ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT AND SPECIAL STUDIES REPORT

2011

Public Health
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Acute Communicable Disease Control Program

Annual Morbidity Report

2011

Los Angeles County
Department of Public Health

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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 electronic reporting. Electronic laboratory reporting has been in place since 2002 and has expanded to more than twenty-five 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:

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 and foreign travel. 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; the 2010 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 is 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 travelers yearly)—making it the nation's 3rd busiest airport.

- foodborne illnesses, with special interest in *Listeria*, norovirus, *Salmonella* and shiga-toxin producing *E. coli* (STEC)
- vectorborne and zoonotic diseases such as West Nile virus, typhus, and plague as well as meningococcal disease and other causes of encephalitis and meningitis
- acute care hospitals, sub-acute healthcare facilities (e.g., skilled nursing facilities), and ambulatory care settings for disease prevention, infection control, and outbreak investigations

- antimicrobial-resistant bacterial agents such as *Streptococcus pneumoniae*, *Staphylococcus aure*us, *Clostridium difficile*, *Enterococcus*, *Acinetobacter*, and *Klebsiella*
- influenza (including pandemic influenza) and other respiratory pathogens through a variety of case-based, aggregate, and virologic surveillance parameters
- LAC DPH Community Health Services (CHS) for outbreak investigations in community settings, providing guidance, support and consultation on infection prevention and control
- Other LAC programs such as Environmental Health and Health Facilities for communicable disease outbreaks, investigations, and consultation
- 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, engaging infection preventionists, emergency departments, and laboratories in these efforts
- automated disease surveillance systems to enhance surveillance and epidemiology 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, as well as the Centers for Disease Control and Prevention (CDC) on communicable disease matters of regional and national scope.
- the Varicella Surveillance Project, a research project examining the incidence of varicella and herpes zoster, as well as immunization coverage levels and the impact of immunization on this herpes zoster. The Project ceased data collection at the end of 2011 and came to an end in 2012.
- LAC Department of Coroner to identify infectious disease related deaths.

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

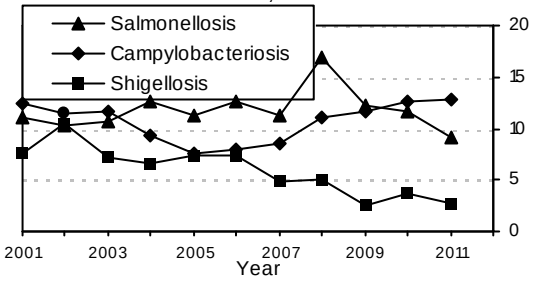
- provide epidemiologic consultation and support, as well as assist with special projects, data maintenance, epidemiologic analysis, data presentation, and geographic information system (GIS)
- plan and evaluate cross-cutting ACDC activities with strategic planning and consequential epidemiology (application of public health research); establish and maintain performance measures for evidence based public health practice
- train and educate internal and external partners to respond 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 many of the investigations and activities conducted by ACDC and CHS. Overall, foodborne diseases have 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 is the lowest in the past ten years, though the campylobacteriosis rate continued to increase over the past five years. Incidence of Shiga-toxin producing *E. coli* (STEC) serotypes has changed in the past two years. Serotype O157:H7 decreased while other serotypes are being reported more often. This is due to the introduction of new stool tests for Shiga toxins which many laboratories are now using; both positive toxin tests and cultures are reportable to Public Health. LAC enteric disease findings are similar to national trends depicting sustained decreases with occasional upsurges

Figure 1
Foodborne Disease
Incidence Rates (cases per 100,000)
by Year
LAC and US, 2001–2011



among many foodborne illnesses, particularly those of the 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 inspection services as well as increased attention to fresh produce safety. Locally, the restaurant grading system in operation in LAC since 1998 advances food safety through training of food handlers and education of the public regarding best practices to reduce foodborne disease.

In 2011, the LAC salmonellosis crude rate dropped to a ten year low. Nationally, the incidence of salmonellosis cases has also been decreasing, but at a slower rate than it has for LAC in the previous ten years.[1] 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 service worker is the source of a salmonellosis outbreak. Another prominent source is reptiles, either by direct contact or through surfaces or other people exposed to reptiles. In 2011, 8.8% of reported LAC salmonellosis cases had contact with turtles, lizards or snakes—an increase of two percentage points that demonstrates the need for continued efforts of the ACDC-led coalition of internal DPH partners and external community stakeholders for community-based prevention 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 21 disease outbreaks in 2011 that were determined to be foodborne, in which at least 353 persons were ill and 12 were hospitalized. Three outbreaks were caused by *Salmonella*, 13 by norovirus, three by bacterial toxin, one by chemical contaminant, and one by fish toxin. While the overall incidence of most foodborne diseases has been decreasing, they continue to account for considerable morbidity and mortality—most likely thousands of preventable infections occur yearly that go unreported. 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., immunocompromise), leading to hospitalization and death. In LAC, foodborne diseases were a contributing factor for at least 16 deaths in 2011. Accordingly, further efforts are needed to improve food quality and to educate the food industry and the public about proper food storage, handling, and preparation.

Efforts are needed to improve food quality and to educate the food industry and the public about proper food storage, handling, and preparation.

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 2011; 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 an ice machine contaminated by an ill customer. Waterborne parasitic disease reports continue to decline for the past ten years, staying below or consistent with statewide incidence rates. From 2006 to 2011, surveillance data reflect a growing proportion of reported amebiasis and giardiasis cases among immigrants and/or refugees in LAC.

From 2006 to 2011, surveillance data reflects a growing proportion of reported amebiasis and giardiasis cases among immigrants in LAC.

[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.

Vectorborne Diseases

Vectorborne disease surveillance has documented the re-emergence of endemic (murine) typhus and other rickettsial diseases in LAC. An increase in murine typhus cases from nine reports in 2005 to over 30 cases was noted in 2011. Murine typhus cases have been documented from known endemic LAC areas of Los Feliz, South Pasadena, and Pasadena as well as newer foci including Santa Monica, downtown Los Angeles, and cities bordering Long Beach. In 2011, West Nile virus (WNV) cases increased from a low of four cases in 2010 to 63 WNV cases in 2011, including 41 cases of neuroinvasive disease (NID), 17 WNV fever cases, and five asymptomatic infections in blood donors. ACDC staff work closely with LAC DPH Veterinary Public Health, Environmental Health Vector Management, and the five local vector control agencies to routinely communicate data, control, and health education issues concerning these vector-borne diseases.

In 2011, LAC experienced the highest WNV activity among all local jurisdictions in the United States.

Invasive Bacterial Diseases

In February 2008, severe community acquired *Staphylococcus aureus* infection was made a reportable disease by California regulation. Forty-four cases that resulted in intensive care unit hospital admission or death were reported in 2011, considerably higher than the 28 cases reported in 2010. However, since almost one third of all cases were reported by only one hospital, substantial under-reporting in both years was likely. Contrary to the publicity around the virulence of methicillin-resistant *S. aureus* (MRSA), only 36% of the cases had MRSA. From interviews with patients or surrogates, it was found that diabetes and current smoking were reported more than any other risk factors. Counter to the popular reports in the press focusing on school aged children with “superbug” infections due to MRSA, those at highest risk for illness were ≥65 years old.

Risk factors for invasive group A streptococcal disease (IGAS) were similar to those for community acquired *S. aureus,* including diabetes and advanced age. The total number of IGAS cases (N=175) was within recent range of cases (129-191). One cluster of IGAS infections (N=7 [5 confirmed and 2 probable]) was identified in a skilled nursing facility. An extensive investigation was undertaken but no source was identified. However, several breakdowns in infection control were identified and the facility was offered infection control training.

Viral Hepatitis

The rate of hepatitis A continued to drop to its lowest recorded level while the rate of acute hepatitis B was stable. For the past two years (2010 and 2011), there have been more reported cases of acute hepatitis B than A, a first for LA County. Though many individual patients appeared to have nosocomial risk factors for acute hepatitis B and C, only one outbreak was detected except a cluster of two patients in an assisted living facility with diabetes. ACDC continues to diligently follow up all potential cases of nosocomial hepatitis B and C.

Influenza

The 2011-2012 influenza season was characterized by mild flu activity both locally and around the nation. Most of the cases of influenza detected in LAC were due to influenza A, unlike the previous season where influenza B was equal to influenza A. Only 21 deaths due to laboratory confirmed influenza were reported, though the median age at death (69 years) was higher than the previous 2 years (~45 years). Based on research, laboratory confirmed deaths represent a small proportion of all influenza related deaths. Influenza A pH1N1 decreased (perhaps due to immunizations and herd immunity). See Influenza Watch for a summary of the 2011-2012 influenza season in LAC.

Vaccine Preventable Diseases

National and international vaccine preventable disease (VPD) outbreaks continue to increase in frequency, and 2011 marked the second highest pertussis incidence in over 50 years although the year’s count was a

decline in incidence from the 2010 epidemic. Notably, over 40% of the 2011 cases were not up-to-date with their vaccinations.

Although infants accounted for the highest incidence rate, adolescents and adults continue to account for a higher proportion of reported cases as they did in 2010. To counter this statewide trend, a California school immunization law was enacted in July 2011 requiring all 7th-12th grade students younger than 18 years of age to receive a Tdap vaccination.

Vaccine Preventable Diseases

- *Although pertussis incidence in LAC has been declining in incidence since the 2010 epidemic, 2011 still recorded the second highest pertussis incidence in over 50 years.*
- *Starting July 2011, all 7th-12th grade students are required to receive a Tdap vaccination according a California school immunization law.*

Due to the international resurgence and 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. A 2011 measles outbreak in Los Angeles County highlighted the importance and practicality of this recommendation when a newly arrived symptomatic refugee with measles from Malaysia exposed two infants and a customs officer, all of whom were not up-to-date on their vaccinations and developed measles.

Although vaccine coverage levels in LAC remain high (over 80% in children) for disease-specific vaccine antigens, an alarming trend among parents to reject, for personal belief reasons, vaccines for their children is on the rise and has contributed to the increased VPD morbidity. 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 vaccine exemptions continues to be high. In 2011, 8% (n=29) of the cases had a personal beliefs pertussis vaccine exemption, double the percentage reported in 2010. A multi-pronged effort incorporating innovative and tailored community-based strategies, especially targeting hard-to-reach populations including international travelers, is being implemented in order to educate parents/guardians about the importance of vaccines and to dispel vaccine myths.

In conjunction with high vaccine coverage levels in children, it's important to achieve and maintain high vaccine coverage levels in adults and adolescents, to curb VPD morbidity in the general community. Attributable in large part to the 2011 California school immunization law, over 98% of LAC students in grades 7th-12th grades were able to document receipt of Tdap vaccine and Tdap coverage for all Californian adolescents 13-17 years of age increased from 71% in 2010 to 83% in 2011. However, California coverage levels remain low for the human papilloma virus vaccine, although improvement has been noted with 43% of California females 13-17 years of age in 2011 able to document receipt of three doses of the vaccine, up from 32% in 2010.

Meningococcal conjugate vaccine (MCV) coverage in California teens remains high at 75%. Although recent MCV coverage level data is not available for LAC, it is estimated to be in the same range as that for California as a whole. Significantly, the incidence of invasive meningococcal disease (IMD) in LAC has continued to show declines across all age- and race-ethnic groups since 1995. In 2011, one outbreak of IMD involving four serogroup C cases was investigated and all cases had some connection with the homeless community. This was the first documented LAC outbreak of IMD in over ten years.

The maintenance of high childhood immunization coverage levels, coupled with steadily increasing adolescent coverage levels should, continue to contribute to the relatively low LAC VPD morbidity levels, when compared to other regions of the country.

Healthcare Associated Infections and Outbreaks

Healthcare associated infections (HAIs) have generated a great deal of attention in the US in recent years, especially the issue of transparency and public reporting of individual hospital infection rates. California legislation mandates healthcare facility reporting of selected conditions and healthcare practices, and established a statewide HAI advisory committee to monitor implementation of these laws to reduce and prevent HAIs. 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. The 2011 CDPH public reports of healthcare associated bloodstream infections and surgical site infections in California hospitals can be found at http://www.cdph.ca.gov/programs/hai/Pages/default.aspx. The data in the report were collected using the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) as a method of standardizing the data.

In 2011, the HOU collaborated with CDPH to conduct a validation project in which 25 on-site hospital visits were made to validate reportable HAI data. The validation project highlighted low sensitivity of reporting central line associated blood stream infections (CLABSIs) and provided consultation to hospitals to improve case identification. The HOU continued to collaborate with CDPH, holding joint information sessions with hospital infection preventionists (IP), hosting monthly conference calls and participating in statewide HAI collaboratives such as the Comprehensive Unit Based Safety Program/Catheter Association Urinary Tract Infection in long term acute care hospitals.

Multidrug-resistant organisms are emerging diseases that have become of increasing public health concern and are frequently HAIs.

Multidrug-resistant organisms are an emerging and increasing public health concern that frequently cause HAIs. In 2011, LAC continued its laboratory surveillance of carbapenem-resistant *Klebsiella pneumoniae* (CRKP). We conducted analysis on the first year of data and found higher rates of CRKP in long term acute care hospitals compared to standard hospitals.

Ambulatory Care Settings

HAIs in ambulatory care settings (ACSs) are a growing concern especially because more healthcare delivery is occurring currently in ACSs rather than acute care hospitals. ACSs are distinct entities, hospital-based or non-hospital-based, that operate exclusively on an outpatient basis for patients who do not require hospitalization with an expected stay of less than 24 hours. In 2011, there were four reported outbreaks in ACSs due to HAIs that include two viral and two bacterial agents. The reported etiologies of these outbreaks included hepatitis B, *Staphylococcus aureus*, and mixed bacteria. For the four outbreak investigations, the total case patient count was 31 (median: 12; mean: 10; range: 5-14). The total number of confirmed cases was nine; three cases were hospitalized. All outbreaks occurred in non-hospital based ACSs, including two contracted home health agencies, one orthopedist office, and one dialysis center. Breaches in infection control identified during these outbreaks related to hand hygiene, reusing single-use medications, and equipment reprocessing and sterilization practices such as improper cleaning of reusable dialyzer headers with O rings (see ACDC 2011 Special Studies Report). ACSs with reported outbreaks were advised of recommended infection control standards and practices. Timely event reporting from ACSs should be promoted in order to prevent and control outbreaks for patient safety.

Sub-acute Healthcare Facilities

The number of reported outbreaks in sub-acute healthcare facilities increased by 5% from 2010 (N=104) to 2011 (N=110). Scabies was the most frequently reported etiology of these outbreaks (35, 31%) followed by gastroenteritis (34, 31%), with 26 of these due to laboratory-confirmed norovirus. Only six respiratory outbreaks were reported in 2011, the same as in 2010, compared to nineteen in 2009 when pandemic influenza was first observed. In four of six respiratory outbreaks, influenza A subtype H3 was identified as the most likely etiology. These influenza outbreaks involved at least 38 skilled nursing facilities (SNFs) residents and 22 staff members. Several studies have documented diminished influenza vaccine efficacy in SNF

residents and the elderly. Routine vaccination of all SNF residents and timely administration of post-exposure influenza antiviral prophylaxis in these and other residential settings involving the elderly is critical to prevent large influenza outbreaks, as is healthcare worker receipt of annual influenza vaccination.

Automated Disease Surveillance

Emergency department syndromic surveillance may provide early detection of bioterrorist-related activity or natural disease outbreaks. Syndromic surveillance can also track trends of known outbreaks or diseases of public health importance such as seasonal influenza.

The achievements of ACDC's automated disease surveillance in 2011 were consolidating gains and building toward future objectives, as well as the continued integration of early detection system activities into routine public health operations. Emergency department syndromic surveillance may provide early detection of bioterrorist-related activity or natural disease outbreaks. Syndromic surveillance can also track trends of known outbreaks as well as diseases and exposures of public health importance such as seasonal influenza, high temperatures, and air pollution.

Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complementing traditional disease surveillance activities; it is one of the tools used for influenza surveillance. In 2011, the near real-time syndromic surveillance system monitored pertussis illness, heat related illness during the summer months, and acute respiratory illnesses. Current hospital participation represents approximately 70% of all emergency department visits in the county and recruitment of additional hospitals is ongoing. Nurse call line, coroner data, veterinary reports of zoonotic diseases, 911 calls, over-the-counter medication sales data, and emergency department ReddiNet, an emergency medical communications network, complement the early event detection system.

vCMR (Visual Confidential Morbidity Report) is a web-based electronic reporting system that 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, manual reporting by hospital infection preventionists, and automated electronic laboratory reporting.

vCMR is aligned with CDC-sponsored initiatives such as the Public Health Information Network (PHIN) and National Electronic Disease Surveillance System (NEDSS). It was converted to a fully web-based application used by the following DPH programs: 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 Control (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 implemented ELR in 2002, and has pursued efforts to recruit and implement additional laboratories, with feeds from 21 laboratories in 2011.

Bioterrorism, Emergency Preparedness and Response Activities

The ACDC Bioterrorism Preparedness and Response team continues active participation and association 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.

Collaboration and partnership continues at the Joint Regional Intelligence Center (JRIC) with a public health nurse detailed to this fusion center, composed of public health, fire services, police, sheriff, and Federal

Bureau of Investigation (FBI) departments working in partnership with other local, state, and federal programs to share and analyze information, disseminate intelligence, and assist with the coordination of resources for a unified response to a terrorism event. The PHN manages and directs the fusion center medical program. This added value and presence of public health expertise at the JRIC allows for the analysis, sharing, and early identification of sensitive health, medical and classified threat information that may pose a public health risk in LAC.

Through ongoing partnership and relationship with the California National Guard 9th Civil Support Team, DPH participated in a full-scale multi-agency bioterrorism response exercise on board on a military cargo vessel docked at a LAC Port. For this exercise, the ACDC training and response unit coordinated and guided a core team for response to a suspected bioterrorism threat in LAC. Participation in these types of exercises provide opportunities to continue testing skills capabilities, improve workforce competence, and increase confidence in response to potential public health emergency events and incidents (see 2011 Special Studies Report). The Response Unit provides ongoing subject matter expertise consultation related to biological incidents to other public health programs, first responder agencies, hospitals and the community as needed. The team will respond in the field to quickly assess and evaluate situations reported as unusual or suspected or cases of Category A agents. This unit works closely with the Public Health Laboratory Bioterrorism Response Unit to prioritize risk level and evaluate situations related to clinical specimens submitted for Category A agent testing. The unit is included in the development of training and planning efforts for upcoming biological response exercises in coordination with other DPH units such as EPRP, OD&T and CHS.

Planning and Evaluation

In 2011, the ACDC Planning and Evaluation Unit convened a Southern California regional workshop to provide training to local public health departments in utilizing Council to Improve Foodborne Outbreak Response (CIFOR)'s *Guidelines for Foodborne Disease Outbreak Response* and its Toolkit. The target audiences for this project were multidisciplinary state, county and city-based teams involved in outbreak response, including epidemiologists, public health laboratorians, environmental health specialists, and public health nurses. The workshop was attended by 57 public health professionals from 11 Southern California jurisdictions. The workshop consisted of case study presentations with tabletop exercises, break-out session with professional peer groups, and action planning session. Workshop attendees gained resources and skills to facilitate foodborne outbreak response. The CIFOR *Guidelines* can influence standardization of foodborne disease investigation as well as other communicable disease investigations. Moreover, continuous utilization of the *Guidelines* and diligent follow-through of the action planning will be essential in contributing to foodborne disease prevention and management.

The Unit's activities and efforts are fundamentally based on the concept of syndemics—*two or more afflictions, interacting synergistically, contributing to excess burden of disease in a population*[2]—which is crucial to enhancing capacity to respond to communicable disease outbreaks and emerging infectious diseases, and to preparing for natural and man-made disasters. Building capacity and community resiliency with the networks of schools, healthcare professionals, and various public and private stakeholders will increase effectiveness and efficiency of public health prevention, preparedness, response, intervention, and mitigation efforts. The Unit continues to work with early childhood education providers for outreach and education on various communicable diseases and emerging infectious diseases.

[2] CDC. Syndemics Prevention Network. Available at: http://www.cdc.gov/syndemics/definition.htm.

Acute Communicable Disease Control
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LOS ANGELES COUNTY
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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
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ACUTE COMMUNICABLE DISEASE CONTROL
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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
PUBLICATIONS AND PRESENTATIONS
2011

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Chaves SS, Lopez AS, Watson TL, Civen R, Watson B, Mascola L, Seward JF. Varicella in infants after implementation of the US varicella vaccination program. *Pediatrics* 2011 Dec; 128 (6):1071-7.

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OVERVIEW

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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
ANNUAL MORBIDITY REPORT
OVERVIEW
2011

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 can be obtained from the Centers for Disease Control and Prevention (CDC) Final Summary of Nationally Notifiable Infectious Diseases on the CDC Morbidity and Mortality Weekly Report (MMWR) web page: http://www.cdc.gov/mmwr/mmwr_nd/index.html.

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 (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] *July 1, 2010 Population Estimates, prepared by Walter R. McDonald & Associates, Inc. (WRMA) for Urban Research, LA County ISD, released 11/24/2010.*

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/CSTE (Council of State and Territorial Epidemiologists) case definition for infectious diseases under public surveillance[2] 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.

[2] 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 can be found in the Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report (MMWR): Final Summary of Nationally Notifiable Infectious Diseases for the corresponding year. 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. Disease rates for <19 cases are omitted as the rates are unreliable.

5. Figures

Figures include disease incidence rates of the Los Angeles County and/or 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. For CA and US rates, refer to the Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html. 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
2011

Table A. Los Angeles County* population by year, 2006–2011

Year	Population	% change
2006	9,644,738	
2007	9,689,462	0.5%
2008	9,728,653	0.4%
2009	9,767,825	0.4%
2010	9,811,210	0.4%
2011**	9,811,210	N/A

* Does not include cities of Pasadena and Long Beach.
**Using 2010 population estimation.

Table B. Los Angeles County* population by age group, 2011**

Age (in years)	Population	%
<1	139,594	1.4%
1–4	580,715	5.9%
5–14	1,328,782	13.5%
15–34	2,949,243	30.1%
35–44	1,439,373	14.7%
45–54	1,351,811	13.8%
55–64	961,483	9.8%
65+	1,060,209	10.8%
Total	**9,811,210**	**100.0%**

* Does not include cities of Pasadena and Long Beach.
**Using 2010 population estimation.

Table C. Los Angeles County* population by sex, 2011**

Sex	Population	%
Male	4,870,901	49.6%
Female	4,940,309	50.4%
Total	**9,811,210**	**100.0%**

* Does not include cities of Pasadena and Long Beach.
**Using 2010 population estimation.

Table D. Los Angeles County* population by race, 2011***

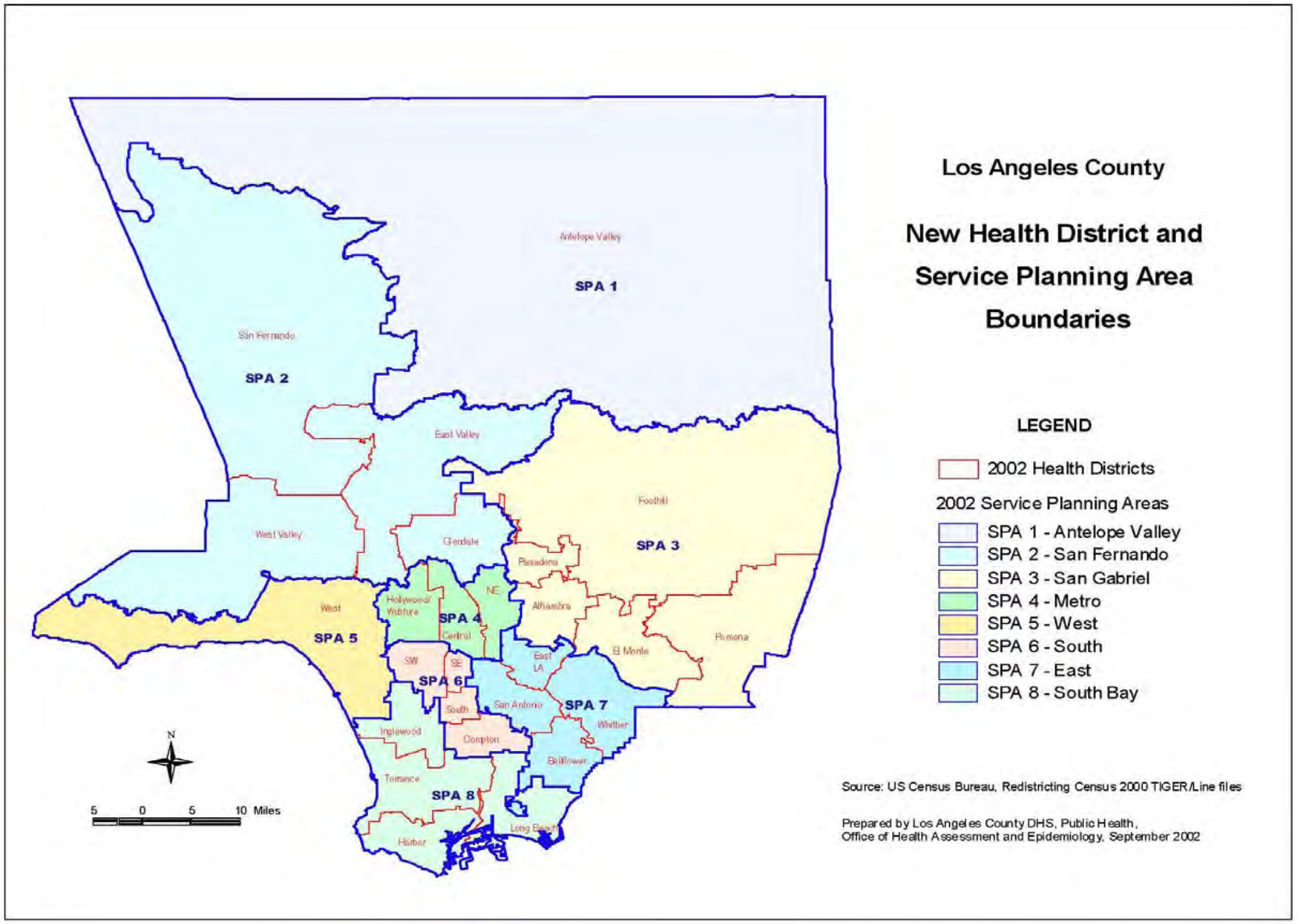
Race	Population	%
Asian	1,333,490	13.6%
Black	852,875	8.7%
Latino	4,732,396	48.2%
White	2,866,642	29.2%
Other**	25,807	0.3%
Total	**9,811,210**	**100.0%**

* Does not include cities of Pasadena and Long Beach.
** Includes American Indian, Alaskan Native, Eskimo and Aleut.
***Using 2010 population estimation.

