.5	1.7	30	4.4	1.0	64	8.1	2.3
35-44	66	11.2	4.4	53	9.9	3.5	67	10.7	4.5	67	10.6	4.6	75	9.5	5.0
45-54	94	15.9	7.4	92	17.3	7.1	90	14.4	6.8	98	14.2	7.0	136	17.3	9.9
55-64	79	13.4	9.5	95	17.8	10.9	106	17.0	11.9	114	17.4	12.6	123	15.6	12.9
65+	219	37.1	22.7	178	33.4	18.2	214	34.3	21.2	264	40.2	26.1	278	34.4	26.2
Unknown	4	0.7		6	1.1		6	1.0		2	0.3		1	0.1	
Race / Ethnicity															
Asian	22	3.7	1.8	19	3.6	1.5	33	5.3	2.6	32	4.8	2.5	50	6.4	3.8
Black	81	13.7	9.4	86	16.1	10.2	70	11.2	8.2	76	11.5	8.9	86	10.9	10.1
Hispanic	164	27.8	3.6	107	20.1	2.3	135	21.6	2.9	124	18.7	2.6	197	25.1	4.2
White	132	22.4	4.6	136	25.5	4.7	102	16.3	3.5	135	20.4	4.6	192	24.4	6.6
Other	1	0.2	3.5	1	0.2	3.5	0		0.0	0		0.0	9	1.1	35.4
Unknown	190	32.2		184	34.5		284	45.5		295	44.6		252	32.1	
SPA															
1	19	3.2	5.5	23	4.3	6.6	24	3.8	6.7	18	2.7	4.9	25	3.2	6.8
2	108	18.3	5.1	95	17.8	4.4	100	16.0	4.6	137	20.7	6.3	156	19.8	7.0
3	104	17.6	6.1	90	16.9	5.2	104	16.7	6.0	99	15.0	5.7	116	14.8	6.7
4	76	12.9	6.1	52	9.8	4.1	66	10.6	5.2	62	9.4	4.9	103	13.1	8.3
5	38	6.4	5.8	35	6.6	5.5	36	5.8	5.6	48	7.3	7.4	54	6.9	8.3
6	84	14.2	8.1	81	15.2	7.8	92	14.7	8.8	107	16.2	10.1	111	14.1	10.6
7	66	11.2	4.8	66	12.4	4.8	79	12.7	5.7	73	11.0	5.3	102	13.0	7.4
8	69	11.7	6.2	68	12.8	6.1	98	15.7	8.8	78	11.8	6.9	89	11.3	7.9
Unknown	26	4.4		12	4.3		25	4.0		40	6.0		30	3.8	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Annual Incidence Rates of Invasive Pneumococcal Disease, LAC and US, 2000-2009

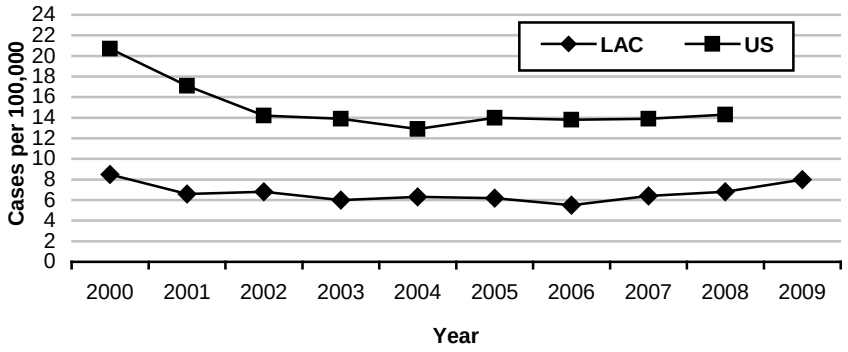


Figure 2. Annual Incidence Rates of Invasive Pneumococcal Disease by Age Group, LAC, 2004-2009

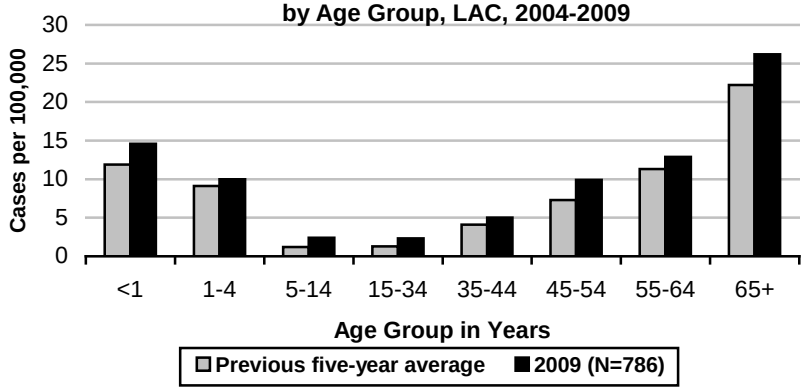
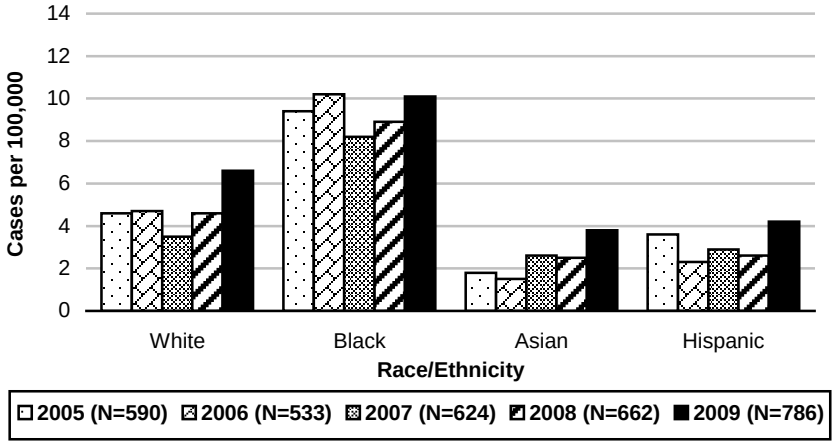


Figure 3. Annual Incidence Rates of Invasive Pneumococcal Disease by Race/Ethnicity, LAC, 2005-2009



*Race-ethnicity was missing for 32%, 35%, 46%, 45%, and 32% of cases for 2005, 2006, 2007, 2008, and 2009, respectively.

Figure 4. Annual Incidence Rates of Invasive Pneumococcal Disease by SPA, LAC, 2004-2009

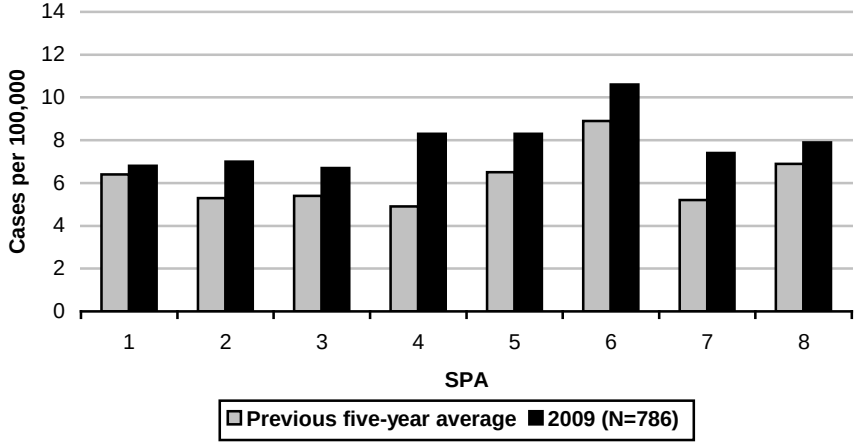


Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2004-2009

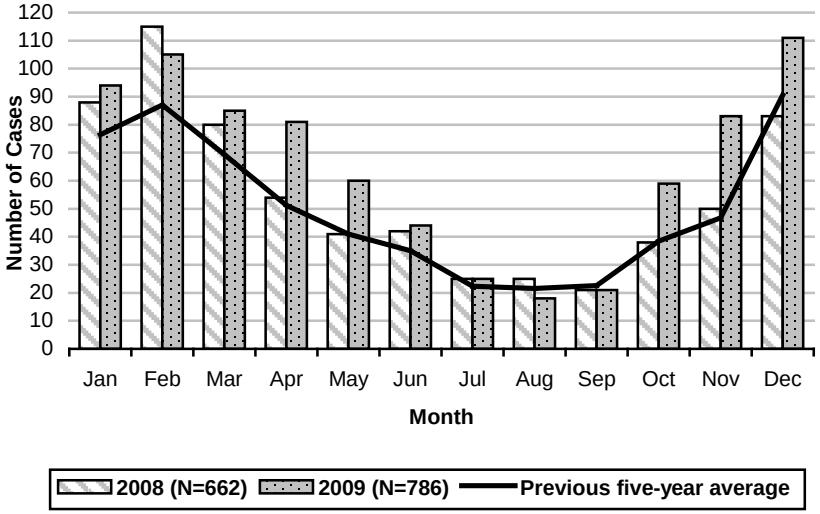
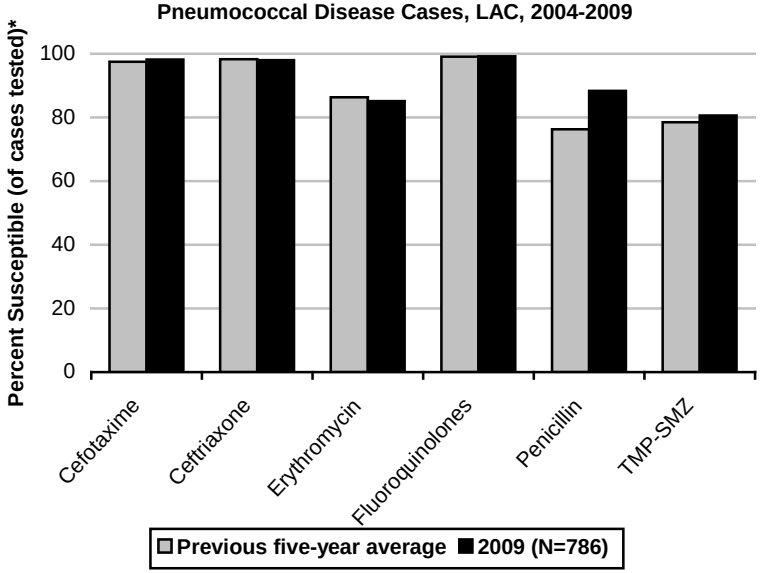


Figure 6. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2004-2009



*Range of number of isolates tested 2004-2009: Cefotaxime (301-389), Ceftriaxone (280-485), Erythromycin (271-456), Fluroquinolones (262-394), Penicillin (490-668), and TMP-SMZ (150-330).

SALMONELLOSIS

CRUDE DATA	
Number of Cases	1194
Annual Incidence[a]	
LA County	12.2
California[b]	13.8
United States[b]	16.9
Age at Diagnosis	
Mean	26.9
Median	20
Range	<1- 100

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Salmonellosis is caused by a Gram-negative bacillus, *Salmonella enterica*, of which there are more than 2,500 serotypes. This disease is transmitted by the fecal-oral route, from animal or human, with or without intermediary contamination of foodstuffs. The most common symptoms include diarrhea, fever, headache, abdominal pain, nausea and sometimes vomiting. Occasionally, the clinical course is that of enteric fever or septicemia. Asymptomatic infections may occur. The incubation period is usually 12 to 36 hours for gastroenteritis, longer and variable for other manifestations. Communicability lasts as long as organisms are excreted, usually from 2 to 5 weeks, but may last for months to years. Healthy people are susceptible, but persons especially at risk are those who are on antacid therapy, have recently taken or are taking broad-spectrum antibiotic therapy or immunosuppressive therapy, or those who have had gastrointestinal surgery, neoplastic disease, or other debilitating conditions. Severity of the disease is related to the serotype, the number of organisms ingested, and host factors. Immunocompromised persons, such as those with cancer or HIV infection, are at risk for recurrent *Salmonella* septicemia. Occasionally the organism may localize anywhere in the body, causing abscesses, osteomyelitis, arthritis, meningitis, endocarditis, pericarditis, pneumonia, or pyelonephritis.

Los Angeles County (LAC)'s review of investigation reports shows that many persons engage in high-risk food handling behaviors such as: consumption of raw or undercooked meats, or produce; use of raw eggs; not washing hands and/or cutting boards after handling raw poultry or meat; and having contact with reptiles.

Reptile-associated salmonellosis (RAS) has been a consistent problem in LAC and nationally for many years. In 2009, 9.2% (n = 104) of non-outbreak cases had some type of reptile exposure, 62% of which were turtle related. These animals remain popular as pets and many people are not aware of laws controlling their sale.

- Always wash hands thoroughly with soap and water after handling reptiles or their cages and equipment.
- Owners and potential purchasers of reptiles should be educated about the risk of acquiring salmonellosis from these animals.
- Persons at increased risk for infection, such as children less than 5 years of age and immunocompromised persons should avoid both direct and indirect contact with reptiles.
- Reptiles are inappropriate pets for households with children less than 5 years of age and immunocompromised persons. If expecting a new child, remove pet reptiles from the home before the child arrives and thoroughly clean the home.
- Reptiles should not be kept in preschools and child care facilities.

2009 TRENDS AND HIGHLIGHTS

- There were six outbreaks investigated in 2009. Two were daycare outbreaks and three were foodborne. One outbreak source was not determined. For more information see the 2009 Foodborne Illness Outbreak summary in this report.
- Overall rates in several categories returned to expected levels in 2009. These rates had been unusually high due to a large outbreak that occurred in October 2008.
- SPA 5 had the highest rate followed by SPA 2 (Figure 4).
- Twenty-one percent of cases were hospitalized for two or more days (consistent with years prior to 2008).
- There were seven deaths in persons diagnosed with salmonellosis. Ages ranged from <1 to 86 years with a mean of 59 years. A newborn case had severe myocardial dysfunction at birth and sepsis was likely from an ascending infection during delivery. A 41 year old male was infected but died due to methamphetamine intoxication. The other cases had concurrent medical problems such as cancer and diabetes.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=1085)			2006 (N=1217)			2007 (N=1081)			2008 (N=1638)			2009 (N=1194)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	95	8.8	67.5	100	8.2	69.0	99	9.2	66.9	89	5.4	63.7	89	7.5	64.9
1-4	191	17.6	32.9	221	18.2	38.1	183	16.9	31.7	613	37.4	108.	229	19.2	40.8
5-14	189	17.4	12.8	208	17.1	14.1	172	15.9	12.0	170	10.4	12.1	195	16.3	14.3
15-34	220	20.3	7.9	251	20.6	9.0	226	20.9	8.0	278	17.0	9.7	271	22.7	9.6
35-44	117	10.8	7.8	105	8.6	7.0	114	10.5	7.6	151	9.2	10.0	110	9.2	7.4
45-54	88	8.1	6.9	112	9.2	8.6	85	7.9	6.4	116	7.1	8.6	101	8.5	7.4
55-64	73	6.7	8.7	80	6.6	9.2	75	6.9	8.5	91	5.6	10.0	76	6.4	8.0
65+	110	10.1	11.4	140	11.5	14.3	124	11.5	12.3	127	7.8	12.4	123	10.3	11.6
Unknown	2	0.2		0	0.0		3	0.3		3	0.2				
Race / Ethnicity															
Asian	105	9.7	8.3	138	11.3	10.9	114	10.5	8.9	114	7.0	8.7	103	8.6	7.9
Black	74	6.8	8.7	95	7.8	11.3	64	5.9	7.5	77	4.7	9.0	75	6.3	8.8
Hispanic	494	45.5	10.9	609	50.0	13.2	539	49.9	11.6	1071	65.4	22.9	620	52.0	13.3
White	392	36.1	13.5	351	28.8	12.2	339	31.4	11.7	326	19.9	11.2	367	30.7	12.6
Other	7	0.6	24.8	4	0.3	14.0	10	0.9	48.0	3	0.2	12.2	10	0.8	
Unknown	13	1.2		20	1.6		15	1.4		47	2.9		19	1.6	
SPA															
1	28	2.6	8.2	33	2.7	9.5	39	3.6	10.9	35	2.1	9.5	40	3.4	10.9
2	249	22.9	11.7	270	22.2	12.6	243	22.5	11.3	657	40.1	30.0	316	26.5	14.3
3	161	14.8	9.4	189	15.5	11.0	186	17.2	10.8	204	12.5	11.8	179	15.0	10.3
4	148	13.6	11.9	179	14.7	14.2	148	13.7	11.7	135	8.2	10.6	138	11.6	11.1
5	87	8.0	13.7	104	8.5	16.3	74	6.8	11.5	46	2.8	7.1	107	9.0	16.4
6	109	10.0	10.6	142	11.7	13.6	132	12.2	12.6	123	7.5	11.7	134	11.2	12.7
7	157	14.5	11.4	175	14.4	12.7	146	13.5	10.6	309	18.9	22.3	152	12.7	11.0
8	141	13.0	12.7	123	10.1	11.1	113	10.5	10.1	129	7.9	11.5	128	10.7	11.4
Unknown	5	0.5		2	0.2		0	0.0		0	0.0				

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Reported Salmonellosis Rates by Year
LAC, CA and US, 2000-2009

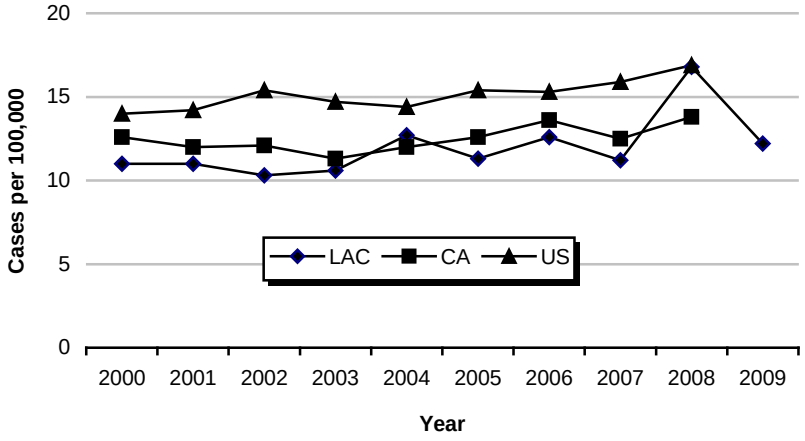


Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2009 (N=1194)

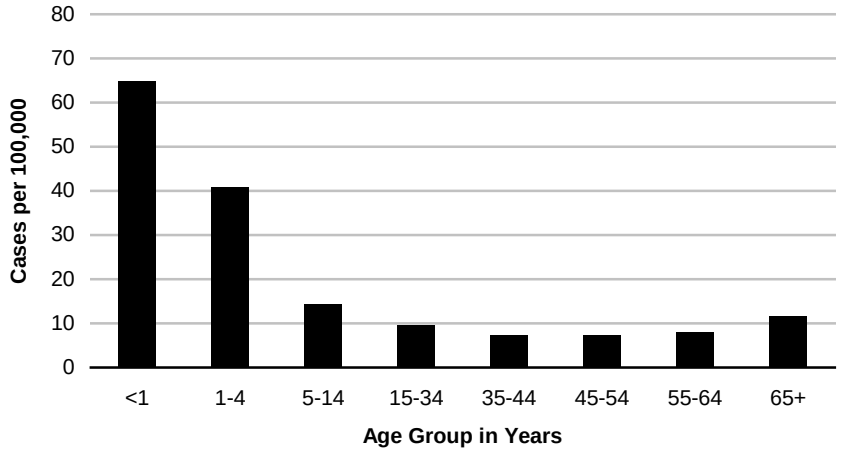


Figure 3. Reported Cases of Salmonellosis by Race/Ethnicity
LAC, 2009 (N=1194)

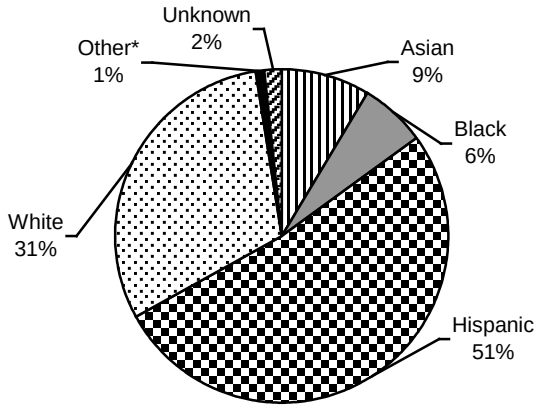
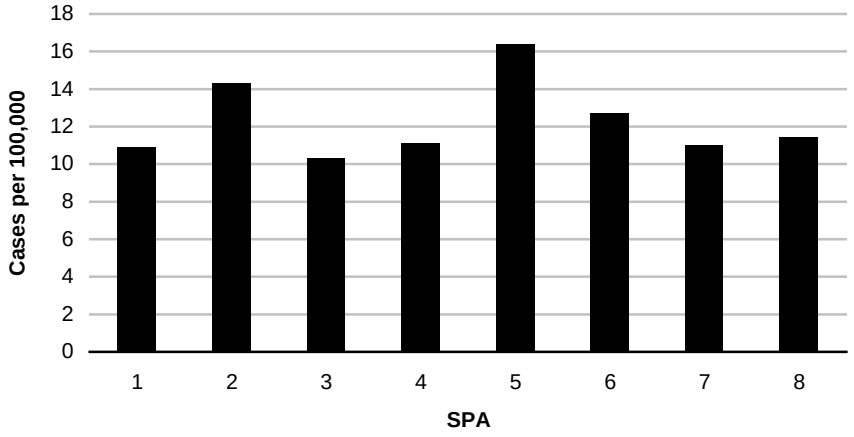
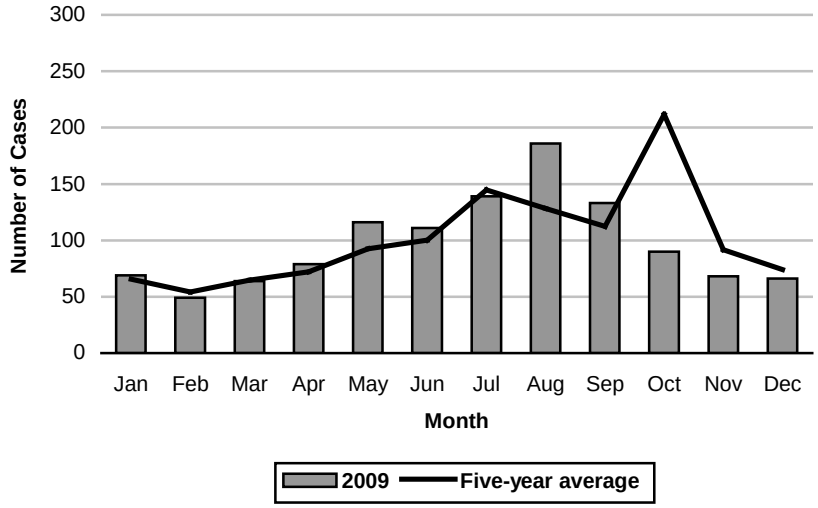


Figure 4. Reported Salmonellosis Rates by SPA
LAC, 2009 (N=1194)

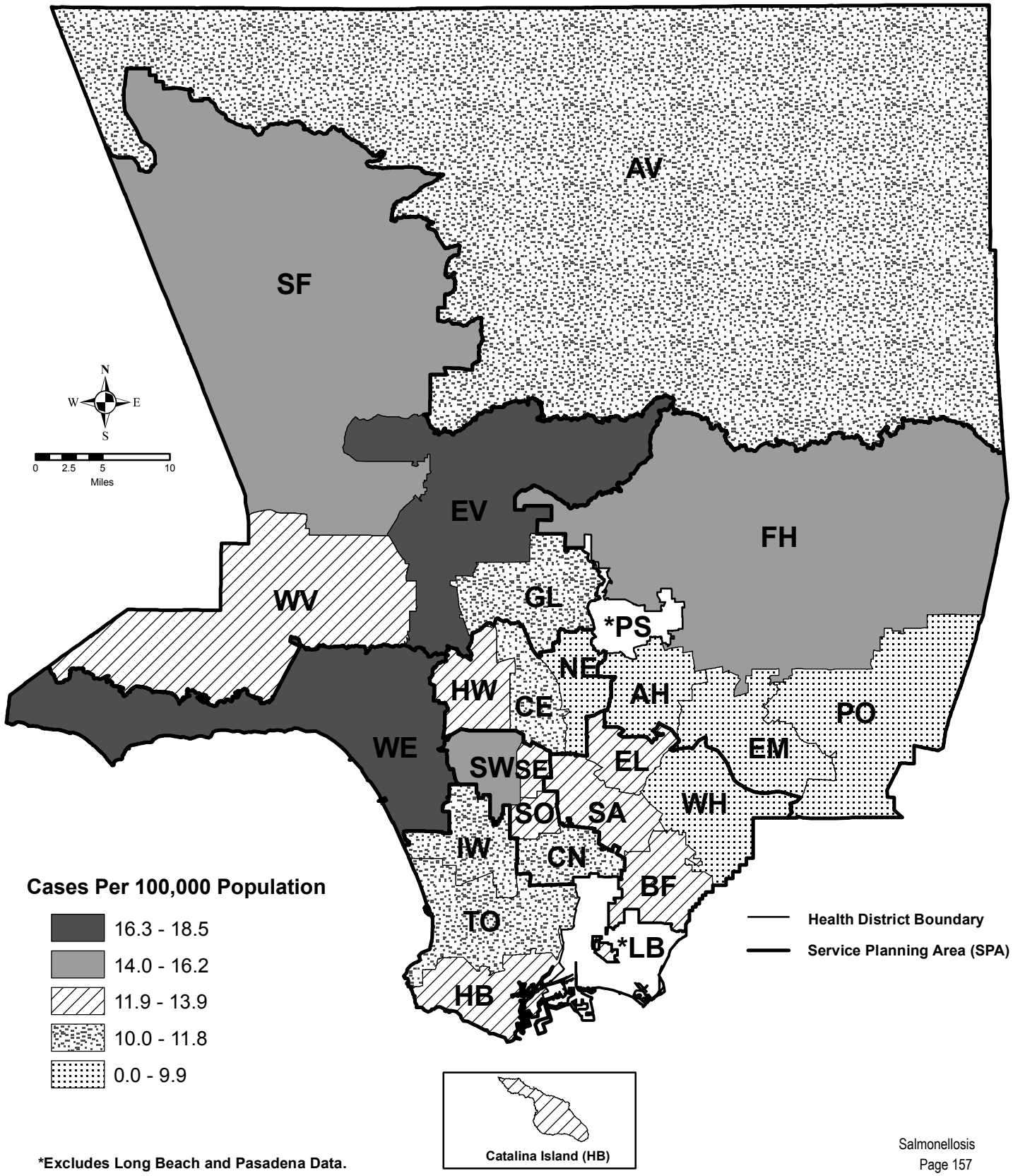


* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2009 (N=1194)



Map 11. Salmonellosis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	259
Annual Incidence[a]	
LA County	2.6
California[b]	4.6
United States[b]	7.5
Age at Diagnosis	
Mean	28.8
Median	30
Range	0-87

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Shigellosis is caused by a Gram-negative bacillus with four main serogroups: *Shigella dysenteriae* (group A), *S. flexneri* (group B), *S. boydii* (group C) and *S. sonnei* (group D). Incubation period is 1 to 3 days. Humans are the definitive host; fecal-oral transmission occurs when individuals fail to thoroughly wash their hands after defecation and spread infective particles to others, either directly by physical contact, including sexual behaviors, or indirectly by contaminating food. Infection may occur with ingestion of as few as ten organisms. Common symptoms include diarrhea, fever, nausea, vomiting, and tenesmus. Stool may contain blood or mucous. In general, the elderly, the immunocompromised, and the malnourished are more susceptible to severe disease outcomes.

Hand washing is vital in preventing this disease. Young children or anyone with uncertain hygiene practices should be monitored to promote compliance. Hand washing is especially important when out in crowded areas. Children with diarrhea, especially those in diapers, should not be allowed to swim or wade in public swimming areas. In Los Angeles County (LAC) cases and symptomatic contacts in sensitive occupations or situations (e.g., food handling, daycare and healthcare workers) are routinely removed from work or the situation until they have culture negative stool specimens tested in the LAC Public Health Laboratory.

2009 TRENDS AND HIGHLIGHTS

- There was a 48% decrease in reported cases in 2009 after a 7.6% increase in cases during 2008 (Figure 1).
- The highest incidence rate was observed in the 1 to 4 years age group (6.1 per 100,000) (Figure 2).
- The incidence of shigellosis among the Hispanic population (59 %, 3.3 per 100,000) remained highest, consistent with previous years (Figures 3, 6). Much of this is believed to be due to overcrowded living situations and contact with visitors from endemic countries.
- Service Planning Area (SPA) 4 had the highest rate (5.9 per 100,000) in 2009, whereas in the previous two years SPA 6 had the highest rates (Figure 4).
- In 2009, the monthly incidence peaked in August, however the incidence during 2009 was below the five-year average, for every month except Feburary (Figure 5).
- No shigellosis outbreaks were detected in 2009.
- In 2009, the percentage of shigellosis cases hospitalized for at least two days increased to 24% (n=63), compared to 16% (n=78) in 2008. No deaths were reported.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=710)			2006 (N=524)			2007 (N=463)			2008 (N=498)			2009 (N=259)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	13	1.8	9.2	5	1.0	3.5	13	2.8	8.8	8	1.6	5.7	4	1.5	2.9
1-4	170	23.9	29.3	118	22.5	20.3	100	21.6	17.3	118	23.7	20.8	34	13.1	6.1
5-14	213	30.0	14.4	134	25.6	9.1	90	19.4	6.3	137	27.5	9.8	47	18.1	3.4
15-34	149	21.0	5.3	111	21.2	4.0	104	22.5	3.7	122	24.5	4.3	67	25.9	2.4
35-44	70	9.9	4.6	71	13.5	4.7	67	14.5	4.5	42	8.4	2.8	51	19.7	3.4
45-54	34	4.8	2.7	39	7.4	3.0	43	9.3	3.3	26	5.2	1.9	33	12.7	2.4
55-64	31	4.4	3.7	17	3.2	2.0	20	4.3	2.3	23	4.6	2.5	12	4.6	1.3
65+	28	3.9	2.9	29	5.5	3.0	26	5.6	2.6	22	4.4	2.2	11	4.2	1.0
Unknown	2	0.3		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	27	3.8	2.1	23	4.4	1.8	26	5.6	2.0	10	2.0	0.8	6	2.3	0.5
Black	43	6.1	5.1	42	8.0	5.0	27	5.8	3.2	25	5.0	2.9	17	6.6	2.0
Hispanic	500	70.4	11.0	356	67.9	7.7	281	60.7	6.1	376	75.5	8.0	154	59.5	3.3
White	126	17.7	4.3	99	18.9	3.4	56	12.1	1.9	71	14.3	2.4	69	26.6	2.4
Other	3	0.4	10.6	1	0.2	3.5	4	0.9	19.2	3	0.6	12.2	0	0	0
Unknown	11	1.5		3	0.6		69	14.9		13	2.6		13	5.0	0
SPA															
1	21	3.0	6.2	6	1.1	1.7	10	2.2	2.8	11	2.2	3.0	5	1.9	1.9
2	133	18.7	6.2	87	16.6	4.1	93	20.1	4.3	89	17.9	4.1	46	17.7	2.1
3	80	11.3	4.7	62	11.8	3.6	72	15.6	4.2	66	13.3	3.8	23	8.9	1.3
4	146	20.6	11.7	103	19.7	8.2	87	18.8	6.9	71	14.3	5.6	74	28.6	5.9
5	43	6.1	6.8	34	6.5	5.3	29	6.3	4.5	23	4.6	3.6	22	8.5	3.4
6	120	16.9	11.6	106	20.2	10.2	80	17.3	7.7	109	21.9	10.3	41	15.8	3.9
7	107	15.1	7.8	84	16.0	6.1	64	13.8	4.6	93	18.7	6.7	33	12.7	2.4
8	60	8.5	5.4	41	7.8	3.7	28	6.0	2.5	34	6.8	3.0	14	5.4	1.2
Unknown	0	0.0		1	0.2		0	0.0		2	0.4		0	0	0

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Reported Shigellosis Rates by Year
LAC, CA and US, 1998-2009

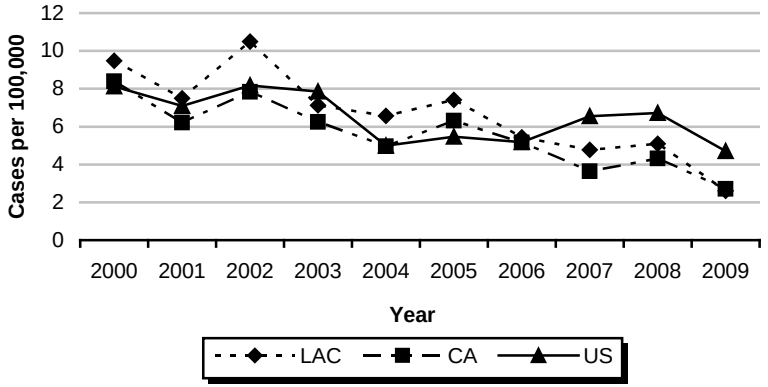


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2009 (N=259)

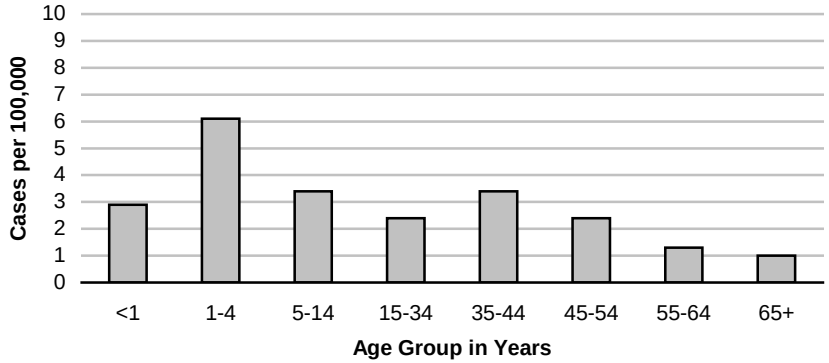
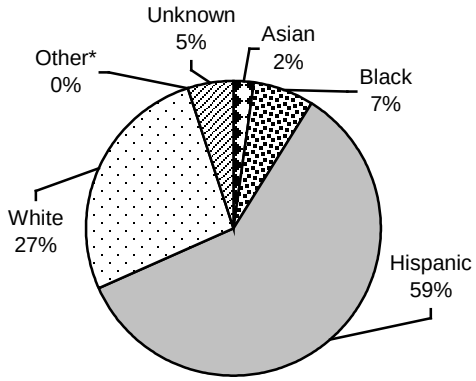


Figure 3. Percent Cases of Shigellosis by Race/Ethnicity
LAC, 2009 (N=259)



*Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 4. Reported Shigellosis Rates by SPA
LAC, 2009 (N=259)

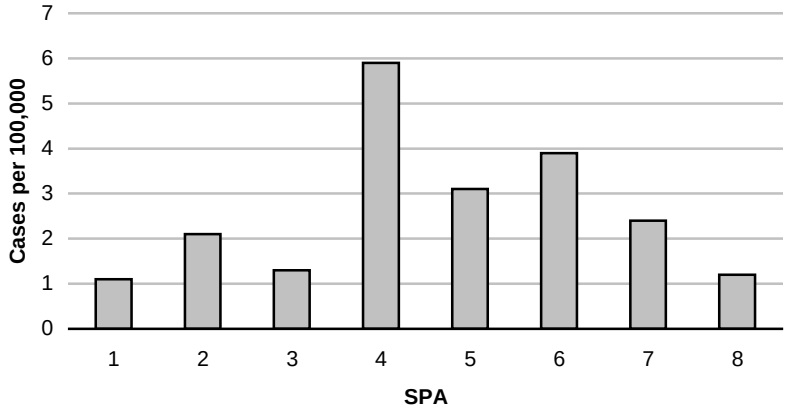


Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2009 (N=259)

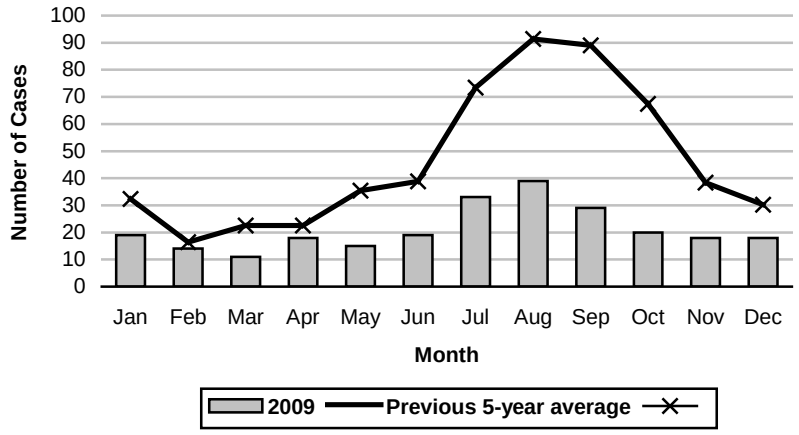
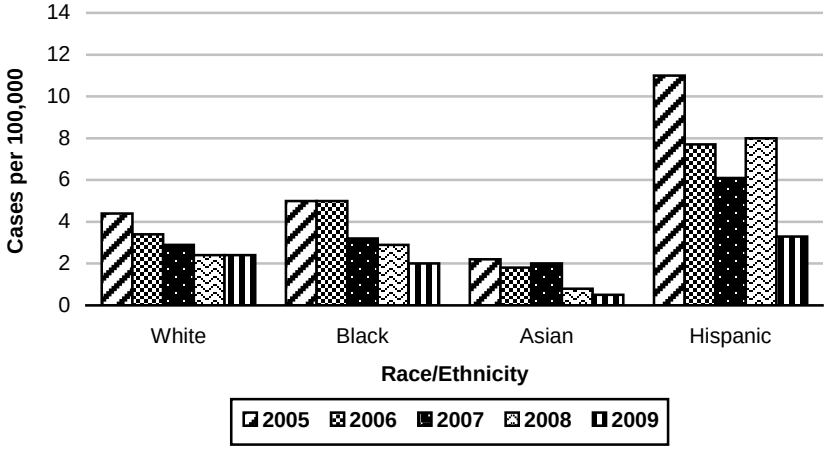
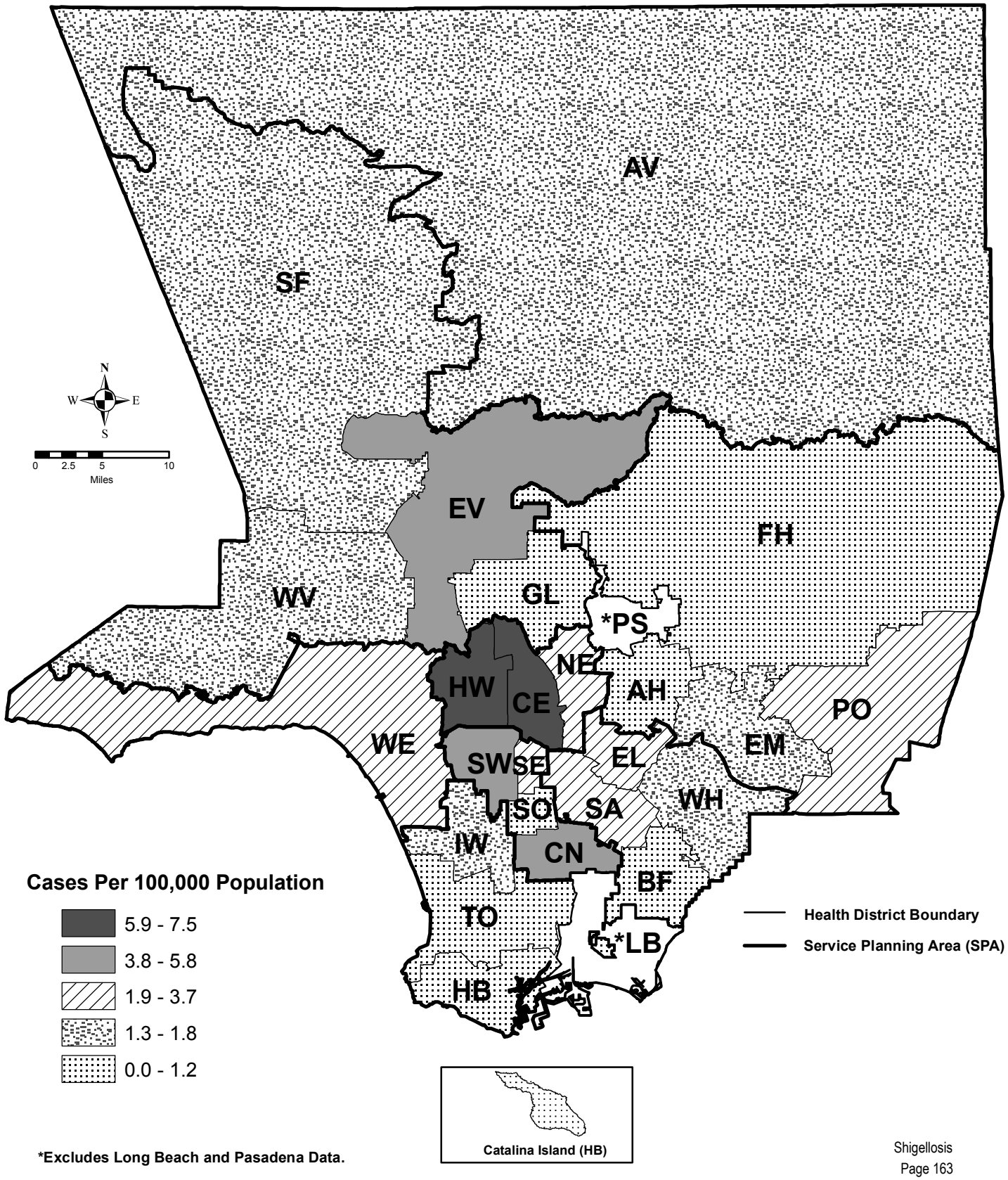


Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2005-2009



Map 12. Shigellosis
Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

SEVERE *STAPHYLOCOCCUS AUREUS* INFECTION IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	27
Annual Incidence	
LA County[a]	0.28
California	N/A
United States	N/A
Age at Diagnosis	
Mean	46
Median	48
Range	1 - 90 years

[a]Cases per 100,000 population.