Table E. Los Angeles County*
population by health district and SPA, 2011**

Health District	Population
SPA1	**373,098**
Antelope valley	373,098
SPA 2	**2,215,358**
East Valley	468,686
Glendale	356,551
San Fernando	482,391
West Valley	907,730
SPA 3	**1,735,085**
Alhambra	364,710
El Monte	479,881
Foothill	315,894
Pomona	574,600
SPA 4	**1,258,210**
Central	369,234
Hollywood Wilshire	537,394
Northeast	351,582
SPA 5	**659,937**
West	659,937
SPA 6	**1,069,244**
Compton	291,145
South	195,239
Southeast	183,839
Southwest	399,021
SPA 7	**1,377,438**
Bellflower	370,977
East Los Angeles	216,377
San Antonio	452,297
Whittier	337,787
SPA 8	**1,122,840**
Inglewood	435,896
Harbor	214,896
Torrance	472,048
Total	**9,811,210**

* Pasadena and Long Beach are separate health jurisdictions and as such are excluded from this table.
**Using 2010 population estimation.


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
Alhambra
West
SPA 5
Central
El Monte
Pomona
SW
SE
East LA
SPA 6
SPA 7
South
San Antonio
Whittier
Inglewood
Compton
Bellflower
Torrance
SPA 8
Long Beach
Harbor
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

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Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2006-2011

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2006	2007	2008	2009	2010	2011		
Amebiasis	94	122	115	107	119	86	111	131
Botulism	2	1	5	1	1	3	2	5
Brucellosis	5	3	3	4	7	6	4	7
Campylobacteriosis	775	825	1072	1135	1239	1259	1009	1361
Cholera	0	0	0	0	0	0	0	0
Coccidioidomycosis[b]	196	145	228	171	235	304	195	262
Cryptosporidiosis	48	50	41	51	61	51	50	63
Cysticercosis	11	7	6	9	3	4	7	13
Dengue	2	3	0	2	1	0	2	4
E. *coli* O157:H7[b]	12	12	16	18	12	21	14	19
E. *coli* Other Stec	6	13	11	20	45	67	-	-
Encephalitis	46	65	89	51	51	59	60	91
Foodborne Outbreaks	37	21	18	16	17	22	22	37
Giardiasis	376	441	355	354	308	292	367	452
Haemophilus Influenzae Type B	5	1	0	2	0	0	2	5
Hansen's Disease (Leprosy)	2	5	1	3	2	2	3	5
Hepatitis A	364	78	80	66	51	45	128	360
Hepatitis B	62	55	66	41	54	60	56	72
Hepatitis C[b]	4	3	5	8	4	10	5	8
Hepatitis Unspecified	7	10	4	19	5	4	9	20
Kawasaki Syndrome[c]	75	52	55	70	65	43	63	81
Legionellosis[b]	24	40	59	66	108	116	59	115
Listeriosis, Nonperinatal	25	21	20	15	14	19	19	27
Listeriosis, Perinatal	12	6	2	5	4	6	6	12
Lyme Disease	16	8	9	4	5	6	8	17
Malaria	33	26	30	24	25	22	28	34
Measles	1	0	1	1	8	8	2	8
Meningitis, Viral	373	395	597	399	570	317	467	655
Meningococcal Infections	46	24	30	21	26	37	29	47
Mumps	10	5	7	7	20	3	10	20
Pertussis	150	69	80	156	972	453	285	962
Pneumococcal Disease, Invasive	533	624	662	786	576	657	636	806
Psittacosis	1	0	0	1	0	0	0	1
Q-fever	1	2	2	0	1	0	1	3
Relapsing Fever	2	0	0	0	0	0	0	2
Rheumatic Fever, Acute	0	0	1	1	1	0	1	2
Rubella	0	0	1	0	0	1	0	1
Salmonellosis	1217	1081	1638	1194	1142	900	1254	1641
Shigellosis	524	463	498	259	355	264	420	614
Staphylococcus Aureus Infection	-	-	25	27	28	44	-	-
Streptococcus, Group A Invasive	197	173	156	129	191	175	169	218
Strongyloidiasis	0	0	0	0	0	0	0	0
Tetanus	4	0	2	0	0	0	1	4
Trichinosis	1	0	0	0	0	0	0	1
Tularemia	0	0	0	0	0	0	0	0
Typhoid Fever, Case	17	17	14	17	15	15	16	18
Typhoid Fever, Carrier	3	1	4	1	4	3	3	5
Typhus Fever[b]	10	17	18	9	31	38	17	32
Vibrio	18	13	18	26	13	19	18	27
West Nile Virus	16	43	170	25	4	63	52	170

[a]The normal distribution assumption may not apply to some rare diseases.
[b]2011 data over 95% upper limit.
[c]Base on 71/2 months data for year 2011.

Table H. Annual Incidence Rates of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2006-2011

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2006	2007	2008	2009	2010	2011
Amebiasis	0.97	1.26	1.18	1.10	1.21	0.88
Botulism	0.02	0.01	0.05	0.01	0.01	0.03
Brucellosis	0.05	0.03	0.03	0.04	0.07	0.06
Campylobacteriosis	8.04	8.51	11.02	11.62	12.63	12.83
Cholera	-	-	-	-	-	-
Coccidioidomycosis	2.03	1.50	2.34	1.75	2.40	3.10
Cryptosporidiosis	0.50	0.52	0.42	0.52	0.62	0.52
Cysticercosis	0.11	0.07	0.06	0.09	0.03	0.04
Dengue	0.02	0.03	-	0.02	0.01	-
E. *coli* O157:H7	0.12	0.12	0.16	0.18	0.12	0.21
E. *coli* Other Stec	0.06	0.13	0.11	0.21	0.46	0.68
Encephalitis	0.48	0.67	0.91	0.52	0.52	0.60
Giardiasis	3.90	4.55	3.65	3.62	3.14	2.98
Haemophilus Influenzae Type B	0.05	0.01	-	0.02	-	-
Hansen's Disease (Leprosy)	0.02	0.05	0.01	0.03	0.02	0.02
Hepatitis A	3.77	0.80	0.82	0.68	0.52	0.46
Hepatitis B	0.64	0.57	0.68	0.42	0.55	0.61
Hepatitis C	0.04	0.02	0.05	0.08	0.04	0.10
Hepatitis Unspecified	0.07	0.10	0.04	0.19	0.05	0.04
Kawasaki Syndrome	0.78	0.54	0.57	0.72	0.66	-
Legionellosis	0.25	0.41	0.61	0.68	1.10	1.18
Listeriosis, Nonperinatal	0.26	0.22	0.21	0.15	0.14	0.19
Listeriosis, Perinatal[a]	8.47	4.23	1.45	4.60	3.23	4.95
Lyme Disease	0.17	0.08	0.09	0.04	0.05	0.06
Malaria	0.34	0.27	0.31	0.25	0.25	0.22
Measles	0.01	-	0.01	0.01	0.08	0.08
Meningitis, Viral	3.87	4.08	6.14	4.08	5.81	3.23
Meningococcal Infections	0.48	0.25	0.31	0.21	0.27	0.38
Mumps	0.10	0.05	0.07	0.07	0.20	0.03
Pertussis	1.56	0.71	0.82	1.60	9.91	4.62
Pneumococcal Disease, Invasive	5.53	6.44	6.80	8.05	5.87	6.70
Psittacosis	0.01	-	-	0.01	-	-
Q-fever	0.01	0.02	0.02	-	0.01	-
Relapsing Fever	0.02	-	-	-	-	-
Rheumatic Fever, Acute	-	-	0.01	0.01	0.01	-
Rubella	-	-	0.01	-	-	0.01
Salmonellosis	12.62	11.16	16.84	12.22	11.64	9.17
Shigellosis	5.43	4.78	5.12	2.65	3.62	2.69
Staphylococcus Aureus Infection	-	-	0.26	0.28	0.29	0.45
Streptococcus, Group A Invasive	2.04	1.79	1.60	1.32	1.95	1.78
Strongyloidiasis	-	-	-	-	-	-
Tetanus	0.04	-	0.02	-	-	-
Trichinosis	0.01	-	-	-	-	-
Tularemia	-	-	-	-	-	-
Typhoid Fever, Case	0.18	0.18	0.14	0.17	0.15	0.15
Typhoid Fever, Carrier	0.03	0.01	0.04	0.01	0.04	0.03
Typhus Fever	0.10	0.18	0.19	0.09	0.32	0.39
Vibrio	0.19	0.13	0.19	0.27	0.13	0.19
West Nile Virus	0.17	0.44	1.75	0.26	0.04	0.64

[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, 2007-2011

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	8.8	8.8	9.4	7.8	8.8	8.4	8.2	9.0	7.6	9.4	7.6	9.0	109.8
Botulism	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.2	0.2	0.0	1.0	0.0	1.8
Brucellosis	0.4	0.4	0.2	1.2	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.4	4.6
Campylobacteriosis	58.6	40.8	49.4	57.4	65.2	81.0	88.0	78.8	68.6	59.6	52.0	42.8	1106.0
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	16.0	15.2	13.2	16.2	17.8	17.8	18.8	18.8	18.4	22.4	23.6	216.6
Cryptosporidiosis	3.4	3.6	2.8	4.4	2.8	3.6	4.6	7.6	5.0	3.2	2.6	2.8	50.8
Cysticercosis	0.2	0.4	1.2	0.6	0.4	0.6	0.8	0.0	0.0	0.6	0.0	0.2	5.8
Dengue	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.6	0.0	0.0	1.2
E. *coli* O157:H7	0.8	0.2	1.0	0.4	1.8	2.2	3.2	2.0	2.2	1.4	0.0	0.6	15.8
E. *coli* Other Stec[a]	1.0	0.4	2.4	2.0	3.0	3.2	4.4	5.0	2.8	2.8	1.8	0.8	29.6
Encephalitis	4.0	2.6	4.8	2.4	2.4	3.4	4.6	8.4	11.2	4.8	3.6	2.8	63.0
Giardiasis	25.6	24.8	25.8	28.8	25.8	28.2	34.0	35.6	33.4	26.0	23.2	23.2	350.0
Haemophilus Influenzae Type B	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.6
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	4.6	7.2	4.4	6.2	5.2	5.0	4.4	7.2	7.6	4.2	5.0	2.8	64.0
Hepatitis B	5.4	4.4	4.6	4.4	5.2	5.8	3.6	4.4	5.6	4.6	4.2	2.8	55.2
Hepatitis C	0.2	0.0	0.6	0.2	0.2	0.8	0.2	1.0	0.6	1.4	0.4	0.2	5.8
Hepatitis Unspecified	0.4	0.2	0.2	0.0	0.2	0.4	0.4	0.0	0.0	0.0	0.0	0.2	8.4
Kawasaki Syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-
Legionellosis	8.0	6.8	6.0	5.6	5.4	6.2	6.2	6.0	4.8	5.6	7.0	10.2	77.8
Listeriosis, Nonperinatal	0.6	1.4	1.0	0.8	1.6	2.4	1.2	3.6	2.6	1.2	0.8	0.6	17.8
Listeriosis, Perinatal	0.4	0.8	0.0	0.2	0.4	0.4	0.6	0.8	0.6	0.2	0.2	0.0	4.6
Lyme Disease	0.2	0.2	0.0	0.2	0.2	1.4	3.2	0.6	0.2	0.2	0.0	0.0	6.4
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	0.0	0.0	0.8	0.0	0.6	0.4	0.2	0.8	0.6	0.0	0.2	0.0	3.6
Meningitis, Viral	27.4	15.8	18.4	25.0	26.0	33.6	55.0	63.6	55.6	46.4	33.0	24.0	455.6
Meningococcal Infections	3.0	5.6	3.4	3.0	1.6	2.6	1.4	1.8	1.2	0.6	1.4	2.0	27.6
Mumps	0.6	0.8	0.8	1.2	1.2	0.6	0.6	0.6	0.2	0.4	0.4	1.0	8.4
Pertussis	21.4	16.4	19.2	18.2	22.0	30.2	48.4	47.2	39.6	32.2	27.8	23.4	346.0
Pneumococcal Disease, Invasive	95.4	99.8	76.6	55.4	45.0	39.2	23.6	21.0	22.4	39.4	54.0	89.0	660.8
Psittacosis	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Q-fever	0.4	0.0	0.0	0.0	0.2	0.2	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rheumatic Fever, Acute	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6
Rubella	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Salmonellosis	57.2	56.6	57.0	70.2	100.4	102.8	133.0	135.0	105.4	195.8	81.8	67.0	1191.0
Shigellosis	18.2	15.4	13.8	16.4	28.2	26.0	50.8	58.0	48.4	36.2	26.4	19.2	367.8
Staphylococcus Aureus Infection	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptococcus, Group A Invasive	17.6	16.0	18.8	16.8	16.8	14.2	9.6	10.0	9.0	8.4	11.4	14.2	162.8
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	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.4
Trichinosis	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
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	1.2	1.6	0.4	2.4	1.4	2.0	0.8	1.6	1.0	0.6	1.8	0.8	15.6
Typhoid Fever, Carrier	0.2	0.4	0.2	0.2	0.8	0.0	0.2	0.0	0.0	0.2	0.0.	0.2	2.6
Typhus Fever	2.0	0.6	0.6	0.2	0.4	1.2	2.4	3.2	2.8	3.0	4.0	2.2	22.6
Vibrio	0.4	0.4	1.2	1.0	0.8	1.0	3.2	3.6	2.6	2.0	0.6	0.0	17.8
West Nile Virus	0.0	0.0	0.0	0.0	0.2	1.0	8.4	20.0	24.6	5.4	0.4	0.0	60.8

[a] Not applicable.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2011

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	1	1	4	26	17	15	9	13	86
Botulism	0	0	0	0	0	1	1	1	3
Brucellosis	0	0	0	1	1	2	0	2	6
Campylobacteriosis	16	158	146	366	133	142	114	172	1259
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	0	1	3	62	35	67	54	82	304
Cryptosporidiosis	0	3	6	16	10	6	3	7	51
Cysticercosis	0	0	0	1	0	1	1	1	4
Dengue	0	0	0	0	0	0	0	0	0
E. *coli* O157:H7	0	6	6	3	2	0	2	2	21
E. *coli* Other Stec	8	30	8	12	2	0	3	4	67
Encephalitis	3	4	10	8	2	9	8	15	59
Giardiasis	1	22	39	84	49	44	29	23	292
Haemophilus Influenzae Type B	0	0	0	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	1	1	0	0	0	2
Hepatitis A	0	1	3	18	11	5	3	4	45
Hepatitis B	0	0	0	12	10	21	12	5	60
Hepatitis C	0	0	0	4	2	1	1	2	10
Hepatitis Unspecified	0	0	0	0	2	1	1	0	4
Kawasaki Syndrome[c]	10	26	7	0	0	0	0	0	43
Legionellosis	0	0	0	5	7	21	22	61	116
Listeriosis, Nonperinatal	0	0	0	0	0	4	5	10	19
Listeriosis, Perinatal[b]	0	0	0	3	3	0	0	0	6
Lyme Disease	0	0	0	1	0	3	1	1	6
Malaria	0	0	5	3	2	8	3	1	22
Measles	0	3	0	5	0	0	0	0	8
Meningitis, Viral	33	6	53	102	39	41	24	18	317
Meningococcal Infections	0	1	1	12	10	3	5	5	37
Mumps	0	0	0	2	0	0	0	1	3
Pertussis	139	73	133	48	26	14	9	11	453
Pneumococcal Disease, Invasive	7	35	31	64	57	107	128	227	657
Psittacosis	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0
Rubella	0	0	0	1	0	0	0	0	1
Salmonellosis	61	134	148	186	93	86	86	106	899
Shigellosis	4	30	37	80	41	44	15	12	264
Staphylococcus Aureus Infection	0	0	2	6	6	9	8	13	44
Streptococcus, Group A Invasive	1	6	10	16	28	32	36	46	175
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	1	0	1	6	2	3	1	1	15
Typhoid Fever, Carrier	0	0	0	0	1	1	1	0	3
Typhus Fever	0	1	3	5	5	9	9	6	38
Vibrio	0	0	1	5	3	5	3	2	19
West Nile Virus	0	0	1	5	3	16	17	21	63

[a] Totals include cases with unknown age.

[b] Mother's age.

[c] Base on 7 ½ months data.

Table K. Incidence Rates of Selected Notifiable Diseases by Age Group
Los Angeles County, 2011

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	0.7	0.2	0.3	0.9	1.2	1.1	0.9	1.2
Botulism	-	-	-	-	-	0.1	0.1	0.1
Brucellosis	-	-	-	-	0.1	0.1	-	0.2
Campylobacteriosis	11.5	27.2	11.0	12.4	9.2	10.5	11.9	16.2
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	-	0.2	0.2	2.1	2.4	5.0	5.6	7.7
Cryptosporidiosis	-	0.5	0.5	0.5	0.7	0.4	0.3	0.7
Cysticercosis	-	-	-	-	-	0.1	0.1	0.1
Dengue	-	-	-	-	-	-	-	-
E. *coli* O157:H7	-	1.0	0.5	0.1	0.1	-	0.2	0.2
E. *coli* Other Stec	5.7	5.2	0.6	0.4	0.1	-	0.3	0.4
Encephalitis	2.1	0.7	0.8	0.3	0.1	0.7	0.8	1.4
Giardiasis	0.7	3.8	2.9	2.8	3.4	3.3	3.0	2.2
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-	0.1	-	-	-
Hepatitis A	-	0.2	0.2	0.6	0.8	0.4	0.3	0.4
Hepatitis B	-	-	-	0.4	0.7	1.6	1.2	0.5
Hepatitis C	-	-	-	0.1	0.1	0.1	0.1	0.2
Hepatitis Unspecified	-	-	-	-	0.1	0.1	0.1	-
Kawasaki Syndrome	-	-	-	-	-	-	-	-
Legionellosis	-	-	-	0.2	0.5	1.6	2.3	5.8
Listeriosis, Nonperinatal	-	-	-	-	-	0.3	0.5	0.9
Listeriosis, Perinatal[a]	-	-	-	3.1	12.3	-	-	-
Lyme Disease	-	-	-	-	-	0.2	0.1	0.1
Malaria	-	-	0.4	0.1	0.1	0.6	0.3	0.1
Measles	-	0.5	-	0.2	-	-	-	-
Meningitis, Viral	23.6	1.0	4.0	3.5	2.7	3.0	2.5	1.7
Meningococcal Infections	-	0.2	0.1	0.4	0.7	0.2	0.5	0.5
Mumps	-	-	-	0.1	-	-	-	0.1
Pertussis	99.6	12.6	10.0	1.6	1.8	1.0	0.9	1.0
Pneumococcal Disease, Invasive	5.0	6.0	2.3	2.2	4.0	7.9	13.3	21.4
Psittacosis	-	-	-	-	-	-	-	-
Q-fever	-	-	-	-	-	-	-	-
Relapsing Fever	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-	-	-	-	-
Rubella	-	-	-	-	-	-	-	-
Salmonellosis	43.7	23.1	11.1	6.3	6.5	6.4	8.9	10.0
Shigellosis	2.9	5.2	2.8	2.7	2.8	3.3	1.6	1.1
Staphylococcus Aureus Infection	-	-	0.2	0.2	0.4	0.7	0.8	1.2
Streptococcus, Group A Invasive	0.7	1.0	0.8	0.5	1.9	2.4	3.7	4.3
Strongyloidiasis	-	-	-	-	-	-	-	-
Tetanus	-	-	-	-	-	-	-	-
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	0.7	-	0.1	0.2	0.1	0.2	0.1	0.1
Typhoid Fever, Carrier	-	-	-	-	0.1	0.1	0.1	-
Typhus Fever	-	0.2	0.2	0.2	0.3	0.7	0.9	0.6
Vibrio	-	-	0.1	0.2	0.2	0.4	0.3	0.2
West Nile Virus	-	-	0.1	0.2	0.2	1.2	1.8	2.0

[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, 2011

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	1	7	40	27	2	9
Botulism	0	0	2	1	0	0
Brucellosis	0	0	5	0	0	1
Campylobacteriosis	28	21	157	119	14	920
Cholera	0	0	0	0	0	0
Coccidioidomycosis	23	48	94	134	1	4
Cryptosporidiosis	3	6	11	20	0	11
Cysticercosis	1	0	3	0	0	0
Dengue	0	0	0	0	0	0
E. *coli* O157:H7	1	1	8	11	0	0
E. *coli* Other Stec	5	2	42	17	0	1
Encephalitis	0	4	33	14	1	7
Giardiasis	20	18	89	146	2	17
Haemophilus Influenzae Type B	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	0	2
Hepatitis A	13	2	8	22	0	0
Hepatitis B	3	13	19	23	0	2
Hepatitis C	1	0	6	2	0	1
Hepatitis Unspecified	0	0	1	0	0	3
Kawasaki Syndrome[c]	13	3	22	5	0	0
Legionellosis	8	20	37	47	2	2
Listeriosis, Nonperinatal	2	0	4	13	0	0
Listeriosis, Perinatal[b]	2	0	3	1	0	0
Lyme Disease	0	0	0	6	0	0
Malaria	2	12	1	2	0	5
Measles	4	0	2	1	0	1
Meningitis, Viral	21	37	147	78	7	27
Meningococcal Infections	4	12	11	10	0	0
Mumps	0	0	0	3	0	0
Pertussis	17	24	286	110	0	16
Pneumococcal Disease, Invasive	49	130	244	233	1	0
Psittacosis	0	0	0	0	0	0
Q-fever	0	0	0	0	0	0
Relapsing Fever	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	0	0	0
Rubella	1	0	0	0	0	0
Salmonellosis	64	53	464	279	8	32
Shigellosis	4	24	149	78	0	9
Staphylococcus Aureus Infection	7	3	17	15	1	1
Streptococcus, Group A Invasive	13	22	49	45	0	46
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	7	0	8	0	0	0
Typhoid Fever, Carrier	0	0	3	0	0	0
Typhus Fever	1	2	9	23	0	3
Vibrio	0	1	8	9	0	1
West Nile Virus	1	1	26	30	2	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.

[c]Base on 7 ½ months data.

Table M. Incidence Rates of Selected Notifiable Diseases by Race/Ethnicity
Los Angeles County, 2011

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.1	0.8	0.8	0.9
Botulism	-	-	-	-
Brucellosis	-	-	0.1	-
Campylobacteriosis	2.1	2.5	3.3	4.2
Cholera	-	-	-	-
Coccidioidomycosis	1.7	5.6	2.0	4.7
Cryptosporidiosis	0.2	0.7	0.2	0.7
Cysticercosis	0.1	-	0.1	-
Dengue	-	-	-	-
E. *coli* O157:H7	0.1	0.1	0.2	0.4
E. *coli* Other Stec	0.4	0.2	0.9	0.6
Encephalitis	-	0.5	0.7	0.5
Giardiasis	1.5	2.1	1.9	5.1
Haemophilus Influenzae Type B	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-
Hepatitis A	1.0	0.2	0.2	0.8
Hepatitis B	0.2	1.5	0.4	0.8
Hepatitis C	0.1	-	0.1	0.1
Hepatitis Unspecified	-	-	-	-
Kawasaki Syndrome	-	-	-	-
Legionellosis	0.6	2.3	0.8	1.6
Listeriosis, Nonperinatal	0.1	-	0.1	0.5
Listeriosis, Perinatal[a]	13.1	-	4.1	4.6
Lyme Disease	-	-	-	0.2
Malaria	0.1	1.4	-	0.1
Measles	0.3	-	-	-
Meningitis, Viral	1.6	4.3	3.1	2.7
Meningococcal Infections	0.3	1.4	0.2	0.3
Mumps	-	-	-	0.1
Pertussis	1.3	2.8	6.0	3.8
Pneumococcal Disease, Invasive	3.7	15.2	5.2	8.1
Psittacosis	-	-	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-
Rubella	0.1	-	-	-
Salmonellosis	4.8	6.2	9.8	9.7
Shigellosis	0.3	2.8	3.1	2.7
Staphylococcus Aureus Infection	0.5	0.4	0.4	0.5
Streptococcus, Group A Invasive	1.0	2.6	1.0	1.6
Strongyloidiasis	-	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.5	-	0.2	-
Typhoid Fever, Carrier	-	-	0.1	-
Typhus Fever	0.1	0.2	0.2	0.8
Vibrio	-	0.1	0.2	0.3
West Nile Virus	0.1	0.1	0.5	1.0

[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, 2011

Disease	Male		Female	
	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	52	1.1	34	0.7
Botulism	2	0.0	1	0.0
Brucellosis	3	0.1	1	0.0
Campylobacteriosis	671	13.8	570	11.5
Cholera	0	-	0	-
Coccidioidomycosis	190	3.9	114	2.3
Cryptosporidiosis	32	0.7	19	0.4
Cysticercosis	3	0.1	1	0.0
Dengue	0	-	0	-
E. *coli* O157:H7	11	0.2	10	0.2
E. *coli* Other Stec	34	0.7	33	0.7
Encephalitis	28	0.6	30	0.6
Giardiasis	198	4.1	93	1.9
Haemophilus Influenzae Type B	0	-	0	-
Hansen's Disease (Leprosy)	2	0.0	0	-
Hepatitis A	29	0.6	16	0.3
Hepatitis B	40	0.8	20	0.4
Hepatitis C	6	0.1	4	0.1
Hepatitis Unspecified	2	0.0	1	0.0
Kawasaki Syndrome[c]	29	-	14	-
Legionellosis	70	1.4	46	0.9
Listeriosis, Nonperinatal	8	0.2	11	0.2
Listeriosis, Perinatal[a]	0	-	6	10.1
Lyme Disease	4	0.1	2	0.0
Malaria	12	0.2	10	0.2
Measles	3	0.1	5	0.1
Meningitis, Viral	161	3.3	156	3.2
Meningococcal Infections	18	0.4	19	0.4
Mumps	1	0.0	2	0.0
Pertussis	205	4.2	248	5.0
Pneumococcal Disease, Invasive	365	7.5	292	5.9
Psittacosis	0	-	0	-
Q-fever	0	-	0	-
Relapsing Fever	0	-	0	-
Rheumatic Fever, Acute	0	-	0	-
Rubella	0	-	1	0.0
Salmonellosis	434	8.9	463	9.4
Shigellosis	164	3.4	100	2.0
Staphylococcus Aureus Infection	28	0.6	16	0.3
Streptococcus, Group A Invasive	110	2.3	65	1.3
Strongyloidiasis	0	-	0	-
Tetanus	0	-	0	-
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	9	0.2	6	0.1
Typhoid Fever, Carrier	0	-	3	0.1
Typhus Fever	24	0.5	14	0.3
Vibrio	10	0.2	9	0.2
West Nile Virus	38	0.8	25	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.
[c]Base on 7 ½ months data.

Table O-1. Selected Notifiable Diseases
SPA 1. Antelope Valley Area
Los Angeles County, 2011

Disease	Frequency Antelope	Rate (Cases per 100,000)[b] Antelope
Amebiasis	0	-
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	46	12.3
Cholera	0	-
Coccidioidomycosis	93	24.9
Cryptosporidiosis	6	1.6
Cysticercosis	1	0.3
Dengue	0	-
E. *coli* O157:H7	1	0.3
E. *coli* Other Stec	2	0.5
Encephalitis	2	0.5
Giardiasis	8	2.1
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	2	0.5
Hepatitis B	0	-
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Kawasaki Syndrome[c]	2	-
Legionellosis	2	0.5
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	2	0.5
Measles	0	-
Meningitis, Viral	33	8.8
Meningococcal Infections	1	0.3
Mumps	0	-
Pertussis	19	5.1
Pneumococcal Disease, Invasive	17	4.6
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	24	6.4
Shigellosis	7	1.9
Staphylococcus Aureus Infection	0	-
Streptococcus, Group A Invasive	3	0.8
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	1	0.3
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	0	-
West Nile Virus	1	0.3

[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.
[c]Base on 7 ½ months data.

Table O-2. Selected Notifiable Diseases
SPA 2. San Fernando Area
Los Angeles County, 2011

Disease	Frequency					Rate (Cases per 100,000)[b]				
	EV	GL	SF	WV	TOTAL	EV	GL	SF	WV	TOTAL
Amebiasis	3	11	4	7	25	0.6	3.1	0.8	0.8	1.1
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	1	2	-	-	0.2	0.1	0.1
Campylobacteriosis	69	59	80	139	347	14.7	16.5	16.6	15.3	15.7
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	6	9	43	28	86	1.3	2.5	8.9	3.1	3.9
Cryptosporidiosis	2	0	8	5	15	0.4	-	1.7	0.6	0.7
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	4	0	0	4	-	1.1	-	-	0.2
E. *coli* Other Stec	0	1	10	3	14	-	0.3	2.1	0.3	0.6
Encephalitis	6	0	2	12	20	1.3	-	0.4	1.3	0.9
Giardiasis	20	27	20	35	102	4.3	7.6	4.1	3.9	4.6
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	3	5	3	6	17	0.6	1.4	0.6	0.7	0.8
Hepatitis B	4	0	3	6	13	0.9	-	0.6	0.7	0.6
Hepatitis C	0	1	0	0	1	-	0.3	-	-	0.0
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome[c]	3	1	3	1	8	-	-	-	-	-
Legionellosis	4	2	6	7	19	0.9	0.6	1.2	0.8	0.9
Listeriosis, Nonperinatal	2	1	1	1	5	0.4	0.3	0.2	0.1	0.2
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	1	1	2	-	-	0.2	0.1	0.1
Malaria	2	0	3	1	6	0.4	-	0.6	0.1	0.3
Measles	0	0	1	0	1	-	-	0.2	-	0.0
Meningitis, Viral	15	10	8	34	67	3.2	2.8	1.7	3.7	3.0
Meningococcal Infections	5	1	0	3	9	1.1	0.3	-	0.3	0.4
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	20	20	25	34	99	4.3	5.6	5.2	3.7	4.5
Pneumococcal Disease, Invasive	25	27	32	43	127	5.3	7.6	6.6	4.7	5.7
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	1	0	0	0	1	0.2	-	-	-	0.0
Salmonellosis	50	26	48	91	215	10.7	7.3	10.0	10.0	9.7
Shigellosis	15	3	5	17	40	3.2	0.8	1.0	1.9	1.8
Staphylococcus Aureus Infection	2	2	4	4	12	0.4	0.6	0.8	0.4	0.5
Streptococcus, Group A Invasive	12	2	6	14	34	2.6	0.6	1.2	1.5	1.5
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	2	0	2	0	4	0.4	-	0.4	-	0.2
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	2	6	1	0	9	0.4	1.7	0.2	-	0.4
Vibrio	1	0	2	1	4	0.2	-	0.4	0.1	0.2
West Nile Virus	12	4	1	22	39	2.6	1.1	0.2	2.4	1.8

[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.
[c]Base on 7 ½ months data.

Table O-3. Selected Notifiable Diseases
SPA 3. San Gabriel Area
Los Angeles County, 2011

Disease	Frequency					Rate (Cases per 100,000)[b]				
	AH	EM	FH	PO	TOTAL	AH	EM	FH	PO	TOTAL
Amebiasis	1	2	4	0	7	0.3	0.4	1.3	-	0.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	1	1	0	2	-	0.2	0.3	-	0.1
Campylobacteriosis	24	33	46	61	164	6.6	6.9	14.6	10.6	9.5
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	1	8	1	3	13	0.3	1.7	0.3	0.5	0.7
Cryptosporidiosis	2	0	2	0	4	0.5	-	0.6	-	0.2
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	3	0	0	3	-	0.6	-	-	0.2
E. *coli* Other Stec	0	2	4	2	8	-	0.4	1.3	0.3	0.5
Encephalitis	2	2	2	3	9	0.5	0.4	0.6	0.5	0.5
Giardiasis	9	3	4	6	22	2.5	0.6	1.3	1.0	1.3
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	1	1	-	-	-	0.2	0.1
Hepatitis A	1	1	1	7	10	0.3	0.2	0.3	1.2	0.6
Hepatitis B	2	1	2	3	8	0.5	0.2	0.6	0.5	0.5
Hepatitis C	0	0	0	2	2	-	-	-	0.3	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome[c]	4	5	0	0	9	-	-	-	-	-
Legionellosis	6	4	4	1	15	1.6	0.8	1.3	0.2	0.9
Listeriosis, Nonperinatal	3	1	0	0	4	0.8	0.2	-	-	0.2
Listeriosis, Perinatal[a]	1	0	1	1	3	0.7	-	0.8	0.4	0.4
Lyme Disease	0	0	1	0	1	-	-	0.3	-	0.1
Malaria	1	0	0	2	3	0.3	-	-	0.3	0.2
Measles	0	1	0	1	2	-	0.2	-	0.2	0.1
Meningitis, Viral	10	17	16	32	75	2.7	3.5	5.1	5.6	4.3
Meningococcal Infections	0	1	0	1	2	-	0.2	-	0.2	0.1
Mumps	0	0	1	0	1	-	-	0.3	-	0.1
Pertussis	15	16	22	33	86	4.1	3.3	7.0	5.7	5.0
Pneumococcal Disease, Invasive	22	17	19	27	85	6.0	3.5	6.0	4.7	4.9
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	38	33	36	55	161	10.4	6.9	11.4	9.6	9.3
Shigellosis	4	10	6	12	32	1.1	2.1	1.9	2.1	1.8
Staphylococcus Aureus Infection	1	2	2	2	7	0.3	0.4	0.6	0.3	0.4
Streptococcus, Group A Invasive	7	8	3	4	22	1.9	1.7	0.9	0.7	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	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	3	1	8	1	13	0.8	0.2	2.5	0.2	0.7
Vibrio	1	1	0	0	2	0.3	0.2	-	-	0.1
West Nile Virus	1	7	4	4	16	0.3	1.5	1.3	0.7	0.9

[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.
[c]Base on 7 ½ months data.

Table O-4. Selected Notifiable Diseases
SPA 4. Metro Area
Los Angeles County, 2011

Disease	Frequency				Rate (Cases per 100,000)[b]			
	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	4	14	2	20	1.1	2.6	0.6	1.6
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	53	67	36	156	14.4	12.5	10.2	12.4
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	12	12	2	26	3.2	2.2	0.6	2.1
Cryptosporidiosis	0	8	0	8	-	1.5	-	0.6
Cysticercosis	0	0	1	1	-	-	0.3	0.1
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	2	3	5	-	0.4	0.9	0.4
E. *coli* Other Stec	2	2	0	4	0.5	0.4	-	0.3
Encephalitis	2	1	1	4	0.5	0.2	0.3	0.3
Giardiasis	15	27	5	47	4.1	5.0	1.4	3.7
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	1	4	1	6	0.3	0.7	0.3	0.5
Hepatitis B	4	9	2	15	1.1	1.7	0.6	1.2
Hepatitis C	0	2	1	3	-	0.4	0.3	0.2
Hepatitis Unspecified	0	0	2	2	-	-	0.6	0.2
Kawasaki Syndrome[c]	2	2	3	7	-	-	-	-
Legionellosis	6	7	0	13	1.6	1.3	-	1.0
Listeriosis, Nonperinatal	0	1	0	1	-	0.2	-	0.1
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	0	0	0	0	-	-	-	-
Malaria	1	1	0	2	0.3	0.2	-	0.2
Measles	0	2	0	2	-	0.4	-	0.2
Meningitis, Viral	4	5	5	14	1.1	0.9	1.4	1.1
Meningococcal Infections	3	2	0	5	0.8	0.4	-	0.4
Mumps	0	0	0	0	-	-	-	-
Pertussis	10	20	21	51	2.7	3.7	6.0	4.1
Pneumococcal Disease, Invasive	30	41	22	93	8.1	7.6	6.3	7.4
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	20	38	22	80	5.4	7.1	6.3	6.4
Shigellosis	20	54	8	82	5.4	10.0	2.3	6.5
Staphylococcus Aureus Infection	1	0	1	2	0.3	-	0.3	0.2
Streptococcus, Group A Invasive	16	7	8	31	4.3	1.3	2.3	2.5
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	2	1	1	4	0.5	0.2	0.3	0.3
Typhoid Fever, Carrier	0	1	0	1	-	0.2	-	0.1
Typhus Fever	2	0	3	5	0.5	-	0.9	0.4
Vibrio	2	2	0	4	0.5	0.4	-	0.3
West Nile Virus	0	0	1	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.
[c]Base on 7 ½ months data.

Table O-5. Selected Notifiable Diseases
SPA 5. West Area
Los Angeles County, 2011

Disease	Frequency	Rate (Cases per 100,000)[b]
	West	West
Amebiasis	6	0.9
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	142	21.5
Cholera	0	-
Coccidioidomycosis	17	2.6
Cryptosporidiosis	5	0.8
Cysticercosis	1	0.2
Dengue	0	-
E. *coli* O157:H7	1	0.2
E. *coli* Other Stec	7	1.1
Encephalitis	1	0.2
Giardiasis	37	5.6
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	2	0.3
Hepatitis B	1	0.2
Hepatitis C	1	0.2
Hepatitis Unspecified	1	0.2
Kawasaki Syndrome[c]	1	-
Legionellosis	8	1.2
Listeriosis, Nonperinatal	4	0.6
Listeriosis, Perinatal[a]	0	-
Lyme Disease	3	0.5
Malaria	1	0.2
Measles	2	0.3
Meningitis, Viral	15	2.3
Meningococcal Infections	1	0.2
Mumps	1	0.2
Pertussis	27	4.1
Pneumococcal Disease, Invasive	49	7.4
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	70	10.6
Shigellosis	14	2.1
Staphylococcus Aureus Infection	5	0.8
Streptococcus, Group A Invasive	14	2.1
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	3	0.5
Typhoid Fever, Carrier	0	-
Typhus Fever	5	0.8
Vibrio	1	0.2
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. [c]Base on 7 ½ months data.

Table O-6. Selected Notifiable Diseases
SPA 6. South Area
Los Angeles County, 2011

Disease	Frequency					Rate (Cases per 100,000)[b]				
	CN	SO	SE	SW	TOTAL	CN	SO	SE	SW	TOTAL
Amebiasis	6	3	1	3	13	2.1	1.5	0.5	0.8	1.2
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	1	0	0	1	-	0.5	-	-	0.1
Campylobacteriosis	34	26	17	46	123	11.7	13.3	9.2	11.5	11.5
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	11	11	1	6	29	3.8	5.6	0.5	1.5	2.7
Cryptosporidiosis	0	1	1	2	4	-	0.5	0.5	0.5	0.4
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	3	0	3	-	-	1.6	-	0.3
E. *coli* Other Stec	1	3	2	2	8	0.3	1.5	1.1	0.5	0.7
Encephalitis	2	1	1	0	4	0.7	0.5	0.5	-	0.4
Giardiasis	1	3	3	13	20	0.3	1.5	1.6	3.3	1.9
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	1	1	-	-	-	0.3	0.1
Hepatitis A	0	1	0	2	3	-	0.5	-	0.5	0.3
Hepatitis B	2	1	0	7	10	0.7	0.5	-	1.8	0.9
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome[c]	2	0	1	1	4	-	-	-	-	-
Legionellosis	3	5	5	10	23	1.0	2.6	2.7	2.5	2.2
Listeriosis, Nonperinatal	0	0	0	0	0	-	-	-	-	-
Listeriosis, Perinatal[a]	0	1	0	0	1	-	1.1	-	-	0.2
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	0	2	2	-	-	-	0.5	0.2
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	6	10	3	7	26	2.1	5.1	1.6	1.8	2.4
Meningococcal Infections	4	4	1	0	9	1.4	2.0	0.5	-	0.8
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	19	10	10	24	63	6.5	5.1	5.4	6.0	5.9
Pneumococcal Disease, Invasive	16	18	10	46	90	5.5	9.2	5.4	11.5	8.4
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	20	26	19	42	107	6.9	13.3	10.3	10.5	10.0
Shigellosis	14	4	7	13	38	4.8	2.0	3.8	3.3	3.6
Staphylococcus Aureus Infection	0	0	1	10	11	-	-	0.5	2.5	1.0
Streptococcus, Group A Invasive	10	6	2	4	22	3.4	3.1	1.1	1.0	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	0	0	0	1	1	-	-	-	0.3	0.1
Typhoid Fever, Carrier	0	0	0	1	1	-	-	-	0.3	0.1
Typhus Fever	0	0	0	0	0	-	-	-	-	-
Vibrio	1	0	0	2	3	0.3	-	-	0.5	0.3
West Nile Virus	1	0	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.
[c]Base on 7 ½ months data.

Table O-7. Selected Notifiable Diseases
SPA 7. East Area
Los Angeles County, 2011

Disease	Frequency					Rate (Cases per 100,000)[b]				
	BF	EL	SA	WH	TOTAL	BF	EL	SA	WH	TOTAL
Amebiasis	0	3	4	3	10	-	1.4	0.9	0.9	0.7
Botulism	1	1	0	0	2	0.3	0.5	-	-	0.1
Brucellosis	1	0	0	0	1	0.3	-	-	-	0.1
Campylobacteriosis	30	22	47	37	136	8.1	10.2	10.4	11.0	9.9
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	5	3	10	2	20	1.3	1.4	2.2	0.6	1.5
Cryptosporidiosis	2	3	0	1	6	0.5	1.4	-	0.3	0.4
Cysticercosis	0	1	0	0	1	-	0.5	-	-	0.1
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	1	0	1	-	-	0.2	-	0.1
E. *coli* Other Stec	2	5	9	4	20	0.5	2.3	2.0	1.2	1.5
Encephalitis	2	2	1	3	8	0.5	0.9	0.2	0.9	0.6
Giardiasis	8	4	8	6	26	2.2	1.8	1.8	1.8	1.9
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	0	0	1	0	1	-	-	0.2	-	0.1
Hepatitis B	0	0	1	2	3	-	-	0.2	0.6	0.2
Hepatitis C	0	0	0	2	2	-	-	-	0.6	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome[c]	0	1	4	1	6	-	-	-	-	-
Legionellosis	4	1	1	9	15	1.1	0.5	0.2	2.7	1.1
Listeriosis, Nonperinatal	0	0	1	1	2	-	-	0.2	0.3	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	13	4	18	13	48	3.5	1.8	4.0	3.8	3.5
Meningococcal Infections	0	2	1	1	4	-	0.9	0.2	0.3	0.3
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	15	11	14	20	60	4.0	5.1	3.1	5.9	4.4
Pneumococcal Disease, Invasive	22	12	24	23	81	5.9	5.5	5.3	6.8	5.9
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	30	15	48	29	122	8.1	6.9	10.6	8.6	8.9
Shigellosis	4	4	9	7	24	1.1	1.8	2.0	2.1	1.7
Staphylococcus Aureus Infection	2	0	1	2	5	0.5	-	0.2	0.6	0.4
Streptococcus, Group A Invasive	3	7	4	6	20	0.8	3.2	0.9	1.8	1.5
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	0	1	-	-	0.2	-	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	1	0	4	0	5	0.3	-	0.9	-	0.4
Vibrio	0	1	1	0	2	-	0.5	0.2	-	0.1
West Nile Virus	1	0	1	2	4	0.3	-	0.2	0.6	0.3

[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.
[c]Base on 7 ½ months data.

Table O-8. Selected Notifiable Diseases
SPA 8. South Bay Area
Los Angeles County, 2011

Disease	Frequency				Rate (Cases per 100,000)[b]			
	HB	IW	TO	TOTAL	HB	IW	TO	TOTAL
Amebiasis	1	2	1	4	0.5	0.5	0.2	0.4
Botulism	0	1	0	1	-	0.2	-	0.1
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	33	48	64	145	15.4	11.0	13.6	12.9
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	3	9	6	18	1.4	2.1	1.3	1.6
Cryptosporidiosis	0	1	0	1	-	0.2	-	0.1
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	1	1	1	3	0.5	0.2	0.2	0.3
E. *coli* Other Stec	0	1	3	4	-	0.2	0.6	0.4
Encephalitis	2	3	0	5	0.9	0.7	-	0.4
Giardiasis	3	11	14	28	1.4	2.5	3.0	2.5
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	1	2	1	4	0.5	0.5	0.2	0.4
Hepatitis B	0	3	5	8	-	0.7	1.1	0.7
Hepatitis C	0	1	0	1	-	0.2	-	0.1
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Kawasaki Syndrome[c]	0	3	3	6	-	-	-	-
Legionellosis	3	8	8	19	1.4	1.8	1.7	1.7
Listeriosis, Nonperinatal	1	1	1	3	0.5	0.2	0.2	0.3
Listeriosis, Perinatal[a]	1	0	1	2	1.1	-	0.5	0.4
Lyme Disease	0	0	0	0	-	-	-	-
Malaria	0	2	3	5	-	0.5	0.6	0.4
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	10	11	14	35	4.7	2.5	3.0	3.1
Meningococcal Infections	0	2	4	6	-	0.5	0.8	0.5
Mumps	1	0	0	1	0.5	-	-	0.1
Pertussis	13	17	18	48	6.0	3.9	3.8	4.3
Pneumococcal Disease, Invasive	18	42	30	90	8.4	9.6	6.4	8.0
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	28	39	50	117	13.0	8.9	10.6	10.4
Shigellosis	10	9	7	26	4.7	2.1	1.5	2.3
Staphylococcus Aureus Infection	1	0	0	1	0.5	-	-	0.1
Streptococcus, Group A Invasive	6	10	12	28	2.8	2.3	2.5	2.5
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	1	0	1	-	0.2	-	0.1
Typhoid Fever, Carrier	0	0	1	1	-	-	0.2	0.1
Typhus Fever	0	0	1	1	-	-	0.2	0.1
Vibrio	2	0	0	2	0.9	-	-	0.2
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.
[c]Base on 7 ½ months data.

DISEASE SUMMARIES

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AMEBIASIS

CRUDE DATA	
Number of Cases	86
Annual Incidence[a]	
LA County	0.88
California[b]	--
United States	N/A
Age at Diagnosis	
Mean	42
Median	40
Range	0 - 83

[a]Cases per 100,000 population.

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.

Stool testing cannot differentiate *E. histolytica* and non-pathogenic *E. dispar*. Many case reports without foreign travel history may represent infection with the non-pathogenic *E. dispar*; but specific testing (EIA for stool antigen) 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.

2011 TRENDS AND HIGHLIGHTS

- From 2010 to 2011, the overall incidence rate (IR) of amebiasis decreased from 1.2 to 0.88 cases per 100,000. This is the lowest incidence rate in the past ten years.
- The largest proportion of cases was in the 15 to 34 year age group, consistent with previous years (Figure 2).
- Hispanic cases accounted for the greatest proportion of cases in 2011 (40, 47%). In the previous five years, whites have had a slightly greater proportion of cases than Hispanics and this was reversed in 2011.
- Service Planning Area (SPA) 2 had the highest proportion of reported amebiasis cases of all the SPAs in 2011, with 25 cases (Figure 4). SPA 4 had the second highest proportion of cases (23%) and highest incidence rate of amebiasis (1.6 per 100,000).
- The number of cases reported in 2011 peaked in June and December with nine reported cases, differing from the previous five-year average in which cases peaked in August (Figure 5).
- Males comprised the majority of reported cases. Incidence rates were 1.1 per 100,000 for males and 0.7 per 100,000 for females.
- Risk factor information was available for 96% of the cases reported in 2011. The most frequently reported risk factor was immigration to the US (17, 21%); immigrants from Mexico (4, 24%) and Iran (6, 35%) were the most frequently reported countries of origin. Travel to another country (7, 9%), particularly to Mexico (4, 57%) was also reported in 2011.

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=122)			2008 (N=115)			2009 (N=107)			2010 (N=119)			2011 (N=86)		
	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	1	1.1	0.7
1-4	6	4.9	1.0	1	0.9	0.2	1	0.9	0.2	5	4.2	0.9	1	1.1	0.2
5-14	11	9.0	0.8	8	7.0	0.6	6	5.6	0.4	8	6.7	0.6	4	4.7	0.3
15-34	30	24.6	1.1	37	32.2	1.3	33	30.8	1.2	38	31.9	1.3	26	30.2	0.9
35-44	30	24.6	2.0	26	22.6	1.7	23	21.5	1.5	25	21	1.7	17	19.8	1.2
45-54	22	18.0	1.7	22	19.1	1.6	22	20.5	1.6	25	21	1.8	15	17.4	1.1
55-64	13	10.7	1.5	12	10.4	1.3	14	13.1	1.5	11	9.2	1.1	9	10.4	0.9
65+	9	7.4	0.9	9	7.8	0.9	8	7.5	0.8	7	5.9	0.7	13	15.1	1.2
Unknown	1	0.8		0	0.0										
Race/Ethnicity															
Asian	10	10.6	0.8	8	6.6	0.6	7	6.1	0.5	2	1.9	0.2	1	1.1	0.1
Black	2	2.1	0.2	10	8.2	1.2	3	2.6	0.4	0	0.0	0.0	7	8.1	0.8
Hispanic	32	34.0	0.7	44	36.1	1.0	36	31.3	0.8	37	34.6	0.8	40	46.5	0.8
White	39	41.5	1.4	50	41.0	1.7	56	48.7	1.9	43	40.2	1.5	27	31.5	0.9
Other	2	2.1	7.0	8	6.6	38.4	4	3.5	16.2	1	0.9		2	2.3	
Unknown	9	9.6		2	1.6		9	7.8		24	22.5		9	10.5	
SPA															
1	2	2.1	0.6	6	4.9	1.7	1	0.9	0.3	2	1.9	0.5	0	0.0	
2	39	41.5	1.8	51	41.8	2.4	52	45.2	2.4	49	45.8	2.2	25	29.0	1.1
3	6	6.4	0.3	14	11.5	0.8	14	12.2	0.8	9	8.4	0.5	7	8.1	0.4
4	17	18.1	1.3	16	13.1	1.3	17	14.8	1.3	18	16.8	1.4	20	23.3	1.6
5	12	12.8	1.9	9	7.4	1.4	6	5.2	0.9	8	7.5	1.2	6	7.0	0.9
6	4	4.3	0.4	8	6.6	0.8	11	9.6	1.0	4	3.7	0.4	13	15.1	1.2
7	7	7.4	0.5	11	9.0	0.8	7	6.1	0.5	12	11.2	0.9	10	11.6	0.7
8	7	7.4	0.6	6	4.9	0.5	7	6.1	0.6	3	2.8	0.3	4	4.7	0.4
Unknown	0	0.0		1	0.8		0	0.0		0	0.0		1	1.2	-

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

Figure 1. Incidence Rates of Amebiasis
CA and LAC, 2002 - 2011

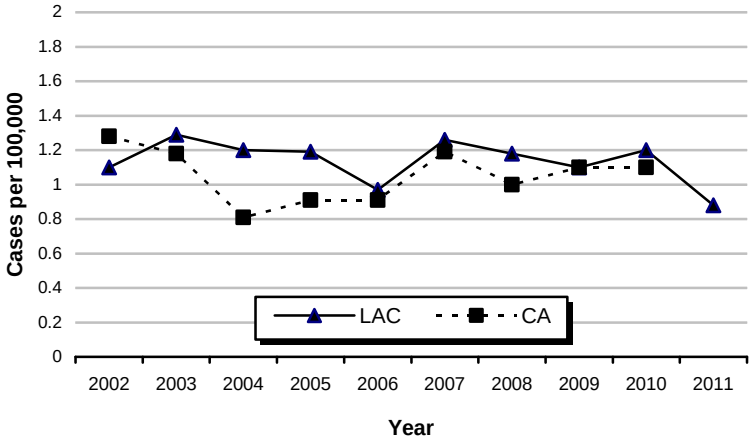


Figure 2. Incidence Rates of Amebiasis by Age Group
LAC, 2011

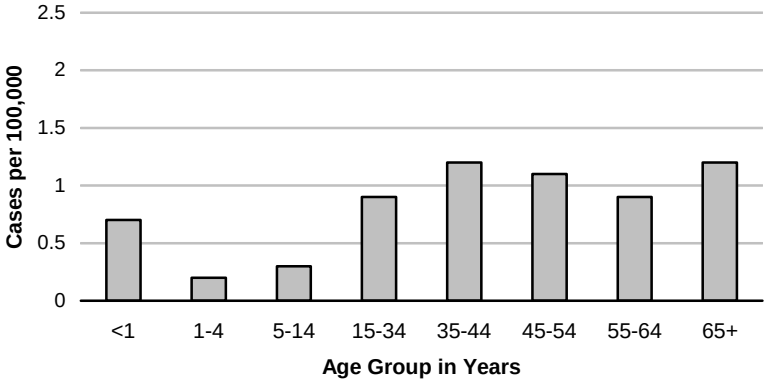


Figure 3. Percent Cases of Amebiasis by Race/Ethnicity
LAC, 2011

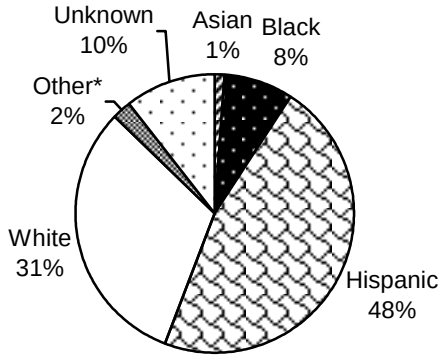
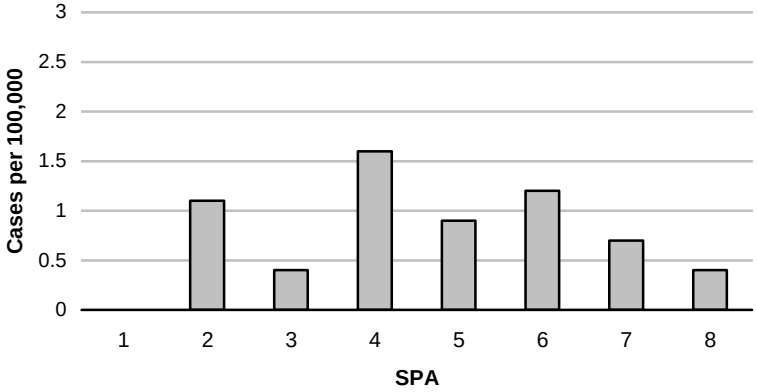