DESCRIPTION

Staphylococcus aureus is a well known bacterial cause of skin infections, causing boils, abscesses, and cellulitis. Infection can result in severe illness, including invasive skin and soft-tissue infection, necrotizing fasciitis, musculoskeletal infection like pyomyositis and osteomyelitis, severe pneumonia, empyema, necrotizing pneumonia, disseminated infections with septic emboli, bacteremia, sepsis syndrome, and death. Statewide surveillance of severe *S. aureus* infections in previously healthy persons began in February 2008. For surveillance purposes, severe *S. aureus* infection in a previously healthy person is defined as isolation of *S. aureus* from either a sterile or non-sterile site in a patient that has died or has been admitted to the hospital intensive care unit (ICU). In addition, the patient must be previously healthy, (i.e., no hospitalizations, surgery, dialysis, residence in long-term care, or percutaneous device/indwelling catheter within the past year).

Staphylococcus aureus is one of the most common bacterial causes of skin infections that result in a visit to a doctor or the hospital. However, most of these infections do not result in ICU admission or death. Therefore, the data presented in this report underestimate all disease caused by this organism in Los Angeles County (LAC).

2009 TRENDS AND HIGHLIGHTS

- Cases aged 65 years and older had the highest rate (0.6 per 100,000) followed by cases aged 45-54 years and 55-64 years both groups of which had a rate of 0.4 cases per 100,000 (Figure 1).
- Blacks and whites had the highest rates of severe *S. aureus* infection at 0.4 cases per 100,000. Asians had the lowest rate at 0.1 cases per 100,000 (Figure 2).
- Service Planning Areas (SPAs) 1 and 6 had the highest rates of severe *S. aureus* infection at 0.8 and 0.9 cases per 100,000, respectively (Figure 3).
- The number of cases of severe *S. aureus* infection peaked during the month of February (Figure 4).
- The percentage of *S. aureus* infections resistant to methicillin was 59% (Figure 5).
- Diabetes and intravenous drug use were reported more than any other risk factors (Table 1).
- Severe *S. aureus* cases presented most often with pneumonia, wound infections, and skin infections(Table 2).
- Forty-one percent of cases were reported by only three hospitals in LAC. Thus, it is suspected that there has been significant underreporting of severe *S. aureus* infections in LAC.

Reported Severe *Staphylococcus Aureus* Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005			2006			2007			2008 (N=25)			2009 (N=27)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.7	0	0.0	0.0
1-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0	1	3.7	0.2
5-14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1	2	7.4	0.1
15-34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.0	5	18.5	0.2
35-44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1	3	11.1	0.1
45-54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	28.0	0.5	6	22.2	0.4
55-64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.4	4	14.8	0.4
65+	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.8	6	22.2	0.6
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0		0	0.0	
Race / Ethnicity															
Asian	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.2	1	3.7	0.1
Black	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.5	3	11.1	0.4
Hispanic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.1	12	44.4	0.3
White	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13	52.0	0.4	11	40.7	0.4
Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0	0	0.0	0.0
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0		0	0.0	
SPA															
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.5	3	11.1	0.8
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.2	2	7.4	0.1
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.5	4	14.8	0.3
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1	3	11.1	0.2
5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.5	1	3.7	0.2
6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.2	9	33.3	0.9
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1	2	7.4	0.1
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.3	2	7.4	0.2
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0		1		

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Severe *S. aureus* Infection by Age Group LAC, 2009 (N=27)

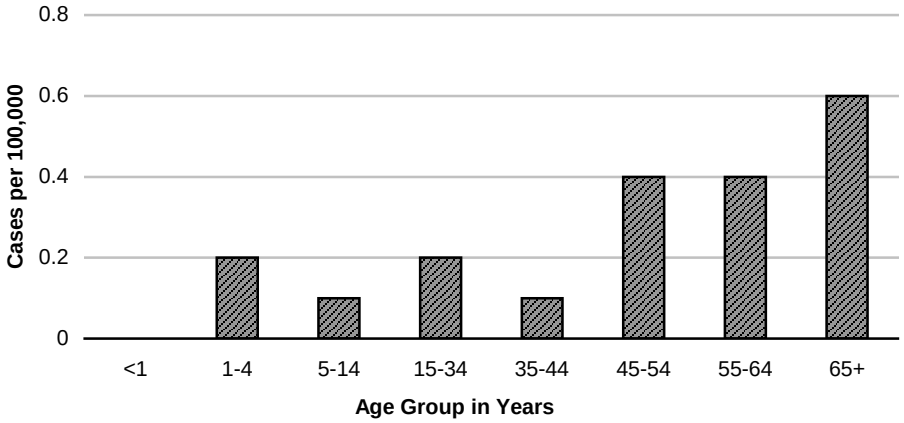


Figure 2. Severe *S. aureus* Infection Incidence Rates by Race/Ethnicity LAC, 2009 (N=27)

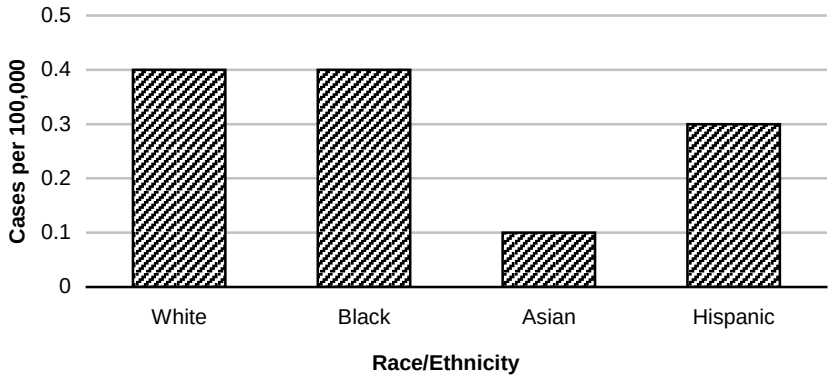


Figure 3. Incidence Rates of Severe *S. aureus* Infection by SPA LAC, 2009 (N=27)

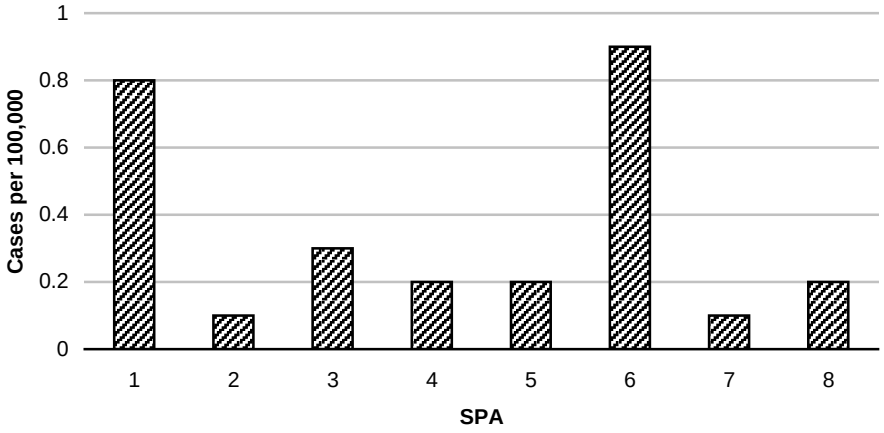


Figure 4. Reported Severe *S. aureus* Cases by Month of Onset LAC, 2009 (N=27)

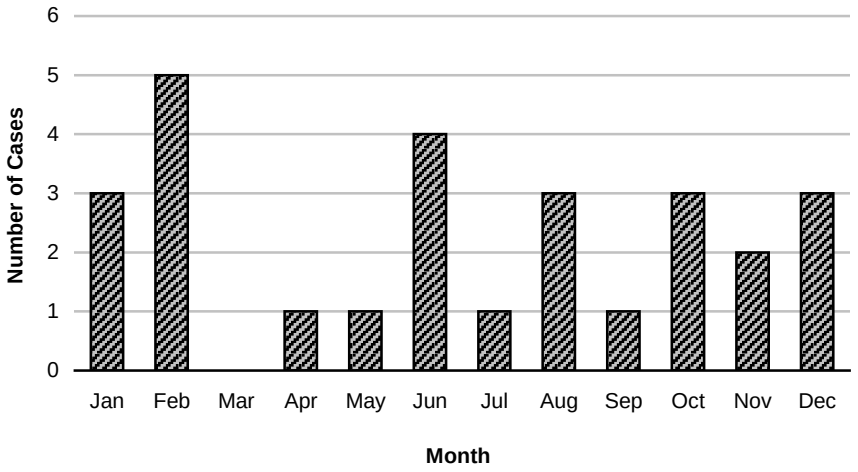
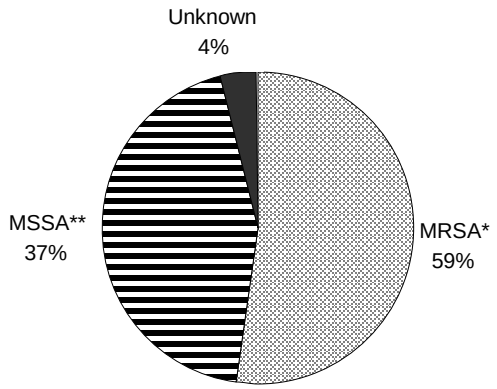


Figure 5. Percent Cases of Severe *S. aureus* Infection by Type LAC, 2009 (N=27)



*MRSA=Methicillin Resistance *Staphylococcus aureus*
**MSSA=Methicillin Sensitive *Staphylococcus aureus*

Table 1. Percentage of Severe *S. aureus* Risk Factors – Based on Date of Onset Between 1/1/08-12/31/2009

	2008 N = 25	2009 N = 27
	%**	%**
Diabetes	28	15
Current Smoker	28	7
Emphysema	20	0
Alcohol Abuse	16	0
Asthma	16	4
Intravenous Drug Use	8	15
HIV/AIDS	4	4
Malignancy	4	4
Other	24	41
None	16	22

*Persons with unknown risk factor information excluded.
**Overlapping risk factors will total over 100%.

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2009

Syndrome	Number	Percent*
Pneumonia	12	44
Bacteremia (without focus)	3	11
Wound Infection	5	19
Skin Infection	5	19
Meningitis	3	11
Septic Arthritis	1	4
Osteomyelitis	1	4
Bursitis	0	0
Endocarditis	2	7

*Overlapping syndromes will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	129
Annual Incidence[a]	
LA County	1.3
California[b]	N/A
United States	--
Age at Diagnosis	
Mean	51
Median	53
Range	0–100 years

[a]Cases per 100,000 population.
[b]Not notifiable.

DESCRIPTION

Invasive Group A streptococcal disease (IGAS) is caused by the group A beta-hemolytic *Streptococcus pyogenes* bacterium. Transmission is by direct or, rarely, indirect contact with infectious material. Illness manifests as various clinical syndromes including bacteremia without focus, sepsis, cutaneous wound or deep soft-tissue infection, septic arthritis, and pneumonia. It is the most frequent cause of necrotizing fasciitis, and is commonly known as "flesh eating bacteria." IGAS occurs in all age groups but more frequently among the very old. Infection can result in severe illness, including death.

For surveillance purposes in Los Angeles County (LAC), a case of IGAS is defined as isolation of *S. pyogenes* from a normally sterile body site (e.g., blood, cerebrospinal fluid, synovial fluid, or from tissue collected during surgical procedures) or from a non-sterile site if associated with streptococcal toxic shock syndrome (STSS) or necrotizing fasciitis (NF). IGAS cases are characterized as STSS if the diagnosis fulfills the Centers for Disease Control and Prevention or Council of State and Territorial Epidemiologists case definition for this syndrome, or as NF if the diagnosis was made by the treating physician.

S. pyogenes more commonly causes non-invasive disease that presents as strep throat and skin infections. However, these diseases are not counted in LAC surveillance of invasive disease, therefore, the data presented in this report underestimates all disease caused by *S. pyogenes* in LAC.

The spread of IGAS can be prevented by good hand washing. CDC guidelines for good hand washing can be found at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5605a4.htm. All wounds should be kept clean and monitored for signs of infection such as redness, swelling, pus, and pain. A person should seek medical care if any signs of wound infection are present especially if accompanied by fever. High risk groups such as diabetics are encouraged to seek medical care sooner if experiencing fever, chills, and any redness on the skin.

2008 TRENDS AND HIGHLIGHTS

- The incidence rate of reported IGAS was 1.3 per 100,000 (n=129) during 2009, the lowest it has been in the past ten years (Figure 1).
- Cases aged 65 years and older had the highest rate (3.3 per 100,000) followed by cases aged 55 to 64 years (2.4 per 100,000) (Figure 2). However, while persons aged 65 years and older had the highest rate of IGAS, this age group showed the most significant decrease in rate relative to the previous four years. The incidence rates for all age groups were lower than or similar to previous years with the exception of cases aged 45 to 54 years which had a higher rate in 2009 compared to 2008.
- While blacks continued to have the highest rate of IGAS, the rate decreased in this group relative to the previous four years. The rate among whites and Latinos were also lower than the previous four years while the rate in Asians was within historical norms (Figure 3).
- SPA 6 had the highest incidence rate at 1.3 cases per 100,000 (Figure 4).
- In 2009 the number of cases peaked in January, although the majority of cases occurred during the spring months. There seemed to be an unusually low number of cases in February in 2009 (Figure 5).
- IGAS cases presented most often with bacteremia and cellulitis (Table 1).
- Diabetes was reported more than any other risk factor followed by alcohol abuse and chronic heart disease. A large percentage of cases (30%) reported having none of the traditional risk factors (Table 2).

Reported Invasive Group A Streptococcus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=179)			2006 (N=197)			2007 (N=173)			2008 (N=156)			2009 (N=129)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	2.2	2.8	1	0.5	0.7	3	1.7	2.0	2	1.3	1.4	1	0.8	0.7
1-4	8	4.5	1.4	9	4.6	1.6	6	3.5	1.0	6	3.8	1.1	3	2.3	0.5
5-14	11	6.1	0.7	15	7.7	1.0	8	4.6	0.6	14	9.0	1.0	9	7.0	0.7
15-34	20	11.2	0.7	20	10.2	0.7	20	11.6	0.7	24	15.4	0.8	15	11.6	0.5
35-44	28	15.6	1.9	34	17.3	2.3	18	10.4	1.2	22	14.1	1.5	14	10.9	0.9
45-54	30	16.8	2.4	36	18.4	2.8	33	19.1	2.5	13	8.3	1.0	29	22.5	2.1
55-64	30	16.8	3.6	29	14.8	3.3	29	16.8	3.3	27	17.3	3.0	23	17.8	2.4
65+	48	26.8	5.0	52	26.5	5.3	56	32.4	5.5	48	30.8	4.7	35	27.1	3.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	9	5.0	0.7	9	4.6	0.7	11	6.4	0.9	14	8.3	1.1	10	7.8	0.8
Black	22	12.3	2.6	23	11.7	2.7	34	19.7	4.0	30	17.8	3.5	16	12.4	1.9
Hispanic	70	39.1	1.5	59	29.9	1.3	49	28.3	1.1	50	29.6	1.1	43	33.3	0.9
White	52	29.1	1.8	65	33.0	2.3	52	30.1	1.8	49	29.0	1.7	40	31.0	1.4
Other	5	2.8	17.7	3	1.5	10.5	4	2.3	19.2	0	0.0	0.0	1	0.8	3.9
Unknown	21	11.7		38	19.3		23	13.3		26	15.4		19	14.7	
SPA															
1	10	5.6	2.9	7	3.6	2.0	5	2.9	1.4	4	2.6	1.1	3	2.3	0.8
2	32	17.9	1.5	43	21.8	2.0	43	24.9	2.0	35	22.4	1.6	22	17.1	1.0
3	28	15.6	1.6	28	14.2	1.6	20	11.6	1.2	19	12.2	1.1	17	13.2	1.0
4	21	11.7	1.7	27	13.7	2.1	15	8.7	1.2	24	15.4	1.9	9	7.0	0.7
5	23	12.8	3.6	23	11.7	3.6	15	8.7	2.3	17	10.9	2.6	6	4.7	0.9
6	24	13.4	2.3	24	12.2	2.3	35	20.2	3.3	14	9.0	1.3	14	10.9	1.3
7	11	6.1	0.8	16	8.1	1.2	18	10.4	1.3	15	9.6	1.1	16	12.4	1.2
8	19	10.6	1.7	19	9.6	1.7	17	9.8	1.5	22	14.1	2.0	12	9.3	1.1
Unknown	11	6.1		10	5.1		5	2.9		6	3.8		30	23.3	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Invasive Group A Streptococcus LAC and US, 2000-2009

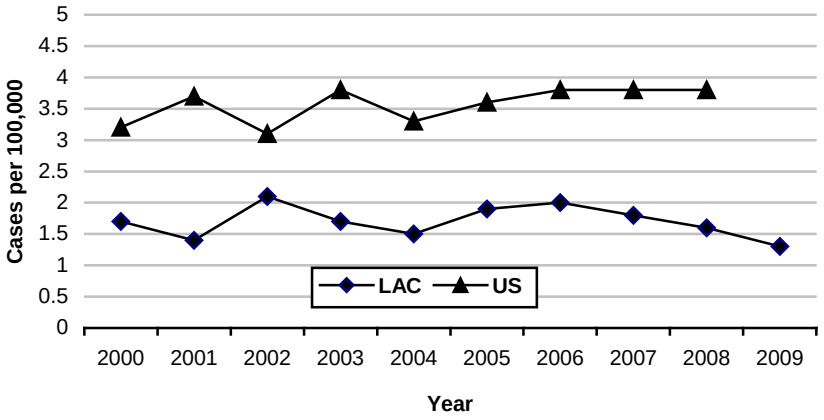
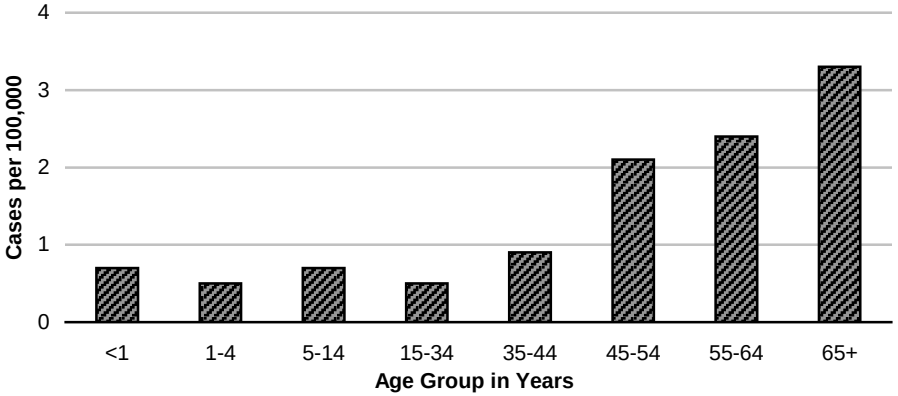
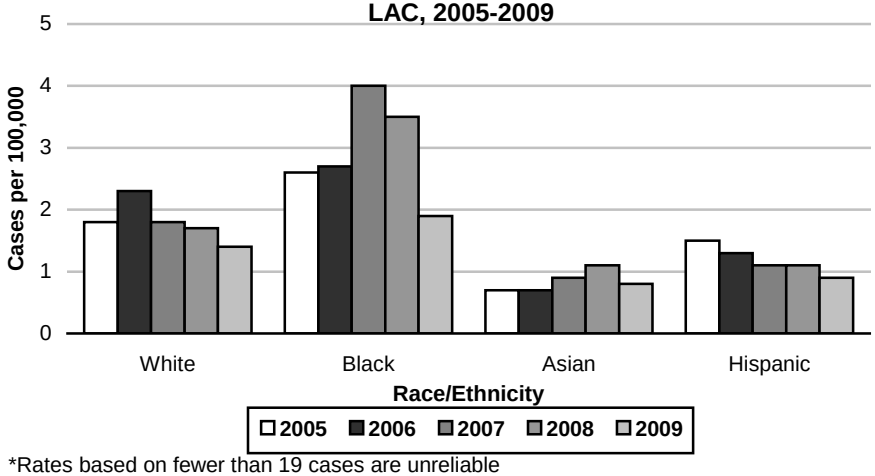


Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2009 (N=129)



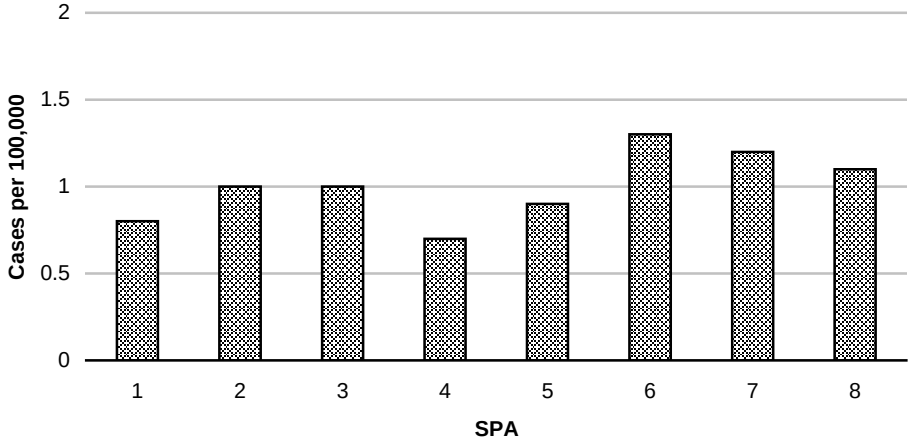
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence by Race/Ethnicity LAC, 2005-2009



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates of Invasive Group A Streptococcus by SPA LAC, 2009 (N=129)



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2009 (N=129)

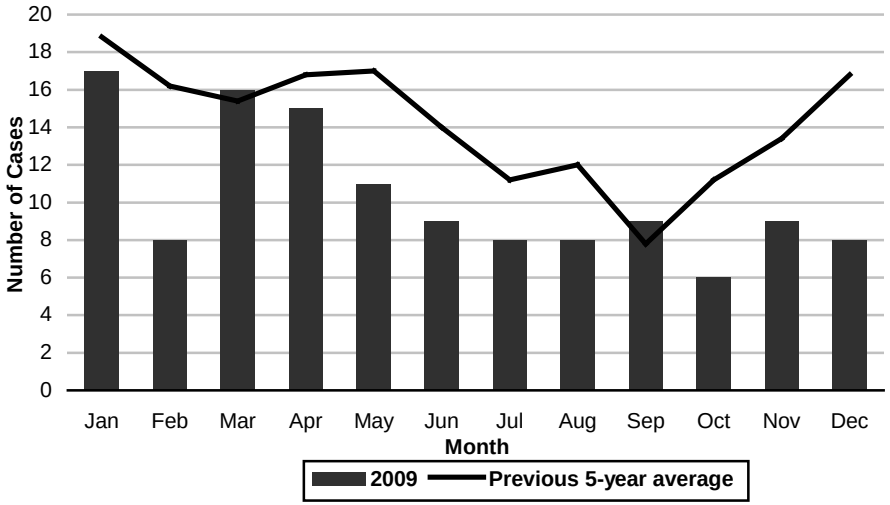


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2009

Syndrome	Number	Percent*
Bacteremia (without focus)	35	30
Cellulitis	35	30
Pneumonia	20	17
Necrotizing Fasciitis	17	15
STSS	17	13†
Non-Surgical Wound Infection	12	10
Other	30	26

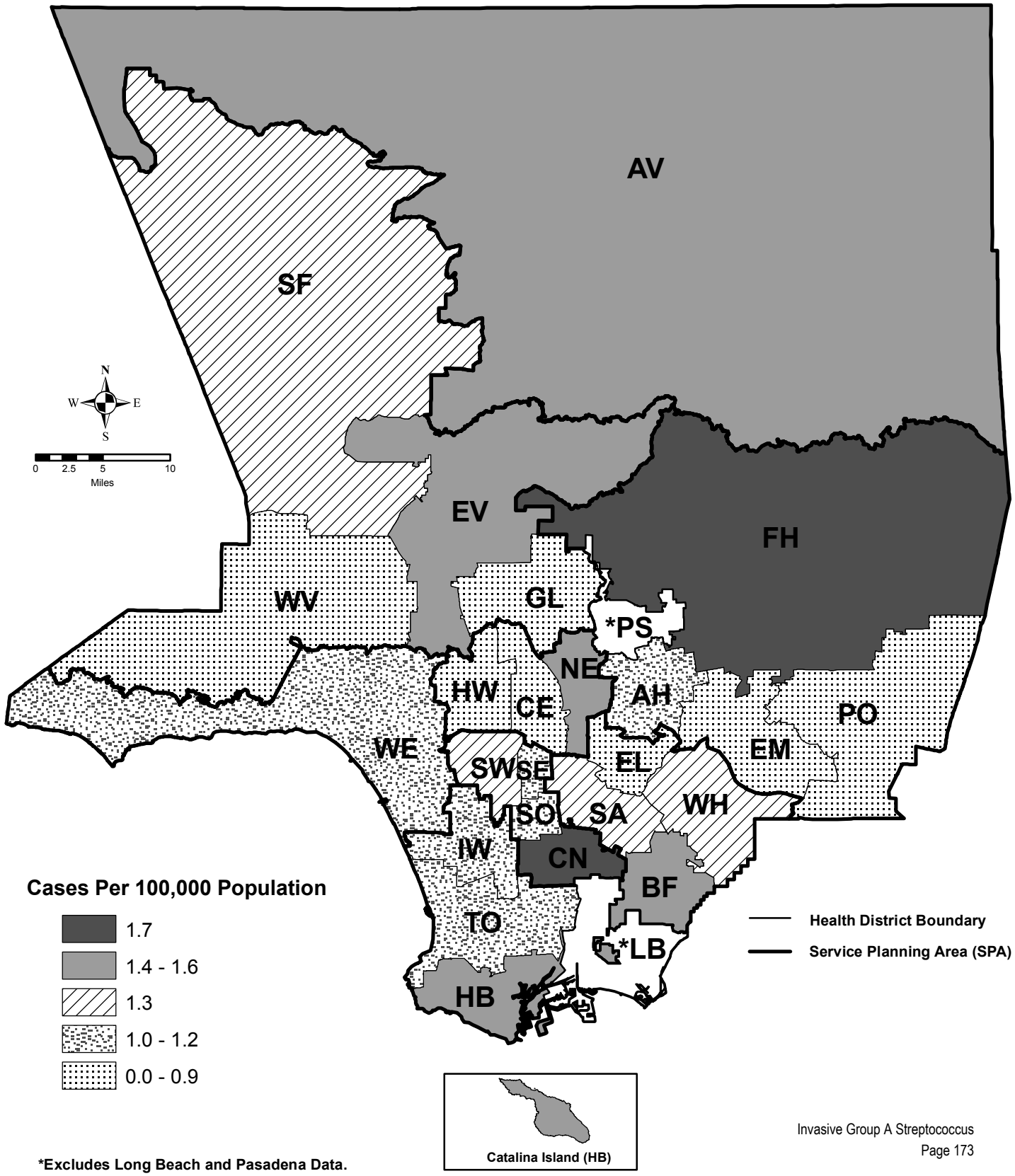
*Overlapping syndromes will total over 100%.
†Denominator data is slightly different for STSS than other syndromes (n=129 for STSS, n=115 for all other syndromes).

Table 2. Percentage of IGAS Risk Factors – Based on Date of Onset Between 1/1/07-12/31/2009

	2007 (N=145)	2008 (N = 138)	2009 (N =113)
	%	%	%
Chronic Heart Disease	19	11	12
Malignancy	10	12	10
IV Drug Use	4	4	3
Alcohol Abuse	14	10	16
Cirrhosis	6	5	3
Diabetes	26	21	33
HIV/AIDS	6	3	2
History of Blunt Trauma	12	5	8
Other	21	17	17
None	33	43	30

*Persons with unknown risk factor information excluded.
**Overlapping risk factors will total over 100%.

Map 13. Streptococcus, Group A Invasive Disease Rates by Health District, Los Angeles County, 2009*



*Excludes Long Beach and Pasadena Data.

TYPHOID FEVER, ACUTE AND CARRIER

ACUTE TYPHOID CRUDE DATA	
Number of Cases	17
Annual Incidence[a]	
LA County	0.17[b]
California[c]	0.21
United States[c]	0.15
Age at Diagnosis	
Mean	32.5
Median	29
Range	6-55

[a]Cases per 100,000 population.
[b]Rates based on less than 19 observations are unreliable.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Typhoid fever, or enteric fever, is an acute systemic disease caused by the Gram-negative bacillus *Salmonella typhi*. Transmission may occur person-to-person or by ingestion of food or water contaminated by the urine or feces of acute cases or carriers. Common symptoms include insidious onset of persistent fever, headache, malaise, anorexia, constipation (more commonly than diarrhea), bradycardia, enlargement of the spleen, and rose spots on the trunk. Humans are the only known reservoir for *S. typhi*. Vaccines are available to those at high risk or from close exposure typhoid carrier in the house or taken travel to foreign countries.

Among untreated acute cases, 10% will shed bacteria for three months after initial onset of symptoms and 2% to 5% will become chronic typhoid carriers. Some carriers are diagnosed by positive tissue specimen. Chronic carriers are by definition asymptomatic.

Hand washing after using the toilet, before preparing or serving food, and before and after caring for others is important in preventing the spread of typhoid. When traveling to locations where sanitary practices are uncertain, foods should be thoroughly cooked and served at appropriate temperature; bottled water should be used for drinking as well as for brushing teeth and making ice. Vaccination should be considered when traveling in high endemic areas. LAC tests household contacts of confirmed cases for *S. typhi* to identify any previously undiagnosed carriers or cases. A modified order of isolation restricts a carrier from engaging in a sensitive occupation or situation. LAC DPH monitors compliance with the isolation order and provides the chance to clear the infection bacteriologically.

2009 TRENDS AND HIGHLIGHTS

- The Los Angeles County (LAC) rates for acute typhoid fever cases continue to be higher than the US rates (Figure 1).
- Asians continue to have the highest percentage of acute cases (Figure 3).
- Service Planning Area (SPA) 2 continues to have the highest number of acute cases (Figure 4).
- Typically most cases occur in the summer; in 2009, the majority of cases occurred in winter and spring. Cases peaked in January and February with each having three cases (Figure 5).
- One new chronic carrier was identified.
- Four carriers are on the state typhoid registry and are monitored by LAC semi-annually (Figure 6).

Reported Acute Typhoid Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=12)			2006 (N=17)			2007 (N=17)			2008 (N=14)			2009 (N=17)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	1	8.3	0.2	2	11.8	0.3	0	0.0	0.0	1	7.1	0.2	0	0	0
5-14	2	16.7	0.1	5	29.4	0.3	1	5.9	0.1	5	35.7	0.4	3	17.6	0.2
15-34	7	58.3	0.2	8	47.1	0.3	10	58.8	0.4	5	35.7	0.2	6	35.2	0.2
35-44	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	1	7.1	0.1	3	17.6	0.2
45-54	2	16.7	0.2	1	5.9	0.1	2	11.8	0.2	0	0.0	0.0	4	23.5	0.3
55-64	0	0.0	0.0	0	0.0	0.0	3	17.6	0.3	1	7.1	0.1	1	5.8	0.1
65+	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	1	7.1	0.1	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	6	50.0	0.5	7	41.2	0.6	9	52.9	0.7	8	57.1	0.6	9	52.9	0.7
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Hispanic	6	50.0	0.1	8	47.1	0.2	7	41.2	0.2	5	35.7	0.1	8	47.0	0.2
White	0	0.0	0.0	1	5.9	0.0	1	5.9	0.0	1	7.1	0.0	0	0	0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		1	5.9		0	0.0		0	0.0	0	0	0	0
SPA															
1	1	8.3	0.3	0	0.0	0.0	2	11.8	0.6	0	0.0	0.0	0	0	0
2	2	16.7	0.1	3	17.6	0.1	6	35.3	0.3	5	35.7	0.2	4	23.5	0.2
3	0	0.0	0.0	7	41.2	0.4	4	23.5	0.2	3	21.4	0.2	3	17.6	0.2
4	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	3	21.4	0.2	2	11.7	0.2
5	1	8.3	0.2	2	11.8	0.3	0	0.0	0.0	0	0.0	0.0	3	17.6	0.5
6	3	25.0	0.3	1	5.9	0.1	2	11.8	0.2	1	7.1	0.1	2	11.7	0.2
7	2	16.7	0.1	3	17.6	0.2	1	5.9	0.1	2	14.3	0.1	0	0	0
8	3	25.0	0.3	1	5.9	0.1	1	5.9	0.1	0	0.0	0.0	3	17.6	0.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

*Rates calculated based on less than 19 cases or events are considered unreliable

Reported Typhoid Fever Carrier Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=4)			2006 (N=3)			2007 (N=1)			2008 (N=4)			2009 (N=1)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
5-14	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0	1	100	0.1
15-34	1	25.0	0.0	0	0.0	0.0	0	0.0	0.0	1	25.0	0.0	0	0	0
35-44	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	2	50.0	0.1	0	0	0
45-54	2	50.0	0.2	0	0.0	0.0	1	100.	0.1	0	0.0	0.0	0	0	0
55-64	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0	0	0	0
65+	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
Race / Ethnicity															
Asian	1	25.0	0.1	1	33.3	0.1	0	0.0	0.0	1	25.0	0.1	0	0	0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Hispanic	3	75.0	0.1	2	66.7	0.0	1	100.	0.0	3	75.0	0.1	1	100	0.1
White	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	0
SPA															
1	1	25.0	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
2	0	0.0	0.0	0	0.0	0.0	1	100.	0.0	1	25.0	0.0	0	0	0
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1	0	0	0
4	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	2	50.0	0.2	0	0	0
5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
6	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
7	2	50.0	0.1	2	66.7	0.1	0	0.0	0.0	0	0.0	0.0	0	0	0
8	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates by Years of Onset of Acute Typhoid Fever LAC and US, 2000-2009

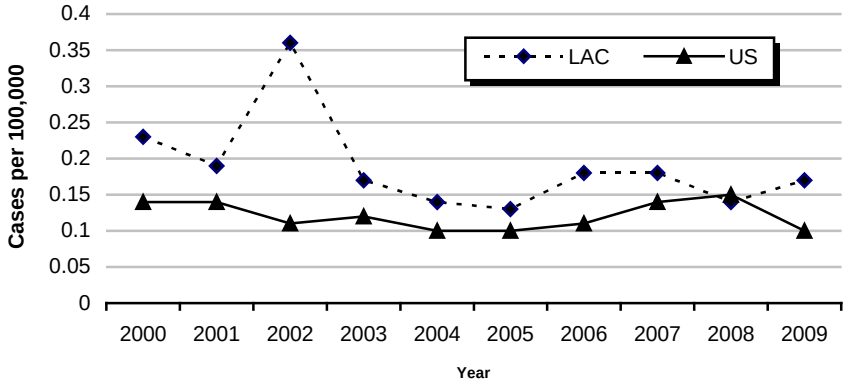


Figure 2. Acute Typhoid Fever Cases by Age Group LAC, 2009 (N=17)

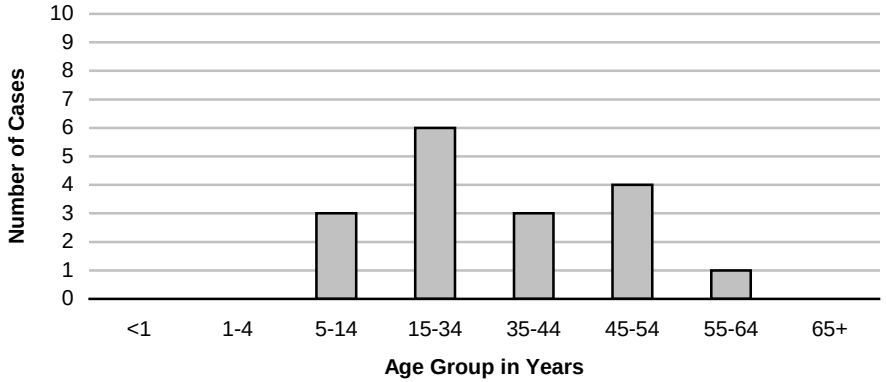


Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity LAC, 2009 (N=17)

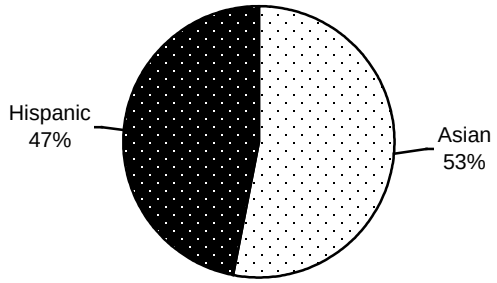


Figure 4. Reported Acute Typhoid Fever Cases by SPA LAC, 2009 (N=17)

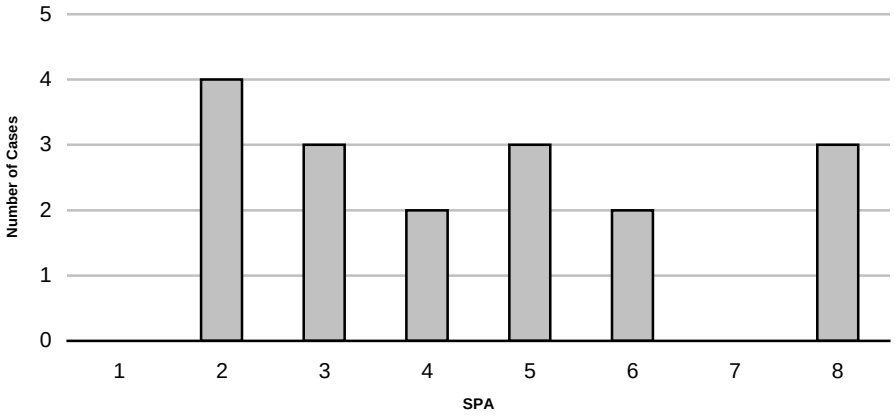


Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2009 (N=17)

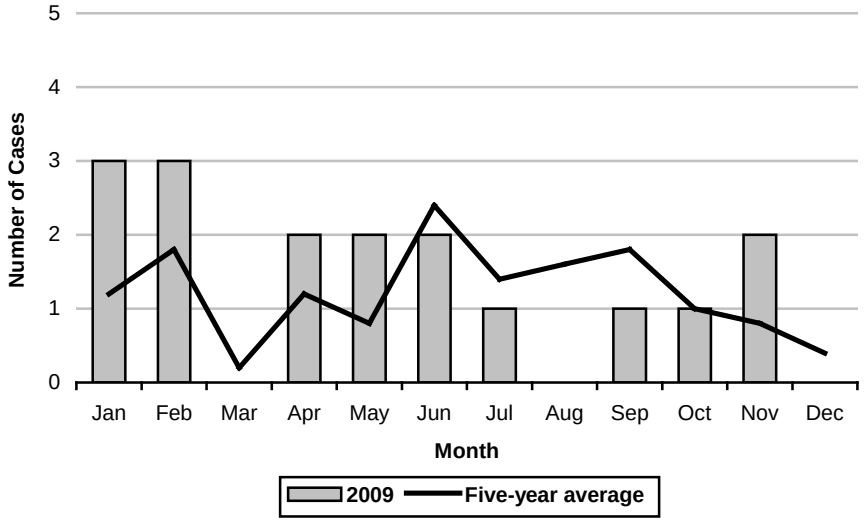
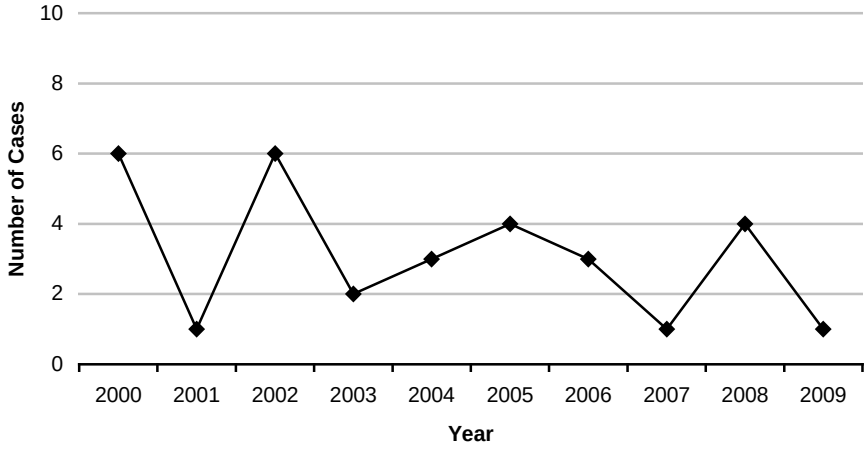


Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 1999-2009



TYPHUS FEVER

CRUDE DATA	
Number of Cases	9
Annual Incidence[a]	
LA County[b]	0.09
California	N/A
United States	N/A
Age at Diagnosis	
Mean	39.8
Median	46
Range	9-60

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.

DESCRIPTION

Typhus fever (murine typhus, endemic typhus) is caused by the bacteria *Rickettsia typhi* and *R. felis* and is transmitted through the bite or contact with feces of an infected flea. Reservoir animals are predominantly rats and opossums that live in areas with heavy foliage. In Los Angeles County (LAC), most reported cases of typhus occur in residents of the foothills of central LAC. Symptoms include fever, severe headache, chills, and myalgia. A fine, macular rash may appear three to five days after onset. Occasionally, complications such as pneumonia or hepatitis may occur. Fatalities are uncommon, occurring in less than 1% of cases, but increase with age. The disease is typically mild in young children. Typhus infection is not vaccine preventable, but can be treated with antibiotics.

Because typhus fever is not a nationally reportable disease, there is no standard case definition across county and state jurisdictions. In Southern California, a workgroup has developed a standard case definition because of expansion of the agent into new regions, including Long Beach and Orange County. For the purpose of surveillance in LAC, cases have been confirmed with a single high IgM titer and appropriate symptoms and exposure history.

Typhus infection can be prevented through flea control measures implemented on pets. Foliage in the yard should be trimmed so that it does not provide harborage for small mammals. Screens can be placed on windows and crawl spaces to prevent entry of animals and their fleas into the house.