Figure 4. Incidence Rates of Amebiasis by SPA
LAC, 2011



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

Figure 5. Reported Amebiasis Cases by Month of Onset
LAC, 2011

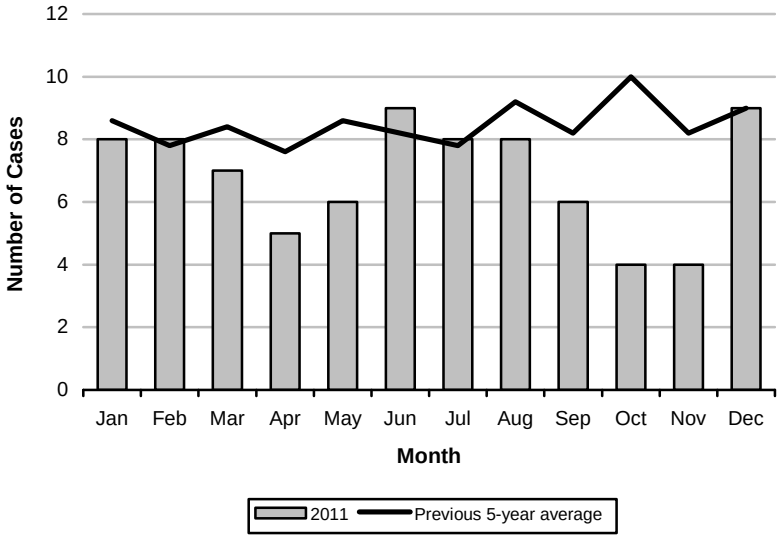
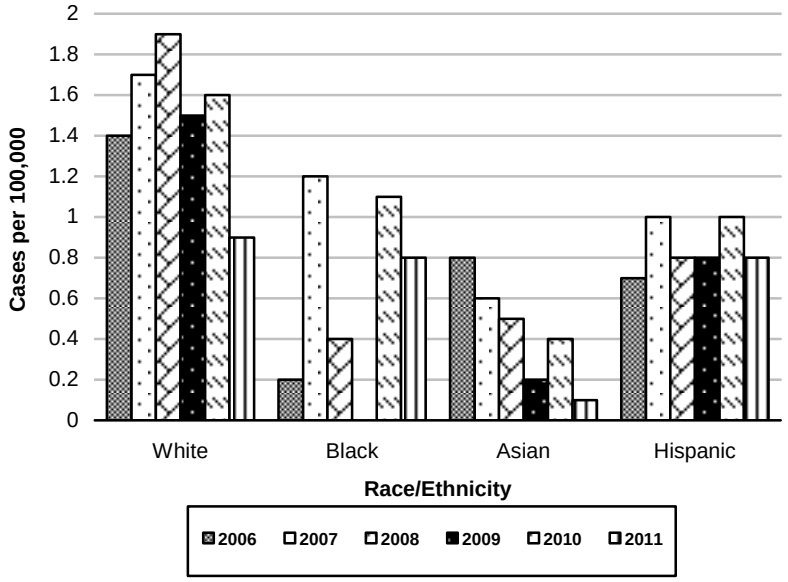
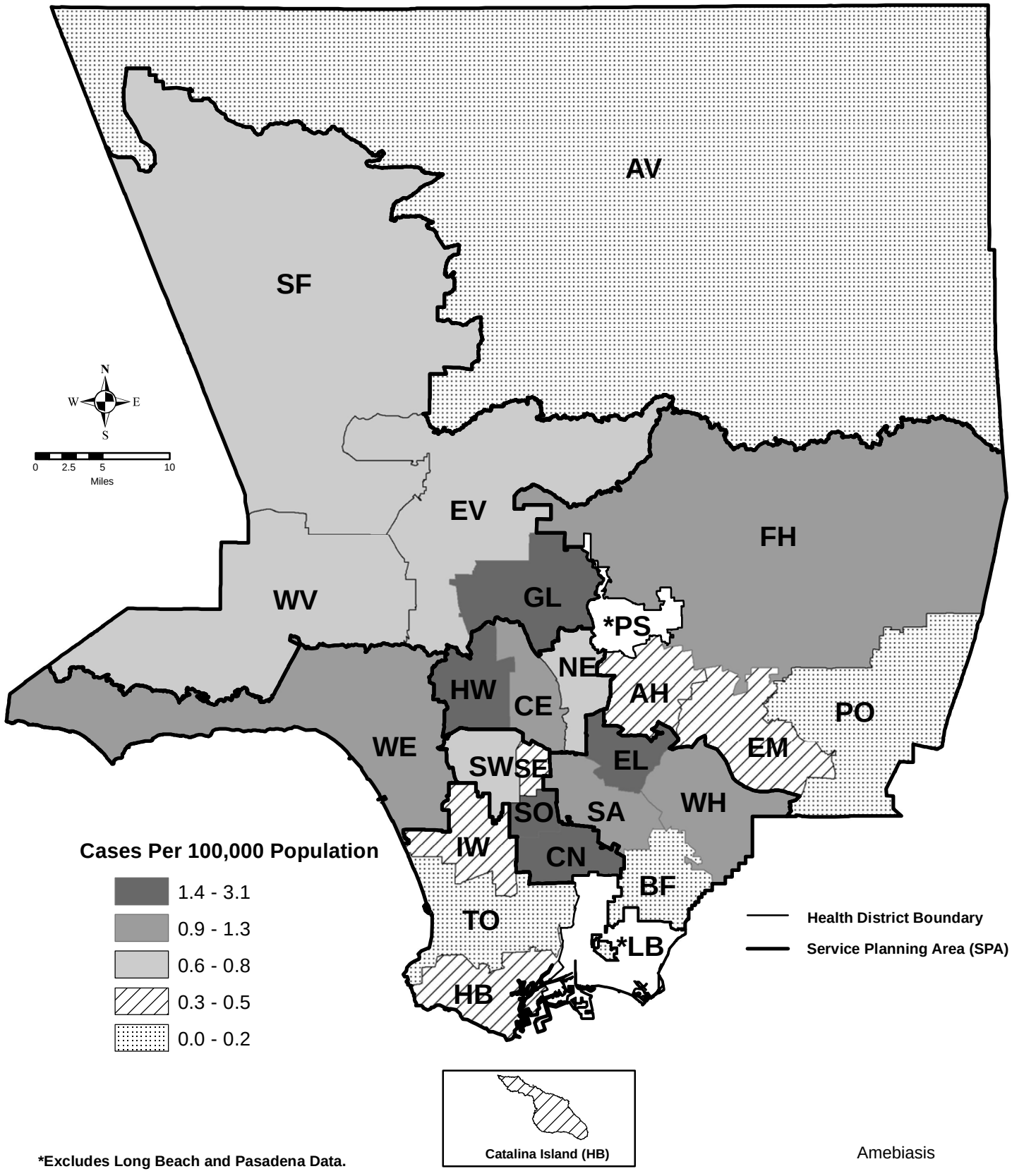


Figure 6. Amebiasis Incidence by Race/Ethnicity
LAC, 2006 - 2011



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1259
Annual Incidence[a]	
LA County	12.8
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	34.4
Median	30
Range	0-95

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

DESCRIPTION

Campylobacteriosis is a bacterial disease caused by several species of Gram-negative bacilli including *Campylobacter jejuni, C. upsaliensis, C. coli* and *C. fetus*. It is 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. 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.

2011 TRENDS AND HIGHLIGHTS

- There was a 1.6% increase in the incidence of campylobacteriosis from the previous year and a 66% increase in cases since 2007 (Figure 1).
- The highest rates continued to be among children aged 1 to 4 years (27.2 per 100,000) followed by persons aged ≥65 years (16.2 per 100,000) (Figure 2).
- Service Planning Area (SPA) 5 had the highest rate (21.5 per 100,000) which is consistent with previous years (Figure 3).
- No outbreaks of campylobacteriosis were detected in 2011.
- Routine interviewing of campylobacteriosis cases was discontinued in 2010, however, surveillance continues to assess for clusters and foodborne illness reports.

Reported Campylobacteriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=827)			2008 (N=1072)			2009 (N=1135)			2010 (N=1239)			2011 (N=1259)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	25	3.0	16.9	42	3.9	30.1	30	2.6	21.9	24	1.9	17.2	16	1.2	11.5
1-4	108	13.1	18.7	137	12.8	24.2	138	12.1	24.6	150	12.1	25.8	158	12.5	27.2
5-14	109	13.2	7.6	152	14.2	10.8	146	12.8	10.7	175	14.1	13.2	146	11.5	11.0
15-34	237	28.7	8.4	285	26.6	9.9	316	27.8	11.2	318	25.6	10.8	366	29.0	12.4
35-44	78	9.4	5.2	129	12.0	8.5	119	10.4	8.0	157	12.6	10.9	133	10.5	9.2
45-54	100	12.1	7.6	127	11.8	9.4	137	12.0	10.0	136	10.9	10.1	142	11.2	10.5
55-64	69	8.3	7.8	90	8.4	9.9	100	8.8	10.5	96	7.7	10.0	114	9.0	11.9
65+	101	12.2	10.0	110	10.3	10.8	143	12.6	13.5	165	13.3	15.6	172	13.6	16.2
Unknown	0	0.0		0	0.0		6	0.5	0	0	0	0	12	0.9	0
Race/Ethnicity															
Asian	86	10.4	6.7	100	9.3	7.7	42	3.7	3.2	35	2.8	2.6	28	2.2	2.1
Black	39	4.7	4.6	31	2.9	3.6	15	1.32	1.8	13	1.0	1.5	21	1.6	2.5
Hispanic	364	44.0	7.9	542	50.6	11.6	156	13.7	3.3	182	14.6	3.8	157	12.4	3.3
White	314	38.0	10.8	373	34.8	12.8	81	7.1	2.8	118	9.5	4.1	119	9.4	4.2
Other	3	0.4	14.4	0	0.0	0.0	9	0.7	0	13	1.0	0	14	1.1	0
Unknown	21	2.5		26	2.4		832	73.0	0	878	70.8	0	920	73.0	0
SPA															
1	22	2.7	6.1	27	2.5	7.4	32	2.8	8.7	39	3.1	10.5	46	3.6	12.3
2	209	25.3	9.7	271	25.3	12.4	292	25.7	13.2	346	2.7	15.6	347	27.5	15.7
3	122	14.8	7.1	154	14.4	8.9	157	13.8	9.1	166	13.3	9.6	164	13.0	9.5
4	68	8.2	5.4	99	9.2	7.8	158	13.9	12.7	158	1.2	12.6	156	12.3	12.4
5	115	13.9	17.9	155	14.5	24.0	151	13.3	23.2	130	10.4	19.7	142	11.2	21.5
6	68	8.2	6.5	122	11.4	11.6	114	10.0	10.8	122	9.8	11.4	123	9.7	11.5
7	108	13.1	7.8	127	11.8	9.2	104	8.8	9.1	145	11.7	10.5	136	10.8	9.9
8	95	11.5	8.5	117	10.9	10.4	114	10.0	10.8	127	10.2	11.3	145	11.5	12.9
Unknown	20	2.4		0	0.0		13	1.1	0	0	0	0	0	0	0

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

**Figure 1. Reported Campylobacteriosis Rates by Year
LAC, 2001-2011**

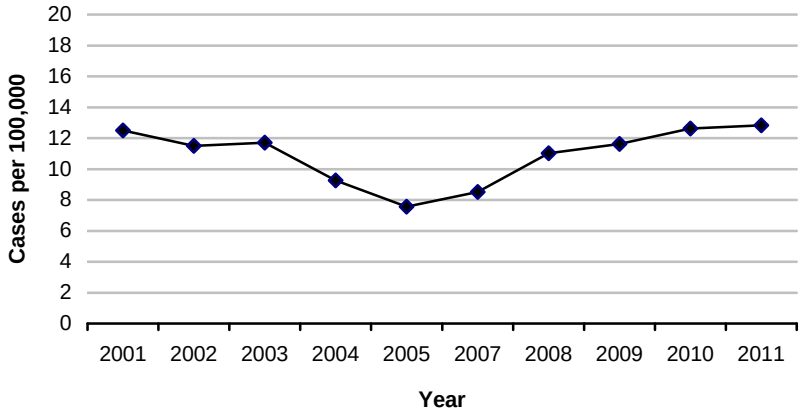


**Figure 2. Reported Campylobacteriosis Rates by Age Group
LAC, 2011 (N=1259)**

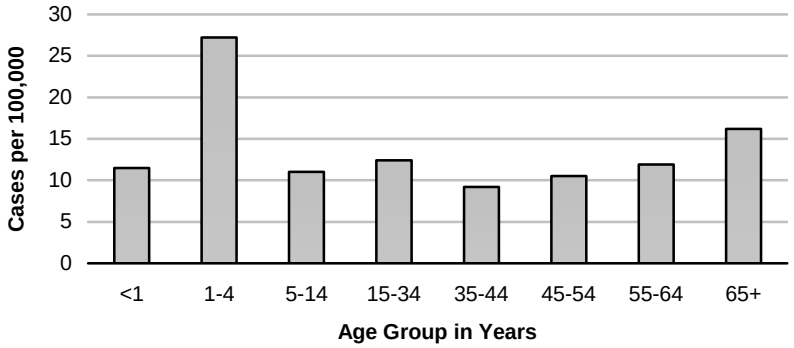
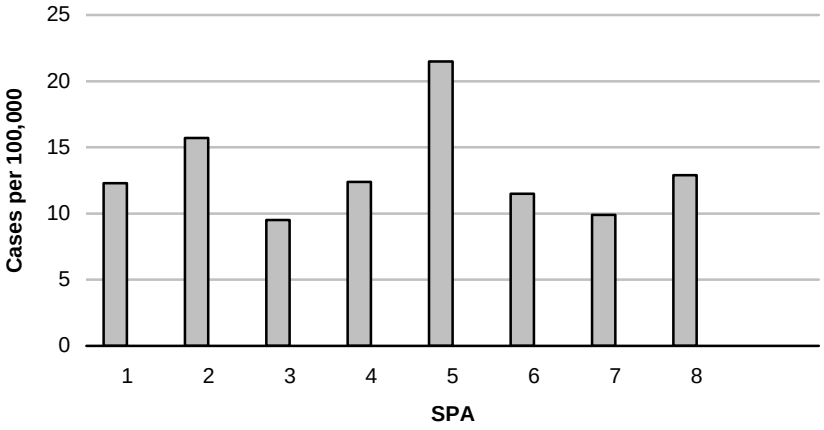
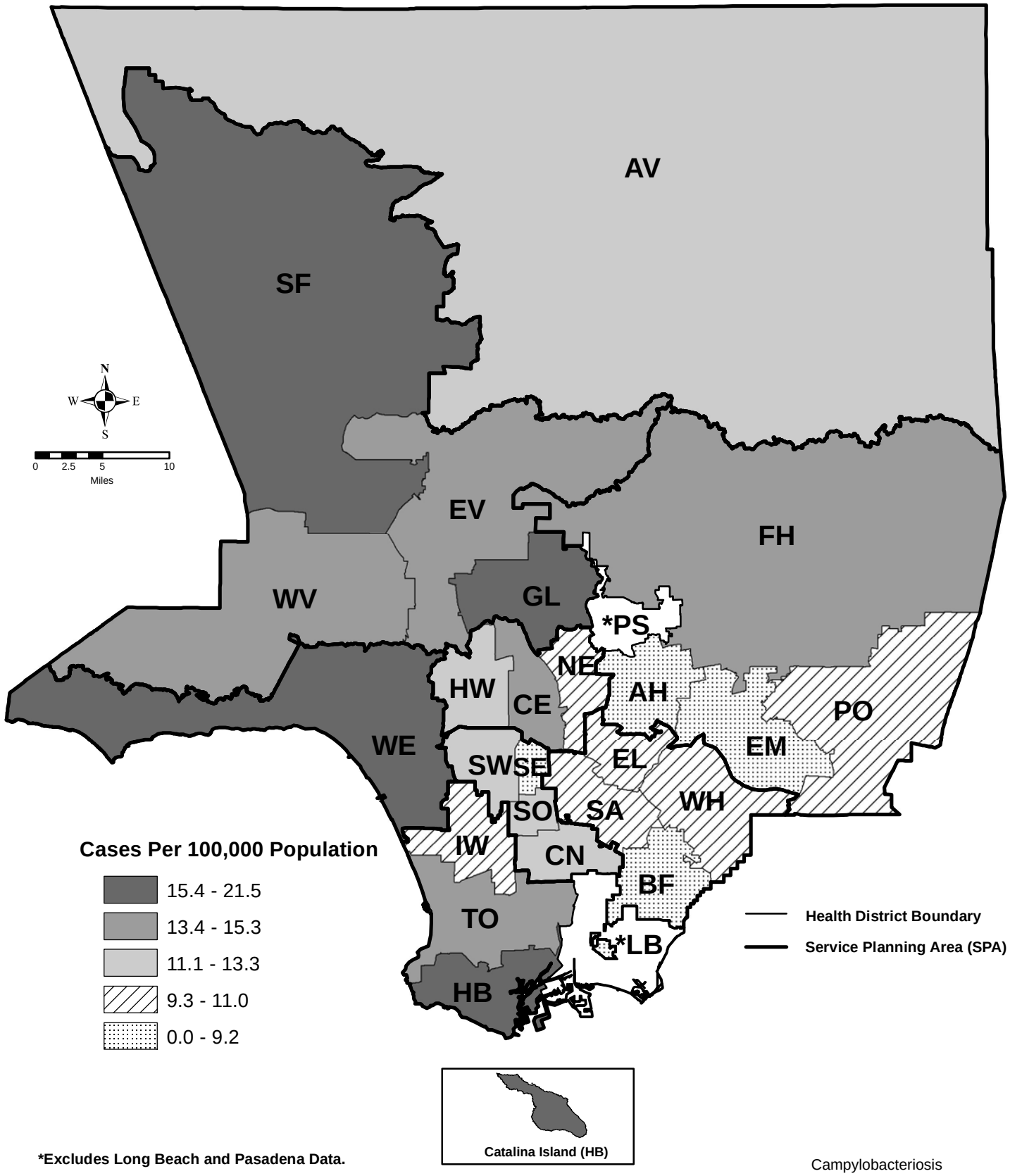


**Figure 3. Reported Campylobacteriosis Rates by SPA
LAC, 2011 (N=1259)**



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	304
Annual Incidence[a]	
LA County	3.1
California[b]	15.3
United States[b]	7.3
Age at Diagnosis	
Mean	51
Median	53
Range	3-90

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

DESCRIPTION

Coccidioidomycosis, or valley fever, 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 include arid to semi-arid regions, dust storms, hot summers, warm winters, and sandy, alkaline soils. The fungus 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. 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, providing the rationale for development of a vaccine for prevention of symptomatic or serious forms of the disease. Increasing construction, a growing naïve population in the endemic area, antifungal treatments that are toxic and not uniformly effective validate the need for prevention efforts.

2011 TRENDS AND HIGHLIGHTS

- Overall, the Los Angeles County incidence rate for coccidioidomycosis has increased in the last ten years (Figure 1), but remains relatively stable since 2005.
- Cases occurred primarily in older adults; the greatest number of reported cases was in ages 65+ years which also had the highest incidence rate, 7.7 cases per 100,000 (Figure 2), consistent with previous years. Service Planning Area (SPA) 1 (Antelope Valley Health District) differs from the rest of the county with a higher percentage of cases in the younger age groups for a more even distribution of case ages.
- Males represented 62.5% of cases; females 37.5%, but in SPA 1, the percentages were similar with males 53% and females 47% (Figure 3).
- Whites had the highest percentage of cases with 44% (n=134) as compared to other racial groups. However, the incidence rate for blacks at 5.6 cases per 100,000 (n=48) was highest among racial groups, consistent with previous years (Figure 4). This trend is also demonstrated in SPA 1, where blacks have a rate of 38.4 (the highest rate of any racial group in any SPA of Los Angeles County).
- SPA 1 reported the highest incidence rate of coccidioidomycosis in LAC, 24.9 per 100,000 (n=93), which has increased from the previous year (Figure 5).
- Coccidioidomycosis cases began to increase in the late spring of 2011, compared to the five-year average (Figure 6). Previously, increased numbers of coccidioidomycosis cases were reported from SPA 1 and 2. During 2011, increased numbers of cases were reported county-wide. (Figure 7).
- The case fatality rate was 4%, a 33% increase from 2010. There were 13 cases of disseminated coccidioidomycosis reported in LAC.

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=145)			2008 (N=228)			2009 (N=171)			2010 (N=235)			2011 (N=304)		
	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	0.4	0.7	0	0.0	0
1-4	1	0.7	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.3	0.2
5-14	4	2.8	0.3	6	2.6	0.4	3	1.8	0.2	5	2.1	0.4	3	1.0	0.2
15-34	27	18.6	1.0	41	18.0	1.5	30	17.5	1.1	43	18.3	1.5	62	20.4	2.1
35-44	30	20.7	2.0	33	14.5	2.2	38	22.2	2.6	38	16.2	2.6	35	11.5	2.4
45-54	37	25.5	2.8	58	25.4	4.3	30	17.5	2.2	55	23.4	4.1	67	22.0	5.0
55-64	26	17.9	2.9	38	16.7	4.1	33	19.3	3.5	42	17.9	4.4	54	17.8	5.6
65+	20	13.8	2.0	52	22.8	5.0	37	21.6	3.5	51	21.7	4.8	82	27.0	7.7
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	10	6.9	0.8	27	11.8	2.1	11	6.4	0.8	26	11.1	1.9	23	7.6	1.7
Black	22	15.2	2.6	37	16.2	4.3	27	15.8	3.2	43	18.3	5.0	48	15.8	5.6
Hispanic	52	35.9	1.1	86	37.7	1.8	67	39.2	1.4	71	30.2	1.5	94	30.9	2.0
White	56	38.6	1.9	62	27.2	2.1	56	32.7	1.9	76	32.3	2.7	134	44.1	4.7
Other	1	0.7	4.8	1	0.4	4.1	2	1.2		3	1.3		1	0.3	
Unknown	4	2.8		15	6.6		8	4.7		16	6.8		4	1.3	
SPA															
1	51	35.2	14.2	52	22.8	14.2	45	26.3	12.2	87	37.0	23.3	93	30.6	24.9
2	47	32.4	2.2	62	27.2	2.8	52	30.4	2.3	54	23.0	2.4	86	28.3	3.9
3	9	6.2	0.5	21	9.2	1.2	16	9.4	0.9	17	7.2	1.0	13	4.3	0.7
4	8	5.5	0.6	20	8.8	1.6	13	7.6	1.0	20	8.5	1.6	26	8.6	2.1
5	1	0.7	0.2	9	3.9	1.4	11	6.4	1.7	7	3.0	1.1	17	5.6	2.6
6	0	0.0	0.0	24	10.5	2.3	15	8.8	1.4	19	8.1	1.8	29	9.5	2.7
7	12	8.3	0.9	21	9.2	1.5	9	5.3	0.7	14	6.0	1.0	20	6.6	1.5
8	8	5.5	0.7	13	5.7	1.2	9	5.3	0.8	16	6.8	1.4	18	5.9	1.6
Unknown	9	6.2		6	2.6								2	0.7	