2009 TRENDS AND HIGHLIGHTS

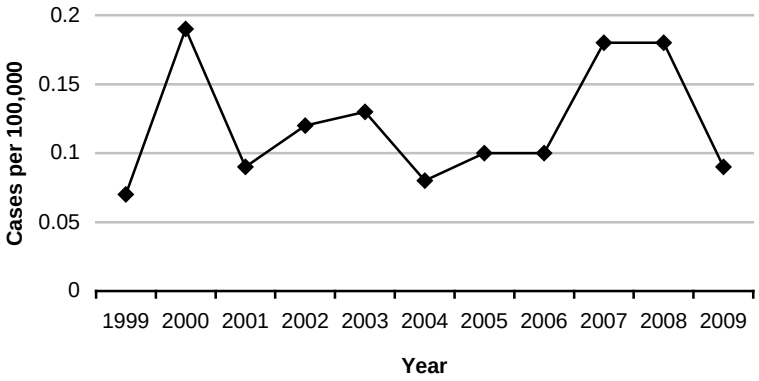
- Total cases of murine typhus declined by 50% in 2009 from 18 cases in 2008 to 9 cases in 2009. This is similar to case reports seen in the years prior to 2006.
- In 2009, the occurrence of typhus in LAC has been limited to its historically endemic areas around north central LAC and central Los Angeles.

Reported Typhus Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=10)			2006 (N=10)			2007 (N=17)			2008 (N=18)			2009 (N=9)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	0	0.0	0.0	0	0.0	0.0	1	5.9	0.2	0	0.0	0.0	0	0	0
5-14	3	30.0	0.2	1	10.0	0.1	1	5.9	0.1	3	16.7	0.2	2	22.2	0.1
15-34	6	60.0	0.2	1	10.0	0.0	3	17.6	0.1	3	16.7	0.1	1	11.1	0
35-44	0	0.0	0.0	5	50.0	0.3	3	17.6	0.2	4	22.2	0.3	0	0	0
45-54	0	0.0	0.0	0	0.0	0.0	6	35.3	0.5	4	22.2	0.3	4	44.4	0.3
55-64	0	0.0	0.0	1	10.0	0.1	2	11.8	0.2	3	16.7	0.3	2	22.2	0.2
65+	0	0.0	0.0	2	20.0	0.2	1	5.9	0.1	1	5.6	0.1	0	0	0
Unknown	1	10.0		0	0.0		0	0.0		0	0.0		0	0	
Race / Ethnicity															
Asian	0	0.0	0.0	1	10.0	0.1	1	5.9	0.1	1	5.6	0.1	1	11.1	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Hispanic	3	30.0	0.1	3	30.0	0.1	1	5.9	0.0	5	27.8	0.1	1	11.1	0
White	7	70.0	0.2	6	60.0	0.2	13	76.5	0.4	12	66.7	0.4	7	77.8	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		2	11.8		0	0.0		0	0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
2	1	10.0	0.0	3	30.0	0.1	2	11.8	0.1	2	11.1	0.1	1	11.1	0
3	6	60.0	0.4	3	30.0	0.2	8	47.1	0.5	9	50.0	0.5	5	55.6	0.3
4	3	30.0	0.2	1	10.0	0.1	1	5.9	0.1	1	5.6	0.1	3	33.3	0.2
5	0	0.0	0.0	1	10.0	0.2	4	23.5	0.6	3	16.7	0.5	0	0	0
6	0	0.0	0.0	1	10.0	0.1	0	0.0	0.0	1	5.6	0.1	0	0	0
7	0	0.0	0.0	1	10.0	0.1	1	5.9	0.1	2	11.1	0.1	0	0	0
8	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	

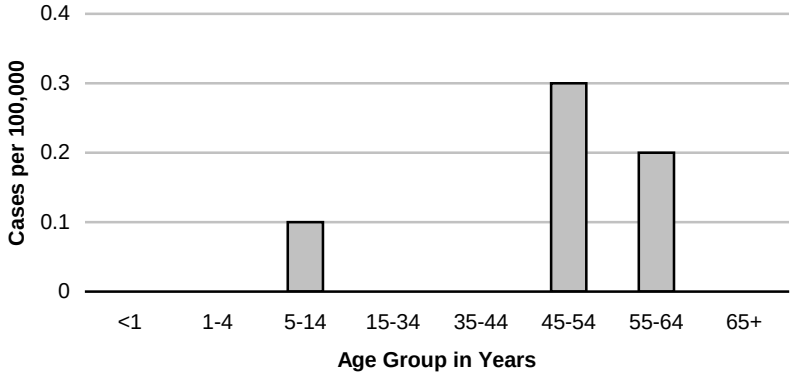
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Typhus Fever
LAC, 1999-2009 (N=9)



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 2. Incidence Rates* of Typhus Fever by Age Group
LAC, 2009 (N=9)



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 3. Percent Cases of Typhus Fever by Race/Ethnicity
LAC, 2009 (N=9)

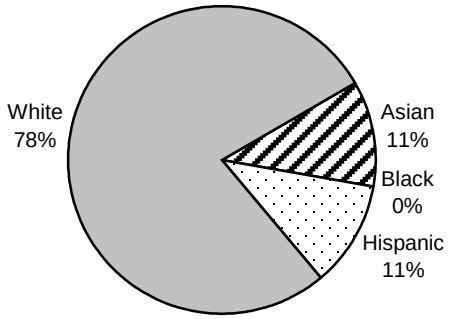
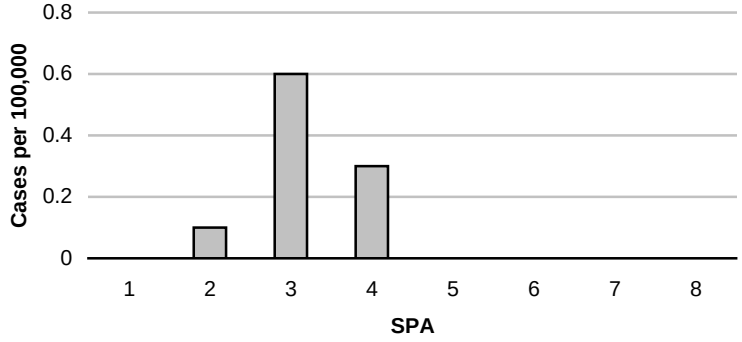


Figure 4. Incidence Rates* of Typhus Fever by SPA
LAC, 2009 (N=9)



*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 5. Reported Typhus Fever Cases by Month of Onset
LAC, 2009 (N=9)

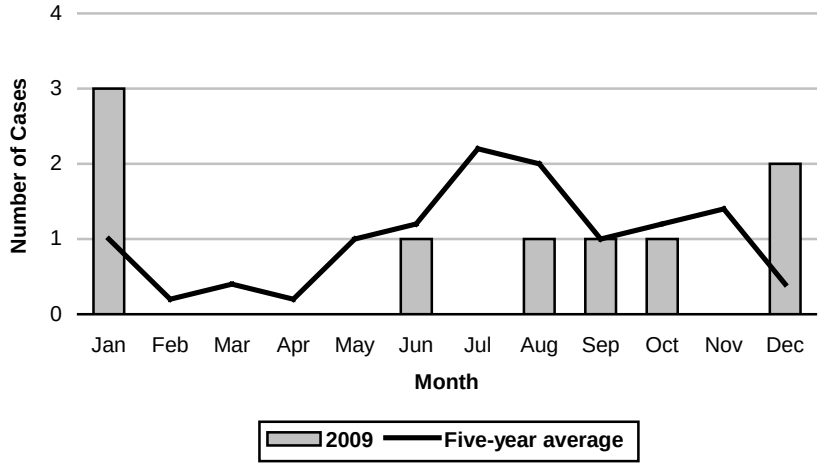
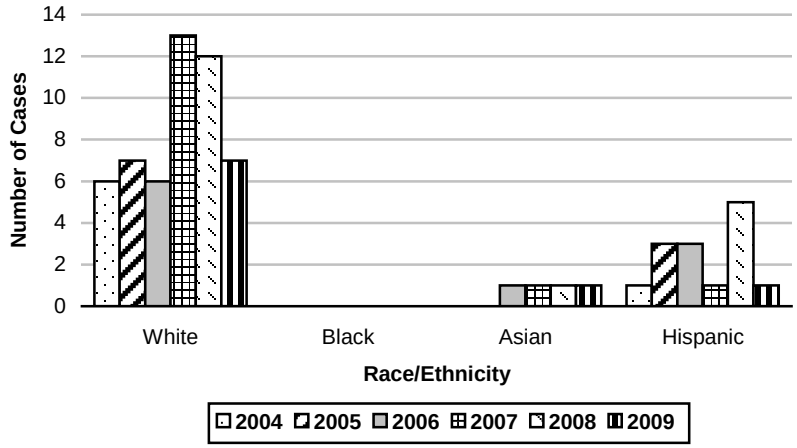


Figure 6. Reported Typhus Fever Cases by Race/Ethnicity
LAC, 2004-2009



VIBRIOSIS

CRUDE DATA	
Number of Cases	26
Annual Incidence[a]	
LA County[b]	0.27
California[c]	0.28
United States[c]	0.19
Age at Diagnosis	
Mean	46
Median	46
Range	1-68

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

Vibriosis is an infection caused by comma-shaped, Gram-negative bacteria of the genus *Vibrio*. Vibriosis most commonly presents as acute diarrhea, but may also occur as wound infection or septicemia. Vibriosis is transmitted by ingesting food or water contaminated with *Vibrio*, or by contact between open wounds and contaminated water. The most common species that cause vibriosis are *V. parahæmolyticus*, *V. alginolyticus*, *V. vulnificus* and *V. choleræ*. Two serotypes of *V. choleræ* may cause cholera, an acute, life-threatening diarrheal illness. The infection may be mild or without symptoms, but sometimes it can be severe. Approximately one in 20 infected persons has severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these persons, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water. Vibriosis is commonly associated with consumption of raw or undercooked seafood, particularly oysters. Many vibriosis patients often have recent history of travel to developing countries.

2009 TRENDS AND HIGHLIGHTS

- Vibriosis incidence is usually too low to extract reliable rate data; however in 2009 there were enough cases to generate incidence rates from the year's data.
- In 2009, whites comprised the majority (63%) of all vibriosis cases (Figure 3). The number of cases among Asians and blacks remains consistently low or absent (Figure 6).
- Vibriosis in Los Angeles County generally is more common in Service Planning Area (SPA) 5 and 8, both of which are coastal (Figure 4). In 2009, SPA 2 had more cases than any other SPA, which is unusual. Cases in SPA 2 were mostly wound infections of species other than *V. parahæmolyticus*.
- Typically vibriosis cases peak during the summer months of June through August. A heat wave in the Pacific Northwest in late July resulted in high concentrations of *V. parahæmolyticus* in the seawater, possibly causing an outbreak of vibriosis. There were six outbreak-associated cases in Los Angeles County.
- In addition to *V. parahæmolyticus*, three other Vibrio species were isolated from the 2009 vibriosis cases: *V. alginolyticus* (3), *V. choleræ* non-O1, non-139 (2), *V. furnissii* (1).
- Six cases of vibriosis occurred among women, while 20 cases occurred among men. This is consistent with past years, and reflects the greater likelihood of recreation water exposure and raw seafood consumption among men compared to women.[1]

[1] Alterkruse SF, Yang S, Babagaleh BT, Angulo FJ. A multi-state survey of consumer food-handling and food-consumption practices.*Am J Prev Med*. 1999;16(3):216-221.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=14)			2006 (N=18)			2007 (N=13)			2008 (N=18)			2009 (N=26)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	3.8	0.2
5-14	1	7.1	0.1	1	5.6	0.1	1	7.7	0.1	2	11.1	0.1	0	0.0	0.0
15-34	3	21.4	0.1	5	27.8	0.2	4	30.8	0.1	3	16.7	0.1	11	42.3	0.4
35-44	4	28.6	0.3	3	16.7	0.2	2	15.4	0.1	3	16.7	0.2	4	15.4	0.3
45-54	3	21.4	0.2	3	16.7	0.2	1	7.7	0.1	3	16.7	0.2	5	19.2	0.4
55-64	2	14.3	0.2	3	16.7	0.3	3	23.1	0.3	5	27.8	0.5	3	11.5	0.3
65+	1	7.1	0.1	3	16.7	0.3	2	15.4	0.2	2	11.1	0.2	2	7.7	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	1	7.1	0.1	2	11.1	0.2	2	15.4	0.2	2	11.1	0.2	1	3.8	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	7	50.0	0.2	4	22.2	0.1	6	46.2	0.1	4	22.2	0.1	8	30.8	0.1
White	4	28.6	0.1	12	66.7	0.4	2	15.4	0.1	12	66.7	0.4	15	57.7	0.5
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	2	14.3		0	0.0		3	23.1		0	0.0		2	7.7	
SPA															
1	2	14.3	0.6	0	0.0	0.0	0	0.0	0.0	1	5.6	0.3	2	7.7	0.5
2	3	21.4	0.1	2	11.1	0.1	1	7.7	0.0	4	22.2	0.2	6	23.1	0.3
3	1	7.1	0.1	0	0.0	0.0	1	7.7	0.1	3	16.7	0.2	3	11.5	0.2
4	1	7.1	0.1	3	16.7	0.2	4	30.8	0.3	0	0.0	0.0	4	15.4	0.3
5	3	21.4	0.5	6	33.3	0.9	1	7.7	0.2	3	16.7	0.5	5	19.2	0.8
6	2	14.3	0.2	0	0.0	0.0	1	7.7	0.1	1	5.6	0.1	0	0.0	0.0
7	1	7.1	0.1	6	33.3	0.4	1	7.7	0.1	0	0.0	0.0	2	7.7	0.1
8	1	7.1	0.1	1	5.6	0.1	4	30.8	0.4	5	27.8	0.4	3	11.5	0.3
Unknown	0	0.0		0	0.0		0	0.0		1	5.6		1	3.8	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Reported Cases of Vibriosis
LAC, 2000-2009

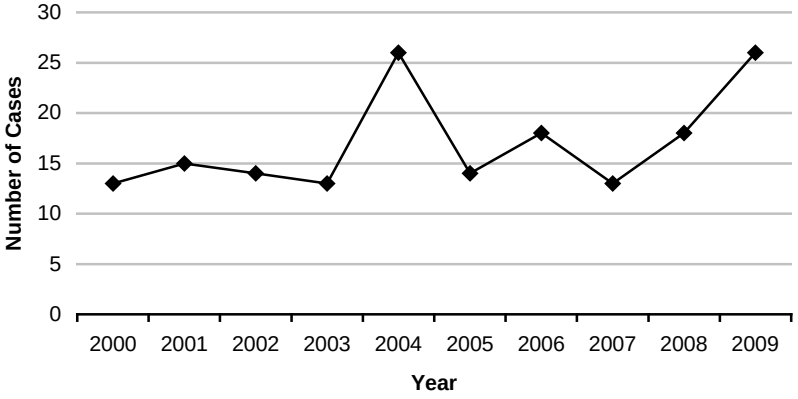


Figure 2. Reported Cases of Vibriosis by Age Group
LAC, 2009 (N=26)

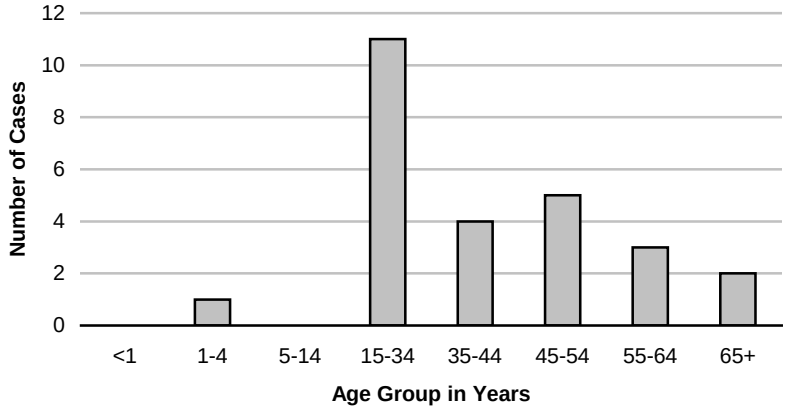


Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2009 (N=26)

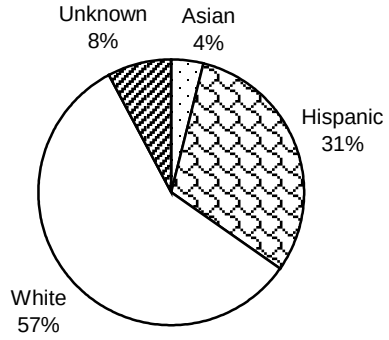


Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2009 (N=26)

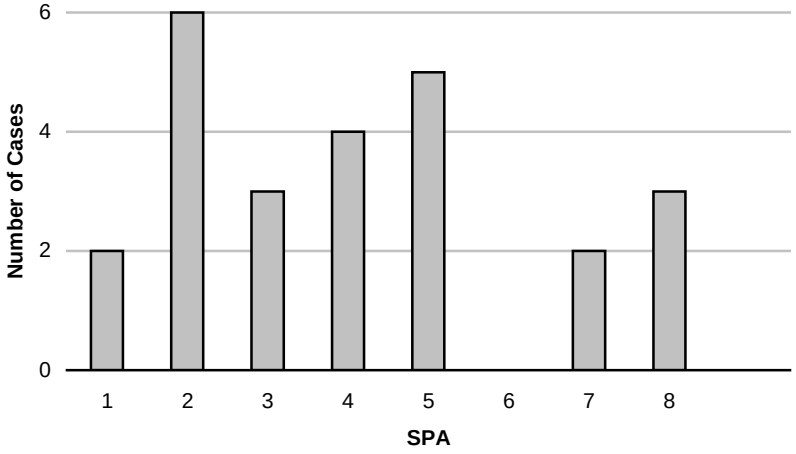


Figure 5. Reported Vibriosis Cases by Month of Onset
LAC, 2009 (N=26)

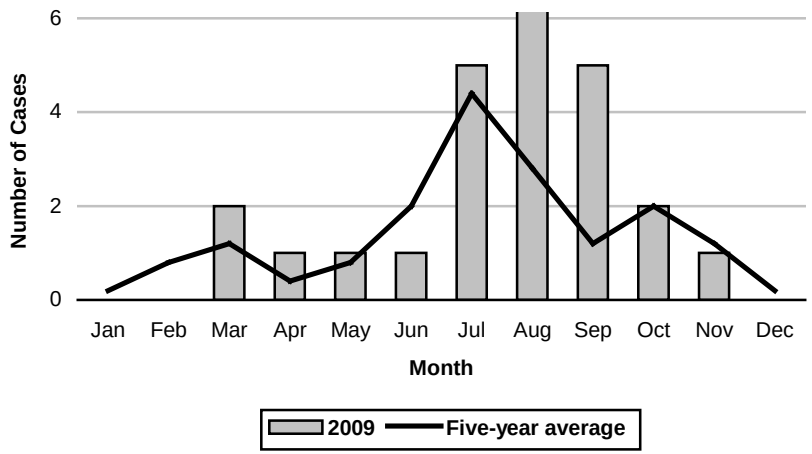
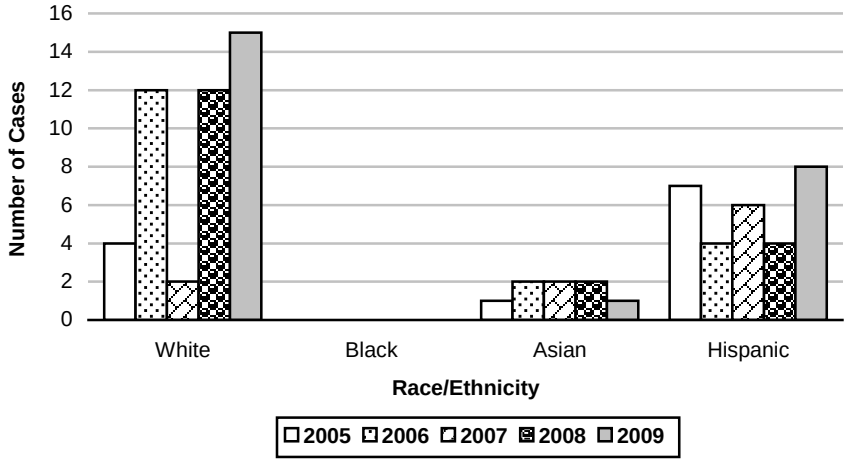


Figure 6. Reported Cases of Vibriosis by Race/Ethnicity
LAC, 2005-2009



WEST NILE VIRUS

CRUDE DATA	
Number of Cases	25
Annual Incidence[a]	
LA County	0.26
California[b]	1.22
United States[b]	0.45
Age at Diagnosis	
Mean	53.4
Median	53
Range	15-87

[a]Cases per 100,000 population.
[b]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869.

DESCRIPTION

West Nile virus (WNV) is a flavivirus related to the viruses that cause Japanese encephalitis (JE) and Saint Louis encephalitis (SLE). Indigenous to Africa, Asia, Europe, and Australia, WNV was first detected in North America in New York City in 1999. Since then, human and non-human WNV surveillance data have documented its spread throughout the continental US, Canada and Mexico.

Normally transmitted by mosquitoes (usually *Culex* or *Anopheles* species) between bird reservoir hosts, humans are incidentally infected with the virus when bitten by an infected mosquito. About 20% of persons infected will develop WNV fever with symptoms that include fever, headache, rash, muscle weakness, fatigue, nausea and vomiting, and occasionally lymph node swelling. Fewer than 1% will develop more severe illness, manifesting as WNV neuro-invasive disease (NID). NID includes meningitis, encephalitis, and acute flaccid paralysis (AFP). WNV-associated meningitis usually involves fever, headache, and stiff neck, and has a good prognosis. WNV-associated encephalitis is commonly associated with fever, altered mental status, headache, and seizures, and usually necessitates a high level of specialized medical care.

Since most persons infected with WNV will not develop clinical illness or symptoms, blood donation is problematic. Beginning 2003, blood donors were screened for WNV infection utilizing polymerase chain reaction (PCR) testing.

No transmission associated with blood products has been reported in LAC. Additional routes of transmission that have been documented include transplantation of WNV-infected organs, transplacental (mother-to-child), occupational exposures, and through breast milk.

Prevention and control of WNV and other arboviral diseases is most effective with vector management programs. These programs include surveillance for WNV activity in mosquito vectors, birds, horses, other animals, and humans; and implementation of appropriate mosquito control measures to reduce mosquito populations when necessary. When virus activity is detected in an area, residents are advised to increase measures to reduce contact with mosquitoes. Currently, there is no human vaccine available against WNV but several vaccines are under development. Important preventive measures against WNV include the following:

- Apply insect repellant to exposed skin. A higher percentage of DEET in a repellent will provide longer protection. DEET concentrations higher than 50% do not increase the length of protection.
- When possible, wear long-sleeved shirts and long pants when outdoors for long periods of time.
- Stay indoors at dawn, dusk, and in the early evening, which are peak mosquito biting times.
- Help reduce the number of mosquitoes in areas outdoors by draining sources of standing water. This will reduce the number of places mosquitoes can lay their eggs and breed.

A wide variety of insect repellent products are available. CDC recommends the use of products containing active ingredients which have been registered with the US Environmental Protection Agency (EPA) for use as repellents applied to skin and clothing. Products containing these active ingredients typically provide longer-lasting protection than others:

DEET (N,N-diethyl-m-toluamide)
Picaridin (KBR 3023)
Oil of lemon eucalyptus.

2009 TRENDS AND HIGHLIGHTS

- The number of WNV infections reported in 2009 (n=25) decreased by 85% compared to 2008 (n=170)
- WNV manifested as neuro-invasive disease in 15 reported infections (60%): 9 meningitis and 6 encephalitis. There were five asymptomatic infections identified through blood donor screening and one WNV-associated death.
- Unlike previous years in which the highest incidences were reported from the San Fernando Valley or the San Gabriel Valley regions, most cases occurred in the Antelope Valley in 2009 (Figure 4).
- The WNV season shifted one month earlier in 2009 compared to the previous five-year average with onsets occurring May through September (Figure 5).

Reported West Nile Virus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2005-2009

	2005 (N=43)			2006 (N=16)			2007 (N=43)			2008 (N=170)			2009 (N=25)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
1-4	1	2.3	0.2	0	0.0	0.0	0	0.0	0.0	1	0.6	0.2	0	0	0
5-14	1	2.3	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0
15-34	7	16.3	0.2	2	12.5	0.1	3	7.0	0.1	19	11.2	0.7	5	20.0	0.2
35-44	4	9.3	0.3	5	31.3	0.3	0	0.0	0.0	15	8.8	1.0	0	0	0
45-54	8	18.6	0.6	3	18.8	0.2	9	20.9	0.7	34	20.0	2.5	10	50.0	0.7
55-64	8	18.6	1.0	3	18.8	0.3	12	27.9	1.4	36	21.2	3.9	4	16.0	0.4
65+	14	32.6	1.5	3	18.8	0.3	19	44.2	1.9	65	38.2	6.4	6	24.0	0.6
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	
Race / Ethnicity															
Asian	2	4.7	0.2	1	6.3	0.1	0	0.0	0.0	6	3.5	0.5	1	4.0	0.1
Black	1	2.3	0.1	0	0.0	0.0	0	0.0	0.0	5	2.9	0.6	0	0	0
Hispanic	17	39.5	0.4	2	12.5	0.0	12	27.9	0.3	68	40.0	1.5	5	20.0	0.1
White	22	51.2	0.8	13	81.3	0.5	29	67.4	1.0	75	44.1	2.6	16	64.0	0.5
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	1.8	12.2	0	0	0
Unknown	1	2.3		0	0.0		2	4.7		13	7.6		3	12.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	2.3	0.3	5	2.9	1.4	12	48.0	3.3
2	18	41.9	0.8	9	56.3	0.4	27	62.8	1.3	37	21.8	1.7	9	36.0	0.4
3	4	9.3	0.2	4	25.0	0.2	9	20.9	0.5	61	35.9	3.5	2	8.0	0.1
4	0	0.0	0.0	3	18.8	0.2	2	4.7	0.2	12	7.1	0.9	1	4.0	0.1
5	1	2.3	0.2	0	0.0	0.0	0	0.0	0.0	1	0.6	0.2	1	4.0	0.2
6	2	4.7	0.2	0	0.0	0.0	1	2.3	0.1	6	3.5	0.6	0	0	0
7	12	27.9	0.9	0	0.0	0.0	2	4.7	0.1	44	25.9	3.2	0	0	0
8	6	14.0	0.5	0	0.0	0.0	1	2.3	0.1	4	2.4	0.4	0	0	0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0	

*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of West Nile Virus
LAC, 2004-2009

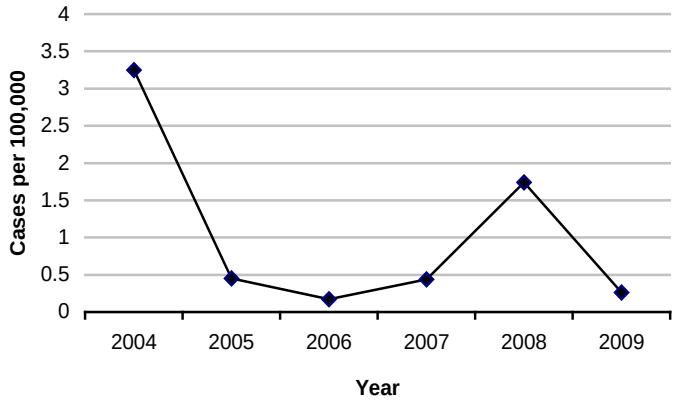


Figure 2. Incidence Rates of West Nile Virus by Age Group
LAC, 2009 (N=25)

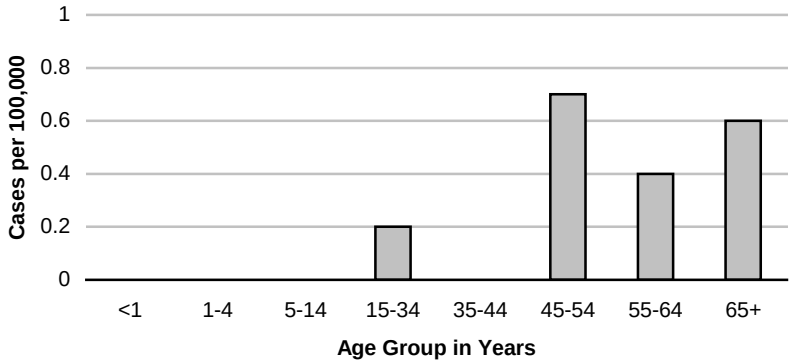
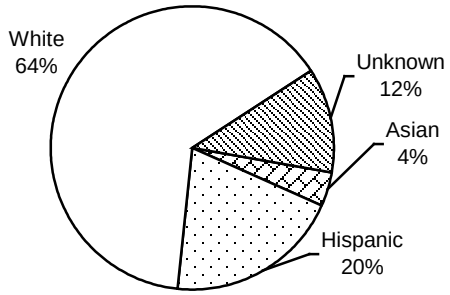


Figure 3. Percent Cases of West Nile Virus by Race/Ethnicity
LAC, 2009 (N=25)



* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 4. Incidence Rates of West Nile Virus by SPA
LAC, 2009 (N=25)

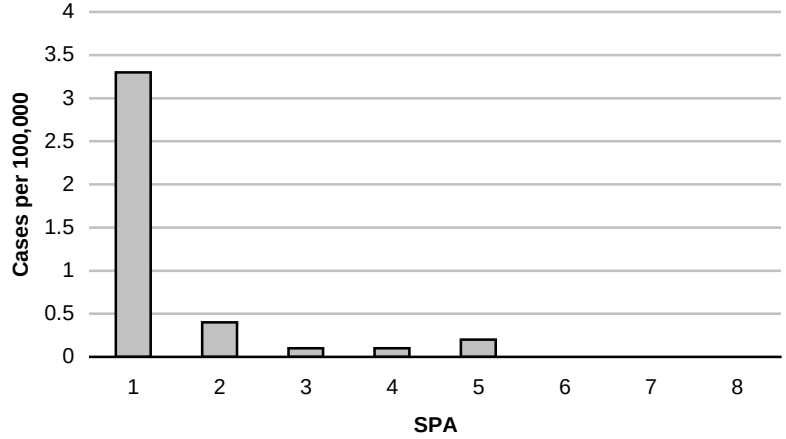


Figure 5. Reported West Nile Virus Cases by Month of Onset
LAC, 2009 (N=25)

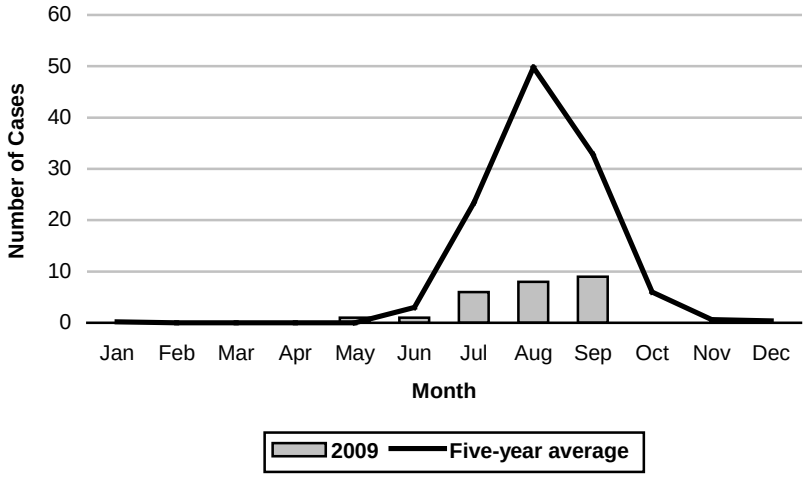
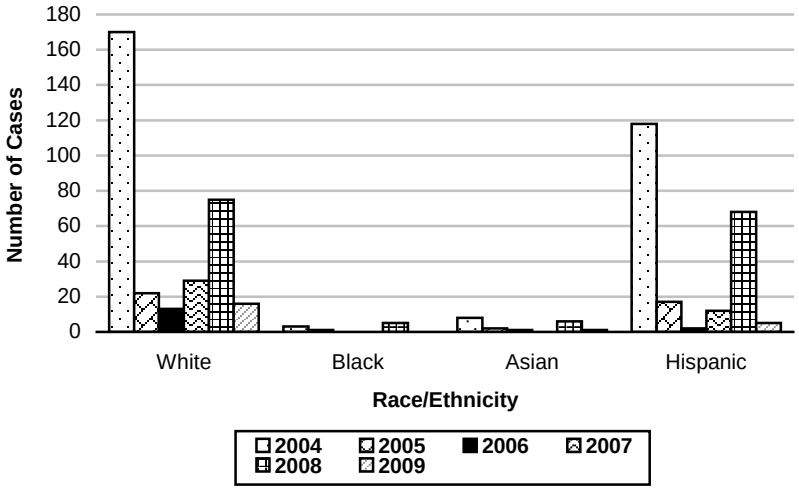


Figure 6. West Nile Virus Incidence by Race/Ethnicity
LAC, 2004-2009



DISEASE OUTBREAK SUMMARIES

COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2009, 459 community-acquired disease outbreaks accounted for 8410 cases of illness (Figure 1). This finding was 3.6 times as many outbreaks and 5 times as many associated cases as the previous year.
- The top three disease categories — respiratory, ectoparasites, and gastroenteritis (GE) - accounted for 93% of all closed confirmed outbreaks for 2009 (Figure 2). While ectoparasites and GE have historically been in the top three etiologies, 2009 was the year of the respiratory outbreak, accounting for 79% of all reported outbreaks.
- Schools (kindergarten and higher) and preschools were the most common setting of community-acquired outbreaks, with 69% and 20% of all outbreaks (Figure 3).
- The number of community outbreaks caused by respiratory infections dramatically increased in 2009. Incidence was influenced by increase circulation of H1N1 pandemic influenza in the younger population in addition to increased school outreach to increase reporting.

Figure 1
Community Acquired Outbreaks
Number of Persons Affected
LAC, 2000–2009

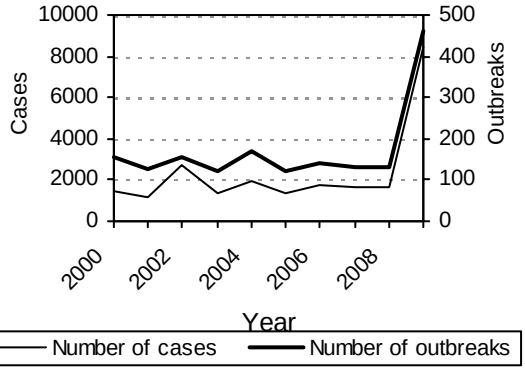
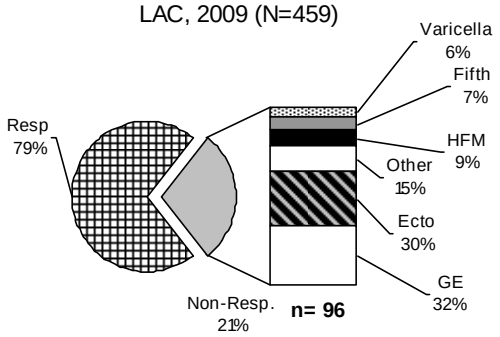
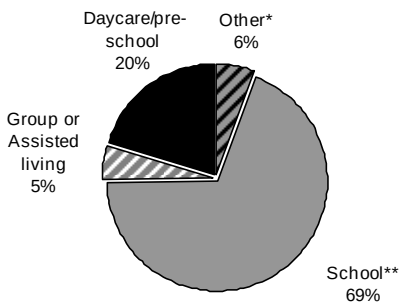


Figure 2
Community-Acquired Outbreaks by Type of Disease*
LAC, 2009 (N=459)



* Ecto=ectoparasites; HFM =Hand, foot & mouth; GE = Gastroentestinal;

Figure 3
Community Outbreaks by Setting
LAC, 2009 (N=459)



*Other includes: kuvnile detention, jails, and camps
** school can include K thropugh university

DATA

Disease outbreaks are defined as clusters of illness that occur in a similar time or place, or case numbers above baseline for a specified population or location. Depending on the nature of the outbreak, investigation responsibility is maintained by either Acute Communicable Disease Control Program (ACDC) or Community Health Services with ACDC providing consultation as needed. The outbreaks reported in this section do not include outbreaks associated with food (see Foodborne Illness Outbreaks section) or healthcare facilities (see Healthcare Associated Outbreaks sections).

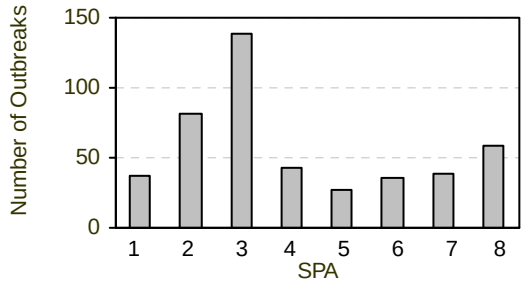
Respiratory illness accounted for 79% of confirmed outbreaks in 2009. GE of various etiologies and ectoparasites were the second and third most common cause of outbreaks, comprising 7% and 6% of all outbreaks respectively (Figure 2, Table 1). The influx of respiratory outbreaks modified relative reporting levels of other causes; however the non-respiratory disease hierarchy was similar to past years.

Influenza outbreaks had the highest incident-specific case average with a mean of 31 cases per outbreak. The single outbreak with the highest number of cases (120) was an unknown respiratory outbreak at an elementary school. Outbreaks caused by norovirus

(n=4) or of undetermined GE etiology (n=25) had a mean of 24 and 18 cases per outbreak, respectively. Many of the undetermined GE outbreaks had similar characteristics to the confirmed norovirus outbreaks, but were not tested for confirmation. These figures highlight the continuing circulation of norovirus and reflect the ease that this agent can be transmitted from person-to-person in community settings, especially among the very young. GE outbreaks were most commonly reported in preschool/daycare settings (52%) (Table 1).

The predominance of outbreaks affecting children in school settings has been recognized over the last several years. In 2009 the most common outbreak setting for illness transmission was again schools (Figure 3), accounting for 69% of all outbreaks: elementary schools (256), middle schools (31), high schools (22), and university (6) settings. While the level of non-respiratory etiologies remained relatively constant, respiratory outbreaks in the school setting surged, especially in the elementary school. Location specific cases counts within the school setting did not appear as widespread as its potential – averaging 21 cases for the 294 school outbreaks. Group and retirement home settings were not as affected by respiratory infections based on only two respiratory outbreaks reported in 2009.

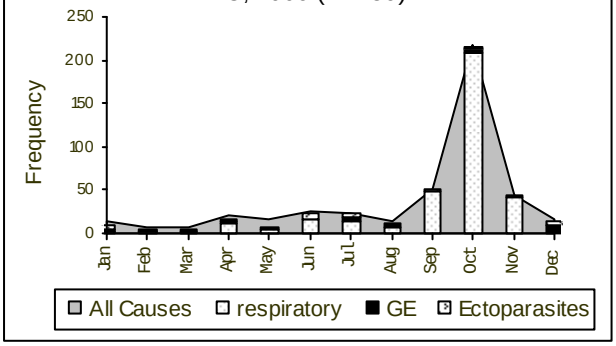
Figure 4
Community Outbreaks by SPA
LAC, 2009 (N=459)



Outbreaks were reported from all eight SPAs (Figure 4). SPAs 3 and 2, the San Gabriel (138) and San Fernando (82) Valleys had the most outbreaks for 2009.

The chart of community-acquired outbreaks by onset month (Figure 5) also illustrates the impact of respiratory infections in 2009. Respiratory outbreaks did occur starting in April, albeit at reduced levels compared to the increases of September through November.

Figure 5
Community Outbreaks by Selected Diseases by Onset Month
LAC, 2009 (N=459)



COMMENTS

The overall number of outbreaks and outbreak associated cases in 2009 was unlike anything in the past ten years. Public Health efforts in preparation for H1N1 pandemic influenza activity included the outreach to school setting administration as illness and transmission within this setting was anticipated. This modified active surveillance could have contributed to the increased frequency of school-based outbreaks reported compared to past years.

Community-acquired outbreaks result in an interaction among particular age groups, locations and specific diseases. A profile emerges where the very young and early adolescent acquire infection/infestation at school (89% in preschool, elementary, middle, or high school). Historically, varicella, pediculosis (head lice), and GE were most common in these age groups, but in 2009, respiratory outbreaks dominated. Not to be lost in this respiratory spike, the dramatic decrease in varicella outbreaks continued in 2009 with only six outbreaks being reported. (see summary of the Varicella Project in the ACDC Special Report). The second age group usually affected by outbreaks is in the older population, often associated with group home settings (26%). In this age category, GE and scabies are the most common causes (Table 2). Outbreak reports in this group dropped to 5% in 2009. Fortunately, only two respiratory outbreaks were reported in this group; one caused by influenza.

Table 1. Community-Acquired Outbreaks by Disease— LAC, 2009

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Varicella	6	45	8	6-9
Scarlet fever/strep throat	5	19	4	2-8
Scabies	14	86	6	2-31
Hand, foot & mouth disease	9	80	9	3-18
Pediculosis	15	127	8	2-28
GE illness - Norovirus	4	94	24	18-33
GE illness - Shigella	0	0	0	0
GE illness – Salmonella	2	12	6	3-9
GE illness - Unknown	25	460	18	7-60
Fifth disease	7	36	5	3-9
Conjunctivitis	2	12	6	3-9
Influenza	68	2075	31	2-185
Respiratory unk.	295	5294	18	3-131
Other*	7	70	10	2-28
Total	**459**	**8410**	**18**	**2–185**

* Includes: unk. rash (2), ringworm (2) , and unk. febrile illness (2).

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2009

Disease	Group Home[a]	School[b]	Preschool or Daycare	Other[c]	TOTAL
Varicella	0	6	0	0	**6**
Scarlet fever/strep throat	0	0	5	0	**5**
Scabies	10	0	4	0	**14**
Hand, foot & mouth disease	0	2	7	0	**9**
Pediculosis	1	4	10	0	**15**
GE illness - Norovirus	2	0	2	0	**4**
GE illness - Shigella	0	0	0	0	**0**
GE illness - Salmonella	0	0	2	0	**2**
GE illness - Unknown	7	4	12	2	**25**
Fifth disease (Parvovirus)	0	5	2	0	**7**
Conjunctivitis	0	0	2	0	**2**
Influenza	0	48	7	13	**68**
Respiratory Unk.	2	246	36	11	**295**
Other	1	1	4	1	**7**
Total	**23**	**316**	**93**	**27**	**459**

[a] Includes centers for retirement, assisted living, and rehabilitation.
[b] Includes elementary (257), middle (31), high schools (22), and university (6).
[c] Includes juvenile detention (15) jail (1), and camps (5).