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

**Figure 1. Incidence Rates of Coccidioidomycosis
US, CA and LAC, 1999-2011**

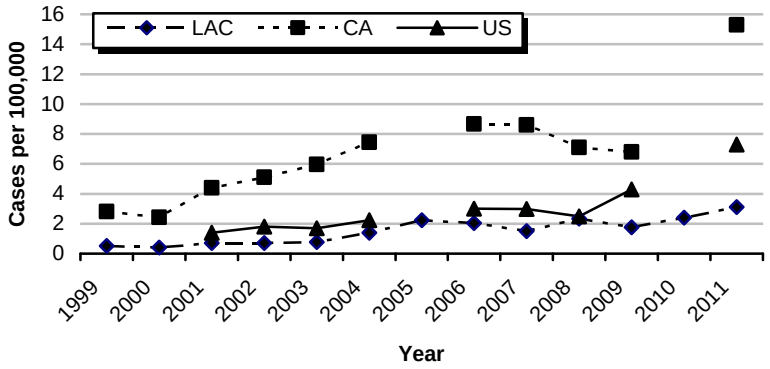


**Figure 2. Incidence Rates of Coccidioidomycosis by Age Group
LAC, 2011 (N=304)**

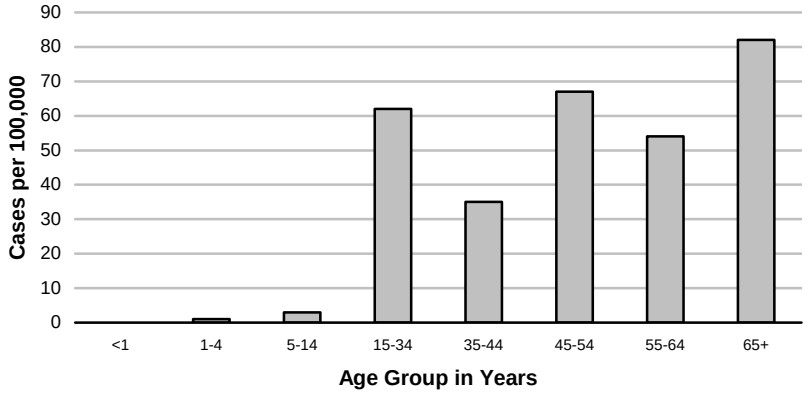


**Figure 3. Percent of Reported Coccidioidomycosis Cases that are Male by SPA
LAC, 2011**

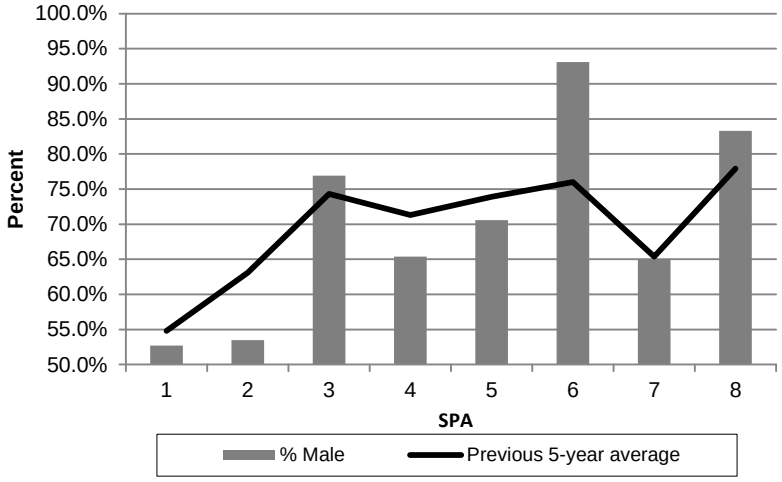


**Figure 4. Coccidioidomycosis Incidence Rates by Race/Ethnicity LAC
2007-2011**

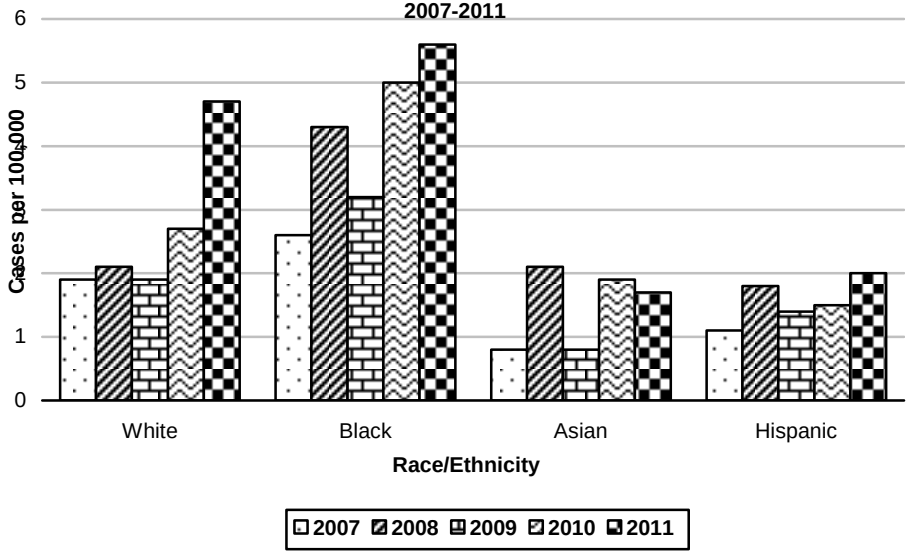


Figure 5. Incidence Rates of Coccidioidomycosis by SPA LAC, 2009-2011

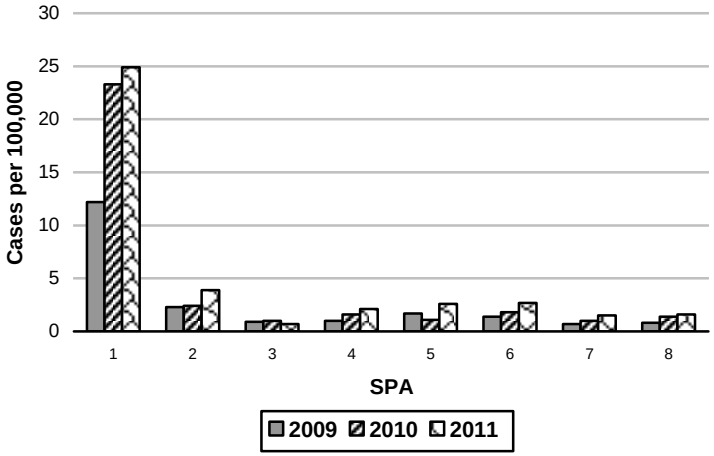


Figure 6. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2011 (N=304)

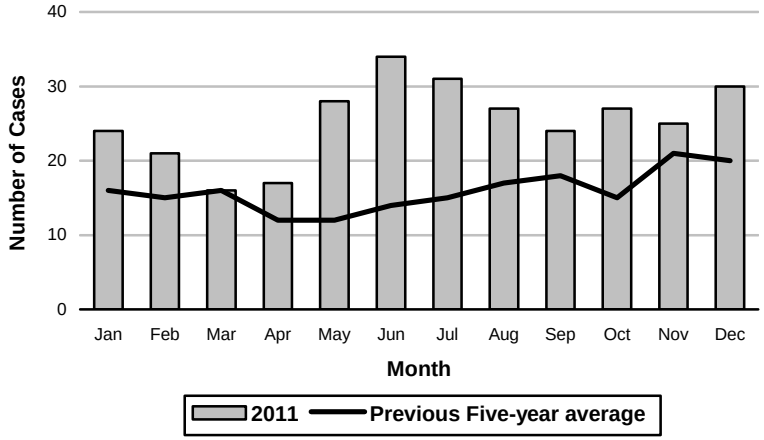
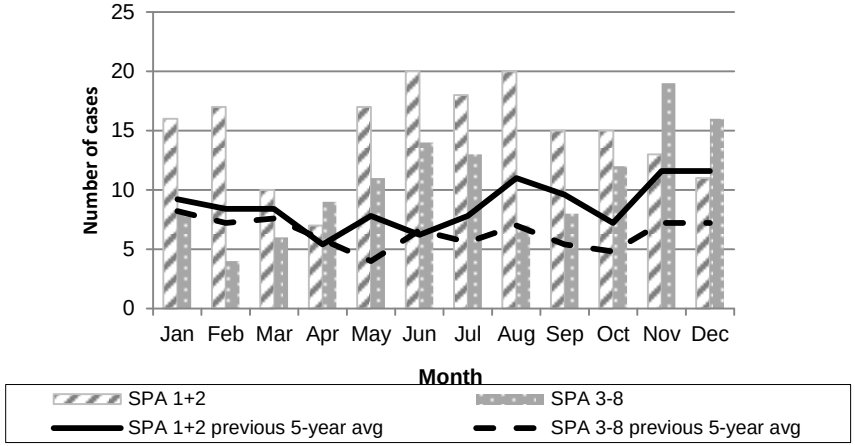
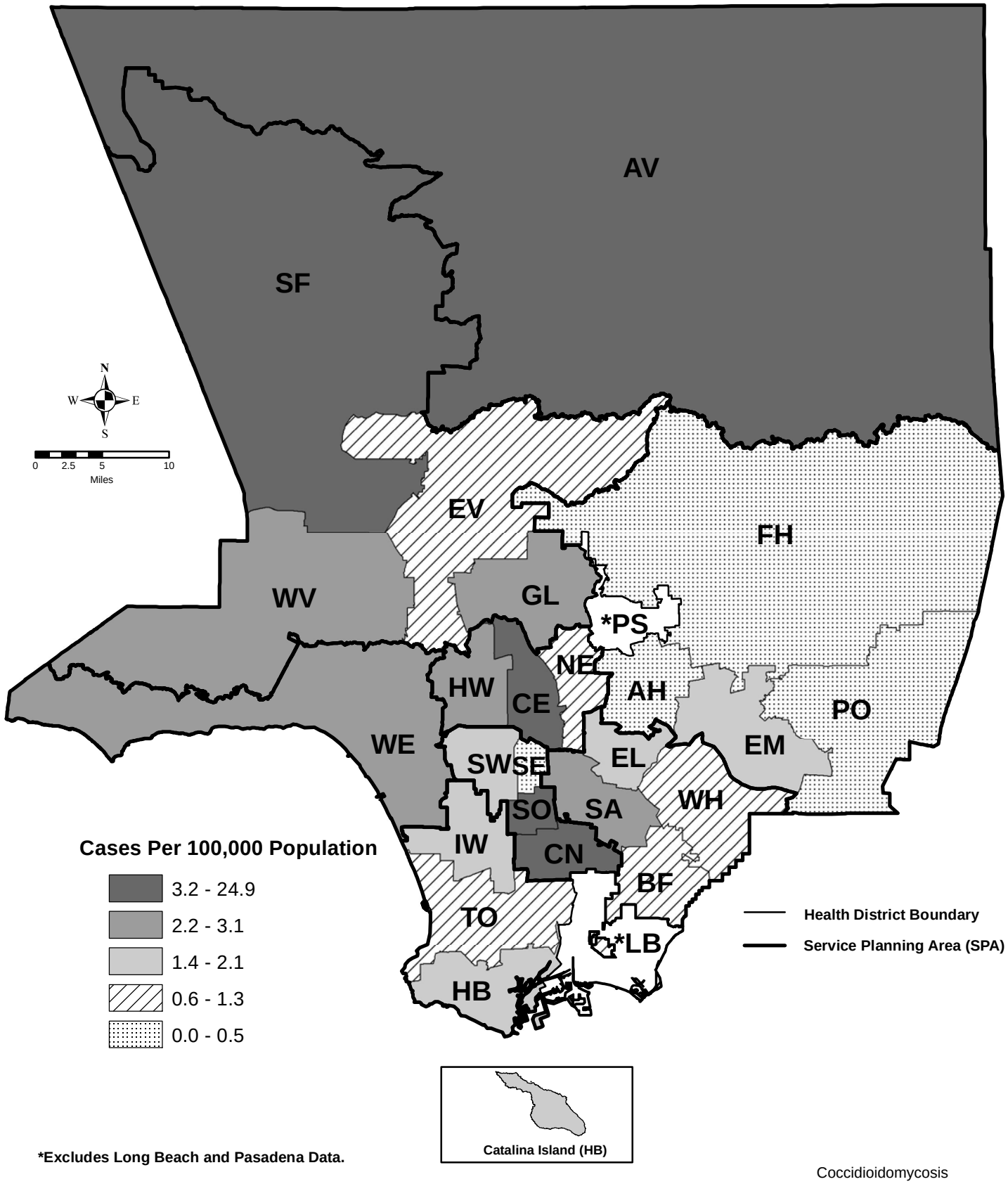


Figure 7. Reported Coccidioidomycosis Cases by SPA and Month of Onset, LAC 2011 (N=304)



Map 3. Coccidioidomycosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases[a]	51
Annual Incidence	
LA County	0.52
California[b]	0.89
United States[b]	2.99
Age at Diagnosis	
Mean	36
Median	36
Range	2-87 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 2 to 10 days with typical symptoms of watery diarrhea, abdominal cramps, and low-grade fever; however, asymptomatic infection is also common. Symptoms last up to 2 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.

2011 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases in Los Angeles County (LAC) decreased slightly from 0.62 to 0.52 cases per 1000,00 in 2010 and 2011, respectively (Figure 1). This is consistent with years previous to 2010.
- The 35 to 44 and 65+ year old age groups had the highest incidence rates for cryptosporidiosis, 0.7 cases per 100,000 (Figure 2). The 35-44 age group has consistently had the highest incidence rate in previous reporting periods. The 15-34 year age group had the largest proportion of cases reported. This is similar to previous years.
- Whites (20, 39%) accounted for the largest proportion of cases in 2011. A large percentage (22%) of cases had unknown race/ethnicity data (Figure 3). Blacks and whites had the highest incidence rate of all the race/ethnicity groups, reporting 0.7 cases per 100,000.
- Service Planning Area (SPA) 2 (15, 29%) reported the largest proportion of cases in 2011. SPA 1 had the highest incidence rate, with 1.6 cases per 100,000; this differs from previous reporting periods where SPA 4 and 5 have had the highest incidence rates (Figure 4).
- In 2011, the number of cases reported peaked in August, consistent with previous years (Figure 5).
- The male to female ratio for 2011 was approximately 2:1. Males have consistently comprised the larger proportion of cases.
- Complete risk factor data were available for 100% of cases. The most frequently reported risk factor was contact with animals (30, 59%), the majority of which was contact with dogs at home. Other reported risk factors were HIV positive status (13, 25%), especially among MSM (12,24%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007 - 2011

	2007 (N=50)			2008 (N=41)			2009 (N=51)			2010 (N=61)			2011 (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
1-4	2	4.0	0.3	2	4.9	0.4	4	7.8	0.7	2	3.3	0.3	3	5.8	0.5
5-14	4	8.0	0.3	7	17.1	0.5	4	7.8	0.3	5	8.2	0.4	6	11.7	0.5
15-34	15	30.0	0.5	10	24.4	0.3	16	31.4	0.6	15	24.6	0.5	16	31.3	0.5
35-44	13	26.0	0.9	15	36.6	1.0	13	25.5	0.9	14	23	1.0	10	19.6	0.7
45-54	10	20.0	0.8	4	9.8	0.3	4	7.8	0.3	13	21.3	1.0	6	11.7	0.4
55-64	1	2.0	0.1	1	2.4	0.1	6	11.8	0.6	5	8.2	0.5	3	5.8	0.3
65+	5	10.0	0.5	2	4.9	0.2	4	7.8	0.4	7	11.5	0.7	7	13.7	0.7
Unknown	0	0.0		0	0.0		0	0.0		0			0		
Race/Ethnicity															
Asian	1	2.0	0.1	1	2.4	0.1	1	2.0	0.1	2	3.3	0.1	3	5.8	0.2
Black	7	14.0	0.8	5	12.2	0.6	8	15.7	0.9	11	18.0	1.3	6	11.7	0.7
Hispanic	8	16.0	0.2	10	24.4	0.2	10	9.6	0.2	13	21.3	0.3	11	21.5	0.2
White	29	58.0	1.0	12	29.3	0.4	16	31.4	0.5	22	36.1	0.8	20	39.2	0.7
Other	2	4.0	9.6	2	4.9	8.1	1	2.0		0	0.0	0.0	0	0.0	0.0
Unknown	3	6.0		11	26.8		15	29.4		13	21.3		11	21.5	
SPA															
1	3	6.0	0.8	2	4.9	0.5	5	9.8	1.4	3	4.9	0.8	6	11.7	1.6
2	19	38.0	0.9	14	34.1	0.6	12	23.5	0.5	16	26.2	0.7	15	29.4	0.7
3	3	6.0	0.2	0	0.0	0.0	5	9.8	0.3	9	14.8	0.5	4	7.8	0.2
4	7	14.0	0.6	12	29.3	0.9	11	21.6	0.9	10	16.4	0.8	8	15.7	0.6
5	7	14.0	1.1	5	12.2	0.8	4	7.8	0.6	5	8.2	0.8	5	9.8	0.8
6	1	2.0	0.1	1	2.4	0.1	5	9.8	0.5	10	16.4	0.9	4	7.8	0.4
7	3	6.0	0.2	3	7.3	0.2	3	5.9	0.2	1	1.6	0.1	1	2.0	0.4
8	7	14.0	0.6	4	9.8	0.4	4	7.8	0.4	4	6.6	0.4	1	2.0	1.9
Unknown	0	0.0		0	0.0					0	0.0		7	13.7	

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

Figure 1. Incidence Rates of Cryptosporidiosis US, CA and LAC, 2002 - 2011

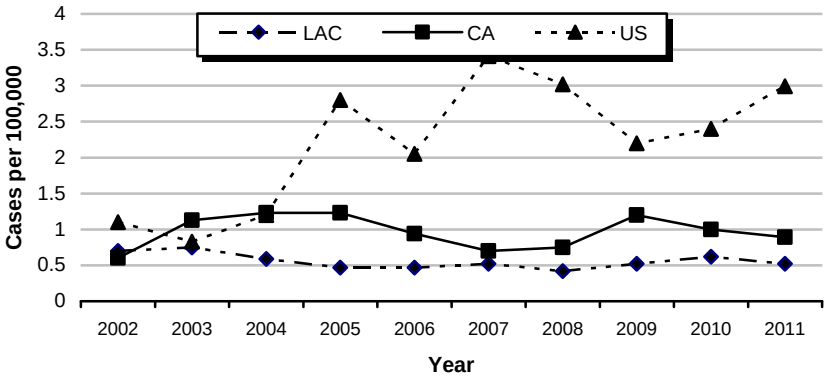


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2011

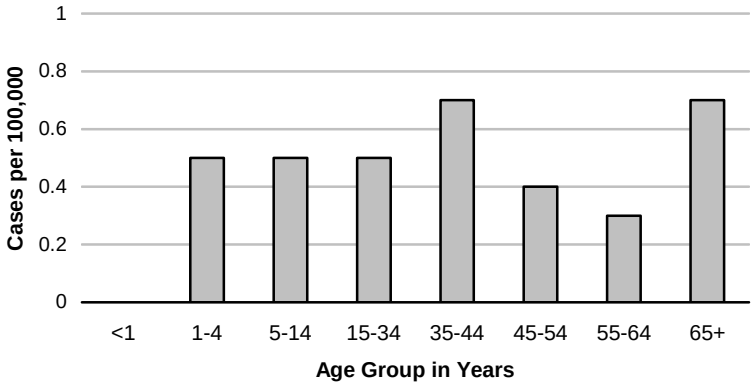
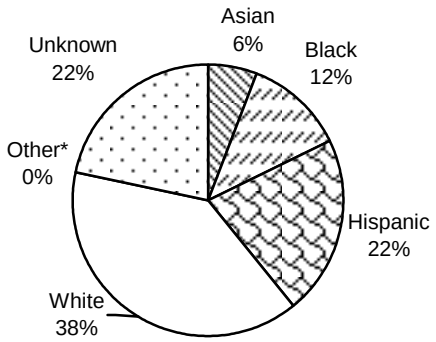


Figure 3. Proportion of Cryptosporidiosis by Race/Ethnicity LAC, 2011



* 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, 2011

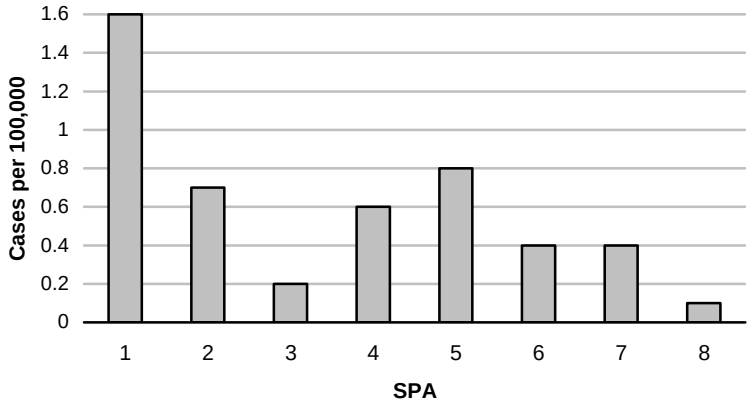


Figure 5. Reported Cryptosporidiosis Cases by Month of Onset LAC, 2011

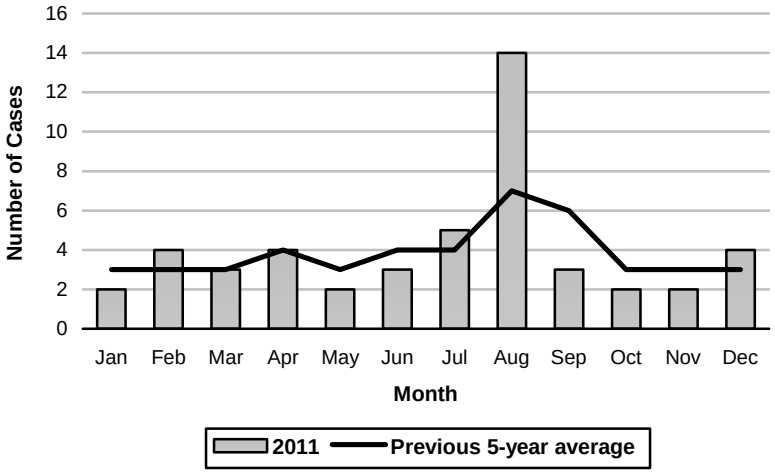
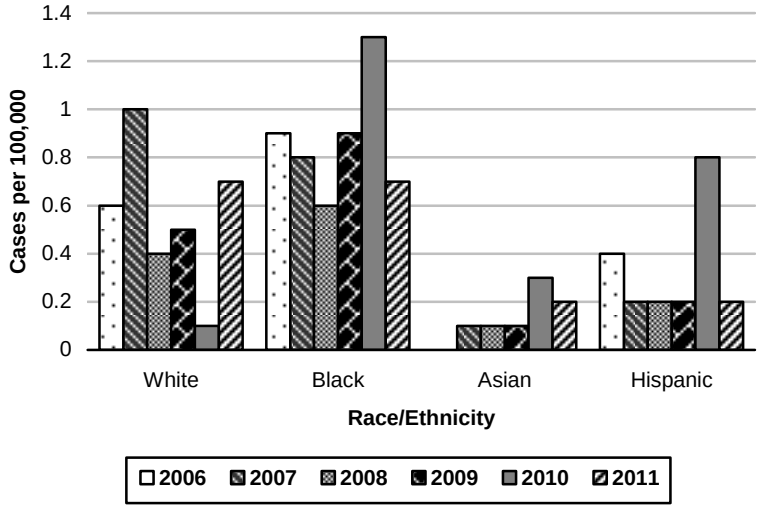
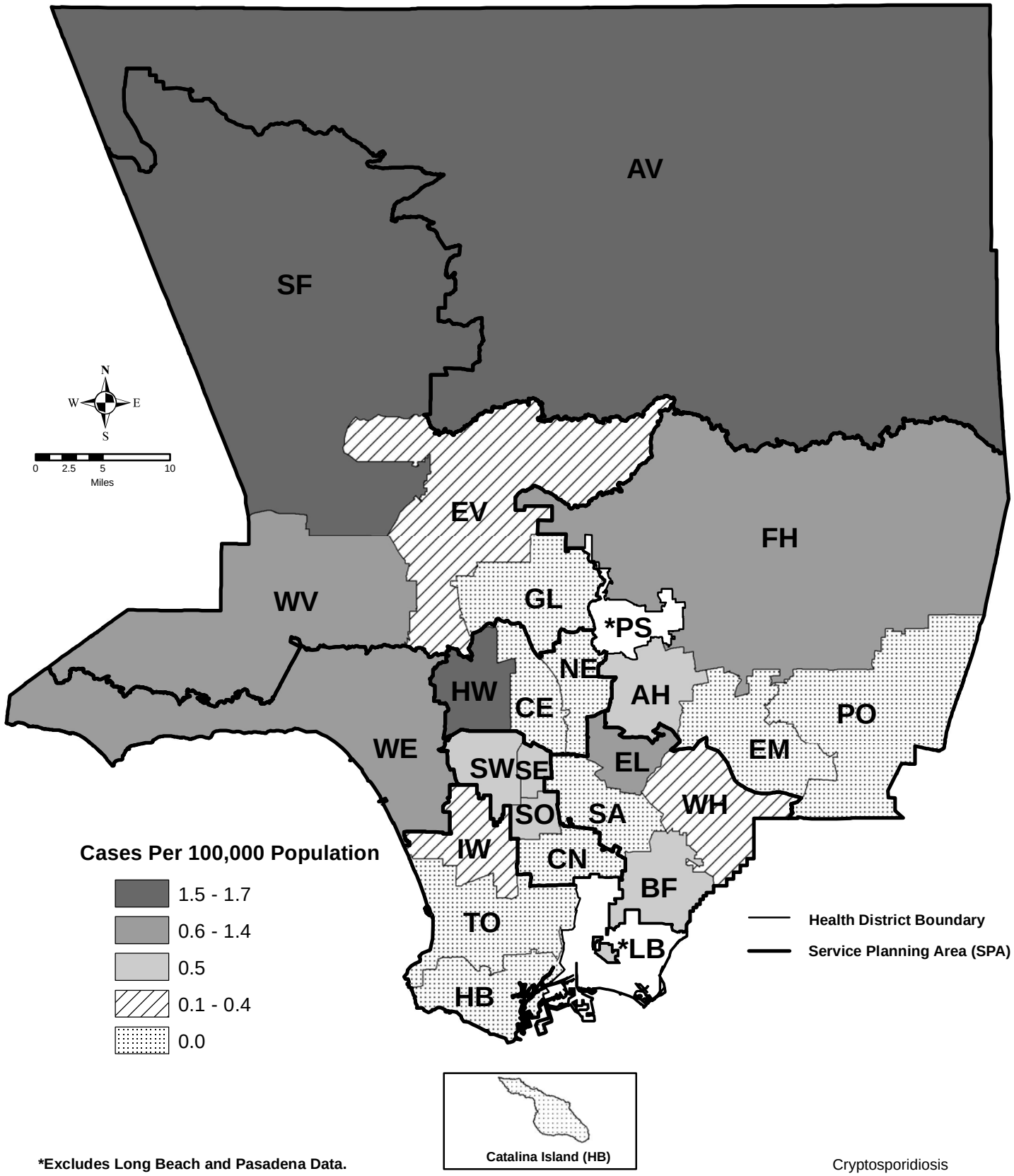


Figure 6. Cryptosporidiosis Incidence by Race/Ethnicity LAC, 2006 - 2011



Map 4. Cryptosporidiosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

ENCEPHALITIS

CRUDE DATA	
Number of Cases	59
Annual Incidence[a]	
LA County	0.60
California	N/A
United States	N/A
Age at Diagnosis	
Mean	41 years
Median	48 years
Range	0 -85 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 and bacterial etiologies, which includes primary and post-infectious encephalitis but excludes individuals with underlying human immunodeficiency virus (HIV) infection. Of special concern are arthropod-borne viruses (i.e., arboviruses), which 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. Arboviruses 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 and thus can be prevented by personal protection and mosquito control (see West Nile virus chapter).