FOODBORNE ILLNESS OUTBREAKS

DESCRIPTION

Foodborne illness outbreaks are caused by a variety of bacterial, viral, and parasitic pathogens, as well as toxic substances. To be considered a foodborne illness outbreak, both the state and the Centers for Disease Control and Prevention (CDC) require at minimum the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food.[1]

The surveillance system used by Los Angeles County (LAC) Department of Public Health (DPH) for detection of foodborne illness outbreaks begins with a foodborne illness report (FBIR). This system receives illness reports associated with commercial food facilities, and foodborne exposures uncovered during disease-specific case investigations (e.g., salmonellosis, shigellosis, campylobacter). LAC Environmental Health (EH), Food and Milk (F&M) Program investigates each FBIR by contacting the reporting individual and evaluating the public health importance and need for follow-up. When warranted, a thorough inspection of the facility is conducted. This is often sufficient public health action to prevent additional foodborne illnesses.

LAC DPH Acute Communicable Disease Control (ACDC)'s Food Safety Unit also reviews all FBIRs. Joint investigations are conducted on possible foodborne illness outbreaks with the greatest public health importance. An epidemiologic investigation will typically be initiated when there are illnesses in multiple households, multiple reports against the same establishment in a short period of time, or ill individuals who attended a large event with the potential for others to become ill. The objective of each investigation is to determine the agent of infection, determine extent of the outbreak, identify a food vehicle or processing error, and take actions to protect the public's health.

RESULTS

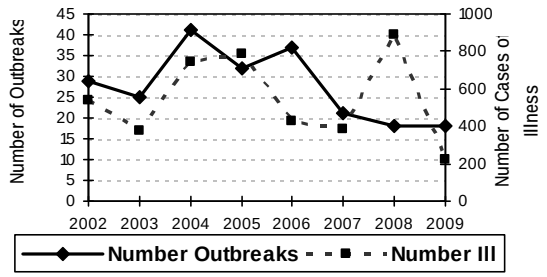
The number of FBIRs received in 2009 (N=1716) was fewer than that received in 2008 (N=2003). Web-based reporting accounted for 42% of FBIRs this year. The F&M Program conducted a site inspection on 33.9% (n=582) of FBIR reports that were deemed high priority. There were 52.8% (n=909) of complaints referred to district EH offices, other EH specialty programs, or other agencies. The remaining 13.3% of FBIR's were duplicates or lost to follow-up.

The ACDC Food Safety Unit conducted 23 outbreak investigations this year; 18 were initiated by FBIR complaints and five were initiated through other surveillance activities. Of these 23 investigations, five (22%) were not considered to be foodborne upon investigation. All five outbreaks were due to norovirus which can easily be spread person-to-person at gatherings serving food. Some of these investigations identified an ill guest at the gathering. In other investigations a judgment was made based on a combination of the following: 1) no food item implicated in the case-control study, 2) no significant food violations or ill food handler identified by the inspection, or 3) the shape of the epidemiological curve of symptom onsets was not consistent with a point source outbreak. In some investigations there is not enough participation from those affected to conduct a thorough case-control study. Determining whether a food item was the source in these outbreaks can be challenging as well as time and resource consuming.

[1] CDC. Surveillance for foodborne disease outbreaks—United States, 2006. MMWR 2009; 58(22);609-615. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5822a1.htm

The 18 outbreaks determined to be foodborne are summarized below. These 18 outbreaks represent 222 cases of foodborne illness (Figure 1), and occurred throughout 2009, with slightly more occurring in the summer months (Figure 2).

Figure 1.
Foodborne Outbreaks
Number of Persons Affected
LAC, 2002–2009



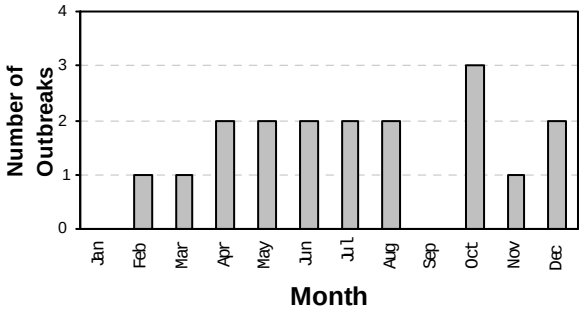
Causes of Foodborne Illness Outbreaks

A food vehicle was epidemiologically implicated in 39% (n=7) of foodborne illness outbreaks this year. Implicated food items included chicken, beef, lamb, spice, beans, pistachios and salsa dish with multiple ingredients. An agent was identified in 100% of foodborne illness outbreaks this year (n=18) and confirmed in 44% (n=8) (Figure 3). Bacterial agents were responsible for eight of the outbreaks, norovirus for six outbreaks, and bacterial toxin for four outbreaks (Figure 3).

Food handler was not implicated as the cause of foodborne illness outbreaks investigated in 2009. F&M inspections identified contributing factors such as temperature violations and contamination or proliferation issues that contributed to 3 outbreaks this year (17%).

Salmonella was responsible for seven foodborne bacterial outbreaks this year, down from the previous year (n=10). One of the largest outbreaks this year involved 23 cases of salmonellosis occurring among persons eating ready-to-eat food from a meat market. The epidemiological investigation implicated a cooked beef dish prepared by the market as the source of the outbreak. The environmental inspection revealed numerous Health and Safety Code violations and the market was closed for thorough cleaning and education (OB#154).

Figure 2.
Foodborne Outbreak Investigations
by Month of Onset
LAC, 2009 (N=18)

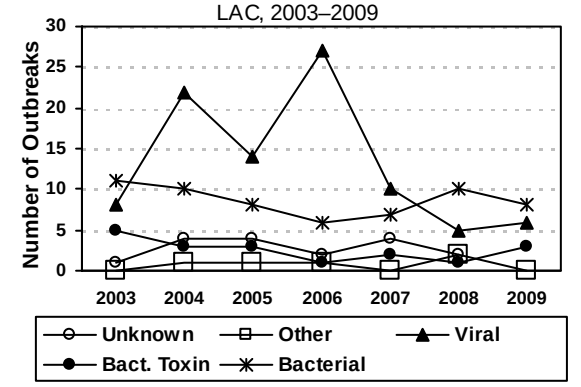


A salmonellosis outbreak involving 17 cases was associated with food consumed at a baptism (OB#187). The epidemiological analysis implicated a home-made lamb dish as the source of the outbreak. Another salmonellosis outbreak involving six cases was associated with a eating at a restaurant, but no food item was implicated in the food analysis and no major violations were identified. All food handlers working at this restaurant were tested for enteric bacteria and were found to be negative at time of testing (OB#195).

A cluster of 12 salmonellosis cases with indistinguishable PFGE pattern was investigated this year. However, no common food or eating location was implicated (OB#373).

Three national salmonellosis outbreaks involving nine LAC cases occurred this year. Two of these outbreaks involved contamination of nationally distributed products (pistachios and contaminated pepper in a salami meat product) identified by OubreakNet. There was no implicated food item in the third national salmonella cluster.

Figure 3
Foodborne Outbreaks
by Etiologic Agent Category
(Lab Confirmed and Suspect)
LAC, 2003–2009



Norovirus was confirmed or suspected in six foodborne illness outbreaks this year (33%) which is comparable to the number found in 2008 (n=5), but a considerable drop from the number seen in 2006 (n=25). This reduction may be due to the ability to better recognize a situation where person-to-person spread is responsible for the cluster and not a food item.

The largest norovirus outbreak this year involved 16 children at a birthday party held at a restaurant (OB# 548). Environmental Health closed the restaurant after its inspection identified a lack of hot water at the facility. The epidemiology analysis did not implicate any one food item. This outbreak may have been the result of a contaminated food item, play area, or restroom at the facility.

Another norovirus outbreak involved 14 cases eating at a catered workplace event. The investigation implicated a salsa dish prepared by an unlicensed caterer as the source of the outbreak (OB#573). Environmental Health was unable to locate this caterer.

In three other norovirus outbreaks, the investigation did not implicate a food item, but contaminated food could not be ruled out. These included a catered meeting at a banquet hall involving 13 cases (OB#571), a catered workplace event involving ten cases (OB#105), and a restaurant involving five cases (OB#124).

Outbreak Locations

Locations for reported foodborne illness outbreaks included restaurants (5), private residences (4) workplaces (4) and a banquet hall (1). Five outbreaks occurred throughout the community due to widely distributed food products. Similar to last year, the largest number of outbreaks was reported from Service Planning Area (SPA) 2 (26%) (Table 1). There was one multi-district and one multi-county outbreak, and three national outbreaks that involved multiple states.

Table 1. Frequency of Foodborne Illness Outbreaks by Location LAC, 2009 (N=18)

SPA	Frequency	Percent
1	1	5.6%
2	4	22.2%
3	1	5.6%
4	2	11.1%
5	3	16.7%
6	1	5.6%
7	1	5.6%
8	0	5.6%
Multi-district	1	5.6%
Multi-county	1	16.7%
Multi-state	3	5.6%

Foodborne Illness Outbreak Investigations - 2009

	Agent	Confirmed	Species	Source	Setting	OB#/ Sit #	Ill	Health District
1	Bact-Toxin	No		Home made beans	Workplace	50	7	62
2	Bact-Toxin	No		Beef	Residence	65	7	58
3	Bact-Toxin	No		Unknown	Residence	87	17	84
4	Bact-Toxin	No		Unknown	Office	167	2	84
5	Campylobactor	Yes	C. jejuni	Chicken Liver	Restaurant	193	6	27
6	Norovirus	No		Unknown	Workplace	105	10	9
7	Norovirus	No		Unknown	Restaurant	124	5	5
8	Norovirus	No		Unknown	Restaurant	179	6	5
9	Norovirus	No		Unknown	Restaurant	548	16	86
10	Norovirus	No		Unknown	Banquet	571	13	25
11	Norovirus	Yes		Salsa	Workplace	573	14	9
12	Salmonella	Yes	Montevideo	Salami	Community	S#40	6	Multi
13	Salmonella	Yes	Montevideo	Pistachio	Community	S#10	1	Multi
14	Salmonella	Yes	Typhimurium	Restaurant	Community	154	23	19
15	Salmonella	Yes	Typhimurium	Lamb	Residence	187	17	75
16	Salmonella	Yes	Group B:i	Unknown	Restaurant	195	6	98
17	Salmonella	Yes	Newport	Unknown	Community	-	2	
18	Salmonella	Yes	Typhimurium	Unknown	Community	373	12	98

Non-Foodborne Illness Outbreak Investigations

1	Norovirus	No		Community	Residence	251	14	13
2	Norovirus	Yes		Community	Jail	21	15	62
3	Norovirus	No		Community	School	31	18	84
4	Norovirus	No		Community	Residence	106	9	9
5	Norovirus	No		Community	Restaurant	579	10	Multi

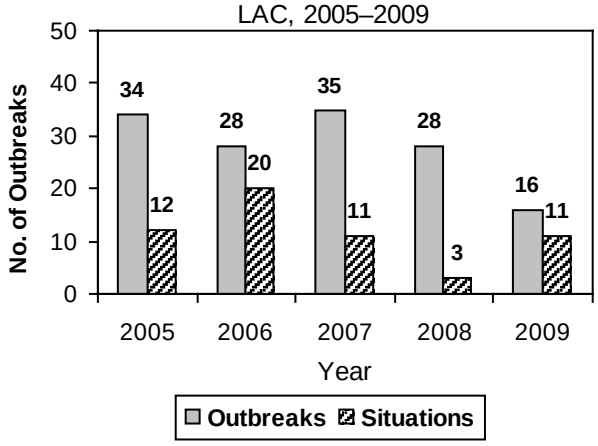
HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITALS

DEFINITION

This chapter will discuss healthcare-associated outbreaks and related situation events that occur within the general acute care hospital setting on any patient unit, sub-acute or specialty area within the facility (e.g., surgical suites or procedure rooms). An outbreak in such settings is defined as a cluster of nosocomial (healthcare-associated) infections related in time and place, or occurring above a baseline or threshold level for a defined area of a facility, including the entire facility, specific unit, or ward. Baseline is relative to what is normally observed in a particular setting.

A situation event is defined as a cluster of nosocomial (healthcare-associated) infections that may not clearly meet all outbreak criteria defined above, where additional information is required to determine if an outbreak has occurred.

Figure 1.
General Acute Care Hospital Outbreaks
and Situation Events
LAC, 2005–2009



ABSTRACT

Confirmed acute care hospital outbreaks decreased 43% from 2008 to 2009. There were 16 outbreaks reported in acute care hospitals in 2009 (Figure 1). Forty-four percent (n=7) occurred in a unit providing intensive or focused specialized care (e.g., neonatal intensive care and telemetry units). Twenty-five percent (n=4) occurred in a sub-acute unit located within the acute care hospital (Table 1). Scabies outbreaks decreased by 57% in 2009 (n=3) as compared to 2008 (n=7), and accounted for 19% of overall outbreaks reported. Thirty-eight percent (n=6) of acute care hospital outbreaks were of bacterial etiology (Table 2) from a multidrug-resistant organisms (MDRO) such as *Acinetobacter baumannii* (*A. baumannii*), methicillin-resistant *Staphylococcus aureus* (*MRSA*) and *Clostridium difficile* (*C. difficile*) were responsible in 2009 (Figure 2). The etiologic agents contributing the largest number of cases in acute care hospital outbreaks were scabies (31, 23%) followed by *C. difficile* (28*, 21%) and A. baumannii* (13,10%). There were 11 situation events reported in acute care hospitals in 2009. Sixty-four percent (n=7) were of bacterial etiology and caused by multidrug-resistant organisms (Table 4).

Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2009

Outbreak Location	No. of Outbreaks
Intensive Care – Adult	1
Intensive Care- Neonatal	5
Medical-Surgical	1
Multiple Units	1
Psychiatric	2
Sub-acute Unit within a Hospital - Adult	3
Sub-acute Unit within a Hospital - Pediatric	1
Rehabilitation	1
Telemetry	1
Total	**16**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition—LAC, 2009

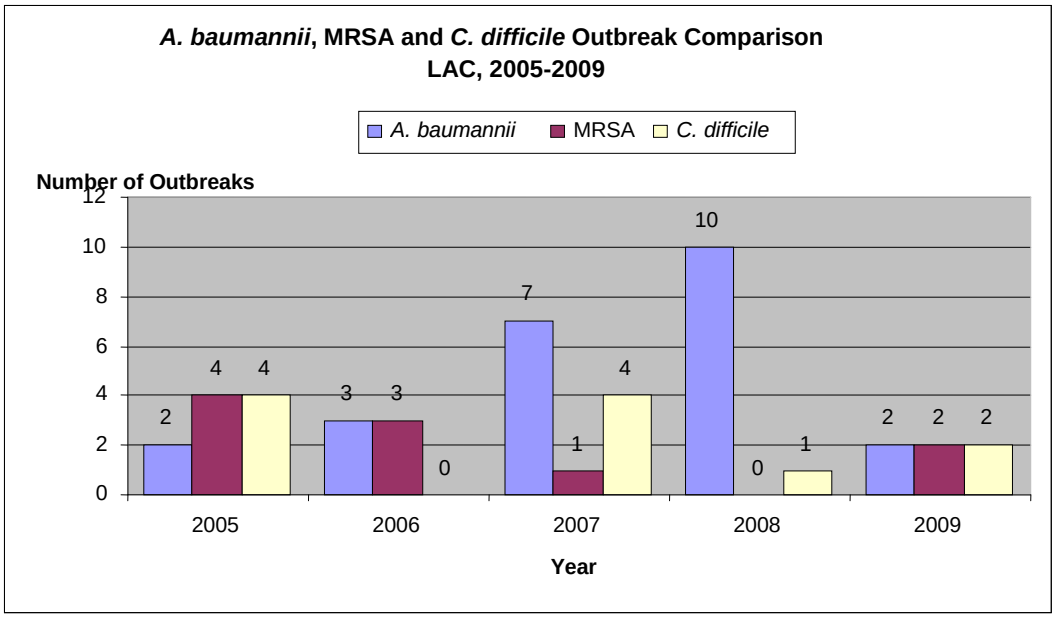
Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
Acinetobacter baumannii	2	13
Clostridium difficile	2	28
MRSA	2	9
Norovirus	1	14
Pandemic Influenza H1N1	3	17
Respiratory Syncytial Virus	1	3
Scabies	3	31
Unknown Gastroenteritis	1	15
Unknown Respiratory	1	2
Total	**16**	**132**

Table 3. General Acute Care Hospital Situation Events by Unit—LAC, 2009

Outbreak Location	No. of Outbreaks
Intensive Care – Adult	2
Intensive Care-Neonatal	3
Intensive Care-Pediatric	1
Medical-Surgical	2
Pediatric	1
Sub-acute Unit within a Hospital - Pediatric	2
Total	**11**

Table 4. General Acute Care Hospital Situation Events by Disease/Condition—LAC, 2009

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
Acinetobacter baumannii	2	6
Botulism	1	1
Elizabethkingia meningoseptica	1	2
KPC *Klebsiella*	1	4
MRSA	2	5
Norovirus	1	8
Pandemic H1N1	1	2
Respiratory Syncytial Virus	1	2
Vancomycin-resistant Enterococcus	1	2
Total	**11**	**32**



COMMENTS

Healthcare-associated infections (HAI) continue to flourish in hospitals worldwide despite ongoing efforts to increase healthcare worker compliance with appropriate hand hygiene and related infection control practices. It is estimated that over 1.4 million people worldwide have suffered from infections acquired in hospitals[1]. In the United States (US), published estimates indicate that 1.7-2 million people per year develop an HAI. The Society of Healthcare Epidemiology of America (SHEA) in its 2010 Position Paper Reducing Healthcare Associated Infections, states that multidrug-resistant organisms are responsible for approximately 10-20% of all HAI[2].

Thirty-eight percent (n=6) of reported outbreaks in Los Angeles County (LAC) were caused by a MDRO. This is a decrease of 45% from 2008 to 2009. In 2009, nine outbreaks (56%) occurred in a neonatal intensive care unit (NICU), adult ICU or sub-acute unit of the hospital.

California continued implementation of the third phase of Senate Bill (SB) 739 of 2006 – Hospital Acquired Infections Act. It mandates general acute care hospitals to implement procedures to reduce the incidence of HAI, protect patients from exposure to pathogens and require regulation of HAI including surveillance and reporting[3,4]. Two additional bills effective January 1, 2009, SB 1058 and SB 158, collectively referred to as the Medical Facility Infection Control and Prevention Act, require hospitals to test patients under specified circumstances for MRSA within 24 hours of hospital admission and require hospital policies to contain specific language on regular cleaning and disinfection of common hospital areas and cleaning of point-of-care testing devices (e.g., glucometers and transportable medical devices). Additionally, hospitals must quarterly report all cases of certain HAI as defined by the Centers for Disease Control and Prevention's National Healthcare Safety Network.

SB 739 has additional provisions for pandemic H1N1 influenza, mandating that hospitals offer onsite influenza vaccinations, upon availability, to all employees and other workers at no cost to the worker, just as with seasonal influenza[5]. It also requires hospitals to institute respiratory hygiene and cough etiquette protocols, develop and implement isolation procedures for patients with influenza, and adopt a seasonal influenza plan.

In April 2009, a novel H1N1 influenza virus was first identified in the US and within months spread around the world causing a significant burden to the healthcare system. During the 2009 H1N1 influenza pandemic three hospital H1N1 influenza clusters were investigated involving 17 cases. Of these, two were located in the NICU. In two of these outbreaks, pre-symptomatic transmission from healthcare worker to patient was suspected to be the mode of introduction. One H1N1 situation event in a pediatric facility on a floor with severely immunocompromised patients was also investigated.

Acute Communicable Disease Control Program (ACDC) Hospital Outreach Unit (HOU) staff facilitated eight H1N1 influenza informational conference calls with LAC hospitals from April through October 2009 to disseminate and clarify H1N1 influenza epidemiology and related information from the CDC, California Department of Public Health and LAC Department of Public Health, to provide status updates and answer questions. Call participants included hospital medical epidemiologists, infection preventionists, laboratory as well as emergency department staff. Topics included vaccine availability and access, specimen submissions, infection control guidelines, reporting of cases and new reporting requirements.

The ACDC HOU's Liaison Public Health Nurses (LPHNs) continue to collaborate with partners in hospitals, clinics, jail medical services and other healthcare settings to enhance emerging infectious disease preparedness and increase communicable disease and outbreak reporting. Established relationships are maintained with the hospital Infection Preventionist to communicate essential health information that can be disseminated quickly throughout the facility. Among LPHN responsibilities are to make an annual visit to their assigned acute care and psychiatric hospitals, attend Association of Professionals in Infection Control and Prevention chapter meetings, and monthly hospital infection control committee meetings, if invited.

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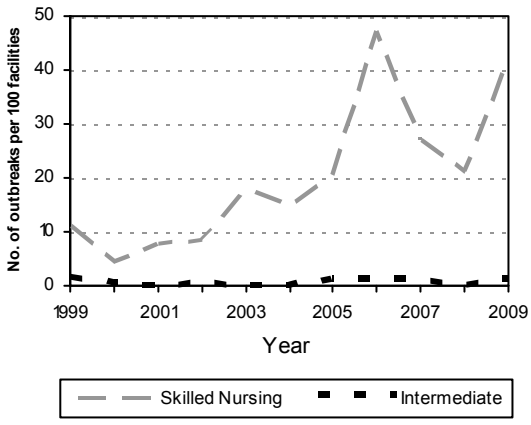
HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

DEFINITION

Healthcare-associated outbreaks are defined as clusters of infections in healthcare settings related in time and place, or occurring above a baseline or threshold level for a facility, specific unit, or ward. Baseline is defined as what is normally observed in a particular setting.

The sub-acute care facilities include skilled nursing facilities (SNFs), intermediate care facilities and psychiatric care facilities. Skilled nursing facilities provide continuous skilled nursing care to patients on an extended basis. Intermediate care facilities also provide skilled nursing care to patients, but the care is not continuous. Psychiatric facilities provide 24-hour inpatient care for patients with psychiatric care needs.

Figure 1.
Sub-acute Facility Outbreaks
LAC, 1999–2009



ABSTRACT

- In Los Angeles County (LAC), total confirmed sub-acute care associated outbreaks nearly doubled from 87 outbreaks in 2008 to 169 outbreaks in 2009. This was largely due to an increase in gastrointestinal and respiratory outbreaks.
- The number of skilled nursing facility outbreaks increased by 96% in 2009 from 85 in 2008 to 166. (Table 1). The rate of skilled nursing facility outbreaks also increased from 21 per 100 facilities in 2008 to 42 per 100 facilities in 2009 (Figure 1).
- There were three outbreaks in intermediate care facilities in 2009, all of which were investigated by district staff.

Table 1. Number of Reported Outbreaks in Sub-acute Healthcare Facilities LAC, 2005–2009

	YEAR				
Type of Facility	**2005**	**2006**	**2007**	**2008**	**2009**
Intermediate Care Facilities	0	3	3	-	3
Psychiatric Care Facilities	-	-	3	2	-
Skilled Nursing Facilities	76	173	110	85	166
Total	76	173	116	87	169

Intermediate Care Facilities: Three outbreaks were investigated in intermediate care facilities (Table 2). The largest was a confirmed pandemic (H1N1) influenza outbreak that occurred in a facility for developmentally disabled adults, and was investigated by district staff. A total of 22 residents and five staff were ill during the outbreak.

Table 2. Intermediate Care Facility Outbreaks by Disease/Condition—LAC, 2009		
Disease/Condition	**No. of Outbreaks**	**No. of Cases**
Influenza A	1	27
Gastroenteritis • Unspecified (n=1) • Norovirus (n=1)	2	42
Total	**3**	**69**

Psychiatric Facilities: No outbreaks were reported in psychiatric care facilities in 2009, compared with two outbreaks in 2008.

Skilled Nursing Facilities: Reported skilled nursing facility outbreaks increased by 96% in 2009 compared to 2008. Scabies and rash outbreaks were the most frequently reported, accounting for 48% of outbreaks. However, gastrointestinal outbreaks accounted for the most illness, 1725 (67%) cases. Four outbreaks due to *Clostridium difficile* were reported in 2009 compared to one outbreak reported in 2008. The total number of respiratory outbreaks tripled in 2009—19 outbreaks were documented in 2009 compared to six in 2008. In 2009, six of the respiratory outbreaks were due to probable influenza compared to two outbreaks in 2008 (Table 3).

Table 3. Skilled Nursing Facility (SNF) Outbreaks by Disease/Condition—LAC, 2009		
Disease/Condition	**No. of Outbreaks**	**No. of Cases**
Clostridium difficile	4	11
Gastroenteritis • Unspecified (n=29) • Norovirus (n=34)	63	1725
Scabies	59	400
Scabies, atypical	3	9
Unknown Rash	18	194
Respiratory illness • Unspecified (n=13) • Influenza (n=6)	19	218
Total	**166**	**2557**

COMMENTS

LAC skilled nursing facilities experienced an increase in the total number of reported outbreaks. There was a 90% increase in gastrointestinal outbreaks in 2009 compared to 2008, with 48% occurring in December 2009. Outbreaks due to *Clostridium difficile* are not commonly reported to Department of Public Health (DPH), and increased from one outbreak in 2008 to four in 2009. This may signal an increased presence in skilled nursing facilities, whose residents frequently transfer to and from acute care facilities or increased compliance with reporting outbreaks.

The large increase in respiratory outbreaks may be attributed to the pandemic (H1N1) 2009 influenza virus that began circulating in the spring of 2009 in California and Los Angeles County. Two respiratory outbreaks of unknown etiology occurred in the first few months of 2009. The remaining outbreaks occurred sporadically

during the summer, with the majority occurring in October and early November. There were five confirmed pandemic (H1N1) 2009 outbreaks in skilled nursing facilities, all occurring in a two week period between the end of October and beginning of November. Along with the increase in respiratory outbreaks in 2009, the number ill attributed to these outbreaks tripled from 68 ill in 2008 to 218 ill in 2009. The largest outbreak in a SNF affected a total of 39 residents and two staff members, however, despite laboratory evaluation in some of the resident, no etiology could be determined. In 2009 half of the respiratory outbreaks investigated had at least one facility staff member ill. However, respiratory illness etiology among staff members was not determined in any of the outbreaks. Laboratory specimens were collected and tested in 17 respiratory outbreaks; the Public Health laboratory tested specimens for four outbreaks. In 6 of the 17 outbreaks diagnostics confirmed H1N1 or were strongly suggestive of influenza and in 11 of the respiratory outbreaks no definitive etiology could be established from the diagnostic testing.

Twenty-three LAC DPH districts investigated at least one healthcare facility outbreak during 2009. The East Valley (19, 11%), Glendale (16, 9%) and West Valley (14, 8%) health districts investigated a larger proportion of outbreaks compared with other districts. Facilities in Service Planning Area (SPA) 2 (47, 28%) SPA 3 (33, 20%) and SPA 4 (29, 17%) reported the largest proportion of outbreaks in 2009.

PREVENTION

The majority of outbreaks in sub-acute care facilities are caused by agents that are spread via person-to-person contact. Thus, appropriate hand hygiene practice by staff and residents is a crucial infection control measure. Influenza vaccination for skilled nursing facility staff and residents as well as proper handwashing, administrative controls, utilization of appropriate antiviral prophylaxis for facility residents and staff and isolation where necessary are essential in the prevention of seasonal as well as pandemic H1N1 influenza. This year LAC DPH Acute Communicable Disease Control Program (ACDC) provided one day of training for LAC public health nurses and other district staff which updated staff on influenza epidemiology, outbreak investigation, appropriate use of antiviral prophylaxis and vaccination for the prevention of influenza. For the coming year, it will be important to assess skilled nursing facility vaccination practices among staff and encourage high influenza vaccination coverage as well as increased specimen collection for residents and staff that are ill from respiratory illness.

The Scabies Task Force in ACDC produced the LAC Scabies Prevention and Control Guidelines for acute and sub-acute care facilities. These guidelines were created in collaboration with district nursing staff and distributed to all nurse managers and area medical directors. They were developed to provide guidance to skilled nursing facilities who were experiencing scabies outbreaks, as well as to be a helpful guide to district nurses who do not regularly investigate scabies outbreaks. These guidelines can be assessed at: http://publichealth.lacounty.gov/acd/Diseases/Scabies.htm.

Acute Communicable Disease Control Program

Special Studies Report

2009

Los Angeles County
Department of Public Health

Public Health
Laurene Mascola, MD, MPH
Chief, Acute Communicable Disease Control Program

ACDC SPECIAL STUDIES REPORT 2009

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BOTULISM CASE REPORT SUMMARY, 2009

David Dassey, MD, MPH

Only four suspected botulism cases were reported in 2009 and one was confirmed; this excludes infant botulism cases. The confirmed case was a male injection drug user with a recent history of both intravenous and subcutaneous injections of black tar heroin. Type A botulinum toxin was detected in a serum sample, confirming the diagnosis of wound botulism. He recovered after treatment with antitoxin.

An elderly woman was hospitalized with symptoms and signs consistent with botulism. She gave a history of eating home-canned green beans shortly before symptom onset; her husband did not consume any home-canned products and remained well. Bivalent AB and monovalent E botulinum antitoxins were released by Public Health for treatment. The couple resided in a neighboring county where the suspected food items were stored, therefore a joint investigation was conducted. Clinical specimens of serum, stool and gastric contents were tested by culture and toxin screen but failed to yield any positive results. Two samples of green beans were likewise tested by culture and toxin screening; all tests were negative. The case was closed as false for lack of laboratory confirmation. Remaining home-canned products were ordered destroyed as a precaution.

A middle age woman was admitted to a hospital with progressive motor paralysis suggestive of botulism and on the seventh hospital day the hospital laboratory contacted the Los Angeles County Public Health Laboratory for guidance in submitting botulism diagnostic specimens. Acute Communicable Disease Control Program contacted the treating physician and infectious disease consultant; because the patient had been stabile neurologically for several days, botulinum antitoxin was withheld. Treatment with intravenous immune globulin was started and she responded clinically, making the diagnosis of Guillain-Barré syndrome. No clinical specimens were submitted, but a sample of home-made garlic oil was culture negative for *Clostridium* bacteria. The case was closed a false.

A young woman with a history of recent cosmetic surgery to the scalp presented with headache and a bizarre set of neurological findings including multiple cranial nerve palsies (bilateral facial paralysis, double vision, ptosis, weak neck muscles), nystagmus, and “lock jaw.” There were paresthesias in both lower extremities. There was no sign of infection; cerebrospinal fluid examination and imaging studies of the head were unremarkable. The case was discussed with experts at the California Department of Public Health and the Centers for Disease Control and Prevention, and trivalent ABE antitoxin was administered. By the following morning, the patient had completely recovered from all neurological deficits, ruling out botulism. Cultures of stool and gastric contents were negative for *Clostridium* and serum was negative for botulinum toxin. The final diagnosis remained unknown.

The California Infant Botulism Program reported five confirmed Los Angeles County cases of infant botulism in infants ranging from two weeks to six months of age. Five were male; three were Hispanic white, one was Asian and one was black. There were two cases with type A intoxication and two cases with type B. The fifth case demonstrated the unusual finding of both types A and B toxigenic organisms in the stool.

LIDOCAINE POISONING RESULTING FROM MEDICATION DOSING ERROR IN OUTPATIENT CLINIC

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BACKGROUND

The Los Angeles County (LAC) Department of Public Health (DPH), Acute Communicable Disease Control Program (ACDC) was notified by an emergency department (ED) physician at a local hospital of a cluster of two patients seen at two EDs on the same day, within a relatively short time frame. Each patient was transported to the ED after developing generalized tonic-clonic convulsions soon after conscious sedation and local anesthesia was administered for a therapeutic abortion (TAB) procedure at a local outpatient clinic. ACDC, LAC Health Facilities (HF) Inspection Division, and the U.S. Food and Drug Administration (FDA), conducted a joint site visit to the clinic the day following the incident. A meeting was held with the clinic medical director, physician, and administrative staff to determine the sequence of events leading to the patients' convulsions, assess patient charts, review policies and procedures, observe medication preparation practices, and to recommend control and prevention measures. Subsequent site visits were made by ACDC and LAC DPH Toxics Epidemiology Program nurses to observe the medication preparation procedure for TAB and to conduct chart reviews of all patients who underwent TAB procedure on the same day as the incident.

This report describes the collaborative investigation and the efforts of multidisciplinary agencies to identify the etiology of generalized convulsions occurring to patients undergoing local anesthesia at a local clinic, and to ensure that safety practices and procedures are implemented to prevent further incidents.

METHODS

ACDC conducted a joint site visit to the clinic with an evaluator from the HF Inspection Division and an inspector from the FDA. Interviews were completed with the clinic medical director, clinic physician, and clinic manager to assess procedures performed in the clinic and to elicit the sequence of events leading to the patients' (Patient 1 and 2) convulsions. Patient 1 and 2's charts were reviewed. The investigative team toured the clinic to view TAB preparation/procedure rooms. The team inspected the medication storage and preparation rooms, as well as the locked controlled medication area and medication inventory records. Policies and procedures for TAB were reviewed, including those for surgical abortion, analgesia, and sedation services; standards of care for local anesthesia; emergency procedures; medication error management; pharmaceutical services; controlled substances; and scope of practice for nurse practitioner and nurse midwife. Open vials and unused pre-filled syringes with medications prepared for anesthesia administration left over that day were retrieved and collected for testing by the FDA. Interview of clinician and observation of practice for lidocaine preparation for TAB was observed. A line list was obtained of the 20 patients who underwent TAB on the same day and their medical records were reviewed. HF Inspection Division made several follow-up visits, including one with the State Pharmacy Consultant, to review medication policies and procedures, give recommendations, and enforce corrective actions as deemed necessary for continued surgical procedures. A blood sample from Patient 1 was analyzed for lidocaine.

RESULTS

During site visit #1, ACDC conducted a chart review of the two patients who developed convulsions shortly after receiving local anesthesia and conscious sedation. Patient 1 received intravenous bolus injections of fentanyl and propofol and four paracervical injections of lidocaine (40 mLs total) with vasopressin. These medications were in compliance with the clinic's standard protocol for conscious sedation and local anesthesia for patients undergoing TAB procedure. Approximately one hour and fifteen minutes later, Patient 2 received similar injections of fentanyl and propofol, and lidocaine paracervical injections without vasopressin. Almost immediately after receiving the paracervical injections, each

patient developed nystagmus for less than five seconds, followed by generalized tonic-clonic convulsion and hypoxemia. Clinic medical staff provided Patients 1 and 2 with oxygen, respiratory support, and intravenous midazolam with resolution of convulsions, and each patient was transported to local EDs by emergency medical services for further evaluation. Both patients recovered with observation in the ED and did not require hospital admission. After Patient 2 was transported to the ED, the clinic staff discovered an opened vial of lidocaine 2% in the medication preparation area. The clinic staff concluded that Patients 1 and 2 most likely received 2% lidocaine inadvertently instead of the 0.5% concentration, exceeding the recommended dose. According to the clinic's Standards of Care for Local Anesthesia, the lidocaine dose for local anesthesia is not to exceed 2 mg per pound or 4.5 mg/kg, with a maximum dose per hour of 550 mg. For most patients, this is achieved with 20-40 mLs of 0.5% lidocaine. If Patients 1 and 2 had received 40 mLs of lidocaine 2%, their doses were 800 mg (250 mg above the maximum recommended dose) or 14.5 mg/kg for Patient 1 and 9.2 mg/kg for Patient 2.

ACDC contacted both local EDs to inquire about stored blood samples. Blood for Patient 1 was sent to a private laboratory and revealed a lidocaine level of 4.2 mcg/mL, drawn 88 minutes after the lidocaine injections. Based on a half-life of 1.5-2 hours and a volume of distribution of 1.1 L/kg for lidocaine[1], pharmacological extrapolation corresponded to an estimated peak lidocaine level of 8-12 mcg/mL for Patient 1[1]. The therapeutic peak range for lidocaine is 1.5-5.0 mcg/mL. Signs of toxicity for lidocaine may be seen with serum levels of 7.3-12.0 mcg/mL[1]. Stored blood samples were not available for Patient 2. The FDA confirmed 1.98-2.03% lidocaine concentrations in syringe residuals retrieved on the day after the incident, exceeding the expected concentration of 0.5%.

The staffing pattern for the TAB on the day of the incident included one certified registered nurse practitioner (CRNP) who performed pre-operation assessments; one CRNP who prepared the lidocaine syringes in the morning for the procedures and also monitored the post-operation and recovery room; one certified registered nurse anesthetist (CRNA) who prepared and administered anesthesia; one physician who administered paracervical lidocaine injections (prepared by the CRNP at the beginning of the day) and performed the procedures; and one reproductive health assistant (RHA) who prepared the patients for TAB and assisted the physician and nurses.

Remaining scheduled TAB procedures for that day were immediately cancelled in the clinic after Patient 2 exhibited the same reaction as Patient 1. All medications utilized to administer local anesthesia for TAB and all leftover medications pre-drawn into syringes for subsequent procedures were sequestered by the clinic. The sequestered medications included an empty 50 mL vial of lidocaine 0.5%, a few mLs in a 50 mL vial of lidocaine 2%, three 50 mL bottles of propofol 1% with approximately 5-30 mL of medication left in the bottles, three 2 mL syringes of fentanyl, an empty 1 mL vial of vasopressin, and five unlabelled syringes filled with a white substance (ranging from 2 to 12 mLs). There were some syringes filled with lidocaine, labeled "20cc lidocaine (0.5%)," and some labeled "20cc lidocaine (0.5%) w. 4U Vasopressin." The FDA took samples of the medications listed above for analysis.

The clinic kept the controlled substances (narcotics) in a locked cabinet with entry by authorized licensed staff only, and maintained inventory records for each drug count and use. Lidocaine was kept inside the laboratory in a locked cabinet without documentation or records. The clinic's formulary did not include lidocaine 2%. The clinic's inventory order sheet indicated that 25 vials of 50 mL lidocaine 2% were ordered, and the clinic's inventory control data sheet indicated that 22 vials of 50 mL lidocaine 2% were in the clinic. During site visit #1, the clinic reported having returned the stock of lidocaine 2% to central supply; however, administration was unable to produce the tracking invoices to confirm such a transaction.

ACDC and Toxics Epidemiology nurses reviewed the medical records of all patients who underwent TAB procedure with local anesthesia on the day of the incident. Twenty charts were reviewed for demographic information, medical history, treatments and medications administered, and vital signs. There were no specific risk factors identified that were unique to Patients 1 and 2 that may have contributed to the onset of tonic-clonic convulsions.

During site visit #2 to the clinic, an ACDC nurse met with the CRNP to review their routine practice of local anesthesia preparation of lidocaine for TAB procedures. The CRNP typically prepares the medications alone over a one hour time span just prior to the clinic services opening. The CRNP regularly prepares four 12 mL syringes of lidocaine for each scheduled TAB procedure. The CRNP reported that on the day of the incident, a combined total of ninety-six 12 mL syringes of lidocaine and lidocaine with vasopressin were pre-filled and prepared using sterile technique in the morning. Ninety-six syringes are usually prepared on the days TABs are performed: 40 syringes of lidocaine only and 56 syringes of lidocaine with vasopressin. The 12 mL syringes are filled between 11–12 mL to allow for waste by the physician prior to direct insertion into the patient. The CRNP obtains twenty-four 50 mL vials of lidocaine from a locked cabinet and five 1 mL vials of vasopressin (20 U/mL). Ninety-six syringes are placed onto a sterile field. The CRNP adds 0.5 mL of vasopressin into a 50 mL vial of lidocaine to obtain a reconstitution of 10 units vasopressin in 50 mL of lidocaine. This procedure is repeated for ten vials of lidocaine mixed with vasopressin. Each 50 mL vial of lidocaine combined with vasopressin is marked with a "V" prior to withdrawing medication into the syringes to distinguish from the vials with lidocaine only. Forty syringes with combined lidocaine/vasopressin are prepared first. Each syringe is identified with a blue and white label reading "20cc lidocaine (0.5%) w. 4U Vasopressin." The remaining 56 syringes are filled with lidocaine only and identified with a white label reading "20cc lidocaine (0.5%)." After preparing the 96 syringes, they are separated, wrapped in a towel, and kept in two separate metal trays. Each tray is identified for type of medication utilizing the same labels placed on the syringes. The CRNP provides the metal trays to the RHA to keep in a centralized location (portable table in the hallway) for use during the day of TAB procedures. The RHA removes the appropriate syringes of lidocaine from the metal trays and sets them inside the procedure room on a sterile field for the physician to administer to the patients.

During site visit #2, the RHA reported finding 22 empty vials of lidocaine by the trashcans just outside the facility. Of those 22 empty vials, 19 were lidocaine 2% and the other three were lidocaine 0.5%. Eight of the lidocaine 2% vials found were marked with a "V" on the bottle. According to the inventory control data sheet, the clinic had received 22 vials of 50 mL lidocaine 2%. The lidocaine 2% vials were stored next to the lidocaine 0.5% on the same shelf in the medication preparation room. Both concentrations of lidocaine are prepared by the same manufacturer and have a very similar appearance, including the same vial size, label markings, and blue-colored vial caps.

Several clinical practices were of concern and several problems were identified during the medication preparation demonstration.

- Storage of lidocaine 2% (which is neither part of the clinic formulary nor regularly stocked) together with regularly-stocked lidocaine 0.5%.
- Improper storage of medications. Medications with similar appearance should be stored in different locations to prevent potential error, provided they are part of the formulary.
- Lack of documentation and record keeping of lot numbers of lidocaine and vasopressin administered.
- Inadequate labeling of pre-filled syringes with lidocaine used for TAB procedures. Although the concentration printed on the labels for each syringe was correct, each label should read exactly what each syringe contains, i.e., 10 mL lidocaine (0.5%) with 2U vasopressin or 10 mL lidocaine (0.5%).
- No verification of concentration of drugs used. The CRNP who prepared the lidocaine did not notice using lidocaine 2% verses lidocaine 0.5% during the medication preparation process.
- Lack of a written procedure for pre-filling lidocaine syringes for TAB procedures.
- Placement of pre-filled lidocaine syringes in an open, unsecured area.
- Lack of record-keeping of number of unused lidocaine syringes discarded at the end of the day.