2011 TRENDS AND HIGHLIGHTS

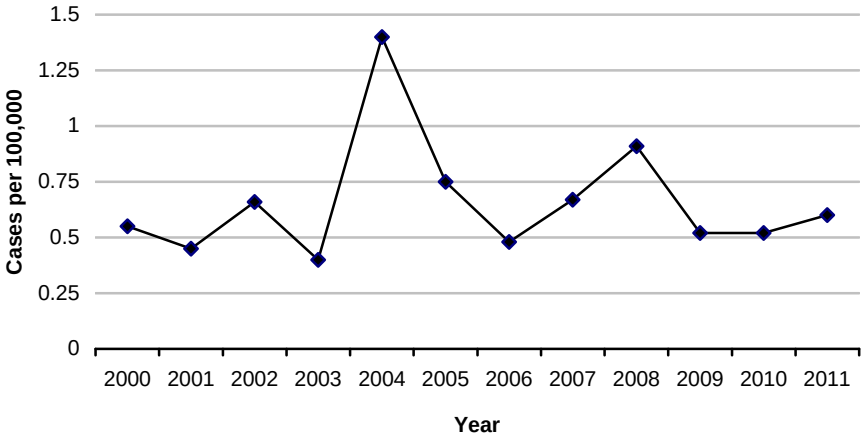
- Most encephalitis case reports originate from acute care medical facilities and physicians. Prior to its closure in January 2012, the California Encephalitis Project (http://ceip.us/encephalitis.htm) contributed a significant number of case reports as well.
- Fifty- nine cases of encephalitis were confirmed in 2011 compared to 51 cases reported in 2010. Fifteen (25%) cases of WNV encephalitis were laboratory confirmed and are included in this report. Cases of WNV encephalitis were reported from July through October, consistent with vector-borne encephalitis, resulting in the spike of summertime cases shown in Figure 4.
- Twenty-seven (46%) encephalitis cases were assessed to be due to an unknown viral etiology based on review of medical records.
- The greatest incidence of encephalitis was in the <1 year old group (2.1 cases per 100,000) followed by those 65 years of age and older (1.4 cases per 100,000 population) (data not shown). The high rate in SPA 2 can be attributed to WNV encephalitis case predominance in that region (Figure 3).
- Seventeen (29%) encephalitis cases were reported to Los Angeles County Department of Public Health (LAC DPH) by the California Encephalitis Project (CEP). Of these, seven cases were laboratory confirmed with a viral or bacterial etiology including HSV-2, adenovirus, *Mycoplasma pneumoniae* (2 cases), enterovirus, and parainfluenza virus 3. One case was later determined to have botulism. Seven cases suggested an infectious etiology that could not be identified and were classified as viral encephalitis of unknown etiology.

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=65)			2008 (N=89)			2009 (N=51)			2010 (N=51)			2011 (N=59)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	4.6	2.0	4	4.5	2.9	0	0	-	1	2.0	0.7	3	5.1	2.1
1-4	6	9.2	1.0	8	9.0	1.4	4	7.8	0.7	4	7.8	0.7	4	6.8	0.7
5-14	13	20.0	0.9	14	15.7	1.0	17	33.4	1.2	21	41.2	1.6	10	16.5	0.8
15-34	15	23.1	0.5	4	4.5	0.1	10	19.6	0.4	11	21.6	0.4	8	13.6	0.3
35-44	2	3.1	0.1	1	1.1	0.1	2	3.9	0.1	1	2.0	0.1	2	3.4	0.1
45-54	6	9.2	0.5	11	12.4	0.8	7	13.7	0.5	4	7.8	0.3	9	15.7	0.7
55-64	7	10.8	0.8	14	15.7	1.5	2	3.9	0.2	6	11.8	0.6	8	13.5	0.8
65+	10	15.4	1.0	33	37.1	3.2	8	15.7	0.8	3	5.9	0.3	15	25.4	1.4
Unknown	3	4.6		0	0.0		1	2.0	0	0	0.0				
Race/Ethnicity															
Asian	7	10.8	0.5	3	3.4	0.2	5	9.8	0.4	6	11.8	0.4	0		-
Black	5	7.7	0.6	5	5.6	0.6	2	3.9	0.2	3	5.9	0.4	4	6.8	0.3
Hispanic	31	47.7	0.7	40	44.9	0.9	22	43.2	0.5	27	52.9	0.6	33	55.9	0.7
White	19	29.2	0.7	38	42.7	1.3	9	17.6	0.3	7	13.7	0.2	14	23.7	0.5
Other	0	0.0	0.0	1	1.1	4.1	1	2.0	-	1	2.0	-	1	1.7	-
Unknown	3	4.6		2	2.2		12	23.5	-	7	13.7	-	7	11.9	-
SPA															
1	3	4.6	0.8	3	3.4	0.8	3	5.9	0.8	2	3.9	0.5	2	3.4	0.5
2	20	30.8	0.9	9	10.1	0.4	11	21.7	0.5	10	19.6	0.5	20	33.9	0.9
3	7	10.8	0.4	25	28.1	1.4	10	19.6	0.6	7	13.7	0.4	9	15.2	0.5
4	5	7.7	0.4	10	11.2	0.8	7	13.7	0.6	4	7.8	0.3	4	6.8	0.3
5	1	1.5	0.2	0	0.0	0.0	0	0.0	-	2	3.9	0.3	1	1.7	0.2
6	6	9.2	0.6	3	3.4	0.3	7	13.7	0.7	13	25.5	1.2	4	6.8	0.4
7	6	9.2	0.4	16	18.0	1.2	9	17.6	0.7	5	9.8	0.4	8	13.5	0.6
8	13	20.0	1.2	9	10.1	0.8	2	3.9	0.2	4	7.8	0.4	5	8.5	0.4
Unknown	4	6.2		14	15.7		2	3.9		4	7.8		6	10.2	

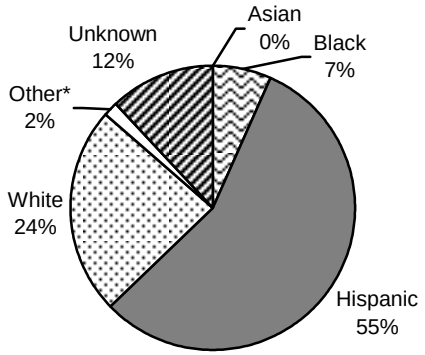
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis
LAC, 2000-2011



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity
LAC, 2011 (N=59)



* 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, 2011 (N=59)

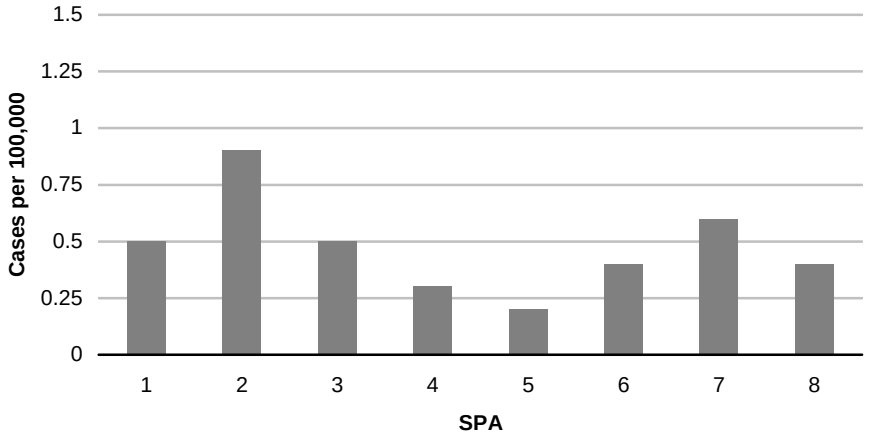


Figure 4. Reported Encephalitis Cases by Month of Onset
LAC, 2011 (N=59)

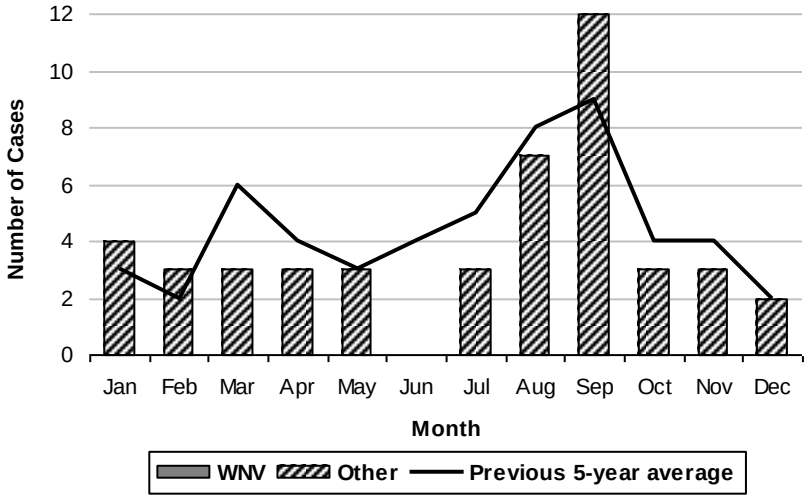
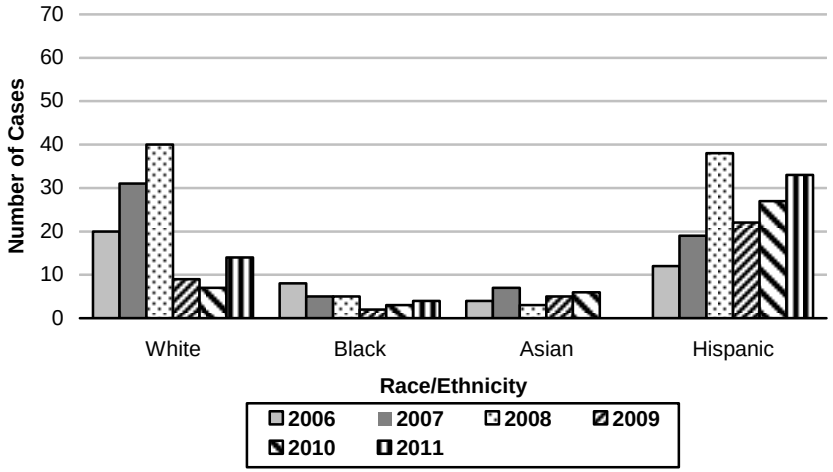
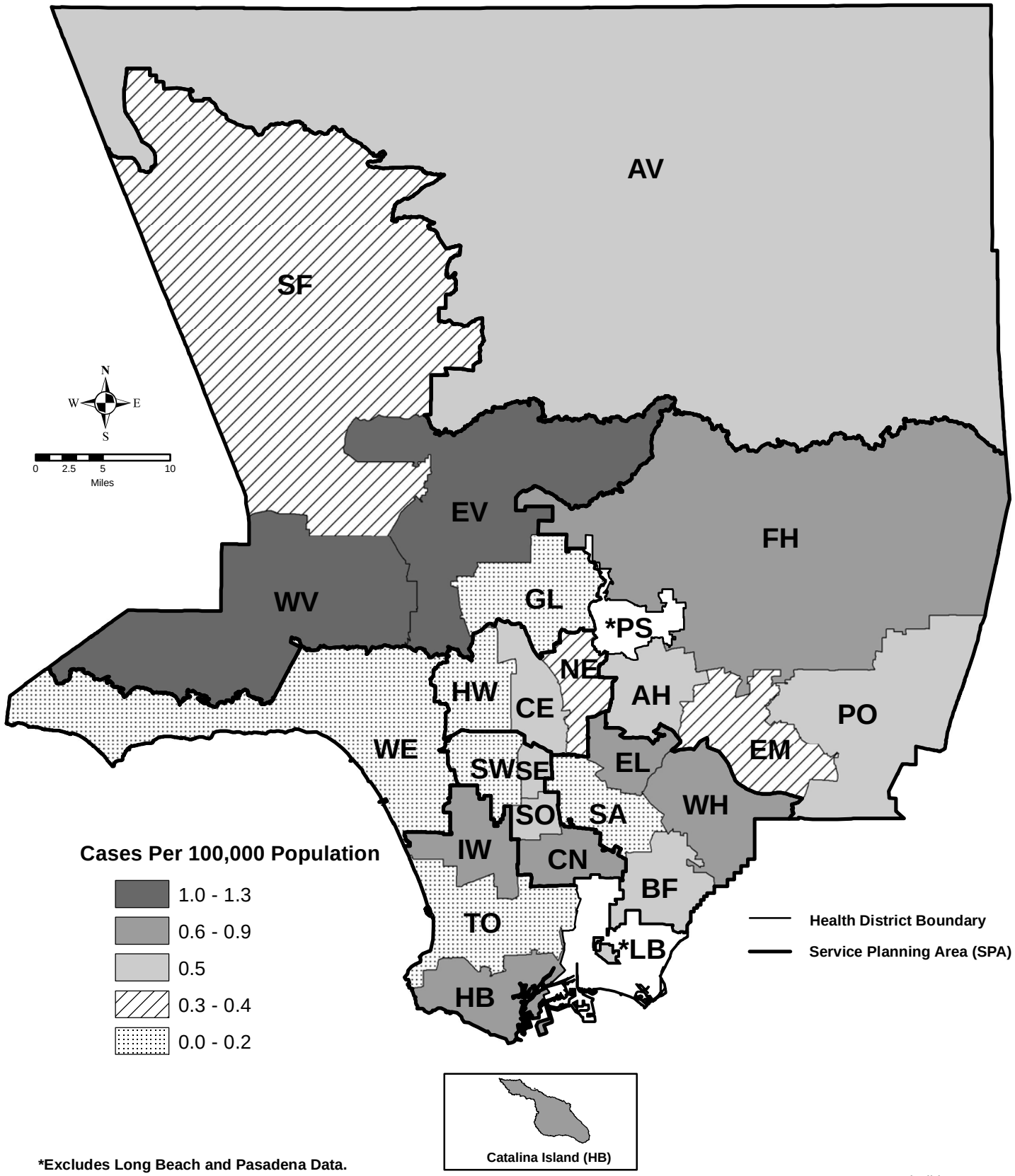


**Figure 5. Reported Encephalitis Cases by Race/Ethnicity
LAC, 2006-2011**



Map 5. Encephalitis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	21	67	88
Annual Incidence[a]			
LA County	0.21	0.68	0.89 [c]
California[b]	--	--	0.11 [c]
United States[b]	--	--	0.15 [c]
Age at Diagnosis			
Mean	22.8	13.6	
Median	13	3	
Range	1-74	0-81	

[a] Cases per 100,000 population.
[b] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.
[c] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

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 occur and cause illness. A positive test for shiga toxin in stool as well as cultures of STEC are reportable to Public Health. All reported 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 recent 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 contamination.

2011 TRENDS AND HIGHLIGHTS

- There was a 75% (n=21) increase in the frequency of confirmed *E. coli* O157:H7 cases in 2011 (Figure1).
- Cases of *E. coli* "other serotypes" had a younger mean age than O157:H7 cases (13.6 vs. 22.8 years). One possible rationale is that cases with other serotypes are largely Hispanic, a group that has historically had less access to health care to be diagnosed, with the exception of Hispanic children who have health care coverage through government programs. This would, in effect, drive the mean age down for the "other serotypes" group.
- The number of confirmed cases of other STEC (non-O157:H7) infections increased by 48% (n=67) compared to 2010. They included ten different serotypes with serotypes O103, O111, O26 being predominant. The increase is most likely due to increased screening for shiga-like toxin

done by major labs in accordance with the CDC 2009 recommendations.[1]

- For serotype O157:H7, the highest number of cases reported was among persons ages 1-14 years (n=12) (Figure 2); it continues to be mainly observed among whites (n=11) (Figures 3, 6). Cases were reported from all SPAs (Table 2, Figure 4).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=30) (Figure 2) and in the Hispanic population (n=42) (Figures 3, 7). The reasons for these differences are unknown.
- Seven HUS cases were reported of which four were laboratory confirmed with STEC serotype O157:H7. One reported death was associated with HUS, however, this was not the underlying cause; the case had multiple medical problems that included congestive heart failure and chronic pulmonary disease.
- There were no Los Angeles County outbreaks of STEC in 2011. Acute Communicable Disease Control Program participated in two multistate cluster investigations.

[1] Centers for Disease Control and Prevention. Recommendations for Diagnosis of Shiga Toxin–Producing *Escherichia coli* Infections by Clinical Laboratories. MMWR 2009;58(No. RR-#):1-14.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2007-2011

	2007 (N=12)			2008 (N=16)			2009 (N=18)			2010 (N=12)			2011 (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	0	0.0	0.0	1	6.3	0.7	0	0	0	0	0	0	0	0	0
1-4	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9	3	25.0	0.5	6	28.5	1.0
5-14	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2	2	16.6	0.2	6	28.5	0.5
15-34	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2	5	41.6	0.2	3	14.2	0.1
35-44	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1	0	0	0	2	9.5	0.1
45-54	1	8.3	0.1	1	6.3	0.1	0	0	0	1	8.3	0.1	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	0	0	0	2	9.5	0.2
65+	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2	1	8.3	0.1	2	9.5	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	0	0.0	0.0	1	5.5	0.1	3	25.0	0.2	1	4.7	0.1
Black	3	25.0	0.4	5	31.3	0.6	0	0	0	1	8.3	0.1	1	4.7	0.1
Hispanic	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1	2	16.6	--	8	38.0	0.2
White	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4	6	50.0	0.2	11	52.3	0.4
Other	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	1	5.5	0.3	0	0	0	1	4.7	0.3
2	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2	5	41.6	0.2	4	19.0	0.2
3	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1	0	0	0	3	14.2	0.2
4	0	0.0	0.0	3	18.8	0.2	0	0	0	0	0	0	5	23.8	0.4
5	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5	3	25.0	0.5	1	4.7	0.2
6	2	16.7	0.2	0	0.0	0.0	0	0	0	0	0	0	3	14.2	0.3
7	1	8.3	0.1	0	0.0	0.0	4	22.2	03	2	16.1	0.1	1	4.7	0.1
8	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4	2	16.1	0.1	3	14.2	0.2
Unknown	0	0.0		0	0.0										

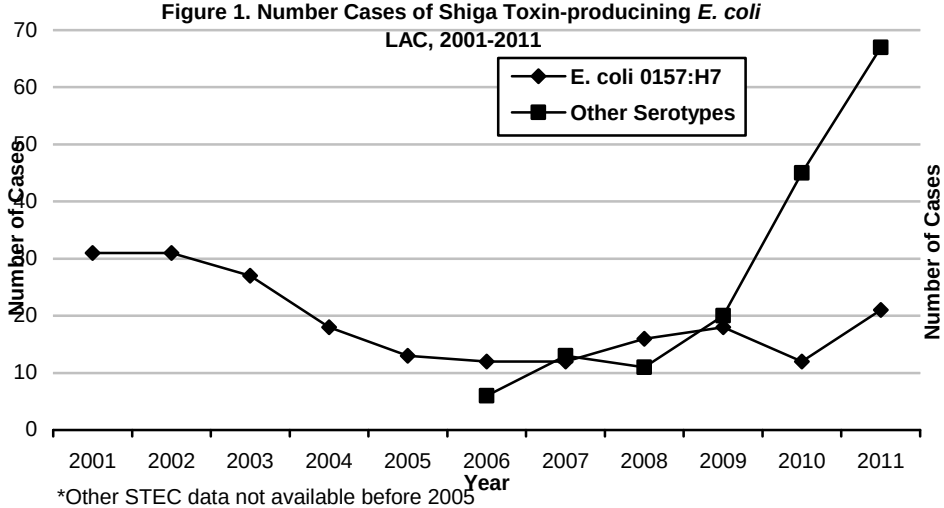
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2007-2011

	2007 (N=6)			2008 (N=11)			2009 (N=20)			2010 (N=45)			2011 (N=67)		
	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	4	8.8	2.9	8	11.9	5.7
1-4	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6	23	51.1	4.0	30	44.7	5.2
5-14	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1	2	4.4	0.2	8	11.9	0.6
15-34	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1	8	17.8	0.3	12	17.9	0.4
35-44	0	0	0	0	7.1	0	1	4.7	0.1	1	2.2	0.1	2	2.9	0.1
45-54	2	20	0.2	1	7.1	0.1	1	4.7	0.1	6	13.3	0.4	0	0	0
55-64	0	0	0	0	0	0	1	4.7	0.1	1	2.2	0.1	3	4.4	0.3
65+	0	0	0	2	14.2	0.2	2	9.5	0.2	0	0	0	4	5.9	0.4
Unknown	0	0	0	0	0	0	0	0	0	0	0	0			
Race/Ethnicity															
Asian	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2	1	2.2	0.1	5	7.4	0.4
Black	0	0	0	1	7.1	0.1	0	0	0	2	4.4	0.2	2	2.9	0.2
Hispanic	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1	31	68.8	0.7	42	62.6	0.9
White	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4	10	22.2	0.3	17	25.3	0.6
Other	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	2.2	--	1	1.4	--
SPA															
1	0	0	0	1	14.2	0.3	0	0	0	1	2.2	0.3	2	2.9	0.5
2	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2	14	31.1	0.6	14	20.8	0.6
3	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2	7	15.5	0.4	8	11.9	0.5
4	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2	6	40.0	0.5	4	5.9	0.3
5	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9	3	6.6	0.5	7	10.4	1.1
6	0	6.6	0	0	0	0	0	0	0	4	8.8	0.4	8	11.9	0.7
7	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1	6	13.1	0.4	20	29.8	1.5
8	6	33.3	0.5	0	0	0	2	9.5	0.2	4	8.8	0.4	4	5.9	0.4
Unknown	0	0	0	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, 2001-2011