In addition, during site visit #1, the CRNA who prepared the propofol on the day of the incident reported that the medication was prepared by pre-filling syringes for all patients scheduled for TAB at the beginning of the day; however, the syringes prepared for that day were neither labeled nor dated. The CRNA stated that sometimes the pre-filled propofol syringes are labeled and timed for two to three patients prior to surgery. It was discovered that after filling the syringes, the CRNA kept them in a lab coat pocket for storage for an undetermined length of time prior to administration. This practice allows for a

breach in aseptic technique, and is not supported by the clinic's General Anesthesia and Deep Sedation Protocol.

ACDC notified HF Inspection Division, Toxics Epidemiology, and the FDA of the retrieved empty vials of 2% lidocaine. Toxics Epidemiology and ACDC recommended that HF Inspection Division carefully review medication procedures and practices of the clinic (storage, preparation, and administration) and requested that a California State certified pharmacy consultant conduct a comprehensive assessment and recommend measures and practices to prevent medication errors.

On the day following the incident, HF Inspection Division ceased operations of anesthesia-related procedures at the clinic until the completion of an audit of pharmacy practices and corrective actions were instituted.

CONCLUSION

Past case reports of fatal overdoses occurred in the 1970s, with hematomas noted at the paracervical injection sites, resulting in communication with the vascular system [2]. Patients 1 and 2 in this investigation likely experienced a similar reaction.

ACDC, HF Inspection Division, Toxics Epidemiology, and the FDA collaborated in the investigation of a cluster of two patients who developed tonic-clonic convulsions and hypoxemia shortly after administration of conscious sedation and paracervical local anesthesia for TAB procedure. The investigation included chart review, staff interviews, medication preparation observation, review of policies and procedures, and laboratory analysis. The investigation strongly suggested a medication dosing error evidenced by discovery of 19 empty 2% lidocaine vials, above expected lidocaine concentration levels in syringe residuals, and an elevated blood lidocaine level in Patient 1.

Several contributing factors in the clinic processes which may have increased the risk of medication error were identified during this investigation. These included failure to return medication to the manufacturer which is not part of the clinic formulary, stocking the same medication of different concentration and similar appearance next to each other, non-adherence to all of the "Six Basic Rights of Medication Safety Practices" (drug, dose, patient, time, route, and documentation) during medication preparation, inappropriate labeling of medications, and finally, lack of written protocol and procedures for the verification of medication dosage prepared by one staff and administered by another, and the safe storage of medications prepared in advance for procedures.

This case illustrates the risk of medication error in local facilities which lack formal protocols for anesthesia. This investigation also served to identify several practices throughout the clinic which may have contributed to the medication errors. This case demonstrates the benefit of multi-agency collaboration to investigate, identify and correct problems.

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NOSOCOMIAL HEPATITIS C: A CRYPTIC SOURCE FOR A CRYPTIC DISEASE

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BACKGROUND

Hepatitis C is the most commonly diagnosed bloodborne pathogen in the United States. Approximately 3.2 million people in the United States are infected with hepatitis C and 75-85% of them will develop long-term complications, which may include cirrhosis, liver failure, and liver cancer.[1] Most people will have no symptoms at the time of initial infection and their complications may only appear 20-30 years after initial infection. The majority of people who currently have chronic hepatitis C are thought to have acquired their infection in the 1970s and 1980s due to blood transfusions or sharing needles during injection drug use, though rarely the infection may also be acquired via sex or during the perinatal period.

A test to detect hepatitis C antibodies was developed in the early 1990s, leading to a sharp reduction in transfusion related cases of hepatitis C. Since the 1990s, most new infections with hepatitis C are thought to be due to sharing needles for illicit injection drug use. However, there has been an increasing awareness of hepatitis C acquired due to healthcare exposure (often referred to as “nosocomial” hepatitis C). These infections have been associated with contaminated multi-use medication vials, re-use of medication syringes, or infection control breaches in hemodialysis centers.[2]

Determining the source of infection with hepatitis C can be very challenging for a variety of reasons. As stated above, most people do not have symptoms at the time of initial infection and may not know that they have been infected with hepatitis C until they develop liver failure. In this case, it is almost impossible to determine when and where they were exposed to the virus in the preceding years or decades. It is also hard to distinguish the acute onset of a new hepatitis C infection from a clinical flare of a longstanding infection; there is no single laboratory test that can distinguish acute hepatitis C from chronic hepatitis C. Both acute and chronic infection may present with abdominal pain, nausea, vomiting, diarrhea, jaundice, fatigue, fever, elevated liver function tests and serological evidence of hepatitis C. Therefore, unless a person has documentation of a negative hepatitis C test in the past, it is almost impossible to know if a patient with newly diagnosed hepatitis C has a newly acquired infection or a clinical flare of a previously acquired infection. The Council of State and Territorial Epidemiologists (CSTE) defines a case of acute hepatitis C as someone who has a discrete onset of clinical symptoms, has jaundice or highly elevated levels of specific liver function tests, and one or more specific blood tests positive for hepatitis C. Of the approximately 20,000 positive serological results reported each year to the Los Angeles County (LAC) Department of Public Health (DPH), only 3-8 each year are ultimately identified as acute hepatitis C cases.

Since mid-2007 staff at the LAC DPH Acute Communicable Disease Control Program (ACDC) have routinely interviewed patients with documented acute hepatitis C to identify any nosocomial sources for their infection. Despite careful re-interviewing, unambiguous cases of nosocomial hepatitis C are rarely identified. However, of ten acute cases of hepatitis C reported to ACDC in 2009, five had traditional risk factors for hepatitis C, including IV drug use and sex with an infected partner, but five appeared to have only nosocomial healthcare exposure. In the spring of 2009, a patient was reported who newly seroconverted to hepatitis C in 2008 after being negative for hepatitis C for many years. In the summer and fall of 2009, four unrelated cases of acute hepatitis C were reported to ACDC; all the cases had significant healthcare exposures in the six months before the onset of their disease (the incubation period of hepatitis C is two weeks to six months) and no other “traditional” risk factors for hepatitis C such as drug use or sex with an infected partner. All five cases had been reported by physicians or the patients who believed that they acquired hepatitis C from a specific healthcare source or medical procedure. Therefore, ACDC conducted detailed investigations of each of the cases. The goal was to determine the patients’ source(s) of infection and to rectify any infection control breaches that may have resulted in the transmission of this infection.

METHODS

Medical records were reviewed and a careful medical history was obtained from all the cases. A list of medical procedures and where they were performed during the incubation period for each of the patients was obtained. ACDC contacted medical facilities and obtained the names and birthdates of the patients who proceeded and followed the index patients for these discrete procedures and cross referenced those names to the LAC DPH hepatitis registry to identify previously reported hepatitis C cases from whom transmission of hepatitis C from patient to patient may have occurred at these facilities. Site visits were made to selected facilities where high risk medical procedures were performed. Diagnostic and infection control procedures were observed; records were reviewed, and personnel were questioned about infection control procedures at the facilities. All facilities where a site visit was conducted received a follow-up letter which detailed any significant findings and provided recommendations for improving infection control or public health practice.

RESULTS

All patients had multiple healthcare exposures during their incubation period that could have been a source of their infection. Medical procedures identified included surgery, cystoscopy, colonoscopy, radiological scans with injected contrast, receipt of intravenous fluids and nutrients, dental procedures, intramuscular and subcutaneous injections, and routine blood draws. Of note, no case had overlapping healthcare exposures with any other case. No other patients with hepatitis C who either preceded or followed the index patients were identified in the hepatitis registry.

Site visits were made to a free-standing surgical center, two free-standing physician's offices that operated medical spas, and two facilities associated with large hospitals where outpatient procedures are performed. Very little evidence of significant breaks in infection control was found in the facilities that were regulated (surgical center, those associated with large hospitals). The facilities were clean and well operated, had documented infection control policies, and provided ongoing education for personnel.

In contrast, inspections made at the free-standing physician's offices revealed several breaches in standard infection control procedures including using single-dose vials for multiple patients, not labeling or ensuring proper discarding of multi-dose vials, and using single syringe-needle combinations to serially enter several multi-dose vials. All of these practices can result in cross-contamination. Furthermore, both facilities lacked on-site written procedures for aseptic medication administration and medication storage, proper policies for infection control, and guidelines for employee exposures to bloodborne pathogens. Both offices also lacked duty statements for their medical assistants. This is important because the State of California clearly regulates what procedures medical assistants may or may not do.[3] These physicians were provided with detailed letters documenting deficiencies and providing recommendations to meet infection control standards consistent published CDC recommendations.

CONCLUSIONS

Investigation results did not identify any single healthcare exposure as a cause of acute hepatitis C in the five patients that were reported to ACDC in 2009. There are several reasons for this: 1) The cases may have been chronic cases that had been infected with the disease years ago and just now are presenting with symptoms; in that case investigating healthcare exposures that took place only six months before their onset of symptoms would not be sufficient to identify a source, 2) These are acute cases that are due to healthcare exposure but the infection control breaches were so rare that no one else became ill or others who become ill have not been reported to ACDC, and 3) These are acute cases but the case has another unreported risk factor for acquiring hepatitis C.

Each of the investigations was painstaking, requiring multiple interviews, chart reviews, obtaining other patients' names and birthdates, reviewing hepatitis registries, lengthy and comprehensive site visits to facilities, and follow-up to site visits. Infection control breaches at some individual physician's offices were identified and improved practices were implemented at these offices, none of the breaches was sufficient to recommend immediate cessation of activities. Based on the experience with these cases, ACDC has

changed its protocol for investigating cases of acute hepatitis C. ACDC will continue to interview patients extensively for possible healthcare exposures. ACDC will document all such medical procedures in a database to detect common events; a site visit to the facility will be made only if another patient states the same medical procedure at the same facility, similar to the algorithm used by New York State to investigate cases of nosocomial hepatitis C.[4] This protocol balances dwindling public health resources with the likelihood of identifying and stopping a source of ongoing hepatitis transmission.

Though a source for these individual cases of hepatitis C was not determined, it was clear that there were breaches in infection control that occurred in the private physician's offices. Such offices are not regulated by any authority other than the California Medical Board and there are few, if any, infection control standards that have been specifically written for this population. Currently there are no regularly scheduled inspections or licensing exams of the offices of individual physicians. Multiple outbreaks investigated by LAC DPH and other public health agencies have documented poor infection control and lack of oversight in private offices leading to a variety of nosocomial infections.[5,6] Better oversight and education of physicians may decrease exposure to hepatitis C and other pathogens.

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OUTBREAK OF JOINT INFECTIONS ASSOCIATED WITH MAGNETIC RESONANCE ARTHROGRAMS PERFORMED AT AN OUTPATIENT RADIOLOGY CENTER

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INTRODUCTION

In 2009, the Los Angeles County (LAC) Department of Public Health's (DPH) Acute Communicable Disease Control Program (ACDC) was notified of a possible cluster of patients with joint infections after receiving magnetic resonance (MR) arthrograms at a single outpatient radiology center, Facility A. ACDC personnel spoke with the Chief Radiologist at Facility A and learned that at least two patients may have had joint infections with *Staphylococcus aureus* following MR arthrograms performed at Facility A both within one week period. ACDC conducted an investigation to confirm the presence of an outbreak, conduct case finding, determine the source of infection, and recommend control and prevention measures. An ACDC team consisting of a physician and public health nurse conducted a site visit and chart review to investigate whether there were other cases of joint infections following MR arthrograms performed at Facility A, reviewed infection control practices and the pharmaceuticals used during MR arthrograms. A second site visit was made by ACDC personnel to observe medication and contrast media preparation procedures for MR arthrograms.

ACDC consulted with the California Department of Public Health (CDPH) and the Centers for Disease Control and Prevention (CDC) Division of Healthcare Quality Promotion to discuss the methods and findings of this investigation and determine if other cases of joint infections following MR arthrogram procedures were reported in the state or nationally.

METHODS

A retrospective cohort study was conducted of patients who received MR arthrograms at Facility A to identify risk factors for joint infection. A confirmed case was defined as a patient who had an MR arthrogram procedure at Facility A, who developed signs and symptoms of joint infection with evidence of septic arthritis and microbiologic growth in the synovial fluid. A possible case was defined as a patient who had an MR arthrogram procedure at Facility A who had acute onset of new joint pain symptoms following the MR arthrogram procedure requiring further medical evaluation and had negative synovial fluid cultures. Case finding consisted of calling all patients who had received MR arthrograms during a two month period. Prospective surveillance was also performed by calling all patients who subsequently received MR arthrograms and inquiring about adverse events within one week following their procedure. Hospital inpatient and Facility A medical records of case-patients were reviewed. The chief radiologist and radiologic technologist (RT) staff were interviewed. Procedures for MR arthrograms were reviewed including infection control practices and pharmaceutical storage, preparation, and injection. An opened 10 mL single-dose vials of gadolinium contrast solution and an opened 100 mL single-dose vials of iodinated contrast solution were collected for testing by the public health laboratory.

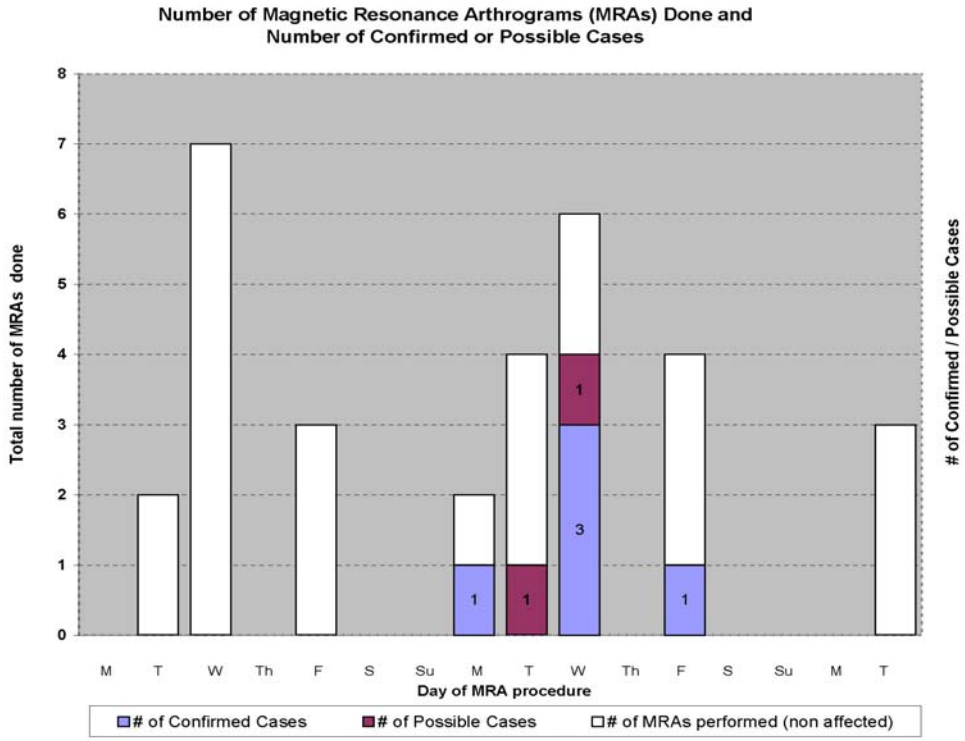
RESULTS

Medical Record review/Case Characterization

ACDC obtained a list of all patients who had MR arthrogram procedures at Facility A during the one week outbreak period. A total of 15 patients had this procedure done during this time period. ACDC contacted all 15 patients and/or their orthopedic surgeons by telephone. Medical records of those who were hospitalized or evaluated in an emergency department (ED) were reviewed. ACDC identified a total of seven case-patients (five confirmed, two possible) out of 16 MR arthrogram procedures performed on 15 patients (one patient had bilateral shoulder MR arthrograms) confirming the presence of an outbreak at Facility A (see Figure). Of the seven total case-patients, five presented initially to the ED or hospital with knee joint pain and two with shoulder joint pain, corresponding to the same joint that was injected during the MR arthrogram procedure (the case-patient with bilateral shoulder MR arthrograms had only one joint infected). No commonalities in the case-patients were found other than receiving an MR arthrogram at Facility A. All five confirmed case-patients were hospitalized at different medical centers for further

management and were diagnosed with septic arthritis. Bacterial cultures of synovial fluid for all five confirmed case-patients grew methicillin-sensitive *Staphylococcus aureus* (MSSA) with the same antibiotic sensitivity profile. The two possible case-patients were seen and evaluated in EDs and diagnosed with joint effusion and/or inflammatory reaction and were not hospitalized; one of these two case-patients received oral antibiotics on initial evaluation; synovial fluid gram stain and culture were negative for both of these patients. For the seven case-patients, average onset time of new acute joint pain symptoms following the MR arthrogram procedure was 1.1 days (range 1-2 days) and the average time to hospitalization or ED visit following the MR arthrogram procedure was 4.6 days (range 1-9 days). Average length of hospitalization for the five confirmed case-patients was 10.8 days (range 5-16 days). All five confirmed case-patients required surgical arthroscopic incision and drainage, peripherally inserted catheter placement, and six weeks of intravenous antibiotics for treatment of septic arthritis.

FIGURE



Infection Control/Aseptic Technique Procedure Review

ACDC conducted a site visit and interviewed the chief radiologist and the RT staff regarding infection control procedures and the MR arthrogram procedure, including injectable medication and contrast media preparation.

ACDC learned that intra-articular injectable medication and contrast media preparation is performed at Facility A by either of two radiologic technologists in one fluoroscopy room, which contains a sink. The chief radiologist is the only radiologist who performs MR arthrograms at this facility. ACDC was informed that the following pharmaceuticals were used for MR arthrogram procedures: (1) lidocaine from a 10 mL ampule is used for local anesthesia, 5 mL per patient, (2) approximately 5-10 mL of Optiray® 350 (iversol) is injected intra-articularly for either knee or shoulder MR arthrograms, (3) 10 mL of a 1:200 dilution of Magnevist® (gadopentetate dimeglumine) is injected intra-articularly for either knee or shoulder MR arthrograms, and (4) 10 mL of 0.9% sodium chloride solution (saline) from 10 mL single-dose vials is used to dilute the Magnevist®. The following infection control and pharmaceutical preparation issues were noted:

1. No written office procedures or policies for infection control were in place and there were no specific written procedures for injectable medication and contrast media preparation using aseptic technique.
2. There was no documentation of lot numbers of injectable medications and contrast media solutions (Optiray®, lidocaine, saline, Magnevist®) used for patients.
3. There was no documentation of the exact dosages of Optiray® and lidocaine used on each patient.
4. Open dates were not written on unsealed medication and contrast media vials.
5. Lidocaine syringes were prepared in advance for some patients and left on the procedure tray but were not labeled with either the medication contained or the date and time of preparation.

ACDC conducted a second site visit specifically to observe injectable medication and contrast media preparation procedures. ACDC was informed that it is routine procedure at Facility A for two RTs to each prepare medications and contrast media for the MR arthrogram procedure. There were no duty statements for the RTs. There were no documented staff trainings or competency evaluations for staff on infection control practices or use of aseptic technique.

The injectable medication and contrast media preparation process involved both RTs. ACDC was informed that one RT was to maintain aseptic, sterile technique and the other RT provided assistance in performing non-sterile functions. The RTs were told by ACDC to prepare medications and contrast media in their usual fashion, so ACDC could observe both RTs performing each of their individual roles. ACDC observed multiple infection control deficiencies including breaches in aseptic technique when preparing contrast media (Magnevist® and Optiray®), and use of single-dose vials of the contrast media incorrectly as multi-dose vials for multiple patients. There were no written procedures for medication or contrast media preparation using aseptic technique.

Retrospective Cohort Review and Active Surveillance

To ascertain any other cases, ACDC attempted to contact all patients who had received MR arthrograms two months prior to the one week period. In addition, ACDC conducted active surveillance for all patients who had subsequently received MR arthrograms for one month after the one week period by telephoning these patients and querying if they developed new acute joint symptoms following their MR arthrogram that required further medical evaluation or hospitalization. During the three month study period there were 145 patients who received MR arthrograms at Facility A. Of these, 117 (81%) patients and/or their orthopedic surgeons were successfully contacted. Twenty-eight (19%) could not be contacted (there was no response to messages left with patient or orthopedic surgeon). No other case-patients were identified other than the seven case-patients identified above (five confirmed, two possible).

Microbiologic testing

ACDC was informed by the chief radiologist that Facility A had independently submitted one vial of Optiray® and one vial of Magnevist® previously to a private laboratory. A copy of those results showed no organisms on gram stain and no bacterial growth on culture for both vials that were submitted.

During the second site visit, ACDC obtained one open vial of Optiray® 350 and one open vial of Magnevist® (open dates illegible) from Facility A for testing at the Public Health Laboratory. Both vials were negative for growth of *S. aureus* on bacterial culture.

Synovial fluid culture isolates from the five confirmed case-patients had been discarded prior to ACDC notification of the outbreak and were not available for further molecular epidemiologic analysis by the Public Health laboratory.

Notifications to federal and state agencies

The manufacturer of both Optiray® and Magnevist® were contacted and a MedWatch report was made by the manufacturer of Magnevist® to the Food and Drug Administration (FDA) regarding the five confirmed case-patients of MSSA joint infections following MR arthrograms performed at Facility A. It was noted that single-dose vials of both contrast media were being used incorrectly as multi-dose vials on multiple patients. It was also noted that other solutions in addition to the contrast media were administered (e.g., lidocaine ampule, saline single-dose vial) to the patients.

The CDPH was notified of the outbreak. A report was also made to the CDC's Epidemic Information Exchange (Epi-X). The CDC and the CDPH were consulted. No other case-patients were identified locally or nationally.

CONCLUSIONS AND FINAL RECOMMENDATIONS

Septic arthritis following arthrography is rare. One study in the medical literature reported that only three cases of septic arthritis (0.0024%) were found in 126,000 arthrographic procedures performed[1]. In another report, there were no infections associated with approximately 13,300 MR arthrograms performed[2]. In a recent prospective evaluation of 1085 patients who had MR arthrography, no patients had infection [3].

In this outbreak investigation, ACDC identified that five of 15 patients (33%) developed septic arthritis during a five-day period following receipt of an MR arthrogram procedure at a single outpatient radiology center and seven of 15 (47%) required hospitalization or emergency department evaluation following the procedure. All case-patients were epidemiologically linked in place and time.

ACDC concludes that this outbreak was more likely than not caused by a breakdown in infection control practices and/or aseptic technique during intra-articular contrast media preparation that could have provided the opportunity for extrinsic contamination of a single contrast media vial resulting in joint infections when injected intra-articularly. This is supported by the findings that: (1) the investigation demonstrated multiple breaches in infection control practices and aseptic technique during contrast media preparation where extrinsic contamination of a contrast media vial could have occurred, (2) single-dose contrast media vials were being used incorrectly as multi-dose vials on multiple patients, (3) during the five-day period in which the outbreak occurred, the use of ~1 mL or ~10 mL of either contrast media used per patient, Magnevist® or Optiray® respectively, is consistent with the use of a single 10 mL vial of Magnevist® or a single 100 mL vial of Optiray®, either of which would have been used on a maximum of ten patients, and (4) the case-patients were clustered temporally and no other case-patients were identified; the extent of the outbreak was limited, making a localized point source most likely. If the infections were due to a contaminated vial, depending on the amount of contamination to which these patients were exposed, patients would be affected with joint infection, joint inflammation or effusion, or may not have been affected during this five day-period. It is considered unlikely that the lidocaine or the saline was responsible for the outbreak particularly because (1) each 10 mL ampule of lidocaine was being used on one or tw patients maximum and then the ampule container was discarded and (2) the entire contents of the 10mL vial of saline was being used correctly as a single-dose vial, 10 mL per patient, and then discarded.

Because of lack of documentation on the open date of vials, lack of documentation on which patient received which vials, and because the exact vials that were administered to the case-patients were not available for further testing, it is not possible to determine the exact circumstances which lead to the outbreak of joint infections at Facility A. However, outbreaks of *S. aureus* joint infections due to breakdown in aseptic technique or non-adherence to manufacturer's instructions when using medication vials have been documented in the medical literature [4, 5]. Because there was lack of documentation as to

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which patients received which contrast media vials, it is impossible to know if the vials that Facility A sent for testing were the vials used on the five confirmed case-patients during the one week outbreak period. Consultations with the CDC and CDPH indicated that breaks in infection control and/or aseptic technique are likely contributors to this outbreak. Although it is theoretically possible that an unidentified environmental source or breach in MR arthrogram injection technique was responsible for the outbreak, ACDC considers this unlikely as no other case-patients were identified other than during the one week outbreak period, supporting the conclusion that a breach in infection control or aseptic technique most likely occurred during that time period and suggests that no persistent source was present.

Review of the medical literature revealed few studies looking at the risks of re-using single-dose contrast media vials. Citing the expensive cost of discarding unused portions of single-dose contrast media vials, two small reports in the medical literature have studied re-use of contrast media that is intended only for single-dose use [6, 7]. However, this practice is not scientifically established nor can it be generalized as a standard of practice and it is against manufacturer's recommendations for single-dose vials [8, 9]. Single-use (single-dose) vials are not designed for multiple entries for withdrawal of contents and might pose a risk for contamination if they are punctured several times[10]. In addition, single-dose vials are frequently preservative-free. When products packaged in single-dose vials are used as multi-dose vials, the probability for contamination is increased. Therefore, products labeled as single-dose containers should be used to supply a dose for a single patient and any residual product should be discarded and not retained for use on other patients. Outbreaks have occurred when single-dose vials of drugs, including contrast solutions, were re-used on multiple patients [11, 12, 13]. In a study testing antimicrobial properties of magnetic resonance imaging contrast media, all of the four contrast media that were tested (including gadopentetate dimeglumine) did not meet minimum compendia criteria (using official methodology and acceptance criteria from the United States, Great Britain, and Europe) for effectiveness of antimicrobial preservative and this study concluded that their findings do not support multidose use of magnetic resonance contrast media [14].

A recurrence of an outbreak of joint infections at Facility A should be prevented by strict adherence to proper infection control practices, use of aseptic technique when performing MR arthrograms, and following manufacturer's instructions for contrast media use. Facility A was instructed to report any patients with possible joint infections following MR arthrograms to ACDC. ACDC recommended that Facility A keep logs of lot numbers, document dosages, label pre-filled syringes, and write open dates on multidose vials. ACDC emphasized with Facility A to follow strict adherence to the manufacturer's recommendations for single-dose contrast media vial use; that single-dose vials should never be used for more than one patient and any residual product should be discarded and not retained for later use on other patients; develop procedures and follow proper infection control practices; review duties of radiologic technologists and ensure consistency with job duties and scope of practice, including preparing and diluting medications and contrast media for intra-articular injection; and to develop procedures and routine training and competency review for use aseptic technique when preparing injection medications and contrast media.

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A MULTI-STATE VIBRIOSIS OUTBREAK LINKED TO OYSTERS HARVESTED FROM BRITISH COLUMBIA

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ABSTRACT

In late July 2009, the Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control Program (ACDC) received a greater-than-expected number of reports of gastrointestinal vibriosis, prompting an investigation of a possible outbreak. Epidemiological investigation found that all the cases had eaten raw oysters within 36 hours prior to onset. Environmental health investigations showed that every case had eaten oysters harvested from the same site during the 10-day period between July 27, 2009 and August 3, 2009. Laboratory testing identified the etiology of the infections as *Vibrio parahæmolyticus*. Further investigation found that jurisdictions outside of LAC had reported similar cases in the same time frame. A multi-jurisdiction outbreak investigation was conducted to determine the source and extent of the vibriosis outbreak.

BACKGROUND

Vibriosis is an infection caused by comma-shaped, Gram-negative bacteria of the genus *Vibrio*. Vibriosis most commonly presents as acute diarrhea, but may also occur as wound infection or septicemia. Vibriosis is transmitted by ingesting food or water contaminated with *Vibrio*, or by contact between open wounds and contaminated water. The most common species that cause vibriosis are *V. parahæmolyticus*, *V. alginolyticus*, *V. vulnificus* and *V. choleræ*[1]. Vibriosis is commonly associated with consumption of raw or undercooked seafood, particularly oysters.

METHODS

Surveillance:

Cases were defined as persons with confirmed vibriosis due to *V. parahæmolyticus* infection who had a history of eating raw oysters between July 25 and August 5, 2009. ACDC received confidential morbidity reports (CMR) from healthcare providers reporting cases of vibriosis. ACDC contacted the cases, interviewing each case about his or her risk factors including: food and restaurant history, travel history and recreational water exposure. Cases citing raw oyster consumption were investigated further for links to the outbreak[2]. The California Department of Public Health (CDPH) contacted other jurisdictions to locate additional vibriosis cases via email and conference calls. A bulletin was posted to Epi-Aid, a restricted internet web site for public health agency epidemiologists, in an effort to find cases nationwide and in Canada.

Environmental Health:

LAC Environmental Health Services (EHS) Food & Milk Program (F&M) inspected restaurants cited by cases as their sources of raw oysters. F&M obtained shellfish harvest tags and seafood invoices corresponding to dates when oysters were eaten by cases. Food & Milk also inspected one of the seafood packing facilities that sold some of the implicated oysters obtaining specimens of oysters harvested from the suspected contaminated site.

Laboratory:

The LAC Public Health Laboratory (PHL) received bacterial isolates from cases' medical providers and confirmed the bacterial identification as *V. parahæmolyticus*. PHL also cultured oysters collected by F&M. Pulse-field gel electrophoresis (PFGE) was used to determine whether *V. parahæmolyticus* cultured from oysters harvested on August 17 genetically matched the bacterial strains that infected the case-patients.

Physical Geography:
ACDC researched the geography of Western Canada, Canadian fisheries and aquaculture as well as regional climate conditions (e.g., air temperatures, cloudiness, precipitation). Research was done online.

RESULTS

Surveillance:

CDPH identified 16 confirmed cases of *V. parahæmolyticus* vibriosis among people who had reportedly eaten oysters prior to their onsets of illness. Of these 16 cases, 13 fit the case definition of this outbreak. Seven of the cases were LAC residents. Two cases were Colorado residents. King County (WA), Orange County (CA), San Diego County and Napa County each had one case.

Environmental Health:

LAC EHS inspected five restaurants. The inspectors did not find any evidence of mishandling of the seafood. Oyster tags from the exposure period were obtained from all the restaurants. Santa Barbara County EHS inspected two restaurants. Oyster tags were obtained and sent to LAC. Southern Nevada Health District EHS inspected one restaurant and sent the oyster tags to LAC. A total of 15 tags from the outbreak period were collected. The four most commonly cited harvest regions are shown in Table 1 below.

Table 1. Number of vibriosis cases associated with shellfish harvest regions

	British Columbia	Washington State	California	Maine
# Cited	9	2	2	2

LAC EHS inspected a local seafood distribution facility that sold oysters to several of the restaurants implicated in the outbreak. Oysters harvested from the Canadian location BC-14-8 were collected and taken to the laboratory. These oysters were harvested after the outbreak period. EHS also obtained memoranda regarding oyster bed closures from the oyster harvesters in British Columbia sent to the seafood distribution company. According to the memoranda, the shellfish harvesters tested bacterial levels in the oyster and halted shipments of large oysters (the type most commonly served raw) on August 10, when levels exceed 10^5 colony forming units[2]. Harvest and shipments resumed on August 19.

Laboratory:

LAC PHL confirmed five cases of vibriosis in LAC residents from July 27 to August 5, 2009. One case could not be confirmed because the reporting laboratory lost the *Vibrio* isolate. PFGE testing found that four isolates were indistinguishable by a Sfi I restriction enzyme pattern. The fifth isolate differed by two bands, which is sufficiently genetically similar to link the isolate to the outbreak. LAC PHL also confirmed *Vibrio* in oysters collected by LAC EHS. The specimens contained 750 MPN/g *V. parahæmolyticus* and 150 MPN/g *V. vulnificus*. The threshold value for a positive result is 100 MPN/g. Oysters did not match genetically to cases by PFGE.

Physical Geography:

British Columbia Ministry of Environment, Oceans and Marine Fisheries Branch provided a map of Area 14 oyster harvest sites around Vancouver Island (Figure 1). On-line Canadian weather data archives[3] revealed the high temperatures in the region for July 25 through August 4, 2009 shown in Table 2 with the previous year's high temperatures for comparison. The average daily temperature (from 1971 to 2000) in July and August around Vancouver Island was 16.9ºC, ranging from 10.7ºC to 23.1ºC (standard deviation = 1.2)[4] (data not shown).

Figure 1. Area 14 oyster harvest sites.

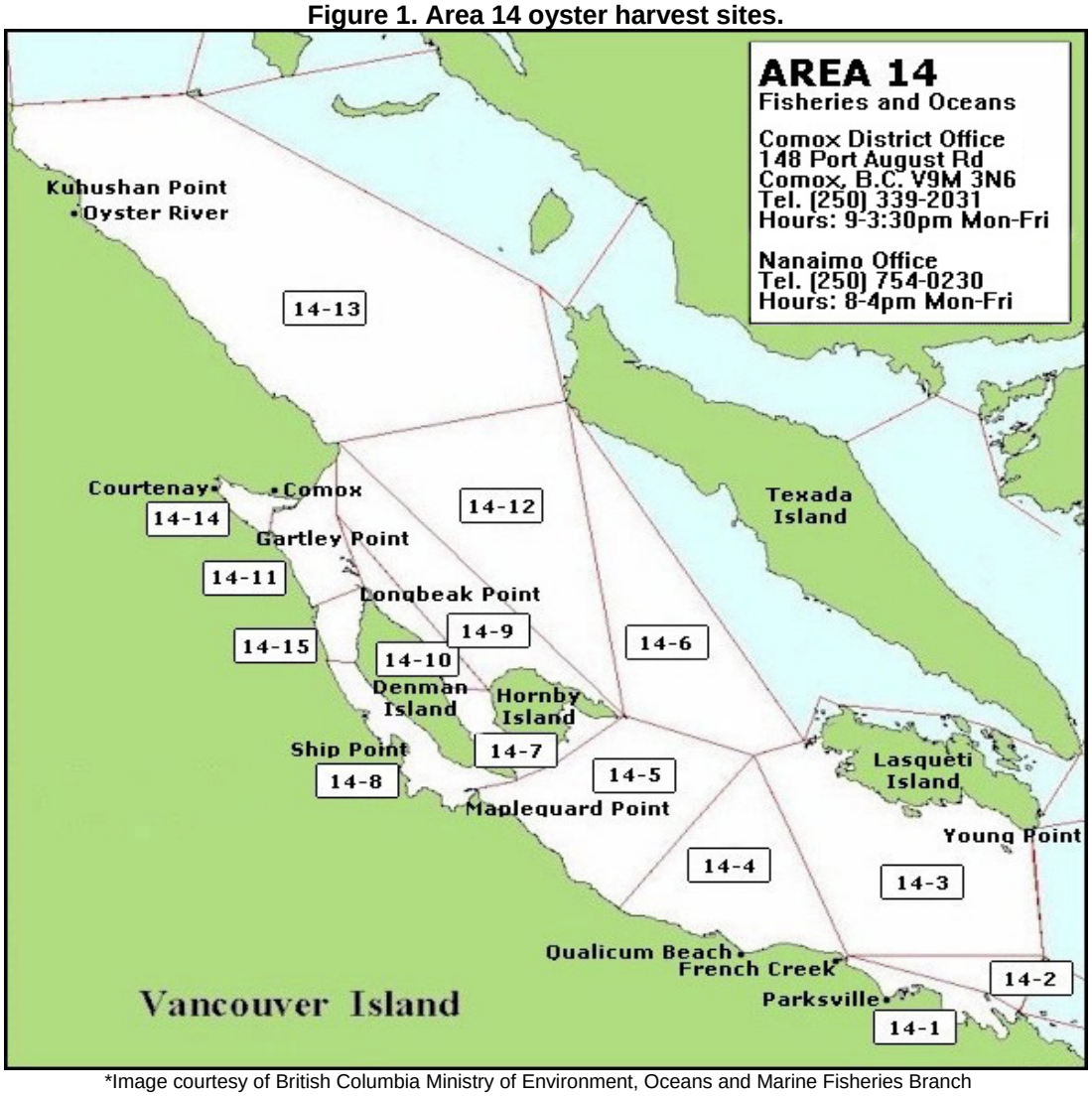

*Image courtesy of British Columbia Ministry of Environment, Oceans and Marine Fisheries Branch

Table 2. Maximum outside air temperatures around Area 14-8 (Campbell River) by date and year

Date	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3	8/4
2009 High Temp. ºC	28.7	31.0	33.3	36.4	33.5	31.6	28.3	30.4	29.8	26.6	24.2
2008 High Temp. ºC	21.5	18.7	19.9	17.5	15.6	18.0	13.8	18.2	20.4	24.3	26.6

DISCUSSION

Vibrio is well-known for thriving in warm seawater, accounting for the adage, “Never eat oysters in a month without an ‘R’ in the name.” Likewise, vibriosis incidence increases the most during summer months. However because of an all-seasons consumer demand for raw oysters, restaurants try to reduce the risk of serving contaminated oysters by purchasing oysters harvested in typically cooler climates. Most of the oysters sold in California during the summer months are harvested in British Columbia and Washington State.

According to the weather data collected by the Meteorological Service of Canada, Vancouver Island, BC experienced aberrantly hot temperatures and hit some record high temperatures during the week of July 27 to August 3, 2009. As the water temperature rose, increased proliferation of *Vibrio* contaminated the oysters, causing illness in many people who ate them.

One troubling aspect of this vibriosis outbreak was its duration. Regulatory agencies could have played a greater role in restricting the harvesting and sale of oysters. Shellfish harvesting companies for the most part self-regulate the harvest and sale of oysters, independently testing the water and specimens for *Vibrio*. When bacterial counts are above a safe threshold, harvesters are supposed to cease operations voluntarily. But it can take a few days following the start of a heat wave for bacteria to proliferate to measurably unsafe levels in the water. By then the oysters may already have become contaminated, yet are still eligible for harvest and sale.

In the interest of preventing vibriosis infections, it would be prudent to create enforceable protocols to suspend the harvesting of shellfish when water temperatures reach a threshold conducive to bacterial proliferation, regardless of bacterial cultures. Though the heat wave in 2009 was unprecedented, global changes in climate may result in similar heat waves in the future. Adding clauses that restrict shellfish harvests during hot weather to current shellfish harvesting regulations would address future climate change issues and likely prevent similar outbreaks in the future.

CONCLUSION

This outbreak of vibriosis was caused by infection with *Vibrio parahæmolyticus* from oysters harvested near Vancouver Island, British Columbia. The outbreak lasted from July 29 until August 5, affecting 16 people and encompassing multiple counties in California, Nevada and Colorado. LAC had the most cases; seven LAC residents were linked to the outbreak. While the bacterial strain isolated from oysters differed from those obtained from case patients, the harvest date was 12 days after the last case, which may have allowed proliferation of multiple strains in waters at the harvest sites. The oysters became contaminated when regional temperatures climbed to unprecedented highs in late July and early August 2009. The unusually warm temperatures allowed the naturally-occurring bacteria to proliferate in the seawater.

More than a dozen people were already sickened before shellfish harvesters ceased shipments of oysters. The outbreak could have been limited in breadth if harvests would have been suspended at the onset of torrid weather conditions. Implementation of shellfish harvesting regulations that account for weather conditions in the future could prevent similar outbreaks from occurring and drastically reduce the incidence of vibriosis.

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FOODBORNE ILLNESS DUE TO INADVERTENT INGESTION OF MARIJUANA

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BACKGROUND

In April, 2009 the Los Angeles County (LAC) Department of Public Health (DPH) Toxics Epidemiology and Acute Communicable Disease Programs investigated a report of a group of preschool teachers with neurological and gastrointestinal symptoms that began within an hour after eating brownies purchased from a sidewalk vendor. The incident was initially reported to the Los Angeles Police Department, who subsequently notified the LAC DPH. The police and health department launched a collaborative investigation that revealed symptoms consistent with inadvertent ingestion of marijuana in the six affected persons. Cannabinoids were found in a recovered brownie sample and marijuana metabolites in the blood and urine of one of the affected persons. The case and investigation were described in detail in the September 4, 2009 issue of the Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report [1].

Marijuana is the most commonly used illicit drug in the United States. Among persons aged $\geq$ 12 years, an estimated 5.8% had used marijuana in the preceding month, 10.1% in the past year, and 40.6% in their lifetime, according to the 2007 National Survey of Drug Use and Health [2,3]. Previous, similar occurrences of inadvertent marijuana ingestion have been documented in Colorado in 1978 [4], and in California in 1981 [5], where persons unknowingly ingested marijuana in baked goods. Accidental marijuana ingestion has led to coma in children [6]. The widespread use of marijuana and the documented cases of accidental ingestion, particularly in children, make it important for clinicians to be aware of the signs and symptoms of accidental ingestion and the possibility of marijuana contamination in foodborne illness.

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LEGIONELLOSIS OUTBREAK AT A FITNESS CENTER

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INTRODUCTION

Legionella pneumophila is a common cause of infections in both hospital and community settings.[1,2,3] Infections can manifest clinically as Legionnaires' disease, a potentially fatal pneumonia, and Pontiac fever, a self-limited febrile illness[3]. It is not transmissible person-to-person. People, who are older, smoke, have other medical conditions or weak immune systems are more likely to develop infection[4]. *Legionella* ideally grow in warm water (between 95º and 115ºF) that is not well disinfected, and are often associated with water sources such as pools, steam rooms, hot tubs, showers or large plumbing systems[1,5,6]. In a majority of Legionnaires' and Pontiac fever cases, a source is never found[7]. Both clinical manifestations can occur as clusters or isolated cases.

BACKGROUND

On August 10, 2009, Los Angeles County (LAC) Department of Public Health (DPH), Acute Communicable Disease Control Program (ACDC), began an investigation of two cases of Legionnaire's disease due to *L. pneumophila* serogroup 1a (Lp1a), with onsets of pneumonia symptoms in July within two days of each other. Both cases were patrons of a local fitness center. Routine follow up demonstrated that both individuals had visited the spa, pool, and showers of the fitness center during the disease incubation period in early July.

METHODS

A case was defined as a patron who visited the facility between July 1, 2009 and July 14, 2009, with clinical symptoms including fever/chills and at least one other symptom of headache, myalgias, malaise, abdominal pain, diarrhea or cough, and a positive laboratory test for *Legionella.* Laboratory tests could include culture or direct fluorescent antibody of respiratory secretions, fourfold rise in serum antibody titer, or urine antigen. This definition was intended to capture both pneumonia and Pontiac fever.

Heightened surveillance for additional cases was performed. A health alert message was sent via email to 20 acute care hospitals in the vicinity of the gym, requesting increased surveillance for community acquired pneumonia. All recently reported cases of legionellosis in LAC were reviewed for connection to this facility.