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2011

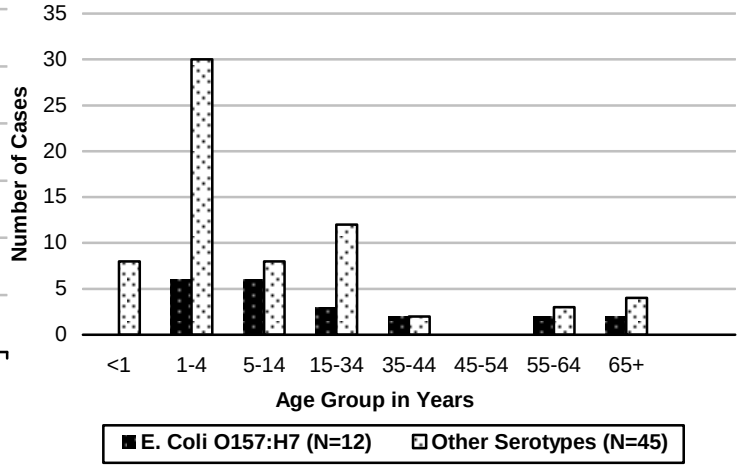


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2011

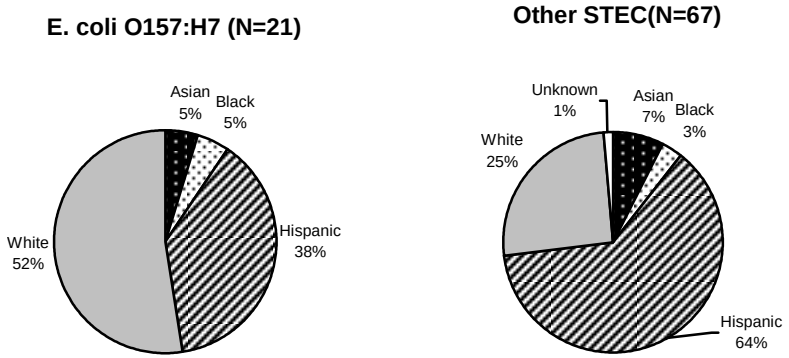


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2011

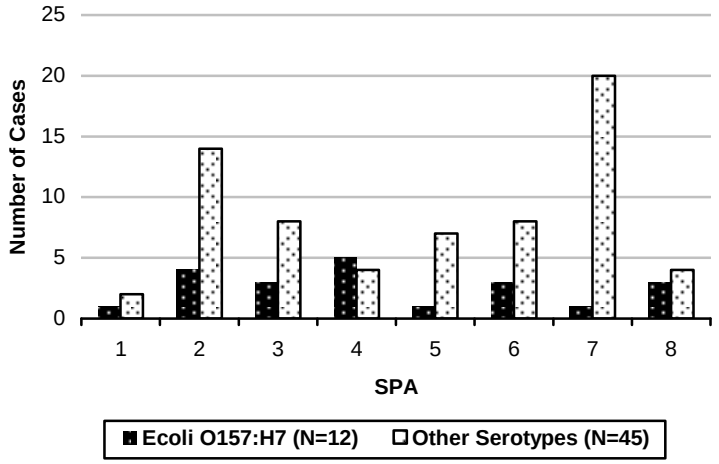


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2011

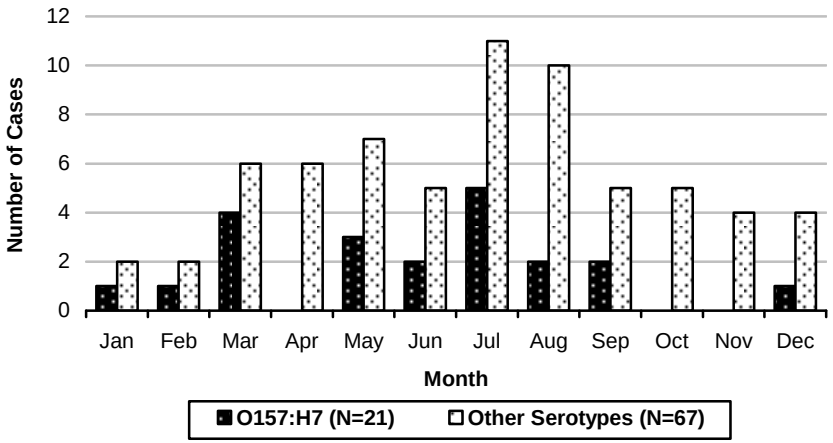


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2007-2011

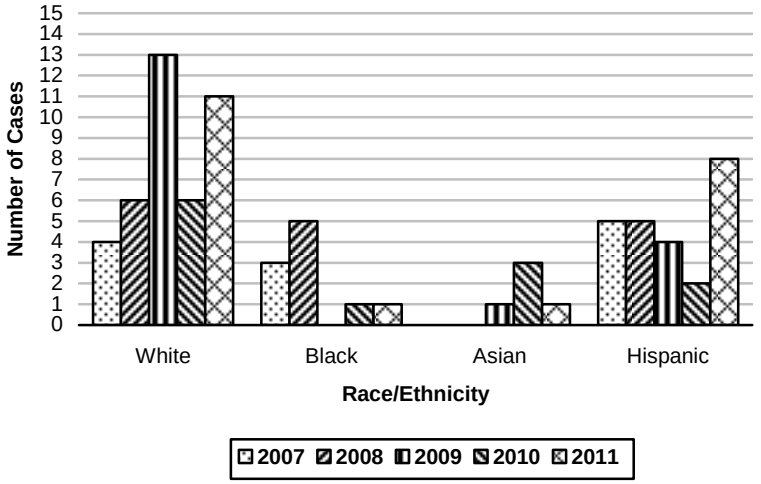
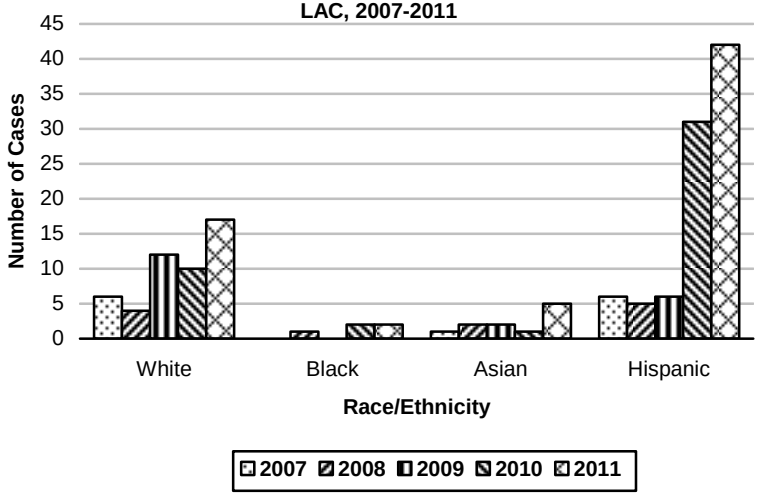
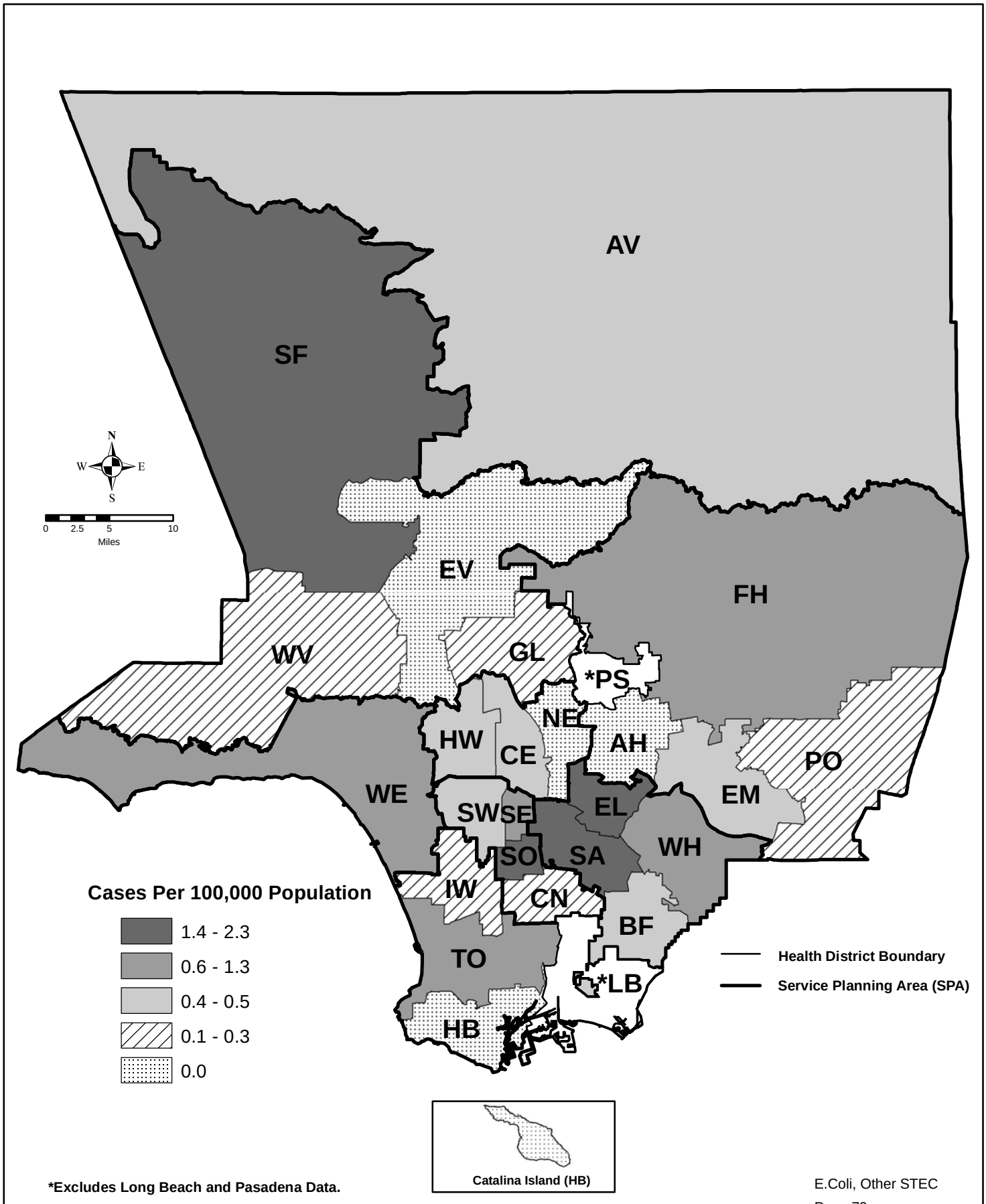


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2007-2011



Map 6. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

GIARDIASIS

CRUDE DATA	
Number of Cases	292
Annual Incidence[a]	
LA County	2.98
California[b]	4.64
United States[b]	5.42
Age at Diagnosis	
Mean	34
Median	34
Range	<1 - 90

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 can range from 3 to 25 days or longer, but the median incubation time is 7 to 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. Persons ill with diarrhea should avoid swimming. Fecal exposure during sexual activity should also be avoided.

2011 TRENDS AND HIGHLIGHTS

- Giardiasis incidence in Los Angeles County (LAC) decreased in 2011 to 3.0 cases per 100,000 from 3.1 and 3.6 cases per 100,000, during 2010 and 2009, respectively (Figure 1).
- The highest age-specific incidence rate occurred among children aged 1 to 4 years; the highest total number of cases was reported in the 15 to 34 year age group which is consistent with the previous year (Figure 2).
- Whites continue to have higher race/ethnicity specific incidence rates and percent cases compared to other races (Figure 3). Whites accounted for 50% of the reported cases.
- Within Los Angeles County (LAC), Service Planning Area (SPA) 5 reported the highest incidence rate of giardiasis with 5.6 cases per 100,000. This is consistent with previous years. The second highest incidence rate was reported from SPA 2 (4.6 per 100,000) (Figure 4).
- The number of cases reported in 2011 peaked early in the summer months, consistent with the previous five-year average (Figure 5).
- The male to female ratio was 2:1; males have consistently accounted for a larger proportion of cases in previous reporting periods.
- The most frequently reported risk factor in 2011 was contact with animals (115, 41%), predominantly dogs. Travel to another country was also frequently reported (67, 24%), with travel to Mexico as the most frequently reported country (13, 19%) and India (12, 18%). Immigration to the US (66, 23%); approximately one fifth of immigrant cases were from Mexico (12, 19%). These risk factors are consistent with risk factor information for other waterborne parasitic diseases reported in LAC.

Reported Giardiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=441)			2008 (N=355)			2009 (N=354)			2010 (N=308)			2011 (N=292)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	0.7	2.0	4	1.1	2.9	1	0.3	0.7	5	0.2	3.6	1	0.3	0.7
1-4	61	13.8	10.6	45	12.7	7.9	46	13.0	8.2	41	13.3	7.1	22	7.5	3.8
5-14	66	15.0	4.6	41	11.5	2.9	40	11.3	2.9	37	12.0	2.8	39	13.7	2.9
15-34	126	28.6	4.5	96	27.0	3.3	85	24.0	3.0	81	26.3	2.7	84	28.7	2.8
35-44	76	17.2	5.1	63	17.7	4.2	67	19.0	4.5	46	14.9	3.2	49	16.8	3.4
45-54	62	14.1	4.7	62	17.5	4.6	43	12.1	3.1	36	11.7	2.7	44	15.0	3.3
55-64	30	6.8	3.4	27	7.6	3.0	41	11.6	4.3	37	12.0	3.8	29	9.8	3.0
65+	17	3.9	1.7	17	4.8	1.7	30	8.5	2.8	24	7.8	2.3	23	7.9	2.2
Unknown		0.0			0.0		1	0.3		0	0		1	0.3	-
Race/Ethnicity															
Asian	33	7.5	2.6	21	5.9	1.6	13	3.7	1.0	23	7.5	1.7	20	6.8	1.5
Black	24	5.4	2.8	16	4.5	1.9	25	7.1	2.9	28	9.1	3.3	18	6.2	2.1
Hispanic	133	30.2	2.9	106	29.9	2.3	102	28.8	2.2	90	29.2	1.9	89	30.5	1.9
White	195	44.2	6.7	167	47.0	5.7	129	36.4	4.4	137	44.5	4.8	146	50.0	5.1
Other	13	2.9	62.4	5	1.4	20.3	4	1.1		8	27.3		2	0.7	
Unknown	43	9.8		40	11.3		81	22.9		22	7.1		17	5.8	
SPA															
1	4	0.9	1.1	8	2.3	2.2	5	1.4	1.4	11	3.6	2.9	8	2.7	2.1
2	170	38.5	7.9	161	45.4	7.4	138	39.0	6.2	10	3.2	0.5	102	35	4.6
3	45	10.2	2.6	34	9.6	2.0	27	7.6	1.6	27	8.8	1.6	22	7.5	1.3
4	63	14.3	5.0	36	10.1	2.8	46	13.0	3.7	49	15.9	3.9	47	16.1	3.7
5	57	12.9	8.9	37	10.4	5.7	43	12.1	6.6	31	10.0	4.7	37	12.7	5.6
6	26	5.9	2.5	27	7.6	2.6	29	8.2	2.8	21	6.8	2.0	20	6.8	1.9
7	42	9.5	3.0	25	7.0	1.8	26	7.3	1.9	31	10.1	2.3	26	8.9	1.9
8	32	7.3	2.9	26	7.3	2.3	36	10.2	3.2	26	8.4	2.3	28	9.6	2.5
Unknown	2	0.5		1	0.3		0	0.0		0	0.0		2	0.7	

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

Figure 1. Incidence Rates of Giardiasis
LAC, CA and US, 2002 - 2011

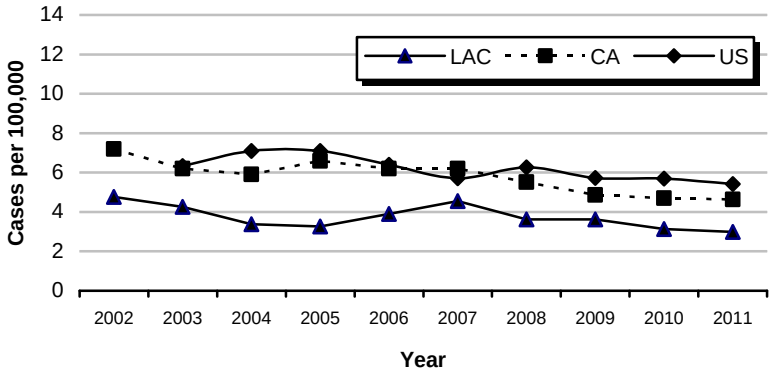


Figure 2. Incidence Rates of Giardiasis by Age Group
LAC, 2011

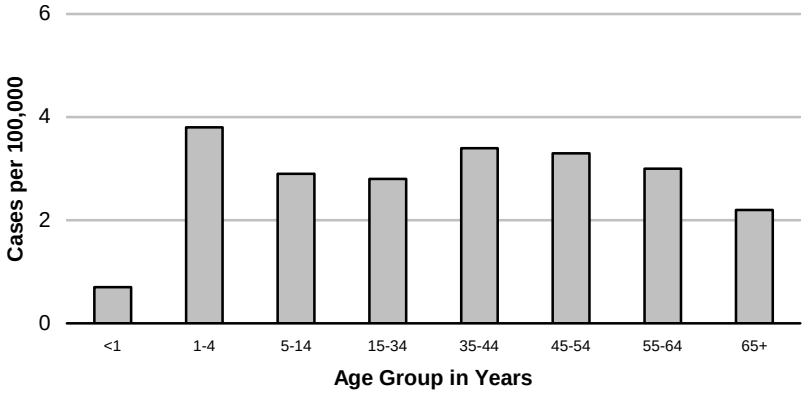


Figure 3. Percent Cases of Giardiasis by Race/Ethnicity
LAC, 2011

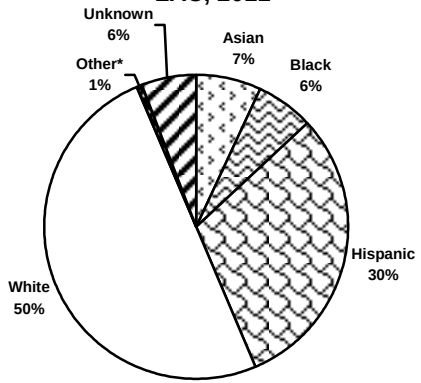
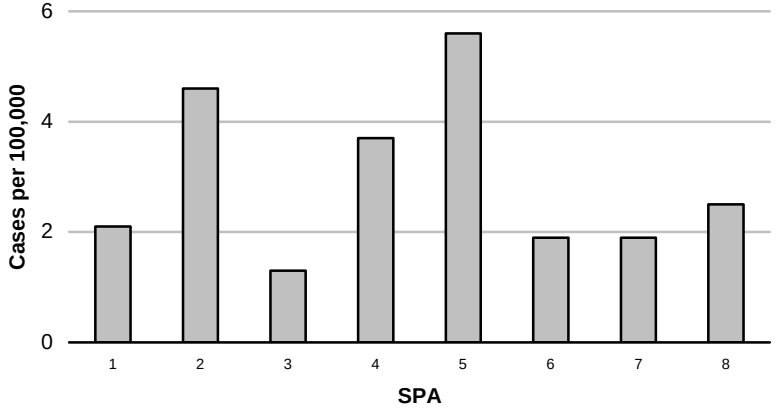


Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2011



* 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, 2011

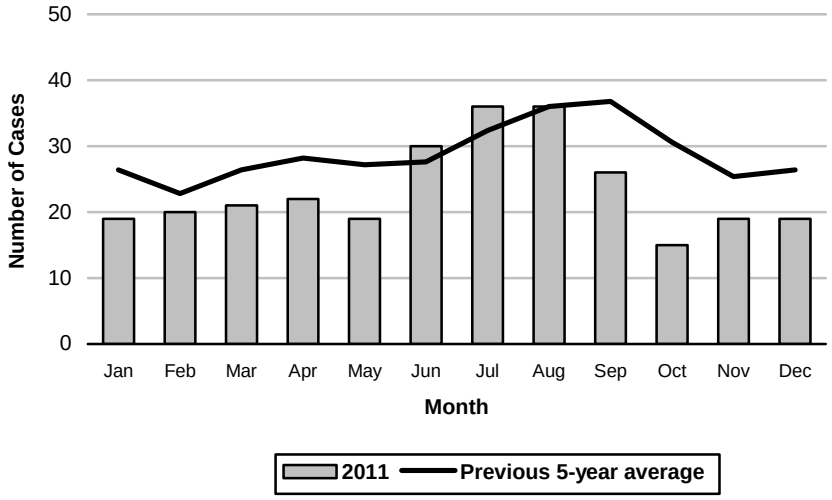
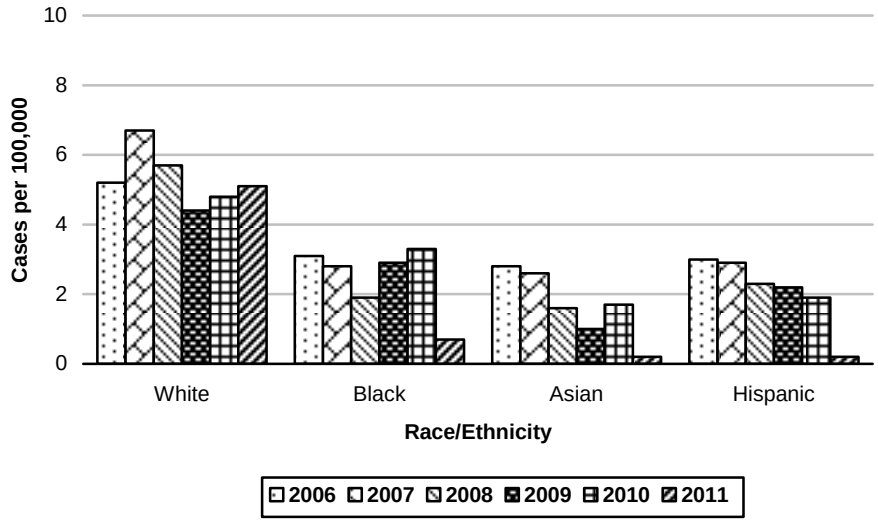
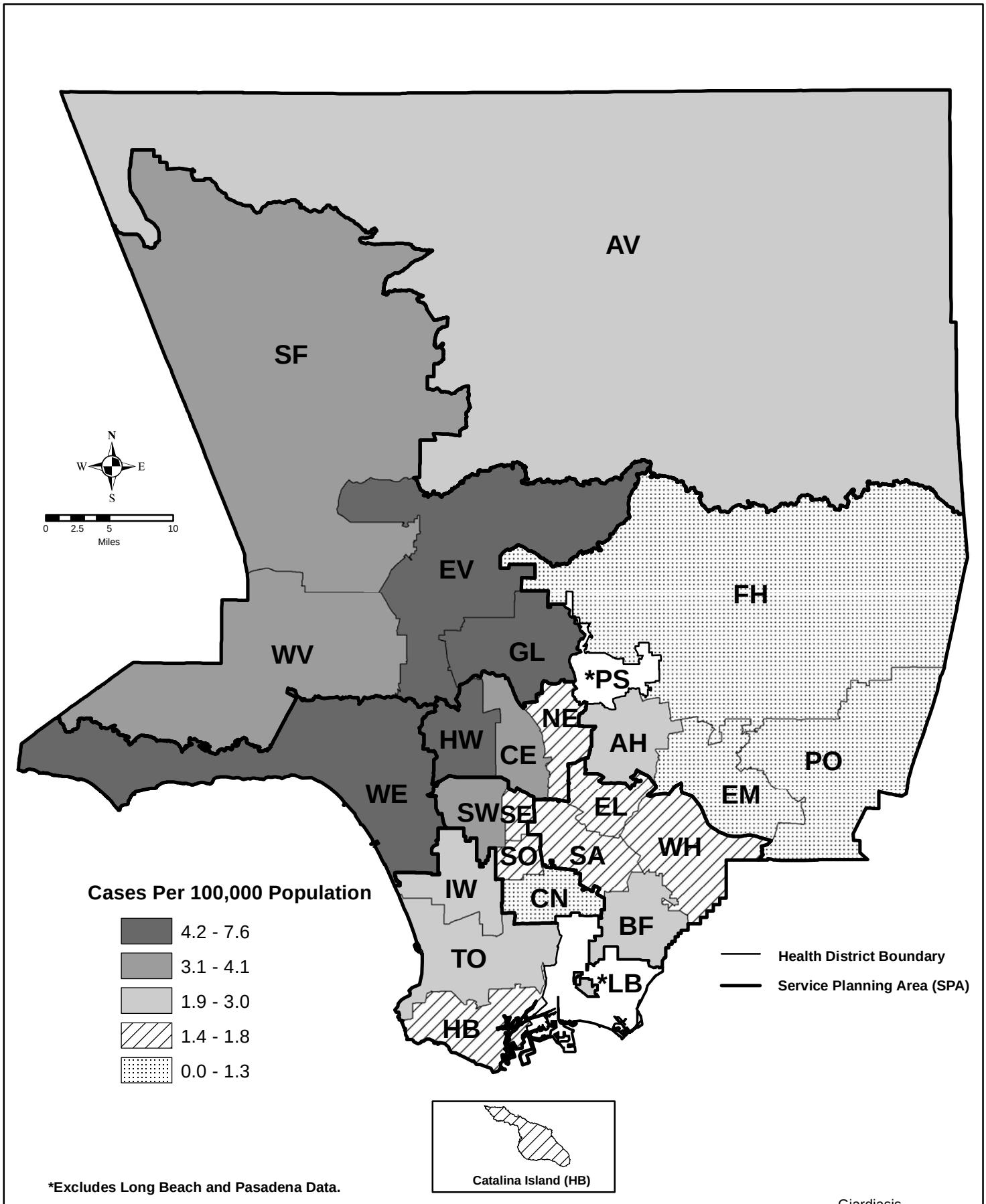


Figure 6. Giardiasis Incidence by Race/Ethnicity
LAC, 2006 - 2011



Map 7. Giardiasis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	66
Annual Incidence[a]	
LA County	0.7
California[b]	0.12
United States[c]	1.15
Age at Diagnosis	
Mean	51.3 years
Median	59.0 years
Range	Birth – 96 years

[a] Cases per 100,000 population.
[b] The incidence rates for California only include cases age <15 years
[c] Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 recommended. Thus, determining the serotype on laboratory specimens for all suspect cases is critical. Since June 2007, the only cases of invasive *H. influenzae* investigated in Los Angeles County (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 primary 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.
- 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.

2011 TRENDS AND HIGHLIGHTS

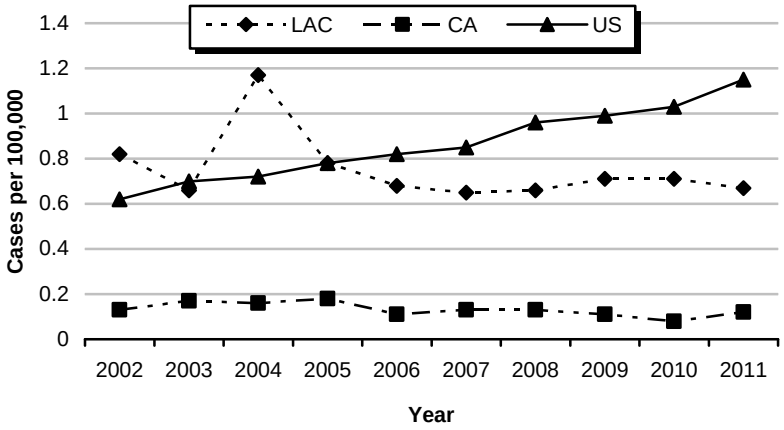
- For the second year in a row, no serotype B cases were identified so none of the cases were vaccine-preventable (Figures 6, 7, 8).
- As in previous years, the highest incidence rates occurred in the <1 and 65+ age groups (Figure 2). *H. influenzae* invasive disease is common in infants and elderly persons, as well as immunocompromised persons.
- None of the cases were linked. Unlike previous years, SPA 2 and SPA 5 reported the highest incidence rates (Figure 4).
- Similar to previous years, the highest incidence rates occurred in the first half of the year, with a peak in March (Figure 5). It is unknown why this occurred.
- Reported cases were either non-B (n=38) or unknown serotypes (n=28) (Figures 6, 7, 8). Of the 28 cases with unknown serotype, 93% (n=26) were ≥15 years of age so serotype testing was not requested. Among all 66 cases, 79% (n=52) were ≥15 years of age and were also not investigated further. Thus, data on race/ethnicity and locations are missing for many of the cases (Figure 3).

Reported H. Influenzae Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=63)			2008 (N=64)			2009 (N=69)			2010 (N=70)			2011 (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	8	12.7	5.4	6	9.4	4.3	7	10.1	5.1	9	12.8	6.4	3	4.5	2.1
1-4	1	1.6	0.2	2	3.1	0.4	4	5.8	0.7	3	4.3	0.5	4	6.1	0.6
5-14	3	4.8	0.2	3	4.7	0.2	0	0.0	-	4	5.7	0.3	7	10.6	0.5
15-34	7	11.1	0.2	4	6.3	0.1	7	10.1	0.2	3	4.3	0.1	6	9.1	0.2
35-44	4	6.3	0.3	5	7.8	0.3	2	2.9	0.1	6	8.6	0.4	6	9.1	0.4
45-54	7	11.1	0.5	11	17.2	0.8	8	11.6	0.6	9	12.9	0.7	4	6.1	0.3
55-64	5	7.9	0.6	2	3.1	0.2	11	15.9	1.2	8	11.4	0.8	7	10.6	0.7
65+	28	44.4	2.8	31	48.4	3.0	30	43.5	2.8	28	40.0	2.6	29	43.9	2.7
Unknown	0	0.0		0	0.0		0	0.0							
Race/Ethnicity															
Asian	1	1.6	0.1	3	4.7	0.2	3	4.4	0.2	0	0.0	-	3	4.5	0.1
Black	8	12.7	0.9	2	3.1	0.2	6	8.7	0.7	2	2.9	0.2	3	4.5	0.4
Hispanic	10	15.9	0.2	13	20.3	0.3	8	11.6	0.2	15	21.4	0.3	12	18.2	0.3
White	13	20.6	0.4	9	14.1	0.3	10	14.5	0.3	20	28.6	0.7	9	13.6	0.3
Other	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
Unknown	31	49.2		37	57.8		42	60.8		33	47.1		39	59.1	
SPA															
1	2	3.2	0.6	0	0.0	-	2	2.9	0.5	4	5.7	1.1	0	0.0	-
2	13	20.6	0.6	7	10.9	0.3	16	23.2	0.7	26	37.1	1.2	20	30.3	0.9
3	3	4.8	0.2	10	15.6	0.6	7	10.1	0.4	4	5.7	0.2	6	9.1	0.3
4	8	12.7	0.6	8	12.5	0.6	5	7.3	0.4	7	10.0	0.6	4	6.1	0.3
5	8	12.7	1.2	4	6.3	0.6	2	2.9	0.3	2	2.9	0.3	5	7.6	0.8
6	12	19.0	1.1	10	15.6	0.9	8	11.6	0.8	4	5.7	0.4	3	4.5	0.3
7	8	12.7	0.6	10	15.6	0.7	11	15.9	0.8	6	8.6	0.4	7	10.6	0.5
8	6	9.5	0.5	9	14.1	0.8	7	10.2	0.6	7	10.0	0.6	7	10.6	0.6
Unknown	3	4.8		6	9.4		11	15.9		10	14.3		14	21.2	

*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").

Figure 1. Incidence Rates of *H. influenzae* Invasive Disease US, CA and LAC, 2002-2011*



*The incidence rates for CA only includes cases aged <30 years (2001-2006) and cases aged <15 years (2007-2010).