Retrospective case finding also occurred by surveying a sample of fitness center patrons; electronic attendance data were used to select a random sample of facility patrons over the age of 59 who visited the center during the two-week exposure period in early July. Since legionellosis can present with a range of symptoms from mild Pontiac fever to more severe Legionnaire's we decided to broadly base our case finding on Pontiac fever symptoms. Using an attack rate of 95% for Pontiac fever, a standard power calculation was done with Epi Info™ Version 6 Statcalc to determine an appropriate sample size to detect additional cases of legionellosis. SAS® 9.3 software was used to assign a random number to each patron and the lowest 100 numbers were chosen to survey. A clinical survey was designed and administered over the telephone between September 1 and September 15, 2009. Two attempts were made to reach patrons. Patrons who indicated they had fever or respiratory symptoms beginning July 1, 2009 were mailed test kits to collect urine for Lp1a antigen testing. Urine test kits were mailed to seven people reporting symptoms and four additional family members based on patron request.

A joint inspection of the fitness center was conducted by ACDC and Environmental Health's cross-connections, environmental hygiene, and recreational water programs. Water samples were taken from the spa, pool, steam room, and shower and tested by the LAC Public Health Laboratory. Chlorine and pH levels were tested. Pool and spa chlorination log books were reviewed.

RESULTS

The two index cases were the only cases identified. No recently reported legionellosis cases in LAC appeared to have an affiliation with this outbreak. Active retrospective surveillance did not identify any additional cases of either Legionnaire's disease or Pontiac fever associated with the fitness center.

Both index cases were over 60 years old, with multiple pre-existing medical conditions, and were hospitalized as a result of their infections (Table 1). Both cases had good outcomes after their hospitalizations.

Table 1. Course of illness for index cases of Legionnaire's disease

Index cases	Visited fitness center	Onset symptoms	Hospitalized	Age	Chronic medical conditions or health behavior
Case 1	7/8	7/15	7/21-7/25	64	Hypertension, gout, hepatitis B, smoker
Case 2	7/10	7/17	7/18-7/24	68	Chronic kidney disease, diabetes, hypertension, hyperlipidemia, coronary artery disease, smoker

A total of 33,728 visits from 10,730 patrons were made to the facility during the defined exposure period; 562 (5.2%) of these patrons were over age 59. Sample size calculations indicated 47 interviews were sufficient to detect cases of Pontiac fever at a 90% confidence level. The questionnaire was administered to a total of 55 people. Of the interviewees, 40-63% used the aquatic facilities regularly (Table 2.) Seven people had symptoms and submitted urine samples; all were negative for Lp1a.

Table 2. Survey results of fitness center patrons

Facilities used regularly	Percent (n=55)
Pool	40% (22)
Spa	35% (19)
Steam room	30% (16)
Showers	63% (35)

All six environmental swab and water samples were negative for *Legionella* species by culture. Discussion with staff and pool and spa records confirmed that the pool and spa had been closed in mid-July due to low chlorine levels. During this investigation the spa was again closed temporarily, due to low chlorine levels as documented on the day of inspection.

There were no cross connection violations. Backflow devices were installed in the proper locations. The pool, spa, steam boiler, irrigation, meter protection and fire system were functioning properly. Cooling towers were not used at this facility or at other nearby businesses. The roof mounted air-handling units were inspected and no significant findings were observed.

DISCUSSION

Legionnaire's disease is rare, but given the high attack rate in outbreaks of Pontiac fever, a small sample size is sufficient to determine with high confidence that no infections are present in the population. By surveying only individuals at high risk for exposure and infection, as selected by age and exposure dates, the investigation team increased confidence that no other legionellosis infections occurred.

Although the source of the outbreak could not be confirmed, both cases were exposed to the facility's pool and spa which were both closed due to inadequate chlorination levels shortly following the exposure. Since no further cases were identified, all environmental specimens were negative, and problems with chlorination of the spa were addressed, the fitness center was allowed to continue operations due to lack of evidence of ongoing risk to the public.

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A HOSPITAL-BASED AGGREGATE REPORTING SYSTEM FOR H1N1 PANDEMIC INFLUENZA SURVEILLANCE IN LOS ANGELES COUNTY, 2009

Ramon Guevara, PhD, MPH

BACKGROUND

The standard method of conducting disease surveillance involves collecting individual case information such as name, birth date, and address. When the H1N1 influenza pandemic emerged in April 2009, this method of individual case reporting and investigation was not feasible with such a highly infectious communicable disease. Theoretically, as the Centers for Diseases Control and Prevention (CDC) and other health agencies including the California Department Public Health (CDPH) and the Los Angeles County (LAC) Department of Public Health (DPH) agreed, aggregate reporting would allow efficient monitoring of influenza morbidity and mortality. Essentially unrealized in communicable disease surveillance before April 2009, the concept of aggregate reporting is to collect counts that represent a group of individuals. This report describes how the Acute Communicable Disease Control Program (ACDC) of LAC DPH established hospital-based aggregate reporting for influenza and the results of this surveillance system.

METHODS

In order to build a surveillance system that would feed into California and the national surveillance systems for H1N1 influenza, ACDC consulted with CDC, CDPH, Colorado Department of Public Health, and Iowa Department of Public Health. Although these agencies had limited experience with aggregate reporting, they shared ideas and recommendations. Data gathering methods were developed with an objective to obtain a high participation percentage from the 102 licensed hospitals in LAC. The professional account for SurveyMonkey™ was utilized to obtain weekly data on laboratory-confirmed influenza hospitalizations and deaths as entered by hospital infection preventionists (IPs). Collected data was analyzed by SAS®, summarized, and results were sent to CDPH on a weekly basis.

The initial implementation of the aggregate reporting system faced challenges from the hospital IPs. For the period from end of July to beginning of August 2009, ACDC followed CDC and CDPH specifications for survey design and asked IPs to begin submitting weekly data such as number of influenza patients with intensive care unit (ICU) admission, non-ICU hospital admission, and death. Only two hospitals complied. Many IPs expressed that the length was too long (31 fields and 9 pages) and that there was lack of clarity and reasoning in terms of what to report and when. The IPs also felt pressured that the reports could not be late per CDPH specification. Basing the IPs' feedback, the surveillance data collection methods were revised—simplified the language, shortened the survey (23 fields and 5 pages), and established a clearer methodology of when and what to report. The fields on ICU admission were omitted. Instructions explained to report hospital admissions and deaths of all types of laboratory-confirmed influenza occurring during the designated reporting week (Sunday to Saturday) by 5:00pm the following Tuesday. Specimen collection date of the first positive laboratory influenza result and date of death defined the occurrences of laboratory-confirmed influenza hospital admissions and deaths, respectively. Rather than having IPs enter a date, a drop down menu was made to allow IPs to select the reporting week. To alleviate the pressure of timely and accurate reporting, the revised protocol allowed the IPs to update reports from past weeks and enter reports even if they were late. Eight hospitals were excluded from reporting because they were under Pasadena, Long Beach, or federal jurisdictions. Weekly rates of total hospitalizations and total deaths accounted for the size (number of licensed beds) of hospitals that reported.

The surveillance protocol was as follows. From Sunday to Tuesday, hospital IPs would report on SurveyMonkey™ the numbers of laboratory-confirmed influenza hospitalizations and deaths by age group during the previous Sunday-Saturday week. On Monday, the ACDC Epidemiology and Data Support team would identify which hospitals had not yet reported so that the ACDC Hospital Outreach Unit (HOU) would send a reminder to report by 5pm Tuesday. On Wednesday, the Epidemiology and Data Support

would review SurveyMonkey™ data, identify problems such as duplicates or missing data, report numbers of hospitalizations to CDPH, and report rates (per 1000 licensed hospital beds) of influenza hospitalizations and deaths to the ACDC Hepatitis, Antimicrobial Resistance, Invasive Bacteria (HARI) Unit which was responsible for reporting all influenza surveillance results to the Disaster Operations Center and for publishing the *Influenza Watch* weekly newsletter. From Wednesday to Friday, HOU nurses would investigate reporting problems and with HOU findings Epidemiology and Data Support would correct cumulative data to produce the weekly ACDC Report on Aggregate Reporting on Influenza. Summary reports for the IPs were sent in September 16 and November 2, 2009, and January 21 and April 22, 2010 to provide feedback and encourage continuous quality in reporting.

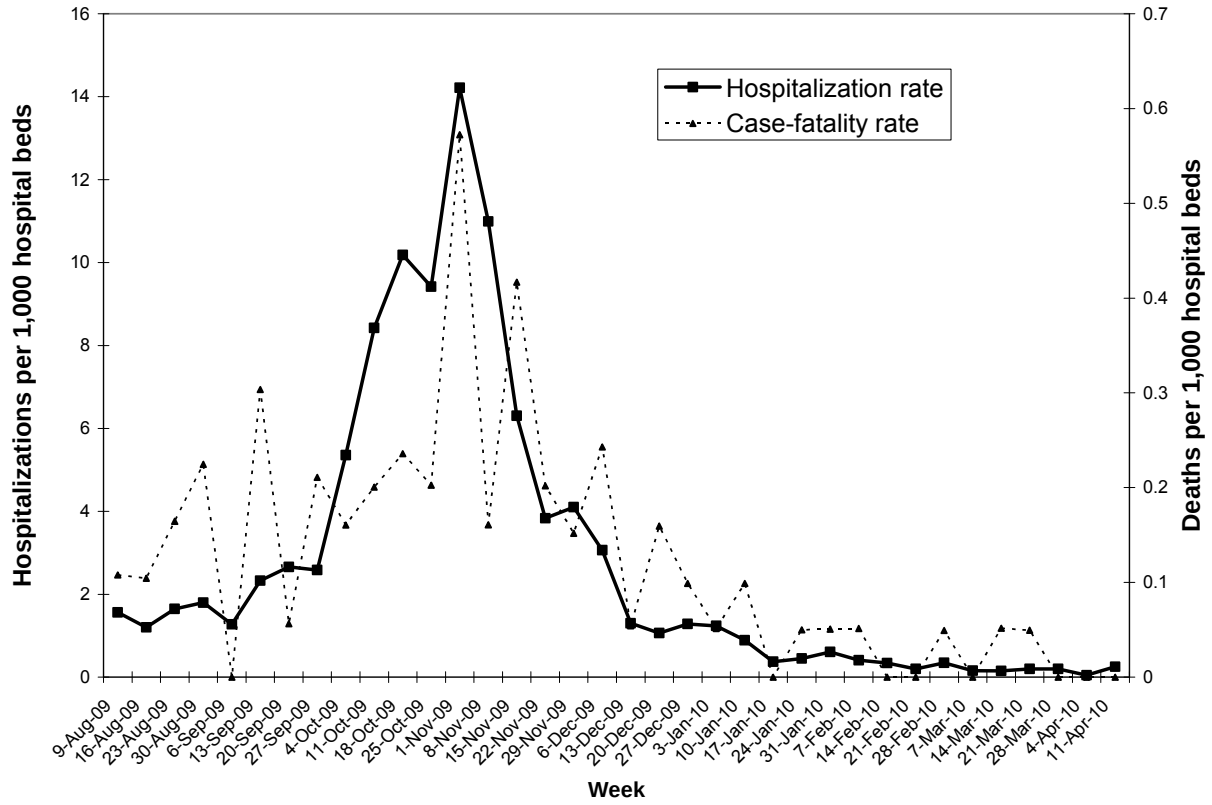
For this report, age-specific rates were calculated by using population estimates from LAC DPH. Some of the original eight age groups defined by CDC and CDPH were combined to fit denominator data for rates.

RESULTS

From August 9, 2009 to April 17, 2010, there were 1,979 hospitalizations and 88 deaths from laboratory-confirmed influenza identified by hospital-based aggregate reporting. Of the 94 acute care hospitals under LAC DPH jurisdiction, the percentage reporting averaged 71.7% per week. The number of hospitals reporting for a given week ranged from 61 to 72 (64.9%-76.6%).

Laboratory-confirmed influenza hospitalizations increased dramatically in October 2009, peaked during the week of November 1, 2009, and then drastically declined (Figure 1). The weekly number of laboratory-confirmed influenza hospitalizations ranged from one to 298. Laboratory-confirmed influenza deaths also peaked during the week of November 1, 2009 (n=12). The total number of laboratory-confirmed influenza deaths ranged from one to 12 per week.

Figure 1. Weekly number of laboratory-confirmed influenza hospitalizations (N=1,979) and deaths (n=88) per 1,000 licensed hospital beds from hospital-based aggregate reporting, Los Angeles County, CA, August 9, 2009 – April 17, 2010.



Analysis by age found that children <1 year-old had much higher hospitalization rates throughout the surveillance period (Figure 2) and the second highest case-fatality rate (Figure 3). Compared to older age groups, children aged 1-4 years had higher hospitalization rates but had the lowest case-fatality rate of all age groups (Figures 2 and 3). Despite hospitalization rates, number of hospitalizations was greatest among people aged 5-49 years-old (Figure 3).

Figure 2. Age-specific rates of laboratory-confirmed influenza hospitalizations from hospital-based aggregate reporting (N=1,979), August 9, 2009 – April 17, 2010, Los Angeles County, CA. Children less than five years old had the highest rates of hospitalization.

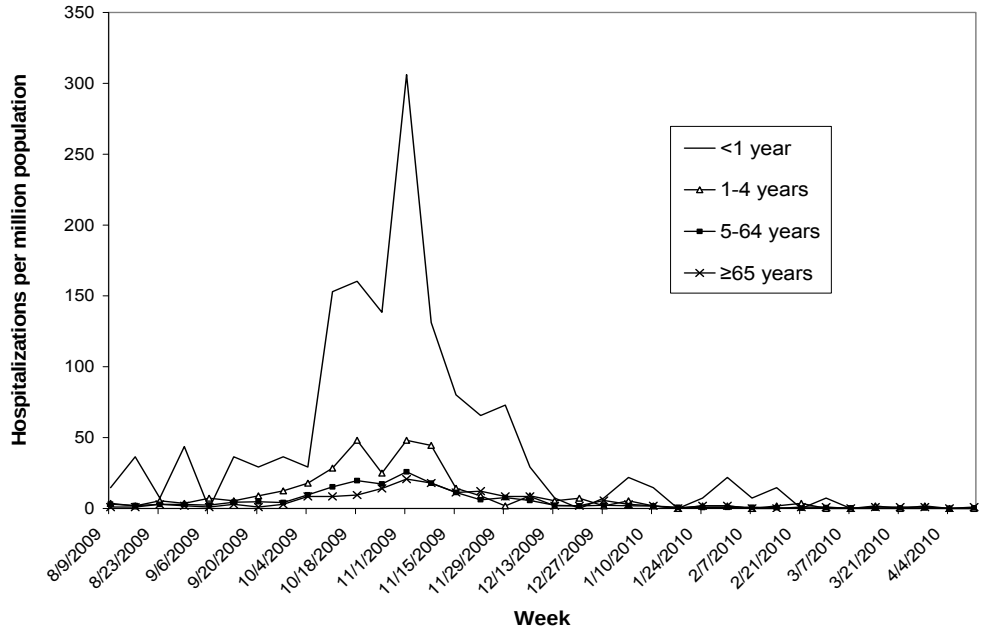
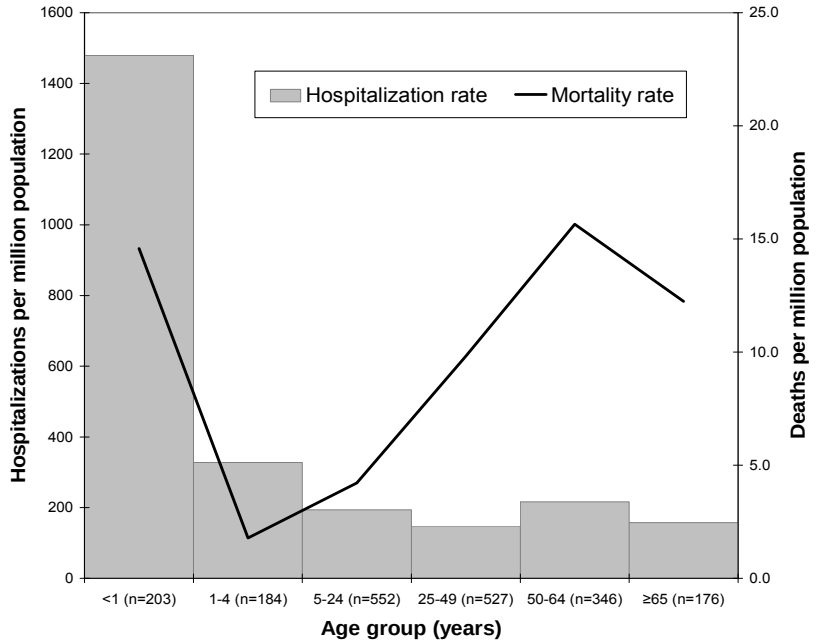


Figure 3. Age-specific rates of laboratory-confirmed influenza hospitalizations and deaths from hospital-based aggregate reporting (N=1,979), August 9, 2009 – April 17, 2010, Los Angeles County, CA. Age group 25-49 years had the lowest hospitalization rate (147.8 influenza hospitalizations per million population) and age groups 50-64 years and <1 year had the highest case-fatality rates (15.7 and 14.6 deaths per million population, respectively). Age group 5-24 years had the most influenza hospitalizations.



Differences between the data reported to CDPH, which represents the initial reports without de-duplication or correction of designated reporting week, and the data used by LAC, which represents updated data after HOU investigations, were greatest during the rise of influenza cases that started in September (the weeks of September 6 – October 11), the week after the peak occurred (November 8), and on the week of November 29, 2009 (Figure 4). The LA County method of allowing corrections and updating by reporting hospital IPs provided a more accurate measurement of the influenza outbreak. From September 6 to October 11, the LA County method showed consecutively greater numbers of 12, 13, 20, 20, 34, and 41 (32-100%) more hospitalizations than initially reported. For the week of November 8, following the influenza peak, the LA County method found 22 (12%) more hospitalized cases. For the week of November 29, the LA County method had 39 less cases than initially reported. A possible explanation for this is the rise in influenza cases presented in the November 2nd summary report to the IPs. After the summary report, previously non-reporting hospitals started reporting and some submitted data for multiple weeks. Providing greater flexibility for IPs, the LA County method found 99 (5.3%) more cases of laboratory-confirmed hospitalized influenza.

Figure 4. Numbers of laboratory-confirmed hospitalized influenza cases from hospital-based aggregate reporting by method of reporting: California State method which lacks de-duplication or corrections (N=1,880) versus Los Angeles County method which allows for updating and corrections (N=1,979), Los Angeles County, CA, August 9, 2009 – April 17, 2010.

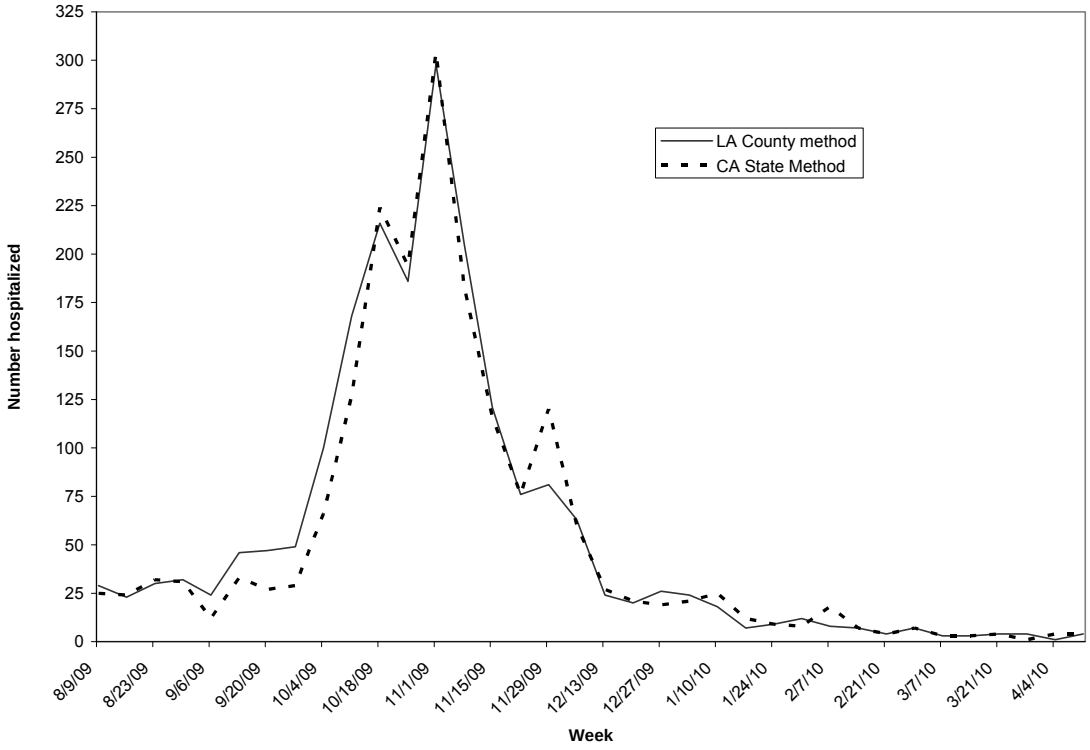
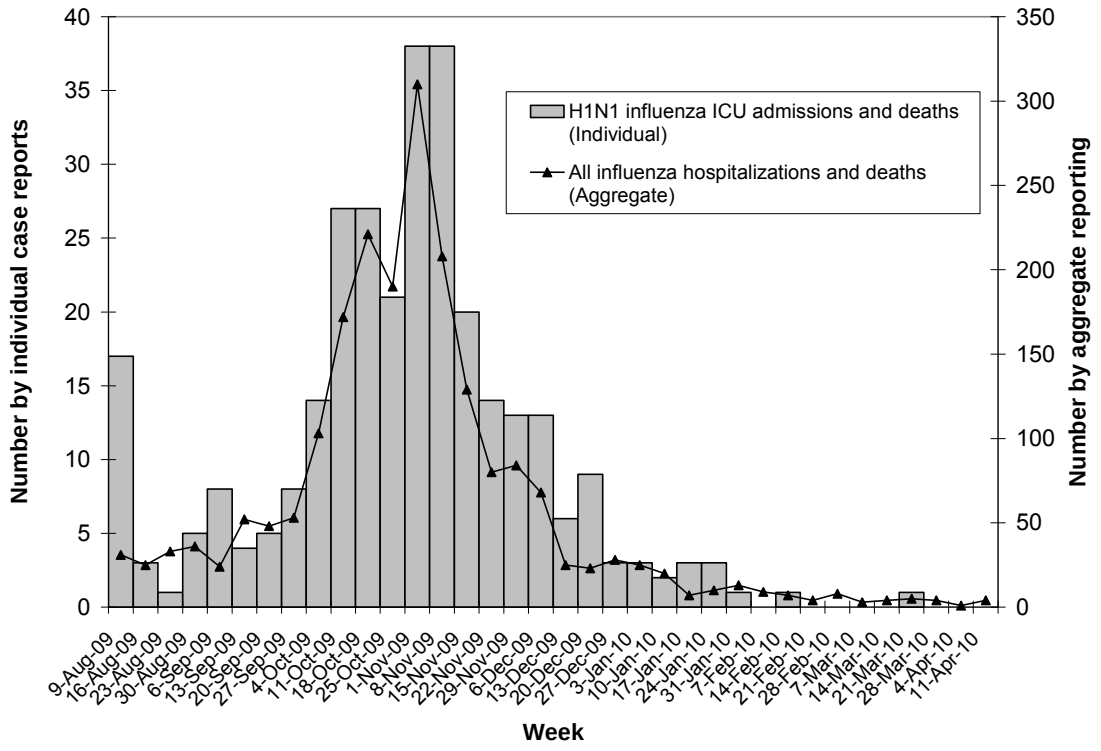


Figure 5. Similar epi-curves for number of pandemic H1N1 influenza Intensive Care Unit (ICU) admissions and deaths from individual case reporting (N=308) and for number of hospitalizations and deaths of all types of laboratory confirmed influenza cases from hospital-based aggregate reporting (N=2067), August 9, 2009 – April 17, 2010, Los Angeles County, CA.



DISCUSSION

ACDC successfully developed a hospital-based aggregate reporting system and conducted population-based active surveillance of influenza during the H1N1 influenza pandemic of 2009-2010. The most important key to the success of this surveillance was its acceptance by the IPs. Understanding their concerns from the first attempt in aggregate reporting and making a clear methodology for IPs and LAC DPH staff to follow helped establish a sustainable high participation percentage of 65%-77% of all 94 non-federal hospitals in LAC DPH jurisdiction on a weekly basis.

Other marks of success of the aggregate reporting system include specificity, sensitivity, accuracy, and adaptability of the surveillance system. In July 2009, CDC gave surveillance options of influenza-like illness or laboratory-confirmed influenza. Having chosen the latter, ACDC prevented the inclusion of other respiratory diseases in their surveillance and afforded greater specificity. While the epi-curves for influenza hospitalizations were similar between the CDPH method and the LAC method (Figure 4), the LAC method found 5.3% more hospitalizations and provided greater sensitivity, particularly during the increase of cases in September and October and during the week after the peak. There is no gold standard to measure the accuracy of the aggregate reporting surveillance system. However, based on data from the ACDC HARI Unit, the epi-curve for H1N1 influenza deaths and ICU admissions from individual case reporting is similar to that of all influenza hospitalizations and deaths from aggregate reporting (Figure 5). Finally, after the surveillance methodology was established, a weekly report for the Disaster Operations Center was imposed in the fall of 2009. Adaptations to meet this demand involved including more staff and minor changes to the protocol.

Aggregate reporting for communicable disease involving so many hospitals and such a large population of approximately 10 million was an unfamiliar and most likely untried idea before August 2009. Much of the concern for CDC and CDPH involved what data elements to obtain. In the second attempt to make

the system work, ACDC actually dropped data elements requested by CDPH and CDC and focused on making an easy, streamlined process that would be minimally burdensome on IPs. In addition, ACDC put as much emphasis in analysis procedures so that updating, correcting initial reports, and quickly presenting weekly summaries would be possible and more accurate in measuring influenza morbidity and mortality. ACDC insisted on defining Sunday to Saturday reporting weeks as opposed to Tuesday to Tuesday weeks proposed by CDPH. As CDPH requested weekly counts of hospitalizations by noon on Wednesdays, the Sunday-to-Saturday week allowed some time to correct duplication and mistakes on reports submitted before Tuesday. After August 2009, ACDC was contacted by CDPH and individuals at different county health departments in California to describe and consult on influenza aggregate reporting.

The influenza aggregate reporting system stopped on April 17, 2010 as the number of hospitalizations and deaths had continually been low since last January 2010 and the H1N1 pandemic emerged in April 2009. To monitor for resurgence in 2010-2011, ACDC may implement a hospital-based aggregate reporting surveillance system using sentinel hospitals that consistently reported, had the highest numbers of hospitalizations and deaths of laboratory-confirmed influenza, and represent a relatively wider geographic area of LAC.

CHARACTERIZATION OF HOSPITALIZED PANDEMIC H1N1 2009 INFLUENZA CASES, LOS ANGELES COUNTY, APRIL 24, 2009 – AUGUST 3, 2009

Melissa Higdon, MPH; Ashley Peterson, MPH

BACKGROUND

The influenza virus is an enveloped RNA virus that spreads easily from person to person via respiratory droplet secretions.[1] It causes an acute viral illness characterized by fever, muscle and joint pain, malaise, sore throat and runny nose.[2] Severe outcomes, including pneumonia, secondary bacterial infections and death, occur predominantly in children under age 2, adults over age 65, persons with chronic heart, lung, kidney, liver or metabolic disorders, or weakened immune systems.[2] The virus circulates throughout the world with seasonal increases during winter months; in Los Angeles County, flu season is typically between October and April with activity peaking around February.[3] Prior to April 2009, only severe pediatric cases of influenza were reportable to the local public health department.

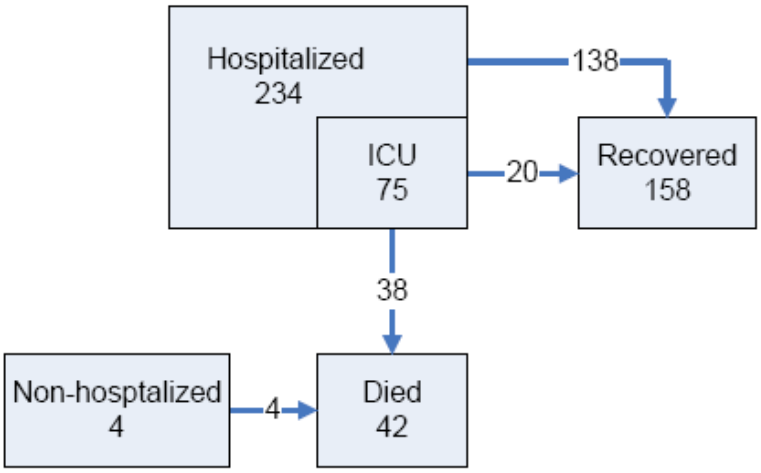
In April of 2009, reports from Mexico indicated the emergence of a novel influenza virus strain causing severe morbidity and mortality.[4] Two weeks later, the first two cases of pandemic influenza were identified in California[5] and, at the end of April, the US Secretary of the Department of Health and Human Services declared an emergency. At that time, the Los Angeles County (LAC) Department of Public Health (DPH) moved into Incident Command Structure to respond to the potential pandemic. Seasonal influenza surveillance systems were enhanced, new influenza case definitions were developed and influenza reporting requirements were amended to include reporting of all hospitalized patients with influenza or patients who died of influenza. This report summarizes hospitalized/deceased pandemic H1N1influenza (pH1N1) cases with symptom onset between April 24, 2009, when the reporting requirements went into effect, and August 3, 2009, after which time only ICU cases or deaths were individually reportable. These cases represent a novel cohort of patients seeking care for influenza far outside the regular influenza season and during the early stages of a pandemic; their disease severity and utilization of health care resources are instructive in assessing the response of the public health system with respect to case surveillance and detection and in planning for future pandemic events.

METHODS

A case was defined as any person who died or was hospitalized with influenza-like-illness who either had a positive influenza A test which was not subtypeable or who had a confirmed positive test for pH1N1 with onset between April 24, 2009 and August 3, 2009.

Cases were reported to LAC DPH Acute Communicable Disease Control Program by hospital infection preventionists, by the Public Health Laboratory, by the Office of the Coroner, and by other local health departments. Once reported, data were abstracted from case medical records using the LAC case report form.

Figure 1: Required Level of Care and Outcomes of All Reported Hospitalized Cases of Pandemic (H1N1) 2009 Influenza, April 24, 2009 - August 3, 2009, Los Angeles County.



Note: There are 38 cases with unknown outcomes

All case data were stored in a Microsoft® Office Access 2003 database and summarized and analyzed using SAS v9.2.

RESULTS

From detection of the first case of pH1N1 in LAC on April, 24, 2009 until August 3, 2009, 238 pH1N1 hospitalized/deceased cases were reported to LAC DPH (see Figure 1). Of the 234 hospitalized cases, 75 were hospitalized in the ICU. Outcomes were available for 200 (84%) of the reported cases. One hundred and fifty-eight of reported cases recovered while 42 died. Thirty-eight of the 42 deaths (90.5%) had been hospitalized in the ICU prior to death. Of cases hospitalized in the ICU with known outcomes, 38 (50.7%) died while 20 (26.7%) recovered. Four cases died without having been hospitalized prior to death (Figure 1). The overall rate of hospitalization due to pH1N1 during this time period was 2.44 per 100,000.

Table 1: Characteristics of Hospitalized pH1N1 Cases Los Angeles County, 04/23/2009 - 08/06/2009

		Number	% of Cases	% of LAC*
Age Group				
	0-4	60	25.2	7.2
	5-24	75	31.5	29.5
	25-49	68	28.6	37.1
	50-64	30	12.6	15.8
	65+	5	2.1	10.4
Race				
	Asian	10	4.9	13.3
	Black	18	8.7	8.8
	Latino	131	63.6	47.9
	White	40	19.4	29.8
	Other	7	3.4	0.3
Gender				
	Male	125	52.7	49.6
	Female	112	47.3	50.4

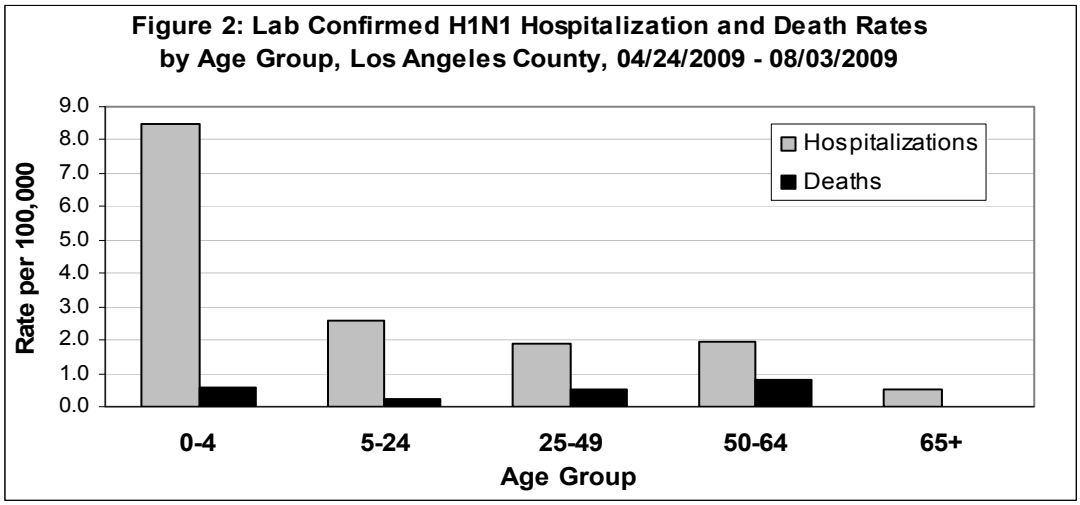
*The % of the population of LAC in specified demographic group

Age

The age of hospitalized cases ranged from 0-84 years with a median of 21.5 years. The age of fatal cases ranged from 0-62 with a median of 38.5 years. Persons aged less than 25 years (especially those aged 0-4 years) were overrepresented among cases when compared to the population distribution of LAC (Table 1). Persons aged 25 years and older (especially those aged 65 years and older) were underrepresented among cases (Table 1). The rate of hospitalization was highest in the 0-4 age group at 8.5 per 100,000 and lowest in persons aged 65 and older at 0.49 per 100,000 (Figure 2). The death rate due to H1N1 was highest among persons aged 50-64 years at 0.8 per 100,000 and lowest among persons aged 65 years and older in which group there were no deaths (Figure 2).

Race

Latinos constitute 47.9% of the population of LAC, however, they comprise 63.6% of cases. While Latinos were overrepresented among cases, Asians and whites were underrepresented (Table 1). The highest rate of hospitalization was seen among Latinos followed by blacks and then whites. Asians had the lowest rate of hospitalization (Figure 3).

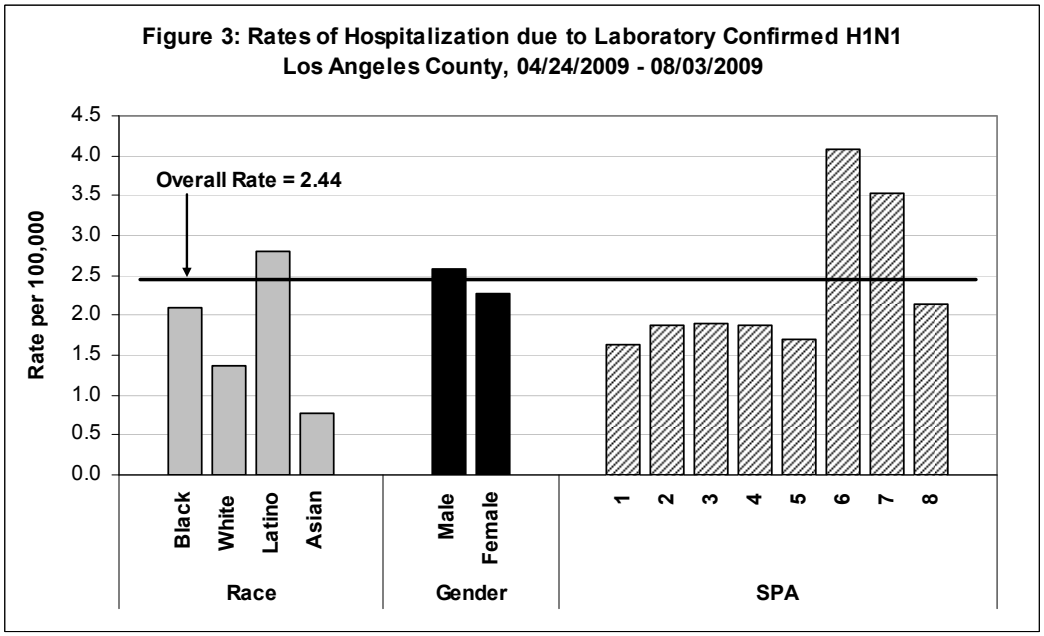


Gender

Approximately 53% of the cases were male while 47% were female (Table 1). The rate of hospitalization was 2.6 per 100,000 among men and 2.3 per 100,000 among women (Figure 3).

Location

The highest rate of hospitalization due to pH1N1 occurred in Service Planning Area (SPA) 6, followed by SPA 7 and SPA 8. The rates of hospitalization in SPAs 1-5 were well below the rate of hospitalization for all of Los Angeles County (Figure 3).



Underlying Medical Conditions

Among children less than 18 years old hospitalized with pH1N1, 60.2% (54) had at least one underlying medical condition, with chronic lung conditions being the most frequently cited conditions followed by developmental delay. Among adults 18 years of age or older hospitalized with pH1N1, 85.5% (118) had at

least one underlying condition with obesity (body mass index ≥30) being the most frequently cited condition followed by metabolic disorders, pregnancy, and chronic lung and cardiac conditions (Table 2).

Table 2: Underlying Medical Conditions of Hospitalized pH1N1 Cases 04/24/2009 - 08/03/2009

	<18 years (n=93)			≥18 years (n=139)		
Underlying Condition	N*	#	%**	N*	#	%**
Cardiac condition	92	7	7.6	136	27	19.9
Chronic lung condition	92	33	35.9	137	31	22.6
Metabolic disorder	93	9	9.7	136	36	26.5
Developmental delay	93	22	23.7	136	8	5.9
Immunosuppression	93	6	6.7	135	15	11.1
Pregnancy†	5	1	20.0	88	23	26.1
Obesity	34‡	2	5.9	127	54	42.5

*Denominator includes those cases for which information on that underlying condition was available.
**As patients may have more than one medical condition, percentages may total over 100%.
†Denominator includes females of childbearing age only (15-44 years).
‡ Denominator includes only children aged 2-17 years.

DISCUSSION

Unlike seasonal influenza which disproportionately causes serious disease in the elderly and young children[3], pH1N1 influenza predominantly affected children of all ages and young adults. Approximately 57% of hospitalized pH1N1 cases were younger than 25 years. The hospitalization rate among children aged 0-4 years was 17.3 times higher than that among persons aged 65 years and older. However, the death rate in this age group was comparable to other age groups. While these differences could be due to true differences in susceptibility to pH1N1, it is likely that children under the age of 5 may have been admitted to the hospital more readily than older cases or that older cases may have delayed seeking care until illness was severe. These differences in treatment and care seeking behavior could have led to selection bias resulting in higher numbers of pediatric hospitalizations and adult deaths.

The pH1N1 hospitalization rate was highest for Latinos and lowest for Asians. While the rates in Figure 3 are not age-adjusted due to small numbers, analysis of more robust data on pH1N1 ICU admissions and deaths reveals little difference between un-age-adjusted and age-adjusted rates for all races. The differences in rates by race could be explained by several factors including differences in access to health care, treatment-seeking behavior, cultural and social behavior, knowledge of respiratory disease prevention, and prevalence of underlying medical conditions.

SPAs 6 and 7 had substantially higher rates of hospitalization due to pH1N1 compared to other SPAs. These two SPAs have the highest percentage of Latinos of all the SPAs in LAC. Latinos make up 63.7% of the population of SPA 6 and 70.5% of the population of SPA 7. SPAs 1 and 5 where pH1N1 hospitalization rates were lowest have the lowest percentage of Latinos of all SPAs (18.1% and 17.5% respectively). The high rates in SPAs 6 and 7 were most likely due to the high proportion of Latinos residing there. However differential testing or reporting practices by hospitals may have played a role if hospitals in certain SPAs were more or less likely to obtain specific influenza testing or to report cases.

Underlying medical conditions were a significant factor in both child and adult hospitalized cases of pH1N1. Of all children under 18 years old for which past medical history was known, 54 (60.2%) had a past medical history. The most frequently cited risk factors for hospitalization among patients under the age of 18 years were chronic lung conditions (including asthma, chronic lung disease, and cystic fibrosis) and developmental disability (including neuromuscular disorders, mental retardation, and seizure disorders). Of 138 patients aged 18 years and older for which past medical history was known, 118 (85.5%) had some kind of underlying condition. The most frequently cited underlying condition for adults was obesity. While 22.2% of LAC adults are obese, 42.5% of hospitalized pH1N1 cases with height and weight information were obese. Seventeen (31.5%) of the 54 obese adult patients had obesity as the only underlying medical condition while thirty-six (67%) had at least one additional concurrent medical

condition. (Information on additional underlying conditions was not available for one obese case). This raises the question whether obesity in and of itself is a significant risk factor for complications from pH1N1 infection.Metabolic disorders, pregnancy, chronic lung conditions, and cardiac conditions were also prominent risk factors for adults. Chronic lung conditions were present in both children and adults suggesting compromised lungs are a risk factor for more severe infection with pH1N1 at any age. Obesity was the most common underlying condition present in adults but the least common in children suggesting that adult obesity may indicate greater risk for more severe infection with pH1N1. However, obesity data were missing from a large proportion of child cases. Obesity data may be reported less frequently for children indicating a gap in knowledge for this potential risk group. Among women of child bearing age (15-44 years), pregnancy was a frequent underlying condition for both children (15-17 years) and adults (18 years and older) in hospitalized cases. Others have reported on a high morbidity of pH1N1 in pregnancy[6] and this is consistent with published literature which indicates pregnant women experience significant morbidity from influenza and so should be an important target group for prevention and vaccination.[7]

CONCLUSION

We present 238 hospitalized cases of pandemic H1N1 2009 influenza reported between symptom onset of the first case detected in Los Angeles County on April 24, 2009 and when hospitalized cases were no longer reportable on August 3, 2009. Hospitalized cases appeared to be younger than cases of seasonal influenza while death rates across all age groups were comparable. Latinos were disproportionately affected with the largest proportion of cases and highest rates with blacks having the second highest rates. The geographic distribution of cases appeared to follow racial distributions within LAC which has implications for resource distribution and health care utilization patterns, however, differences in reporting of cases between areas of LAC may have affected this observation. Presence of an underlying health condition was an important factor in disease severity in both child and adult hospitalized cases. Presence of obesity, various chronic lung conditions, metabolic disorders and cardiac conditions in adults, presence of chronic lung conditions and developmental delay in children, and pregnancy in women of childbearing age should all be considered when evaluating a case of pH1N1 as they are predictors of a more severe outcome.

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PRE-SYMPTOMATIC HEALTHCARE WORKER TRANSMISSION OF PANDEMIC (H1N1) 2009 INFLUENZA IN ACUTE CARE SETTINGS LOS ANGELES, CALIFORNIA, 2009

Patricia Marquez, MPH; Dawn Terashita, MD, MPH; L'Tanya English, RN, MPH

BACKGROUND

Nosocomial transmission of seasonal influenza resulting in outbreaks in healthcare settings has been previously documented in the literature [1]. Asymptomatic or pre-symptomatic transmission of influenza is not well understood [2]; however, it is believed to be possible and thus a concern in healthcare settings. Pandemic H1N1 influenza (pH1N1) was first seen in Los Angeles County in April of 2009. Los Angeles County (LAC) Department of Public Health (DPH) investigated outbreaks in two acute care facilities where it was hypothesized that influenza transmission occurred during the pre-symptomatic infectious period from a healthcare worker (HCW) to patients. Both outbreaks occurred in units with immunocompromised patients where HCWs are required to have higher skill competencies. In each situation, contact between a HCW and the index patient took place before the HCW's symptom onset. According to the investigations, ill HCWs were not at their workplace while symptomatic. This report describes these two outbreaks, which occurred during a pandemic prior to vaccine availability.

METHODS AND RESULTS

Outbreak A

The first influenza outbreak occurred in July 2009 on the hematology-oncology unit of facility A. The infection preventionist (IP) at the facility notified DPH of two cases of pH1N1 influenza on the same unit within five days of each other. A case was defined as a patient residing in the hematology-oncology unit who was positive for pH1N1 influenza via real-time reverse transcriptase polymerase chain reaction (rRT-PCR). Both cases were recently diagnosed leukemia patients who resided in adjacent rooms on the same unit and were admitted for chemotherapy treatment. Case 1 was admitted to the facility 27 days prior to symptom onset, and Case 2 was admitted seven days prior to symptom onset (Table 1). Interviews with facility staff revealed one symptomatic HCW (HCW 1) who had onset of influenza-like illness (ILI) the same day as Case 1. HCW 1 provided direct care to Case 1 for three days prior to Case 1 onset. Indirect contact occurred between both cases through the mother of Case 2, who had contact with the mother of Case 1 and would visit with Case 1 in their room while Case 1 was in isolation. Nursing staff believed the mother of Case 2 could be the source of transmission between Cases 1 and 2. No clinical information was available on the mother. Case 2 developed ILI five days after Case 1; HCW 1 did not have direct contact with Case 2. Neither case was exposed to any other known symptomatic or pre-symptomatic visitors or staff.

Late in the investigation another case was identified, Case 0, who had been admitted to the facility with ILI seven days prior to the onset of illness in HCW 1. HCW 1 provided primary care to Case 0 for several days prior to HCW 1 symptom onset; HCW 1 could have contracted influenza from Case 0. HCW 1 was clinically diagnosed with influenza by an outside provider; no specimen was obtained for testing. No contact between HCW 1 and any patients occurred while HCW 1 was symptomatic. HCW 1 did not return to the workplace until symptoms resolved and completely treated with oseltamivir. Respiratory distress required all three case patients be transferred to the pediatric intensive care unit (PICU) for further care, where all were treated with oseltamivir. All cases subsequently expired in the PICU from complications of influenza.

Table 1. Case Characteristics for Facility A Outbreak.			
	Case 0	**Case 1**	**Case 2**
Age	8 years	15 months	3 years
Underlying chronic condition	Chronic Langerhans histiocytosis	Down syndrome/ Acute myelogenous leukemia	Down syndrome/ Acute myelogenous leukemia
Admission diagnosis	Fever/neutropenia	Chemotherapy treatment	Chemotherapy treatment
Days in facility prior to onset	0	27	7
Symptoms:			
Cough	Yes	Yes	Yes
Fever	Yes	Yes	Yes
Respiratory distress	Yes	Yes	Yes
Diarrhea	Yes	Yes	Yes
Vomiting	No	Yes	No

Outbreak B

A second H1N1 influenza outbreak was investigated in October 2009 in the neonatal intensive care unit (NICU) of facility B. The IP notified DPH of one infant symptomatic with ILI and two infants with non-specific symptoms, all in the NICU within a 24 hour period (Table 2). Two infants were rRT-PCR positive for pH1N1, the third was antigen positive for influenza A. A case was defined as a patient residing in the NICU who was positive for pH1N1 via rRT-PCR. Facility B has a strictly enforced visitor policy excluding sick visitors from the NICU; there were no known ill visitors. Prior to the outbreak, roll calls to assess HCWs for ILI were implemented in the NICU and maternity unit. Interviews with NICU staff revealed four HCWs who cared for the three cases who subsequently became ill. The index HCW (HCW 1) cared for index Case 1 and Case 2 during the two days prior to onset of ILI. This HCW experienced a mildly achy prodrome at the end of the shift on the second day and did not return to work the next day. She reported having fever during the course of illness.

Table 2. Case Characteristics for Facility B Outbreak.			
	Case 1	**Case 2**	**Case 3**
Gestational age (weeks)*	37	27	32
APGAR score[o]	7, 8, N/A	5, 6, 9	8, 9, N/A
Underlying medical condition	Gastroschisis	Respiratory distress	Respiratory distress
Ventilator dependent	Yes	Yes	Yes
Days in NICU prior to onset	148	125	44
Symptoms:			
Cough	No	Yes	No
Fever	Yes	No	No
Increased secretions	No	Yes	Yes
Vomiting	Yes	No	Yes
Poor feeding	Yes	Yes	Yes

[o]At one, five and ten minutes

HCWs 2, 3, and 4, became symptomatic with ILI within 1-2 days after HCW 1. HCW 2 provided care to Case 1 and 2 while pre-symptomatic; HCWs 3 and 4 provided care to Case 3 while pre-symptomatic. No HCWs cared for patients while symptomatic. None of the ill HCWs was tested for influenza by facility B or their primary medical doctors. All infants and healthcare workers recovered from their illness.

DISCUSSION

Vaccination continues to be the primary method to prevent influenza infection and transmission each season [3]. Exposure of HCWs to ill patients, as well as the exposure of vulnerable patients to ill HCWs, is an occupational hazard that can be greatly reduced via influenza vaccination each season [4]. Despite this, seasonal influenza vaccination rates among HCWs remain below 40% worldwide [4]. The ability to transmit influenza to others while pre-symptomatic or asymptomatic may contribute to viral transmission in healthcare settings. As many as 50% of individuals have asymptomatic influenza infection or have mild symptoms; studies have shown approximately 20% of unvaccinated adults have serological evidence of infection each winter [5]. In addition, HCWs are apt to work while symptomatic, becoming a potential source of infection for patients and coworkers [3]. Influenza vaccination also prevents workplace disruption and staffing issues by limiting the number of HCWs out of work due to illness [6]. The beneficial effects of HCW vaccination on patient morbidity and mortality have a larger effect when the employee vaccination rate in facilities exceeds 50% [5]. The Centers for Disease Control and Prevention recommends a target rate for HCW compliance with vaccination of 80% [7]. Increased numbers of vaccinated HCWs contribute to herd immunity that protects unvaccinated HCWs and vulnerable high risk individuals treated in healthcare settings.

California enacted legislation in 2007 that requires all general acute care hospitals to provide on-site influenza vaccination to employees at no cost to the employees. It also requires reporting of the numbers employees vaccinated as well as the number of documented vaccination declinations. During the pandemic this regulation was interpreted to cover the new H1N1 vaccine.

Unfortunately, the H1N1 vaccine was not available at the time of these outbreaks. Neither investigation showed any significant lapses in infection control. Both outbreaks demonstrate the possible transmission of influenza from pre-symptomatic HCWs and highlight that enhanced respiratory and hand hygiene is critical for HCWs in high-risk patient settings, especially during a pandemic in the absence of an effective vaccine.

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RAPID ASSESSMENT OF PUBLIC KNOWLEDGE AND ATTITUDES ABOUT LIVE ATTENUATED INFLUENZA VACCINE (LAIV) AT MASS H1N1 INFLUENZA VACCINATION CLINICS

Caitlin Reed, MD, MPH; Amy Lightstone, MPH; Susie Baldwin, MD, MPH; David Dassey, MD, MPH; Laurene Mascola, MD, MPH

BACKGROUND

At Los Angeles County (LAC) Department of Public Health (DPH) pandemic H1N1 vaccination clinics in 2009, uptake of nasally-administered live attenuated influenza vaccine (LAIV) was lower than expected. At the first mass H1N1 vaccination clinics (aka Point of Dispensing clinics, PODs) 77% of the available injected monovalent vaccine (IMV) doses were used, in comparison of only 31% of LAIV. LAIV production may be more rapid and may produced higher yields compared with IMV, resulting in greater LAIV availability early in pandemics. A rapid assessment was performed to determine why LAIV uptake was low in the setting of an overall H1N1 vaccine shortage, and what interventions might improve LAIV uptake.

Initially, LACDPH H1N1 vaccination clinics were targeted at persons in the following five priority groups:

1. children and young adults aged 6 months to 24 years
2. pregnant women
3. caregivers of infants aged <6 months
4. persons aged 25-64 years with chronic medical conditions
5. health care workers.

Certain of these groups have contraindications to receiving LAIV, including persons aged <2 years and >49 years, pregnant women, and persons with chronic medical conditions such as asthma, diabetes, and HIV. For this reason, children ages < 2 years in group 1 and all persons in groups 2 and 4 were offered only injected vaccine. However, persons in LAC DPH vaccine clinic priority groups 1 (except for children aged <2 years), 3, and 5 were eligible to be vaccinated with LAIV. Although these persons were eligible, poor uptake of LAIV was noted. The anecdotal impression of clinic staff was that parents and persons seeking to be vaccinated preferred IMV, even when eligible for LAIV.

METHODS

Formative Research

LAC DPH Acute Communicable Disease Control Program (ACDC) conducted formative research by briefly interviewing persons standing in line at two mass H1N1 vaccination clinics regarding LAIV and IMV and observing the flow of patients through the vaccine clinic.

1) Several themes emerged from these interviews:

- some people had never heard of the nasal spray live attenuated influenza vaccine (LAIV),
- many people had heard of LAIV, but most did not know much about it,
- some knew that the nasal spray was a live virus and the injection (flu shot) was inactivated virus, but did not know what the significance of live versus dead virus was,
- common misperceptions among those who knew about LAIV were that 1) it doesn't work as well as the flu shot 2) it is only for children and 3) that because it is a live virus it could possibly make you sick,
- another common concern was that live virus shedding from LAIV could make others sick
- people felt more comfortable with the familiar injectable flu shot
- some people preferred LAIV if they had the choice because they are afraid of needles
- other people preferred a flu shot because they don't like having things sprayed in their nose

2) Observations of patient flow through H1N1 clinics

Observations noted busy clerical staff at the outdoor check-in tables with multiple demands on their attention. In this setting, there were some errors made in determining which persons should be offered LAIV. For example, a registration worker thought that children > 2 years old who are in childcare should not receive LAIV because of a possible risk of transmission of vaccine virus to other children at the childcare center. Clinical personnel were stationed inside the hall and were unable to observe these types of screening decisions occurring at the outdoor registration area. Both clinical and clerical personnel stated that although they had completed training modules, the guidelines for LAIV eligibility were confusing, particularly since persons eligible for LAIV were only a subset of the priority groups for influenza vaccination.

Survey

A survey was designed to assess public knowledge and attitudes toward LAIV, in collaboration with colleagues at the LAC DPH Health Assessment Unit. The following data were collected: basic demographic information, including age, sex, race/ethnicity, educational level, language group, household size and income, usual source of H1N1 vaccine information, most trusted source of vaccine information, and a series of true/false and yes/no knowledge and attitude questions about LAIV and IM vaccine (see Figure 1).

Figure 1. Knowledge and Attitude Questions from Survey

True-False Questions

The H1N1 vaccine is available in a nasal spray **(True/False/Don't Know)**

The H1N1 nasal spray vaccine: **(True/False/Don't Know for each prompt)**
- contains live weakened virus
- is OK for everyone to get
- is as good as the shot in preventing flu
- could give me the flu
- could make my friends or family get the flu

Yes or No Questions

I am more comfortable getting vaccines in the form a shot than a nasal spray
I am afraid of live vaccines
I am afraid of shots
I do not like having something sprayed in my nose

Vaccine Preference Question

If I could choose which type of H1N1 vaccine to get, I would choose the (choose one):
Nasal spray/Shot/Whatever the doctor recommends/Don't know

The survey was conducted as a convenience sample (N=326) in English and Spanish of persons aged ≥18 years at four mass H1N1 vaccination clinics from November 11-14, 2009. People waiting in line to be vaccinated were given a paper-and-pencil survey prior to reaching the registration tables at the front of the line, where surveys were collected. Low LAIV knowledge scores was defined as two or fewer correct answers to four true/false questions (mean correct: 2.3 ± 1.4; median: 2). Chi-square was used to compare knowledge by age, sex, race, and education.

RESULTS

Demographics

A slight majority of respondents (54%) were female. Age distribution was fairly even (see Table 1) among persons aged <65 years. Educational levels in the surveyed group included elementary school only (6%), some high school (9%), high school graduate (18%), some college (24%), college graduate (28%), and advanced degrees (15%). A wide range of income levels were also represented, with 33% reporting < $25,000 in total household income, while 25% reported > $100,000. Fifty-eight percent of respondents were born in the United States. English was the primary home language in 66% of households, Spanish in 24%, and other languages 6%.

Table 1. Demographics of survey respondents (N=326)

	No. respondents	%
Sex	318	
Male	147	46
Female	171	**54**
Age (years)	326	
18–29	51	16
30–39	87	**27**
40–49	87	**27**
50–65	82	25
> 65	19	6
Education	323	
Elementary school	18	6
Some high school	30	9
High school graduate	59	18
Some college	77	24
College graduate	90	**28**
Advanced degree	49	15
Total Household income	297	
< $25,000	100	**34**
$25,000-$50,000	61	21
$50,000-$100,000	61	21
> $100,000	75	25
US born		
Yes	185	**57**
No	138	43
Primary language at home	313	
English	206	**66**
Spanish	75	24
Other	30	10

The racial/ethnic distribution of respondents is shown in Table 2. There were more Asians represented in this survey and among POD attendees, and fewer Hispanic survey respondents and POD attendees, than in LAC as a whole. Blacks were better represented in the survey (11%) than their overall attendance at the PODs (3%). Whites were overrepresented in the survey (34%) compared with their POD attendance (19%) or proportion of the LAC population.

Table 2. Distribution of race/ethnicity in survey respondents compared with overall POD attendees and LAC population overall

	Survey (%)	POD attendees† (%)	2009 LAC population estimate (%)
Asian/Pacific Islander	23	30	10
Black	11	3	11
Hispanic	32	44	54
White	34	19	26
Other	1	2	<1

† as of 11/24/09, N=133,202

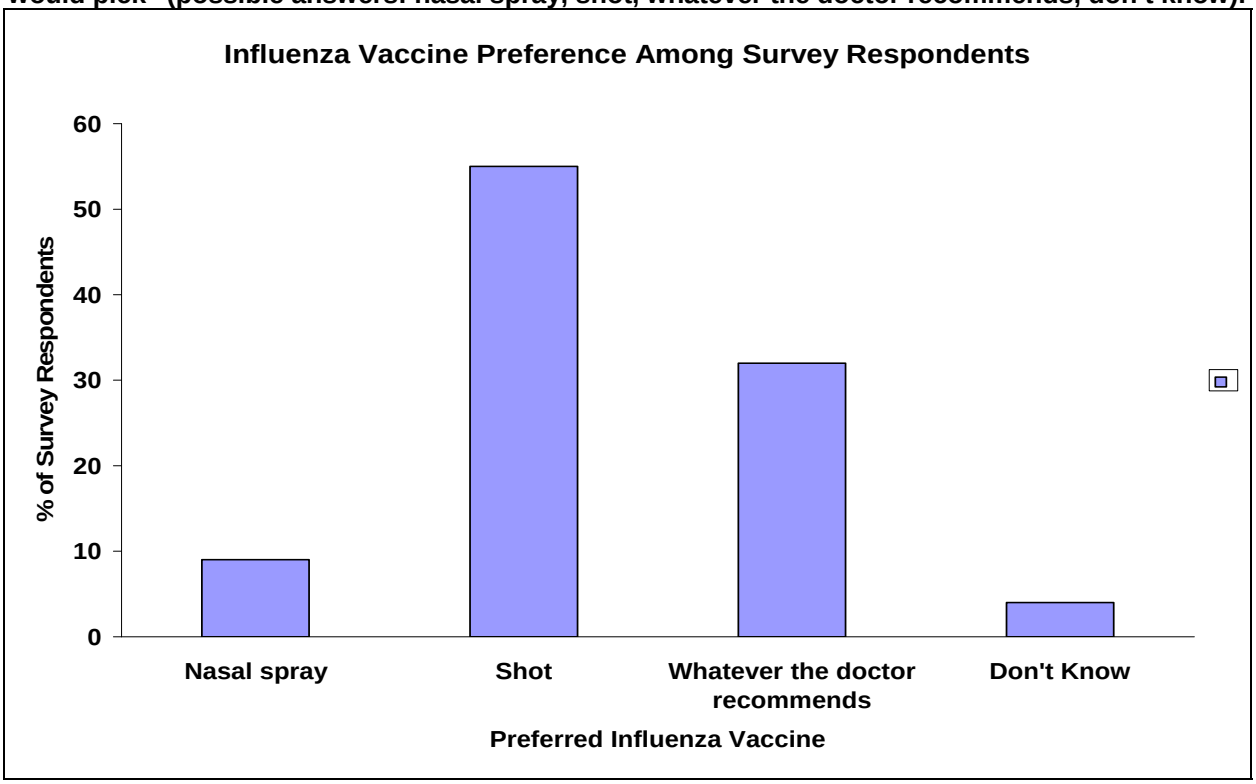
Knowledge and Vaccine Information Sources

Of 326 respondents, 81% knew that H1N1 vaccine was available in a nasal spray, 50% that it contained live weakened virus, 49% that it was not indicated for everyone, and 54% that it was as effective in preventing influenza as injected vaccine. Persons with high school education or less were 3.1 (95% confidence interval [CI], 1.9–5.1) times more likely to have a low score than those with more education. Compared with whites, blacks were 6.2 (CI, 2.6–15.2) times and Hispanics 3.3 (CI, 1.9–5.8) times more likely to have a low score. Most blacks and Hispanics reported their primary vaccine information source was television (59% and 53%, respectively); whites reported relying more on the Internet (42%; *P*<.0001). Compared with whites, blacks were 9.5 (CI, 3.2–28.0) and Hispanics were 6.7 (CI, 2.8–15.5) times more likely to report television as their most trusted information source.

Vaccine preferences

The initial anecdotal reports of patient preference for IMV over LAIV were borne out by the survey responses.

Figure 2. Response to the survey question "If I could choose which type of H1N1 vaccine to get, I would pick" (possible answers: nasal spray, shot, whatever the doctor recommends, don't know).



The majority of respondents preferred IMV (see Figure 2). More persons endorsed fear of live nasal spray vaccines (25%) than fear of injections (shots) (13%). Forty-one percent were unsure if LAIV "could give me the flu" and 63% reported "I am more comfortable with vaccines in the form of a shot than a nasal spray." Persons who believed that LAIV could make them ill and those who reported feeling more comfortable with injected vaccines were more likely to prefer IMV (AOR=3.3, 95% CI=1.3–8.4 and AOR 15.1, 95% CI=6.5-35.5, respectively). After adjustment, age, sex, race, and education were not associated with preference for IMV.

LIMITATIONS

This survey was a convenience sample, not a demographically representative sample of all persons being served by LAC DPH mass H1N1 vaccination clinics. For practical reasons, the survey result could not link to individual information on whether the respondent was eligible to receive LAIV, or to which vaccine they ultimately received. However, the vaccine preference question was framed as "If I could choose", to indicate a hypothetical choice.

DISCUSSION

Education level and racial/ethnic differences in knowledge about LAIV exist, although these did not emerge as the primary reasons driving the observed preference for IMV. The majority of patients attending a mass vaccination clinic preferred IMV to LAIV because of their comfort with injectable vaccines and uncertainty about whether LAIV could cause them to become ill with influenza. This suggests that an educational campaign aimed at the myth of LAIV reversion to virulence could be helpful in increasing uptake. Television was the most popular overall media information source, and physicians were the most trusted information source. This finding suggests that television coverage, particularly earned 'free media', could be of particular utility in communicating vaccine safety messages. Finally, shifting clinicians to the registration area to help with vaccine exclusion decisions, having LAIV inclusion and exclusion criteria printed on reference cards at the registration tables, and a switch to an 'opt-out' strategy to funnel medically eligible persons to LAIV could help to increase LAIV uptake. These findings might be applicable to future influenza vaccination campaigns.

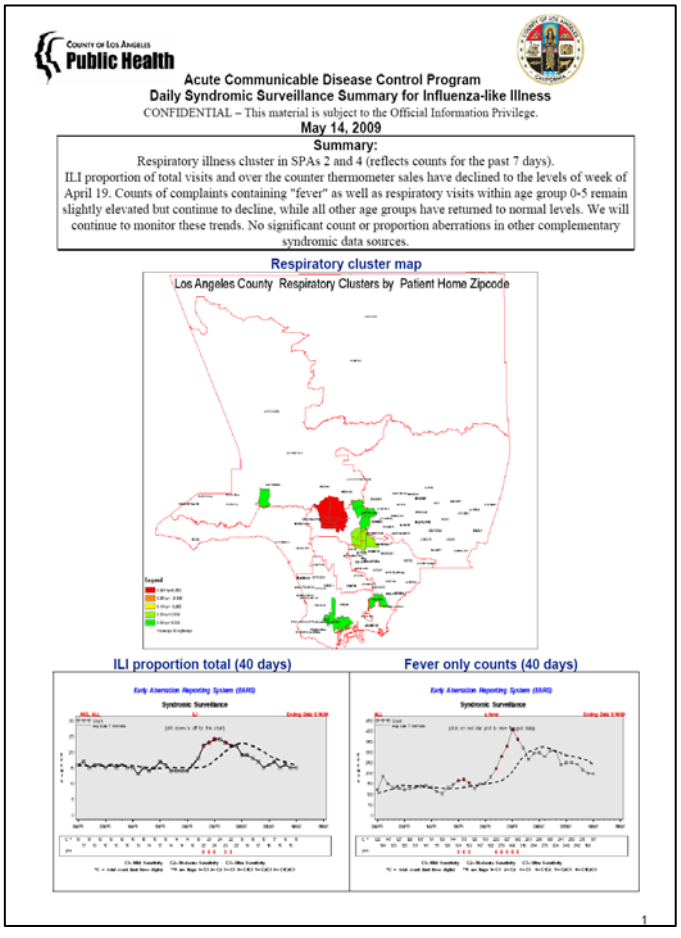
USE OF SYNDROMIC SURVEILLANCE DURING THE 2009-2010 INFLUENZA SEASON IN LOS ANGELES COUNTY

Patricia Araki, MPH; Bessie Hwang, MD, MPH

In April of 2009, several media reports and notifications from neighboring health jurisdictions warned of the possible circulation of a novel strain of influenza near central Mexico and the Mexico/US border. Later that month, these suspicions were confirmed by the World Health Organization (WHO) as the first confirmed cases of Pandemic Influenza (H1N1). As a large metropolitan region in close proximity to the potential outbreak, the Los Angeles County (LAC) Department of Public Health (DPH) Automated Disease Surveillance Section (ADSS) of Acute Communicable Disease Control Program (ACDC) began conducting enhanced surveillance for Influenza-like illness (ILI) activity in LAC through its pre-existing syndromic surveillance and complementary systems. In addition to this, a daily ILI report was created to provide key public health stakeholders and Departmental Operations Center (DOC) staff with near real-time ILI-related analysis results, trend graphs and temporal-spatial statistics and maps.

The LAC emergency department syndromic surveillance (EDSS) system analyzes data from approximately 60% of all emergency department (ED) visits throughout LAC. For every participating hospital, each ED visit is systematically classified into one of several syndrome categories based upon patient chief complaint. These include: rash, respiratory, gastrointestinal, neurological, and ILI. Each syndrome category is then tallied and compared to a threshold generated by the Centers for Disease Control and Prevention (CDC)-Early Aberration Reporting System (EARS) algorithm based upon the individual hospital's previous data. During the period from April to May 2009, ILI- and fever- classified counts obtained from the syndromic surveillance system were utilized to produce overall and age-group stratified trend graphs for a daily ILI report which summarized and displayed analysis results from several surveillance systems (Figure 1).

Figure 1. Influenza-Like Illness (ILI) Daily Report



Other data source results selected for the ILI report included information from SaTScan™, respiratory-classified nurse calls, respiratory-classified coroner's deaths, respiratory-related 911-calls, and emergency department volume biosurveillance (total ED visits and total ICU admissions from the ED). Most results were generated by SAS® in Cary, North Carolina and presented in trend graph format, with the exception of the respiratory SaTScan™ cluster map. Data sources were selected based upon prior knowledge about the quality of information, timeliness and consistency of reporting, relevancy with respect to ILI early-event detection surveillance, and additional value gained by inclusion in the report. Since the pandemic was the first observed since the foundation of early-event detection surveillance in LAC, the circumstances served as an opportunity to assess the utility of each of the data sources utilized and presented in the report for inclusion in any future report related to ILI. For this assessment, retrospective evaluation of daily ILI reports from mid April through May 2009 was conducted.

Each data source in the ILI report was retrospectively assessed for increasing trend from April through May, 2009, due to a known increase in confirmed cases of novel H1N1 influenza (H1N1) reported during this time period. From reviewing the reports, a sudden and significant increase in the proportion of total ED ILI visits (~8-10%) within the timeframe of a few days (Figure 2) is observed in combination with early signaling among EDSS fever-categorized visits during the same period (Figure 3), to suggest the possibility of an ILI outbreak in the community. Respiratory SaTScan™ cluster maps confirmed several clusters of local communities with significant respiratory activity during the analysis period (Figure 1). Age-stratified EDSS ILI data identified age categories in which the burden of illness was greatest (Figure 4), observing an increase in ILI ED visits among younger persons (<45 years old) and more specifically, those between the ages of 14-44 years old, with little to no difference in trend detected among those over 45 year old. Respiratory-classified nurse calls and total volume of ED visits biosurveillance data also confirmed increases in ILI-related encounters during the assessment period. In contrast, 911-calls and total ED-to-ICU transfers volume trend data remained static throughout the observation period and Coroner's results were unreliable due to delayed data receipt. For future reports, these data sources may not be as useful an indicator for detecting ILI activity.

Figure 2. Total EDSS ILI-classified visits per day

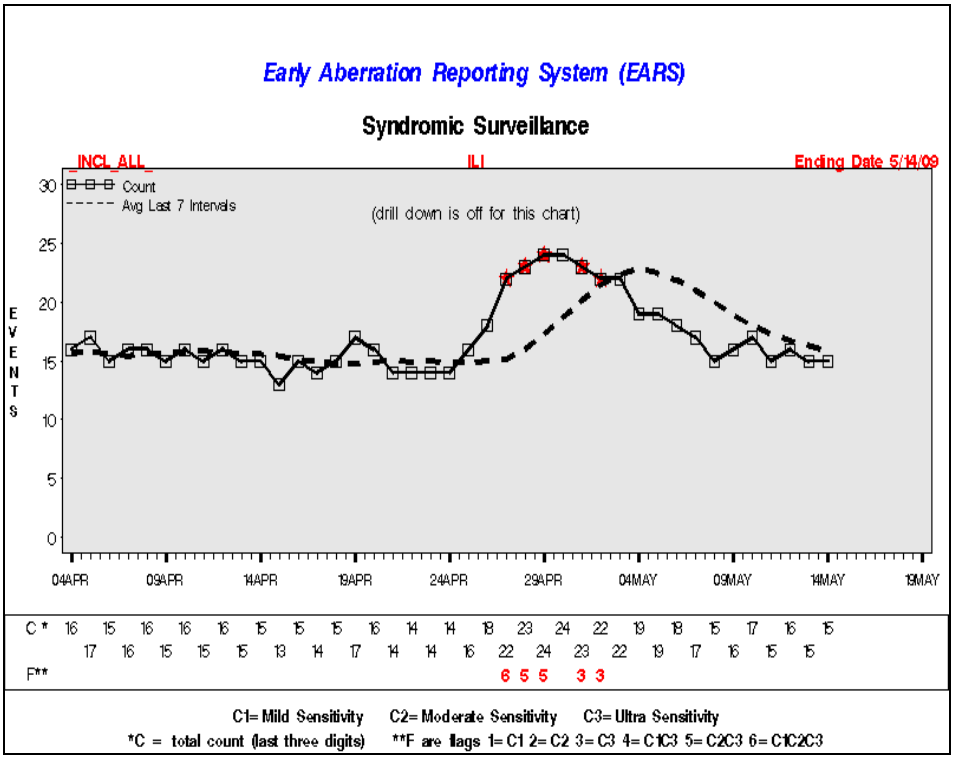


Figure 3. Total EDSS fever-classified visits per day

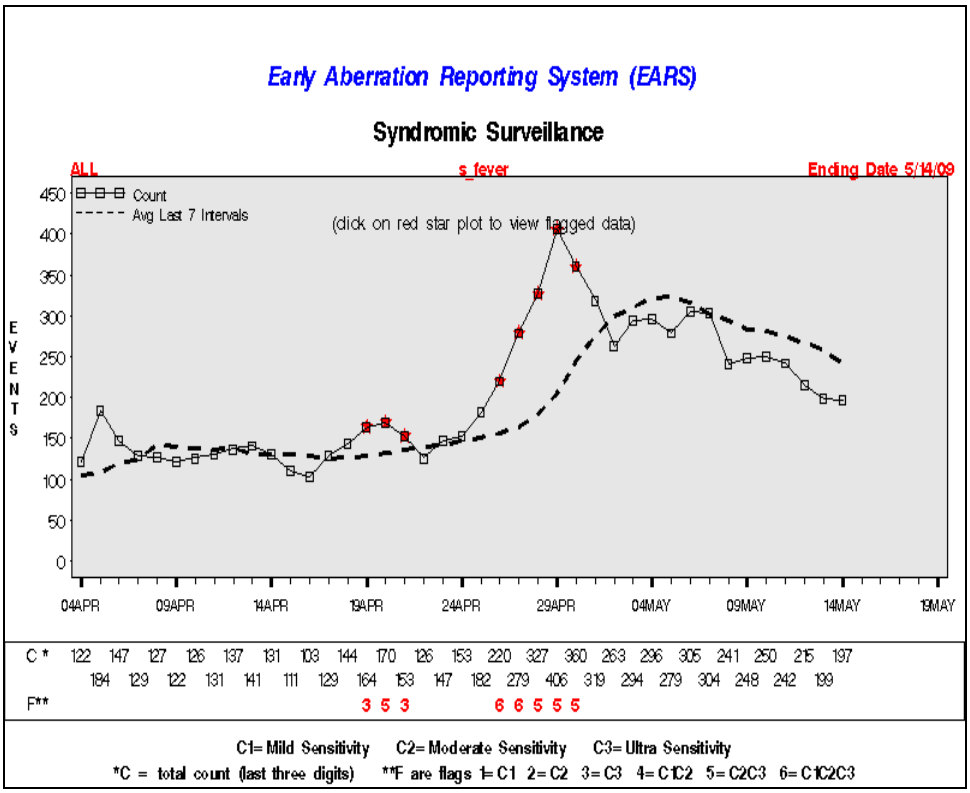
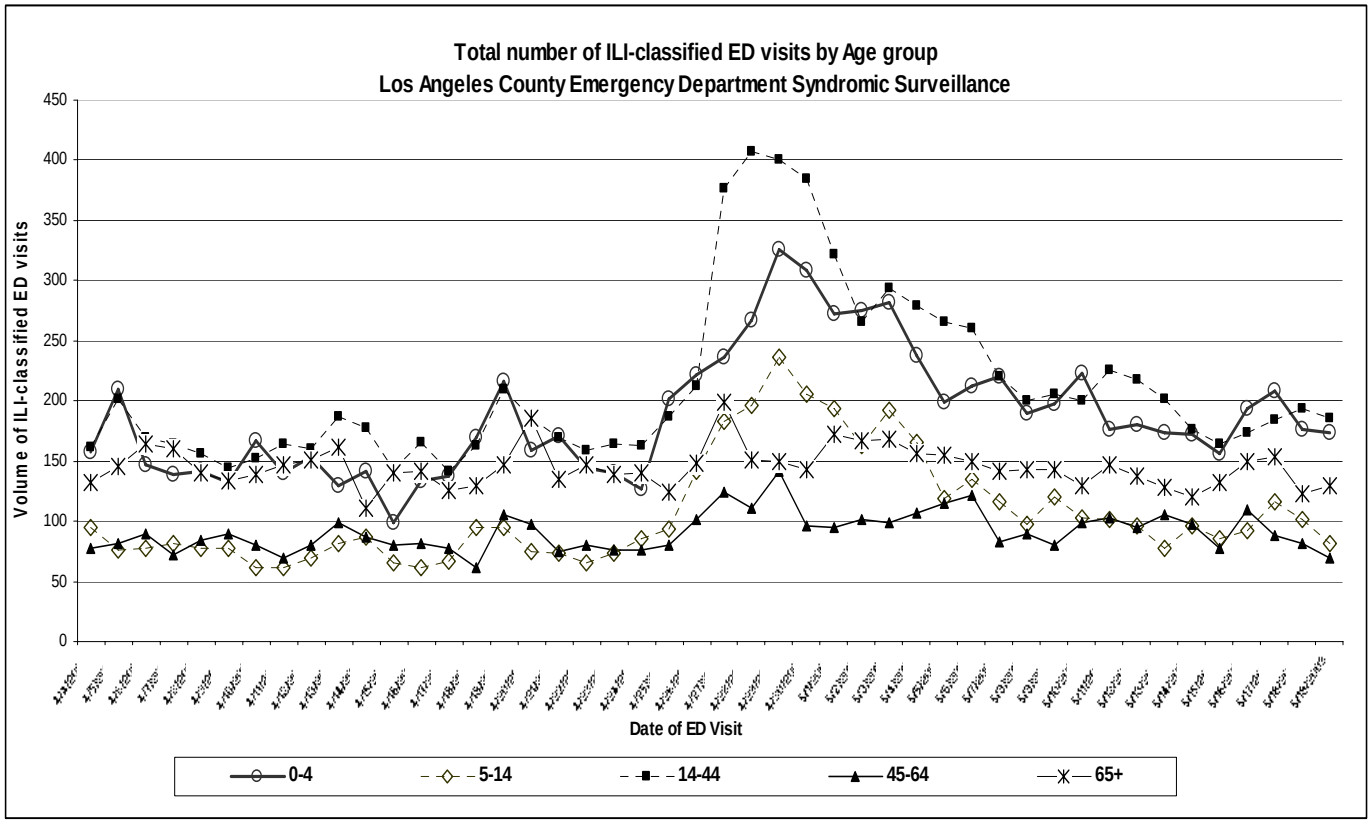
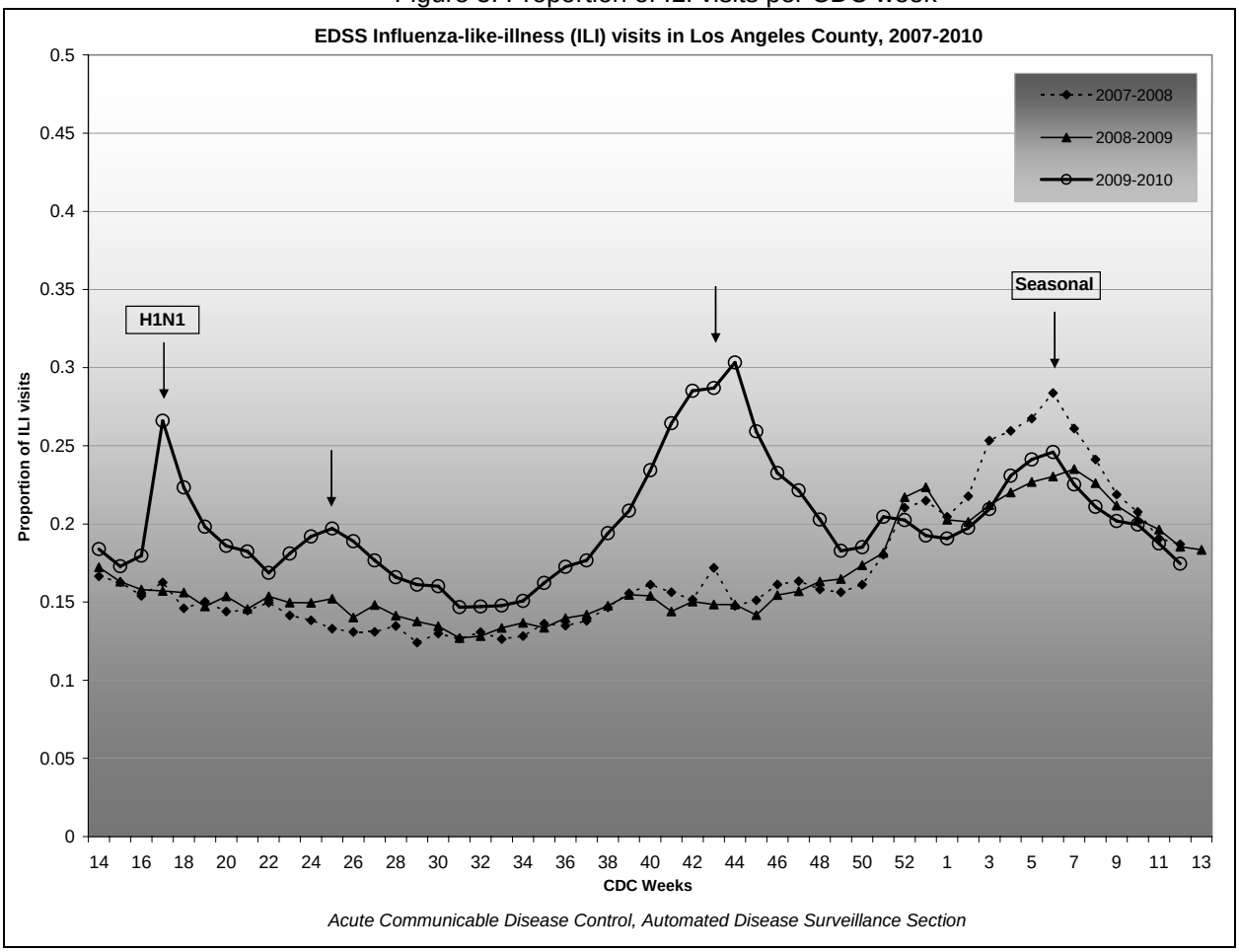


Figure 4. Age-stratified EDSS ILI trend graph from April through May, 2009



Further retrospective assessment of overall ILI activity as captured by the LAC EDSS system, revealed several notable findings upon review of annual trend in proportion of ILI-classified ED visits for the same period each year between 2007 and 2010[1]. The first being the sudden appearance of a large increase in ILI activity early on in the 2009-2010 season (Figure 5, CDC weeks 16-20) followed by two more significant peaks which are observed to be absent from the two previous years. While these sharp increases are not based upon confirmed H1N1 novel influenza counts, they are consistent and positively associated with H1N1 influenza activity through cross-referencing with other data sources[2]. In contrast, the final peak (weeks 1-13) is seen across all three years and has been attributed to annual influenza, as both the length and timing of increasing ILI activity correlates with that of recurring seasonal influenza. In summary, the presence of these atypical yet significant increases in ILI activity early on in the 2009-2010 season following several local reports of confirmed H1N1, in conjunction with annually anticipated seasonal influenza activity suggest that the additional peaks can more than likely be attributed to novel H1N1 influenza activity.

Figure 5. Proportion of ILI visits per CDC week



[1] Prior to 2009, the novel H1N1 influenza virus had never been detected in a single influenza virus (source: www.flu.gov). All laboratory positive influenza tests prior to the 2009-2010 season were recorded as seasonal influenza.
[2] California Department of Public Health: ***Influenza and Respiratory Disease Surveillance Report***

The case for the presence of a novel strain of influenza, in addition to yearly expected seasonal influenza, was further supported by the comparison of the total number of EDSS ILI signals generated annually by all participating hospitals from 2007 through 2010. Whereas, the total number of syndromic surveillance ILI signals for the year beginning in April 2007 through 2008 was 37, and for the same time period the following year 38, by contrast, during the final year (2009-2010) the total number of ILI signals generated by EDSS reached 80, indicating a twofold increase in the number of statistically significant ILI signals observed across all LAC EDs the final year in comparison to the two previous years. This information in combination with records of only laboratory positive seasonal influenza prior to 2009, again suggests that the sharp increase in number of ILI signals along with the observation of several additional ILI peaks (increasing proportion of ILI ED visits) during the 2009-2010 season are more than likely attributable to a novel form of influenza, or H1N1 (Figure 6).

Figure 6. Total number of ILI syndromic surveillance signals generated by participating hospitals

April 1, 2007- March 31, 2008	April 1, 2008- March 31, 2009	April 1, 2009- March 31, 2010
37	38	80

Overall, several observations unique to the 2009-2010 influenza season are notable. LAC DPH began conducting enhanced surveillance in April, 2009, utilizing several pre-existing surveillance systems following local reports of increased ILI activity from neighboring jurisdictions and abroad. These analysis results were then compiled into a daily ILI report for distribution among Public health stakeholders and DOC personnel as status updates for the duration of the declaration of emergency for novel influenza (H1N1).

Upon retrospective review of the daily ILI reports between April through May, 2009, several data sources displayed concurrent trend increases with that of proportion of total EDSS-ILI trend graphs. These data sources included EDSS fever-classified visits, EDSS age-stratified ILI visits, respiratory-classified nurse calls, and total ED volume biosurveillance data, suggesting these particular results may be useful as supplementary data sources for inclusion in future ILI surveillance reports. EDSS data provided very useful information due to the type of data captured, enabling analysts to subset observations further by chief complaint (e.g., the keyword “fever”), and additionally, to stratify data by ZIP code or age-group. This not only identified certain age-groups as being more susceptible to ILI during the outbreak, but also informed health officials as to location of clusters of ILI activity in the community.

Furthermore, comparison of annual trends in proportion of EDSS ILI visits from 2007-2010 revealed an unusually high proportion of ED ILI visits during traditionally non-ILI months, in addition to normal levels of seasonal influenza ED ILI visits during the 2009-2010 season, in contrast to the two previous years. This was complemented by the observation of twice as many EDSS ILI signals from 2009-2010 in comparison to annual totals of EDSS ILI signals seen in prior years. Overall, these data sources, used collectively, may help detect ILI activity, in near real-time, when conducting surveillance during the course of an ILI emergency.

KNOWLEDGE, ATTITUDE, AND PERCEPTION REGARDING LISTERIOSIS EDUCATION AMONG COMPREHENSIVE PERINATAL SERVICE PROGRAM (CPSP) PROVIDERS IN LOS ANGELES COUNTY, 2009

Alan Wu, MPH; Ben Techagaiciyawanis, MPH

BACKGROUND

Listeriosis is a disease transmitted primarily through consumption of food contaminated with the bacterium *Listeria monocytogenes*. An infected pregnant woman may then transmit Listeria vertically to her fetus. The disease primarily affects the immunocompromised, pregnant women, newborns and the elderly. During August to November 2006 there was an increase of 17 reported cases of listeriosis throughout Los Angeles County compared to 9 cases during the same period in 2005. In response the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County (LAC) Department of Public Health (DPH) conducted various communication and health education activities to promote awareness and education about listeriosis to the medical and at-risk communities of LAC. In addition ACDC collaborated with the Comprehensive Perinatal Service Program (CPSP) and Women, Infants and Children programs (WIC) in LAC to distribute listeriosis health education materials (brochures and posters) to pregnant mothers. Listeria brochures were sent out to over 500 CPSP providers and seven WIC distribution sites from November 2006 to May 2007 to target prevention education to pregnant women who are at higher risk of developing listeriosis than the general population. Recommendations to avoid consuming certain foods include raw milk, soft cheeses, deli meats, and raw or undercooked meat and certain types of seafood.

In the United States, physicians are a trusted source of health information for the general public [1]. To assess the role of physicians as food-safety educators for high-risk patients, ACDC conducted a knowledge, attitudes and perception survey of physicians and providers within the CPSP providers network after the distribution of listeriosis health education materials.

Table 1. Demographic Characteristics of Providers Who Responded to Survey (n=72)

Variable	No. (%)
Job Title	
Physician	18 (25)
Nurse	16 (22)
CPHW	14 (19)
Other	24 (34)
Average no. patients seen per week	
None	3 (4)
1-10	3 (4)
11-25	10 (14)
26-50	12 (17)
51-75	8 (11)
>75	34 (47)
Not sure	2 (3)
Age	
< 30	11 (15)
30-40	19 (26)
41-50	21 (29)
51–60	15 (21)
61-70	5 (7)
> 70	1 (2)
Gender	
Male	16 (22)
Female	56 (78)
Race	
White	16 (22)
Black/African-Am	5 (7)
Hispanic/Latino	40 (56)
Asian	10 (14)
Other/Persian	1 (1)

METHODS

In June 2009, a 17-question survey was prepared and distributed using a web-based survey tool, SurveyMonkey. The target population for the survey was CPSP providers throughout LAC. Physicians working in these specialties are more likely to serve patients who are at greater risk of listeriosis. The survey consisted of three sections: demographics, information distribution and knowledge, attitudes and perceptions (KAP). Questions were both open-ended and closed-ended; the KAP section measured respondents' levels of agreement or disagreement to statements.

In June 2009, ACDC sent out an initial email with a link to the web-based survey generated in SurveyMonkey to all CPSP providers (total of 367) in LAC; an additional email was sent to the CPSPs reminding them to complete the survey later that month. The survey was closed on July 10, 2009. Due to

a low response rate the survey was re-opened and resent to gather more responses from October 21 to November 6, 2009.

RESULTS

Response Rate and Study Population

All 367 CPSP providers were contacted by email to complete the survey. The survey response rate was 24% (87 responses). Of the 87 survey responses, 72 (83%) responses were complete and 15 (17%) were partially complete. Respondents included physicians (25% of respondents), nurse practitioners (22%), Comprehensive Perinatal Health Worker (CPHW, 19%) and other health care staff (34%) (Table 1). The median number of years participating providers had practiced was 12 (range 1-44 years).

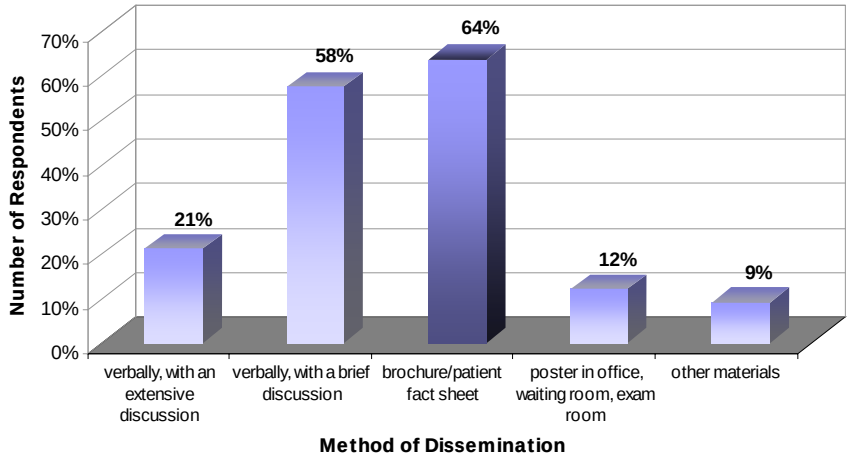
Food-Safety Education Practices

Forty-one (57%) of 72 providers in the survey reported that food-safety information was requested by patients one to ten times per week. Thirty-three providers (46%) reported that they worked in clinics that provide food-safety information to patients. Twenty-seven providers (38%) worked in clinics that do not provide food-safety information to their patients.

Of the 41 respondents who answered question regarding whether they would provide listeriosis information to patients, 37 providers (90%) answered that they would provide information to their patients. Clinics reported that food-safety information was provided to patients by physicians (39% of respondents), nurses (33%), dieticians (21%), CPHWs (30%) and other personnel (15%).

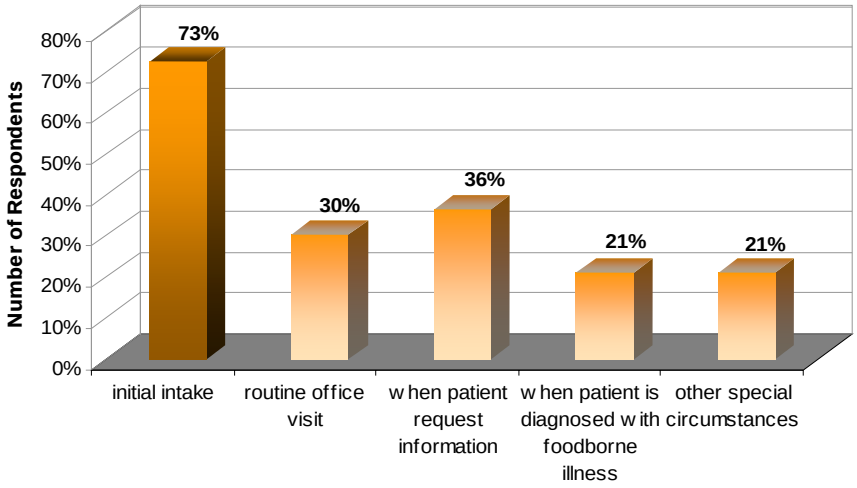
A variety of methods was used to disseminate food-safety information, including brief discussions (reported by 58% of respondents), brochures (64%), extended discussions (21%), posters (12%), and other materials (9%) (Figure 1).

Figure 1. How Listeriosis Information is Provided to Patients (n=33)



Providers reported giving food-safety information upon patient request (36% of respondents), at initial intake (73%), when patients are diagnosed with a foodborne illness (21%), during routine office visits (30%), and other special circumstances (21%) including pregnancy (6%), obstetrics health education (3%), prenatal care orientation (3%), prenatal class (3%), and nutrition class (3%) (Figure 2).

Figure 2. When Is Listeriosis Information Provided? (n=33)



Providers' Perceptions as Food-Safety Educators

Figure 3 shows a key perception of providers' role as food-safety educators. Eighty-five percent of providers who responded believed that educating patients about listeriosis should be part of their role.

Figure 3. Making Sure Patients Receive Information About Prevention of Listeriosis is Part of My Role (n=63)

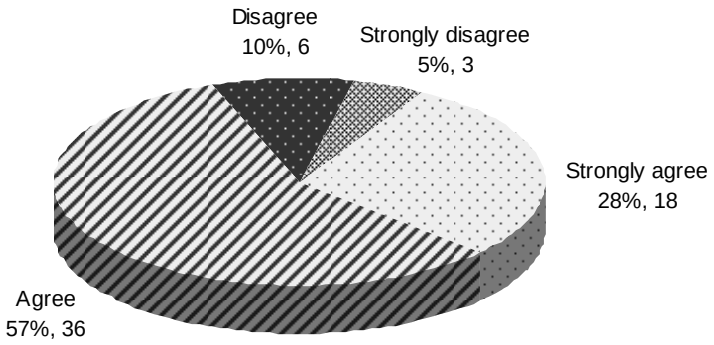


Table 2 summarizes the responding providers' perceptions regarding their role as food-safety educators. Most responding providers agreed that the provision of food-safety information is part of the physician's role (85%). Additionally, most providers were willing to provide a brief talk to their patients about preventing listeriosis (93% of respondents) and believed that educating patients about food safety would result in a decrease in listeriosis (98%).

Table 2. Perceptions of Responding Providers Regarding Their Role as Food-Safety Educators

Statement of perception	No. (%) of respondents, by answer (n = 72)				
	Neutral* or no answer	Strongly agree	Agree	Disagree	Strongly disagree
I am comfortable with my general knowledge of listeriosis	12	7 (12)	38 (63)	9 (15)	6 (10)
I am comfortable in identifying risk factors in my patients who are at risk for listeriosis	23	6 (12)	29 (59)	10 (21)	4 (8)
Many of my patients are “at-risk” for listeriosis	31	5 (12)	20 (49)	12 (29)	4 (10)
Making sure that patients receive education about prevention of listeriosis is part of my role	9	18 (28)	36 (57)	6 (10)	3 (5)
My patients would be interested in learning how they can prevent listeriosis	18	12 (22)	38 (70)	2 (4)	2 (4)
I am willing to provide a brief (three minute) talk to my patients on preventing listeriosis	11	20 (33)	37 (60)	1 (2)	3 (5)
Educating patients about food safety will result in a decrease in listeriosis	6	27 (41)	38 (57)	0 (0)	1 (2)
My patients are likely to comply with recommendations I provide on prevention of listeriosis	19	11 (21)	38 (71)	3 (6)	1 (2)
Effectively educating patients on how to prevent listeriosis takes too much time	24	4 (8)	6 (13)	34 (71)	4 (8)
I am confident about diagnosing and treating listeriosis in my patients	29	4 (9)	24 (56)	6 (14)	9 (21)
I am comfortable making recommendations on how to prevent listeriosis	17	14 (25)	35 (64)	2 (4)	4 (7)
My patients feel that I am a valuable resource for advice on prevention of listeriosis	11	13 (21)	40 (66)	5 (8)	3 (5)
Health education materials can help me with educating my patients about prevention of listeriosis	5	38 (57)	26 (39)	1 (1)	2 (3)

* The total no. of responses for the above statements does not include neutral responses.

Food-Safety Education Barriers

Table 3 is a summary of anecdotal comments and responses to an open-ended question on barriers to providing patient education.

Table 3. Barriers Providers Face in Providing Prevention Education to Patients (n=72)

Education/Literacy	Most pregnant women are low education
	Patients’ lack of education
	Low level of education in the population we serve
	Around 70% of patients didn’t finish elementary school
Lack of Time	
Providers	Patients are scheduled every 10 minutes
	Too busy doing other tasks
	Pressure of seeing patients with limited time
	Not enough time to educate patients on so many areas
Patients	Most of the moms don’t have time or show no interest in health education
	Working mothers’ busy schedules
	Patients are in a hurry or do not have time for education
Lack of Educational Materials/ Resources	Like to have education video and flip chart to better address listeriosis information
	No reading material for patients on listeriosis
	Need more printed low literacy materials at 4th grade reading level
	Need educational material and literature in Spanish
	Need educational material in Armenian
	Need appealing, up-to-date free health education materials in English and Spanish
	Not enough funding for educational material, handouts and posters
Patient Non-Compliance	Patients resistant to change behavior, especially the change may have financial impact (i.e., if it's more expensive to buy cheese in a supermarket rather than getting home-made cheese at low cost).
	Patients do not follow instructions
	Patients do not show an interest in learning

DISCUSSION

In this survey, 33 (46%) of 72 responding providers worked in clinics that provided listeriosis information to their patients; 18 (55%) of these providers provided the information themselves. Of the 27 providers who worked in practices that did not provide food-safety information, 15 (94%) reported that they would like to provide such information to their patients.

A total of 87 providers responded to this survey and 72 complete surveys were analyzed. Responses indicate that overall providers' knowledge, attitudes and perception regarding listeriosis patient education are positive. They strongly believe in the value and need for patient education and that it should be their role. Most providers indicate they are willing to provide education. Almost all believe in the value of health education materials in assisting them with prevention education. In fact, they indicated the importance of having culturally and literacy appropriate educational materials. Despite their strong belief in patient education, they face challenges and barriers including time constraints due to pressure of seeing patients with limited time, lack of education materials and resources, and patients' lack of education. Almost one half of providers are seeing more than 75 patients per week (see Table 1).

Providers serving at-risk patients are in an important position to serve as food-safety educators. Given the positive providers' attitudes and perceptions on listeriosis patient education found in this survey, a targeted food-safety education campaign for providers serving patients at risk for listeriosis could enhance provider-based education. Such a campaign can focus on increasing providers' perceived roles as food-safety educators, increasing providers' awareness of their value to patients as food-safety educators for their patients, and increasing their comfort in providing listeriosis information to their patients. Education campaign and efforts should also focus on the small group of providers who do not perceive listeriosis education to be part of their role (15%) and their patients are at risk for listeriosis (39%) (Table 2).

A low response rate is a limitation of this study. Therefore, the results cannot be generalized to and may not accurately reflect all providers within the CPSP providers network. The tremendous workload of these providers may explain the low response rate. In a study by Kaner et al. [2], a general increase in physicians' workloads is a primary factor for low response rates to surveys. This increase in workload could have biased the survey responses. For example, physicians who felt they did not have time to provide food-safety information to patients may not have had time to fill out the survey. Moreover, in depth statistical analyses could not be performed because sample size was too small.

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BUILDING RELATIONSHIPS WITH EARLY CHILDHOOD EDUCATION PROVIDERS TO PREVENT INFECTIOUS DISEASE

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BACKGROUND

The Acute Communicable Disease Control Program (ACDC) is committed to working in collaboration with diverse stakeholders to initiate and sustain meaningful interventions to prevent disease among vulnerable community members, such as the very young and the very old. This report summarizes an example of ACDC's efforts to translate knowledge into action and build community capacity to address public health risks using a mix of quantitative and qualitative research methods.

Over 1,200 *Salmonella* cases in Los Angeles County are reported to ACDC each year, and though largely considered to be a foodborne illness, an average of 10% of these cases is associated with reptile (mostly turtle) exposure. In contrast, rates of reptile-associated cases average 6% of overall cases on a national level. *Salmonella*, a bacterium that most reptiles naturally carry in their systems, can easily be shed, both directly and indirectly, and can infect humans. Salmonellosis is a preventable disease that can cause serious illness and harmful consequences, including invasive disease, hospitalization, and, on occasion, death for children under age five and for individuals who have chronic health conditions that weaken their immune system.

According to ongoing ACDC surveillance reports and anecdotal evidence provided by Public Health Nurses investigating cases in the field, low-income Latino families with young children who live in apartments in Service Planning Areas 2 and 4, who have pet reptiles, have consistently accounted for the majority of reported reptile-associated salmonellosis (RAS) cases in Los Angeles County. Observations by ACDC staff indicate that small turtles are common classroom pets in child care and early childhood education programs throughout the County, despite the nationwide law since 1975 prohibiting the sale or distribution of small turtles (with shells less than four inches in length) as well as the recommendation endorsed by the Centers for Disease Control and Prevention (CDC) that children under age five should not have contact with reptiles or amphibians [1].

With this in mind, ACDC developed in 2008 a community-level intervention on reptile-associated salmonellosis prevention to raise community awareness and build the capacity of stakeholder organizations to take action. This intervention, which is ongoing, began with the establishment of a RAS Working Group. This advisory body is an interdisciplinary group of DPH staff including health educators, nurses, physicians, veterinarians, students, and research analysts, who, in partnership with representatives of community-based organizations, including groups involved in expanding access to quality child care and early childhood education, promoting environmental health, and organizing low-income tenants, representatives of public sector agencies, including City of Los Angeles Animal Control and County of Los Angeles Office of Child Care, and institutions of higher learning, such as faculty and graduate students of Public Health,. The RAS Working Group has been meeting bimonthly to develop and implement strategies to reduce the risk of RAS in vulnerable communities. Strategies include designing and disseminating updated, culturally competent health education materials with tailored RAS prevention messages, participating in relevant community education and outreach activities, and developing and proposing to community-based organizations and stakeholder agencies the integration of policy recommendations on animals, infectious disease, and children's health.

ACDC staff sought opportunities to meet stakeholders who serve vulnerable populations throughout LAC during monthly meetings of the Child Care Planning Committee, whose mission is "to engage parents, child care providers, allied organizations, community, and public agencies in collaborative planning efforts to improve the overall child care infrastructure of the County of Los Angeles, including the quality and continuity, affordability, and accessibility of child care and development services for all families"[2]. ACDC staff regularly provided information and updates during public comment portions of the agendas. Updates focused on RAS prevention, infectious diseases, health and safety, H1N1, emergency preparedness, and

food borne illness outbreaks affecting young children and their families. These updates have reached a wide range of family-based and center-based early childhood education (ECE) providers, State of California Community Care Licensing advocate, parents, and other stakeholders appointed to the Committee, and were summarized in the meeting minutes, which are sent out to hundreds of child care programs and ECE providers throughout the County. Attending these meetings helped ACDC understand the context within which ECE providers work to serve local children, families and communities. Building relationships with the Child Care Planning Committee members has led to opportunities and invitations for ACDC to present workshops at regional ECE professional development conferences and events. In addition, ACDC staff has worked with Child Care Planning Committee members to test and disseminate several new, targeted health education materials to raise RAS awareness among ECE providers.

ACDC determined that conducting site visits with a sample of ECE providers, most of whom are members of the Child Care Planning Committee, would enable staff to see and experience daily life at diverse program sites, conduct informational interviews, and share DPH/ACDC and RAS prevention resources. The aims of these field visits were to: 1) better understand the environments where ECE programs take place; 2) explore ECE provider strengths and challenges in infectious disease prevention, health, and safety; 3) strengthen the relationship between ECE providers and DPH/ACDC; and 4) determine the feasibility of future partnerships for RAS and other infectious disease prevention.

METHODS

A plan was developed to conduct site visits and interviews during the months of June through September, 2009. The visits were designed to strengthen relationships with ECE providers in order to enhance and expand infectious disease prevention practices. In contrast to the formal visits and audits from government inspectors familiar to licensed center-based and family-based ECE providers, ACDC staff embraced a nonjudgmental, conversational approach and philosophy of harm reduction. Using a train-the-trainer concept, staff aimed to encourage ECE providers to integrate RAS prevention education into the training/education of their staff, parents, and children, through ongoing activities at their sites. As teachers and leaders, ECE providers are well-positioned to initiate program-specific changes, including staff training, organizational policy development and enhanced disease prevention practices.

In determining which ECE sites to visit, ACDC staff reviewed findings from 109 surveys they conducted in 2008 with ECE providers during RAS prevention outreach and education sessions at professional development conferences in Central, South, and Southeast Los Angeles and in meetings of the Child Care Planning Committee. They then targeted the 18 ECE providers located throughout the eight Los Angeles County Service Planning Areas (16.5% of total respondents) who reported that they had seen reptiles in their ECE program sites.

Before conducting site visits, staff determined logistics, made introductory telephone calls and emails, and scheduled the visits. Staff conducted an initial visit and then, weeks later, confirmed the schedule and conducted a follow-up visit to each site. Staff informed ECE providers that the visits were voluntary and confidential, and explained the purpose of the site visits. Staff developed and facilitated an interview guide and compiled a binder of bilingual health education materials on RAS prevention and a range of relevant public health topics. Staff assembled a tabbed folder for each site, complete with driving directions, an interview guide, materials order form, and field notes. For the follow-up visits, staff prepared a 12-item evaluation survey, and a resource box filled with color copies of the amount specified of each specific health education material requested, and a “Partners in Public Health” certificate of appreciation for each ECE provider, signed by the ACDC Chief, the DPH Director of Communicable Disease Control, and the ACDC health education unit supervisor.

RESULTS

Of the 18 ECE providers ACDC staff invited to participate, 7 (39%) agreed to the visits. Eleven providers were unreachable despite multiple efforts to engage them. Participating providers were located in SPAs 2, 3, 4, 5, and 8; a total of 1,604 children were enrolled in their programs (Table 1). All of the providers serve culturally and ethnically diverse children from low-income, under-served families, most of whom

receive subsidized child care. Thirteen (13) visits were conducted during the months of June-September 2009. Two ACDC staff members, a research analyst and a student worker, both trained in anthropology, planned and conducted all of the visits, using quantitative (survey) and qualitative (participant observation and interviewing) methods. Two DPH health educators, serving SPAs 2 and 4, each attended one site visit, further strengthening DPH collaboration with ECE providers. ECE providers at six sites (86%) participated in two visits and one provider participated in a single visit; this ECE program had an initial, comprehensive telephone interview prior to the visit, and determined that one visit would be sufficient. During the visits, ACDC staff and ECE providers discussed infectious disease prevention, issues related to animals and children's health, and the activities of the ECE programs. ACDC staff showed sample health education materials, participated in a facility tour, and recorded field notes.

Table 1. Characteristics of site visits conducted

Characteristics	Site A	Site B	Site C	Site D	Site E	Site F	Site G
SPA	4	5	8	5	2	4	3
Facility Type	Center	Center	Family	Center	Center	Center	Center
Year Organization Established	1996	2001	1994	2002	2008	1914	2005
No. Children Served	72	716	15	100	144	473	84
No. Teachers	16	76	4	19	27	65	6
Reptile History	Yes	No	Yes	No	No	No	Yes
Other Pet(s)	Yes	No	Yes	Yes	Yes	Yes	Yes

Three (43%) of the seven providers had a history of having a reptile as a pet in their ECE classroom; one had a reptile (turtle) at the time of the site visit. Six (86%) of the seven had other pets at some point in time, including the following: (fish-4, dog-1, bird-1, hermit crab-1, frogs-1, chicken-1, and rabbit-1). ECE providers shared experiences of receiving, without prior notice, pets gifted to their programs by parents of enrolled children, which presented challenges and opportunities for discussion, learning, and policy changes at their programs.

Staff selected and presented 37 health education materials relevant for ECE environment, including DPH's *Pandemic Flu Toolkit for Early/Child Care Providers and Families*. On average, sites requested and received materials on 26 topics (ranging from 17-37 topics). A total of 2,525 copies (ranging from 85-878 copies); averaging 366 copies per site) of materials were requested and delivered. Topics included: ACDC reportable disease list, several RAS prevention materials, guide to animal bites, bats and rabies, flu prevention, West Nile Virus, food safety self-inspection guide, children's emergency preparedness, daily health checklist, attendance and symptom record, hand washing stickers and posters, California Childcare Health hotline information, district DPH clinic information, Environmental Health resource telephone numbers and websites, and the DPH Office of Health Assessment report, "The ABCs of Child Care: Access, Barriers, and Concerns."

Evaluation results from a 12-item post-visit survey were analyzed; when asked on a scale of 1-10 (10 being most satisfied/most important) about their overall satisfaction, time spent on the visit, face-to-face meeting, and materials requested and received, the average score was 9.57 from all providers. Six (86%) of the seven ECE providers reported that the second visit was necessary. Seven (100%) noted more than one topic of value when asked, "Which health topic(s) was most useful to you?" Seven (100%) reported that they are likely to share the material with more than one population (such as staff, parents, children, advisory board members, colleagues). Seven (100%) ECE provides reported that they plan to implement post-visit changes and two (29%) of seven identified barriers to implementing changes (both of whom indicated lack of time and one indicated lack of funds).

All participating ECE providers shared feedback:

- "The questions asked of our organization helped us to reflect on what existing practices are in place and what additional measures can still be taken to improve upon our agency's systems and infrastructure. The reflective time is a gift. We welcomed all the informative and guiding leaflets and documents."
- "We appreciated the attention to punctuality and brevity. I am grateful for the respectful manner in which our time was valued."
- "The meeting face-to-face was more appropriate due to the sensitivity of our site specific issues. I had some very strong compelling reasons why I thought animals should be a part of the young students' school experience and (ACDC staff) (were) able to patiently and effectively show me the dangers and the importance of educating staff, families, and students (about) the serious health risks with turtles/reptiles."
- "I felt like a follow up doctor's visit. Very important!"
- "Thanks to all the materials we got, our center is now more enriched and in many different languages."
- "I think it is important because we had the opportunity not only to get information but also share ideas in a more friendly way (face to face)."
- "The visit was conducted professionally and I was satisfied with the help given."
- "Having an outside eye look over the facility definitely helped in seeing areas that I can work with."
- "The face to face was important. It gave (them) a chance to see first hand how I am set up and I feel gives them a better ability to customize the information to the needs of the facility."
- "The amount of information exchanged and the handouts, pamphlets, posters could only have been done in person to be effective."
- "Very relevant information and materials shared. Visit tailored to the needs of our Center."
- "Relationship based collaborations seem to be more successful. (ACDC staff) having a chance to see the Center were able to suggest relevant resources."

Responses, when asked, "What changes, if any, will you make as a result of the visit?" were:

- "Developing written policies regarding pets in the classroom. Information received is informing revision of emergency preparedness plan."
- "In the process of sharing it (information) already."
- "Staff/parent training and integrating materials into curriculum."
- "Train staff to be aware of what they have in the classroom and the importance of washing hands constantly."
- "An emergency preparedness supply (can) will be developed. Information on the Pandemic Flu and Reptile-associated Salmonellosis will be presented to parents."
- "As a result of the visit, we were able to make adjustments in our policies and reflected the changes in our Parent Handbook. We also shared information with staff and plan to utilize the information as part of professional staff development."

Responses, when asked, "What could we do to improve future visits?" were:

- "Sending an email prior to the meeting reminding of visit, stating objectives for meeting so that we can better plan for other relevant staff to be present."
- "To improve future visits, it might be a good idea to do a parent workshop and share information with the parents directly…I think future visits could entail walking through classrooms to highlight or pinpoint ways to support the safety and health of children." "Continue to support information with data/statistics and share stories from the field."
- "Continue providing information to the public about health issues to prevent spreading."

CONCLUSION AND RECOMMENDATIONS

As this series of site visits demonstrates, ECE providers working at center-based and family-based programs play a vital role in linking vulnerable, under-served families to needed health resources. ECE providers care deeply about children's health and disease prevention and are committed to taking action

to improve community health. ECE providers merit recognition for their commitment to promoting infectious disease prevention, community health and safety.

Building and sustaining relationships between DPH program staff and ECE providers is mutually beneficial: DPH is able to reach a large number of parents and caregivers throughout Los Angeles County whose children are served by ECE providers, ECE providers are able to access and disseminate health information and resources that the families they serve need. With a growing number of ECE providers participating in local, regional, and national initiatives seeking to improve the quality of services and working conditions for early childhood education, DPH/ACDC should continue to partner with ECE providers via their professional development networks to reach families with priority infectious disease prevention and public health messages and interventions. Furthermore, there is an ongoing and potentially unmet need to reach the many exempt and unlicensed child care providers in Los Angeles County with RAS, infectious disease prevention information, and health and safety updates, since these providers may be unaffiliated with ECE networks and may lack access to targeted public health messages.

All of the ECE providers visited, and providers throughout Los Angeles County routinely use the Early Childhood Environment Rating Scale (ECERS), a nationally recognized and leading method of measuring quality indicators in early childhood education settings. This observational tool identifies nature/science as important elements, and the scoring form includes an “example of science/nature observed in daily events” [3]. As the ECE providers explained during the field visits, many providers have a live animal at their program site in order to fulfill this quality standard. Since education and regulation are important in combating the risk of RAS [4], and the ban on the sale of turtles is poorly enforced [5] perhaps the ECERS tool and scoring sheet should include a recommendation that reptiles and amphibians not be present in the ECE environment, in order to conform to CDC guidelines.

These field visits proved important in building trust and engaging community stakeholders, and more such visits should be conducted where appropriate, to build bridges between DPH and ECE providers and thus advance collaborative infectious disease prevention efforts in Los Angeles County.

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VARICELLA DISEASE INCIDENCE AND CLINICAL PRESENTATION AFTER INTRODUCTION OF THE TWO-DOSE VARICELLA VACCINE SCHEDULE

Amanuel Hussien, MSc; Rachel Civen, MD, MPH

BACKGROUND

Varicella (chickenpox) is a highly infectious disease caused by the varicella-zoster virus (VZV). In 1995, a vaccine to prevent varicella (VARIVAX®) was licensed in the United States for use among healthy children aged ≥ 12 months, adolescents, and adults and was endorsed by the Advisory Committee on Immunization Practices (ACIP) [1]. Since September 1994, the Centers for Disease Control and Prevention (CDC) have sponsored two active surveillance projects for varicella with the Philadelphia Department of Public Health and the Los Angeles County (LAC) of Department of Public Health (DPH) situated in Antelope Valley, California. The objectives of these active surveillance projects have been to obtain population-based varicella incidence rates, to examine the clinical presentation of varicella, and to evaluate the transmission of varicella and varicella vaccine distribution practices.

The Antelope Valley (AV) Varicella Active Surveillance Project (VASP) has conducted population-based active surveillance for varicella disease since January 1, 1995. Since that time, varicella vaccination coverage within LAC increased from 13.9% in 1996 to 92.3% in 2005 for children 19-35 months [2]. Correspondingly the varicella incidence rate (IR) declined by 90% from 1995 to 2005 within the AV VASP [3]; similar results have been reported from Philadelphia. Despite the overall decline in varicella incidence observed within both of the surveillance projects, there were increasing reports of varicella outbreaks nationally among highly vaccinated populations [4]. Investigators also more thoroughly understood the vaccine effectiveness of the one-dose regimen was approximately 85% in the prevention of varicella infection [5] and that improved immunologic response to varicella vaccination developed when one versus two vaccine doses was received [6, 7]. As a result, in 2006, the ACIP adopted new recommendations to support routine two-dose varicella vaccination program for children, with the first dose administered at age 12-15 months, and the second dose at age 4-6 years; a second dose catch-up varicella vaccination for children, adolescent, and adults who previously had received one dose; and routine vaccination with two doses for all healthy persons ≥ 13 years without evidence of immunity [8]. This report presents comparison of the incidence of varicella infection and the clinical presentation of varicella disease at the end of one-dose vaccination era (2005-2006) and the initiation of two-dose varicella vaccine era (2007-2008).

METHODS

Varicella Active Surveillance Project (VASP) conducts active surveillance for varicella disease from more than 300 surveillance sites, which include daycare centers, schools, households, public health clinics, hospitals, skilled nursing facilities, private practice physicians, health maintenance organization offices and correctional facilities. All sites report varicella cases to the VASP every two weeks, even if no cases are identified. Vaccine providers reported varicella vaccine doses administered by age group on a monthly basis. Project staff completed a structured telephone interview with each case or parent/guardian to collect detailed demographic and clinical data.

Case Definitions

- A varicella case is defined as illness with acute onset of a diffuse maculopapulovesicular rash without other known cause that is diagnosed and/or reported by a licensed healthcare provider, school attendance staff, or parents.
- A verified varicella case has a completed case report which validates the diagnosis of varicella and resides in the Antelope Valley (AV).
- A breakthrough (BT) varicella case has illness consistent with varicella infection >42 days after documented varicella vaccination.
- A probable varicella case is reported by a healthcare provider with a clinical history that could not be confirmed by medical chart review or case interview.

Vaccination history is verified on each case using the vaccination record provided by the case, the school, or the medical provider. Susceptible household members are interviewed four to six weeks after the initial contact to identify additional household cases. If phone interview is not obtainable, medical records are reviewed to verify varicella cases.

All data were entered into Microsoft Access and data analysis was performed with SAS® 9.2. Only verified cases were included in the analysis. Annual varicella incidence rates were calculated using AV 2005-2008 US census data as denominators. The relative risk of acquiring varicella in the one-dose era compared to the two-dose vaccine era was calculated comparing the incidence of varicella from 2005-2006 to the incidence of varicella during 2007-2008. The Chi-square test was used to assess statistical significance among variables.

RESULTS

From 2005-2008, 1617 varicella cases were reported; 1270 were verified cases, 56 cases were classified as probable, and 347 cases were excluded because residence was out of the surveillance area or the diagnosis was not consistent with the varicella case definition. Of 1270 verified varicella cases, 757 (60%) and 513 (40%), were reported in 2005-2006 and 2007-2008, respectively. Of the 757 cases, 36 (4.8%) cases were less than one year of age, 92 (12.1%) were 1-4 years, 286 (37.8%) were 5-9 years, 249 (32.9%) were 10-14 years, 38 (5%) were 15-19 years, and 56 (7.4%) were 20 years and older (Table 1). Of the 513 verified cases from 2007-2008, 24 (4.7%) cases were less than one year of age, 72 (14%) were between 1-4 years, 179 (34.9%) were 5-9 years, 168 (32.7%) were 10-14 years, 37 (7.2%) were 15-19 years, and 33 (6.4%) were 20 years and older (Table 1).

Table 1: Verified varicella cases and age- specific incidence rates (IR), Antelope Valley, California, 2005-2008

Age (years)	2005-2006		2007-2008		
	n (%)	IR (#/1000 pop)	n (%)	IR (#/1000 pop)	RR (95% CI)
< 1	36 (4.8)	3.3	24 (4.7)	2.0	1.7 (1.27-2.13)
1 – 4	92 (12.1)	2.2	72 (14.0)	1.5	1.5 (1.28-1.72)
5 – 9	286 (37.8)	5.4	179 (34.9)	3.5	1.5 (1.36-1.64)
10 – 14	249 (32.9)	3.8	168 (32.7)	2.7	1.4 (1.26-1.54)
15 – 19	38 (5.0)	0.6	37 (7.2)	0.5	1.2 (0.93-1.47)
> 19	56 (7.4)	0.12	33 (6.4)	0.07	1.7 (1.45-1.95)
Total	757 (100)	1.1	513 (100)	0.7	1.6 (1.52-1.68)

When the varicella overall incidence rate was compared among all age groups, the varicella incidence declined significantly from 2.6 (2005-2006) to 1.7 (2007-2008) cases per 1,000 population ($p<0.05$) in the two periods, respectively. All age groups <15 years and those >19 years of age show that the risk of varicella disease was greater in the one-dose era, 2005-6, versus the two dose era, 2007-8 (Table 1).

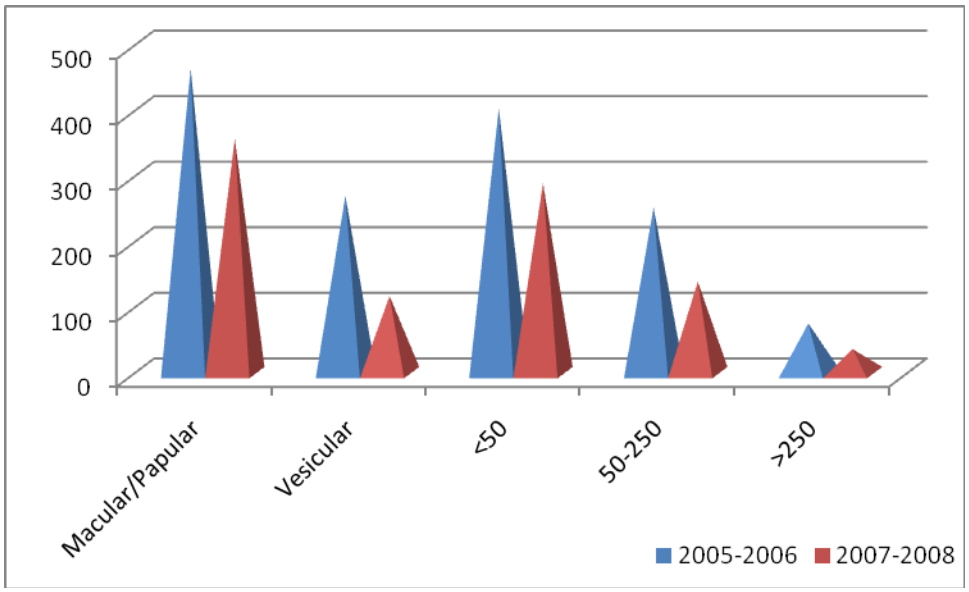
Vaccine doses increased among all age groups <15 years in 2007-2008 compared to 2005-2006. The overall varicella vaccine doses also increased by 149% during this period from 14,858 in 2005-2006 to 37,107 doses in 2007-2008. The largest increase in vaccine doses was among the 5-9 year range increasing from 1666 to 11,504 doses during the respective time periods (Table 2).

Table 2: Varicella Vaccine Doses Administered by Age Group, Antelope Valley, California, 2005 – 2008		
Age Group	**2005-2006**	**2007-2008**
	# vaccine doses (%)	**# vaccine doses (%)**
1-2	9943 (66.4)	12027 (32.4)
3-4	1104 (7.5)	4643 (12.5)
5-9	1666 (11.1)	11504 (31.0)
10-12	1202 (8.0)	5246 (14.1)
13-19	906 (6.0)	3567 (9.6)
>19	162 (1.1)	120 (0.3)
Total	14983 (100)	37107 (100)

Verified breakthrough (BT) cases also declined in 2007-2008 compared to the number reported in 2005-2006. Of the 1270 were verified cases documented from 2005-2008, 727 cases were BT. Of 727 BT varicella cases, 414 and 313 were reported in 2005-2006 and 2007-2008, respectively. The overall proportion of BT cases declined by 25% in the two respective study periods (p>0.05). Of the 414 cases from 2005-2006, 50 (12.0%) were 1-4 years, 242 (58.5) were 5-9 years, 113 (27.3%) were 10-14 years, 7 (1.7%) were 15-19 years, and 2 (0.5%) were 20 years and older. Of the 313 verified cases from 2007-2008, 43 (13.7%) were 1-4 years, 156 (49.8%) were 5-9 years, 111 (35.5%) were 10-14 years, and 3 (1.0%) were 15-19 years (data not shown). The largest proportion of BT cases in both time periods were among children 5-9 year olds. Cases in this age group declined by 35 % from 242 to 156, cases, within the respective time periods, (p=0.01). The median age of BT cases also increased from 8 years in 2005-2006 to 9 years in 2007-08.

The proportion of cases exhibiting a mild clinical presentation increased in 2007-2008 compared to 2005-2006. Cases reporting <50 lesions increased from 55% (2005-2006) to 62% (2007-2008) (p=0.02). Fewer cases reported 50-250 lesions and >250 lesions from 2005-2006 to 2007-2008, but neither of these differences was statistically significant (Figure 1).

Figure 1: Clinical presentation of verified varicella cases, rash description and lesions at presentation, Antelope Valley, CA, 2005-2008.



The proportion reporting mostly macular/papular rash increased from 62% in 2005-2006 to 70% in 2007-2008 (p=0.01) and those reporting vesicular rash decreased from 37% in 2005-2006 to 23% in 2007-2008 (p<0.01) (Figure 1).

CONCLUSION

Varicella incidence declined significantly among all age groups <15 years with the adoption of the recommended two-dose varicella regimen in 2007. There was a 47.6 % decline in overall incidence from 2005-2006 compared to 2007-2008. During both time periods, the 5-9 year old group had the highest age-specific incidence of any of the age groups. This group also had the most significant in age-specific incidence decline with incidence declining from 5.4 to 3.5 cases per 1,000 population (p<0.0001) in the two time periods. The 5-9 year old age group also had the greatest increase in varicella vaccine doses, with an increase of 590.5% in the two time periods (Table 2). The decline in varicella case reports and age specific incidence rates among almost age groups supports the assumption that community-wide varicella transmission was interrupted with the adoption of two-dose of varicella recommendation.

There was also a significant decline in reported BT cases during the two time periods. The total 727 BT varicella cases made up 57% and 43% of total cases in 2005-2006 and 2007-2008, respectively. The decline in BT cases was most likely due to the increased number of children that were vaccinated in the 1-4 and 5-9 age groups.

Vaccine distribution data from VASP also supported that vaccine providers supported the updated ACIP recommendation. The greatest increase in vaccine distribution in 2007-2008 was among the following age groups 1-4 years, 5-9 years and 10-14 years which also correspond to the greatest declines in varicella incidence (Table 2).

VASP surveillance activities are scheduled to continue through September 30, 2011. The current surveillance project challenges include: increasing specimen collection of both BT and non-BT associated varicella cases, continue strong surveillance site project participation and to assess the vaccine coverage within the surveillance area. Concurrently, the project is participating in a combined VASP (Antelope Valley and Philadelphia) case-control study whose goal is to assess the vaccine efficacy of two-dose versus one-dose varicella vaccine regimen. It is hoped that this study will increase laboratory confirmation of varicella cases and to lead to a better understanding of the enhanced protection with the two-dose versus one-dose varicella vaccine schedule.

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