Figure 2. Incidence Rates of *H. influenzae* Invasive Disease by Age Group LAC, 2011 (N=66)

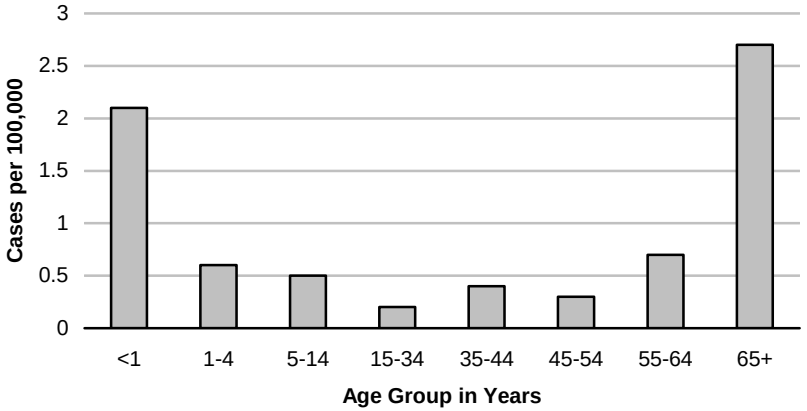


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2011 (N=66)

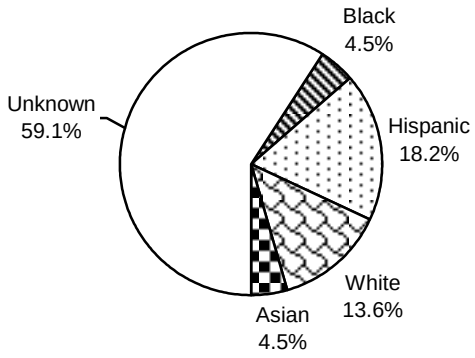


Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2011 (N=66)

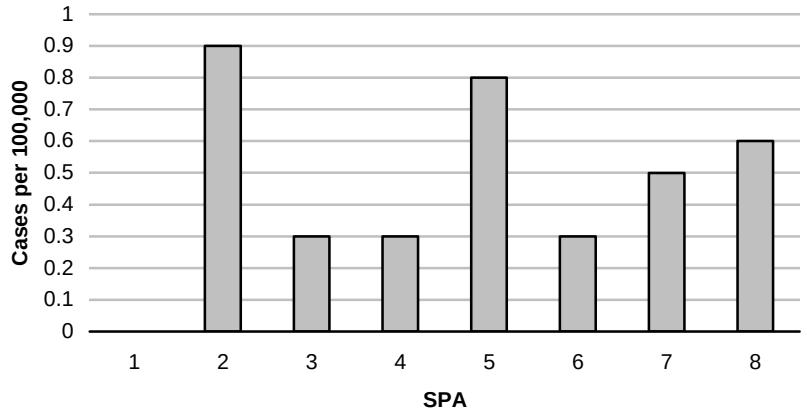


Figure 5. Reported *H. influenzae* Invasive Disease Cases by Month of Onset, LAC, 2011 (N=66)

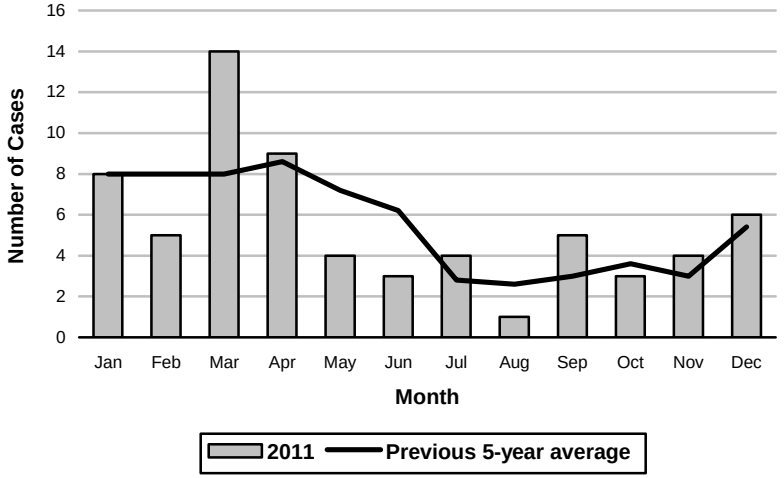


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 2002-2011

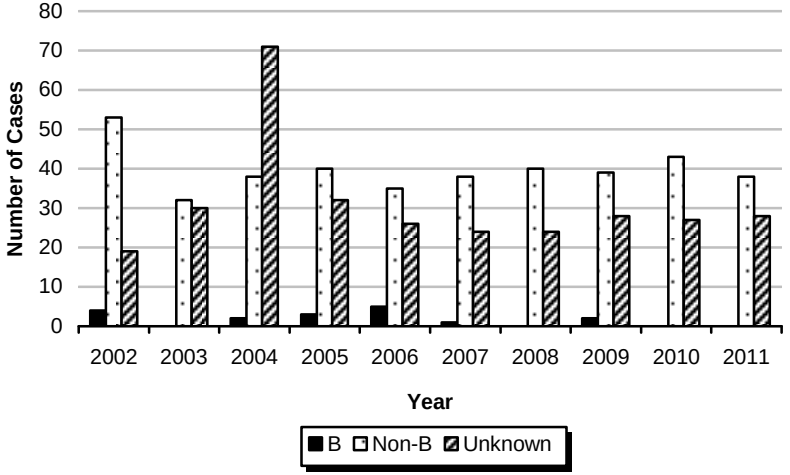
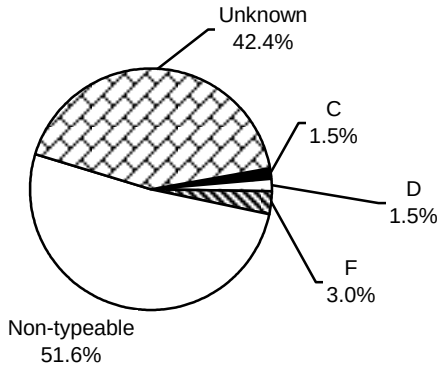


Figure 7. Reported *H. influenzae* Invasive Disease Cases by Serotype, 2011 (N=66) vs. Previous 5-Year Average

	B		Non-B		Unknown[2]	
	2011	Previous 5-Year Average	2011	Previous 5-Year Average	2011	Previous 5-Year Average
Total Cases	0	1.6	38	39.0	28	25.8
Age at Onset (years)						
Mean	--	51.4	48.7	46.8	54.7	64.5
Median	--	52.5	60.0	53.5	55.0	67.4
Range	--	<1 – 73	<1 – 90	<1 – 99	<1 - 96	<1 – 98
Case Fatality	--	0.0%	2.6%[1]	3.1%	0.0%	9.3%

[1] One death was reported. The case was <1 year of age and was hospitalized with pneumonia, sepsis, and respiratory failure.
[2] The majority of unknown serotype cases (96%) are >15 years of age so no further serotype testing is requested.

Figure 8. Percent Cases of *H. influenzae* Invasive Disease by Serotype LAC, 2011 (N=66)



HEPATITIS A

CRUDE DATA	
Number of Cases	45
Annual Incidence[a]	
LA County	0.46
California[b]	0.49
United States[b]	0.45
Age at Diagnosis	
Mean	38
Median	35
Range	3-89 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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. In the United States (US), among adults with identified risk factors, the majority of cases are among men who have sex with other men, persons who use illegal drugs, and international travelers. Sexual and household contacts of HAV-infected persons are also at increased risk for getting the disease.

The average incubation period is 28 days (range 15–50 days). Signs and symptoms of acute hepatitis A include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored bowel movements, joint pain, and jaundice. Many cases, especially in children, are mild or asymptomatic. Recovery usually occurs within one month. Infection confers life-long immunity.

Hepatitis A vaccination is the most effective means of preventing HAV transmission among persons at risk for infection. Hepatitis A vaccination is recommended for all children at age 1 year, for persons who are at increased risk for infection, for persons who are at increased risk for complications from hepatitis A, and for any person wishing to obtain immunity.

LAC DPH uses the CDC/CSTE criteria for acute hepatitis A to standardize surveillance of this infection. A case of hepatitis A is defined as a person with 1) an acute illness with discrete onset of symptoms and 2) jaundice or elevated aminotransferase levels, and 3) either IgM anti-HAV positive, or an epidemiologic link to a person who has laboratory confirmed hepatitis A

2011 TRENDS AND HIGHLIGHTS

- The 2011 incidence rate of acute hepatitis A in Los Angeles County (LAC) was lower than the previous year (0.46 per 100,000 versus 0.52 per 100,000) (Figure 1).
- The rate was highest in those between the ages of 35-44 (0.8 per 100,000), followed by the 15-34 age group (0.6 per 100,000) (Figure 2).
- The highest rate was seen in Asians (1.0 per 100,000) followed by whites (0.8 per 100,000), blacks (0.2 per 100,000), and Hispanics (0.2 per 100,000) (Figure 3).
- Four Service Planning Areas (SPA) had rates greater than the overall county mean rate of 0.46 per 100,000)—SPA 2 (0.8 per 100,000), SPA 3 (0.6 per 100,000), SPA 1 (0.5 per 100,000) and SPA 4 (0.5 per 100,000) (Figure 4).
- Risk factors were identified in 70% (n=31) of the 44 confirmed interviewed cases (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=21, 68%) was the most common risk factor reported, followed by eating raw shellfish (n=12, 39%), having a household member who traveled outside of the US in 3 months prior to onset of illness (n=12, 39%), and contact with a suspected or confirmed hepatitis A (n=2, 6%) (Figure 5).
- Forty-two percent (n=19) of acute hepatitis A cases were hospitalized.

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=78)			2008 (N=80)			2009 (N=66)			2010 (N=51)			2011 (N=45)		
	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
1-4	1	1.3	0.2	0	0.0	0.0	0	0	0	2	3.9	0.3	1	2.2	0.2
5-14	6	7.7	0.4	7	8.8	0.5	1	1.5	0.1	3	5.9	0.2	3	6.7	0.2
15-34	32	41.0	1.1	34	42.5	1.2	34	51.5	1.2	27	52.9	0.9	18	40.0	0.6
35-44	16	20.5	1.1	14	17.5	0.9	10	15.1	0.7	6	11.8	0.4	11	24.4	0.8
45-54	13	16.7	1.0	9	11.3	0.7	6	9.1	0.4	3	5.9	0.2	5	11.1	0.4
55-64	5	6.4	0.6	7	8.8	0.8	5	7.6	0.5	3	5.9	0.3	3	6.7	0.3
65+	5	6.4	0.5	9	11.3	0.9	10	15.1	0.9	7	13.7	0.7	4	8.8	0.4
Unknown	0	0.0		0	0		0	0	0	0	0	0	0	0	0
Race/Ethnicity															
Asian	15	19.2	1.2	14	17.5	1.1	18	27.3	1.4	12	23.5	0.9	13	28.9	1.0
Black	5	6.4	0.6	6	7.5	0.7	2	3.0	0.2	3	5.9	0.4	2	4.4	0.2
Hispanic	33	42.3	0.7	36	45.0	0.8	21	31.8	0.4	22	43.1	0.5	8	17.8	0.2
White	24	30.8	0.8	23	28.8	0.8	24	36.4	0.8	14	27.4	0.5	22	48.9	0.8
Other	0	0.0	0.0	1	1.3	4.1	0	0	0	0	0	0	0	0	0
Unknown	1	1.3		0	0.0	0	1	1.5		0	0	0	0	0	0
SPA															
1	5	6.4	1.4	3	3.8	0.8	2	3.0	0.5	3	5.9	0.8	2	4.4	0.5
2	16	20.5	0.7	17	21.3	0.8	22	33.3	1.0	18	35.3	0.8	17	37.8	0.8
3	17	21.8	1.0	17	21.3	1.0	8	12.1	0.5	3	5.9	0.2	10	22.2	0.6
4	9	11.5	0.7	7	8.8	0.5	6	9.1	0.5	9	17.6	0.7	6	13.3	0.5
5	5	6.4	0.8	10	12.5	1.5	8	12.1	1.2	6	11.8	0.9	2	4.4	0.3
6	8	10.3	0.8	2	2.5	0.2	8	12.1	0.8	4	7.8	0.4	3	6.7	0.3
7	12	15.4	0.9	15	18.8	1.1	6	9.1	0.4	6	11.8	0.4	1	2.2	0.1
8	5	6.4	0.4	7	8.8	0.6	6	9.1	0.5	1	2.0	0.1	4	8.8	0.4
Unknown	1	1.3		2	2.5					1	2.0				

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

**Figure 1. Incidence Rates of Hepatitis A
LAC, CA and US, 2007-2011**

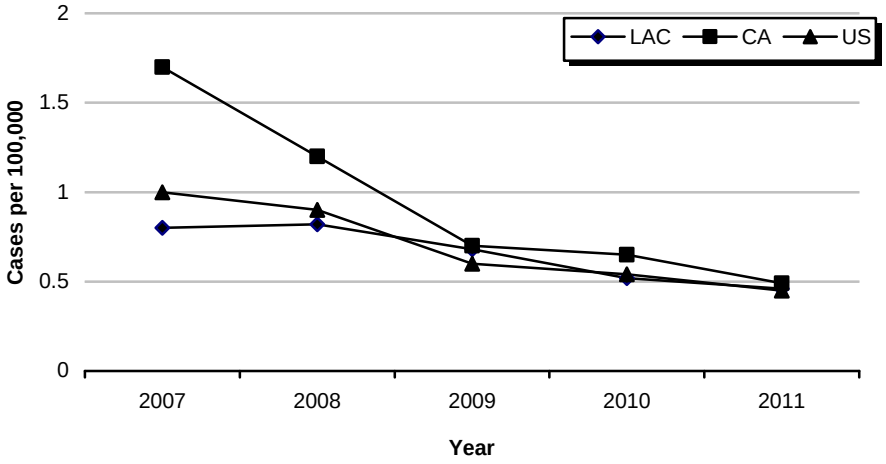


**Figure 2. Incidence Rates* of Hepatitis A by Age Group
LAC, 2011 (N=45)**

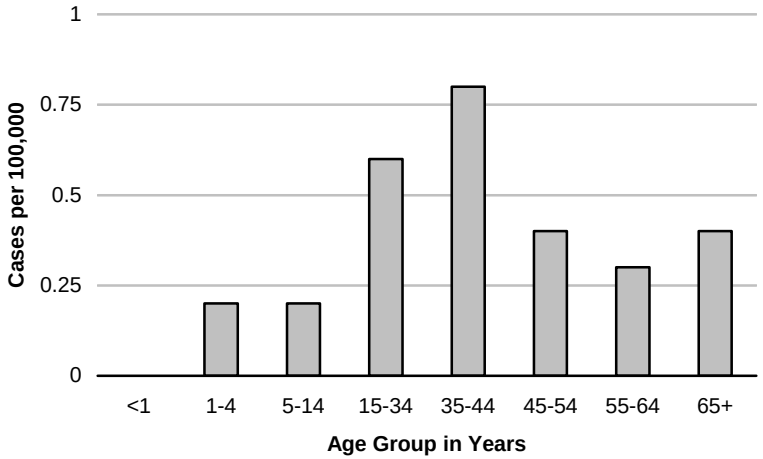


**Figure 3. Hepatitis A Incidence Rates* by Race/Ethnicity
LAC, 2011 (N=45)**

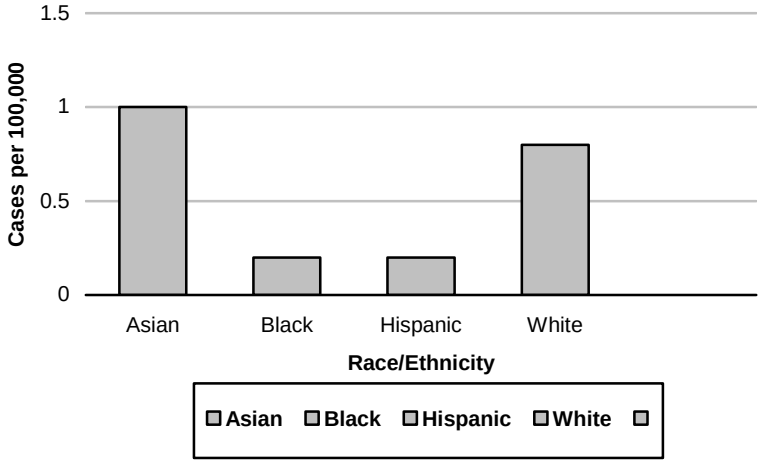
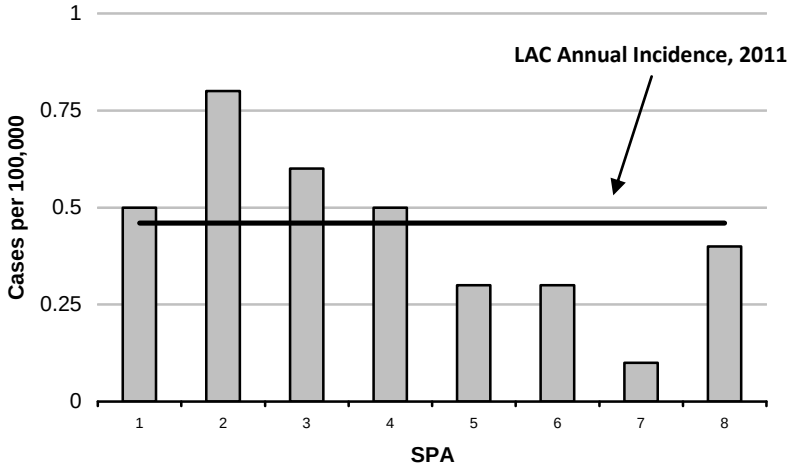
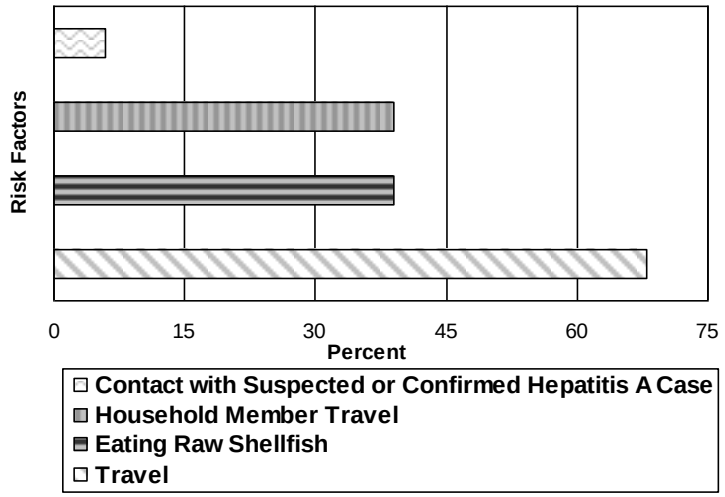


**Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 2011 (N=45)**



* Rates based on fewer than 19 cases are unreliable

Figure 5. Hepatitis A Reported Risk Factors*
LAC, 2011 (n=31)



*Includes cases with multiple risk factors

HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	60
Annual Incidence[a]	
LA County	0.61
California[b]	0.42
United States[b]	0.93
Age at Diagnosis	
Mean	47
Median	48
Range	21-84 years

[a] Cases per 100,000 population

[b] Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

DESCRIPTION

Hepatitis B is a DNA-virus transmitted through activities that involve percutaneous or mucosal contact with infectious blood or body fluids, most often through injection drug use, sexual contact with an infected person, or contact from an infected mother to her infant during birth. Transmission also occurs among household contacts of a person with hepatitis B. Healthcare-associated transmission of hepatitis B is documented in the United States (US) and should be considered in persons without traditional risk factors.

Symptoms, which occur in less than half of those acutely infected can include: fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored bowel movements, joint pain, and jaundice. 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.

The absence of acute hepatitis B in persons under age 19 is evidence of the successful immunization strategy to eliminate HBV transmission in the US. This strategy includes: screening all pregnant women 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.

Adult vaccination is recommended for those in high risk groups including; men who have sex with men (MSM), history of multiple sex partners, injection drug users, incarcerated persons; household and sex contacts of persons with chronic HBV infections, healthcare workers and hemodialysis patients.

In 2011, the Advisory Committee on Immunization Practices (ACIP) recommended that hepatitis B vaccination should be administered to unvaccinated adults with diabetes mellitus aged 19 through 59 years and may also be administered, at the discretion of the treating clinician, to unvaccinated adults with diabetes mellitus aged ≥60 years.

For the purpose of surveillance, LAC DPH 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).

2011 TRENDS AND HIGHLIGHTS

- The 2011 incidence rate increased from the previous year (0.61 per 100,000 versus 0.55 per 100,000) (Figure 1).
- The rate was highest in those between the ages of 45-54 years (1.6 per 100,000), followed by the 55-64 year age group (1.2 per 100,000) (Figure 2).
- The male-to-female ratio was 1:0.5.
- As in 2010, the 2011 incidence rate was highest in blacks (1.5 per 100,000) (Figure 3).
- Three Service Planning Areas (SPA) had rates greater than the overall county mean rate of 0.61 per 100,000)—SPA 4 (1.2 per 100,000), SPA 6 (0.9 per 100,000), and SPA 8 (0.7 per 100,000) (Figure 4).
- Risk factors were identified in 63% (n=32) of the 51 confirmed cases interviewed (including some cases with multiple risk factors). The most common risk factor was MSM (n=11, 52% of males), followed by having multiple sexual partners (n=12, 38%), recent dental work (n=8, 25%), using non-injection street drugs (n=6, 19%), receiving fingersticks (n=5, 16%), having a diagnostic medical procedure (n=4, 13%), having contact with a confirmed or suspected case of hepatitis B (n=3, 9%), living in a long term care facility (n=3, 9%), receiving a tattoo (n=3, 9%), receiving IV/IM injections (n=3, 9%), acupuncture (n=2, 6%), being incarcerated (n=1, 3%), and IVDU (n=1, 3%) (Figure 5).

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=55)			2008 (N=66)			2009 (N=41)			2010 (N=54)			2011 (N=60)		
	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	9	16.4	0.3	18	27.3	0.6	12	29.3	0.4	18	33.3	0.6	12	20.0	0.4
35-44	21	38.2	1.4	14	21.2	0.9	7	17.1	0.5	13	24.1	0.9	10	16.7	0.7
45-54	12	21.8	0.9	13	19.7	1.0	16	39.0	1.2	11	20.4	0.8	21	35.0	1.6
55-64	3	5.5	0.3	14	21.2	1.5	4	9.7	0.4	7	13.0	0.7	12	20.0	1.2
65+	9	16.4	0.9	7	10.6	0.7	2	4.9	0.2	5	9.2	0.5	5	8.3	0.5
Unknown	1	1.8		0	0		0	0		0	0		0	0	
Race/Ethnicity															
Asian	7	12.7	0.5	7	10.6	0.5	5	12.2	0.4	11	20.4	0.8	3	5.0	0.2
Black	11	20.0	1.3	15	22.7	1.8	11	26.8	1.3	14	25.9	1.6	13	21.7	1.5
Hispanic	16	29.1	0.3	16	24.2	0.3	12	29.3	0.3	14	25.9	0.3	19	31.7	0.4
White	19	34.5	0.7	22	33.3	0.8	11	26.8	0.4	14	25.9	0.5	23	38.3	0.8
Other	2	3.6	9.6	1	1.5	4.1	0	0		1	1.8		0	0	
Unknown	0	0.0		5	7.6		2	4.9		0	0		2	3.3	
SPA															
1	1	1.8	0.3	2	3.0	0.5	0	0	0	2	3.7	0.5	0	0	0.0
2	13	23.6	0.6	9	13.6	0.4	4	9.8	0.2	5	9.3	0.2	13	21.7	0.6
3	4	7.3	0.2	6	9.1	0.3	6	14.6	0.3	10	18.5	0.6	8	13.3	0.5
4	14	25.5	1.1	7	10.6	0.5	13	31.7	1.0	8	14.8	0.6	15	25.0	1.2
5	5	9.1	0.8	9	13.6	1.4	1	2.4	0.2	4	7.4	0.6	1	1.7	0.2
6	9	16.4	0.9	22	33.3	2.1	10	24.4	1.0	8	14.8	0.7	10	16.7	0.9
7	4	7.3	0.3	6	9.1	0.4	2	4.9	0.1	7	13.0	0.5	3	5.0	0.2
8	5	9.1	0.4	4	6.1	0.4	4	9.8	0.4	10	18.5	0.9	8	13.3	0.7
Unknown	0	0.0		1	1.5		1	2.4		0	0	0	2	3.3	

*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, 2007-2011**

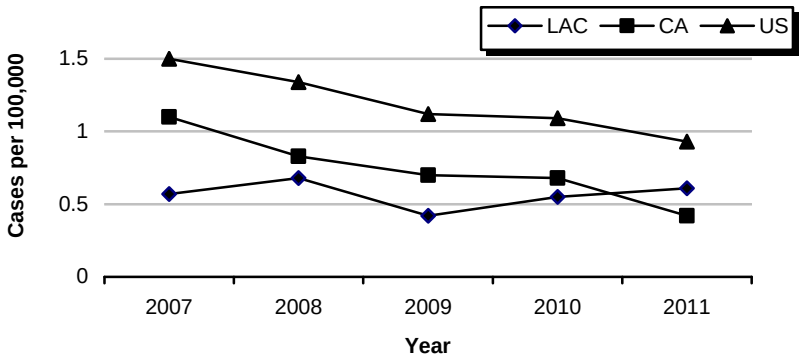
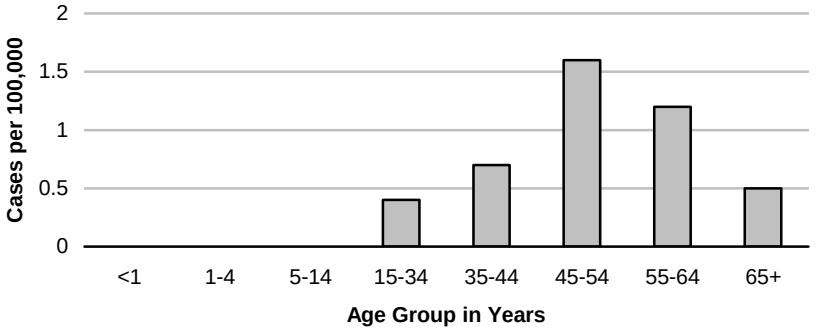


**Figure 2. Incidence Rates* of Acute Hepatitis B by Age Group
LAC, 2011 (N=60)**



* Rates bases on fewer than 19 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence Rates* by Race/Ethnicity
LAC, 2009-2011**

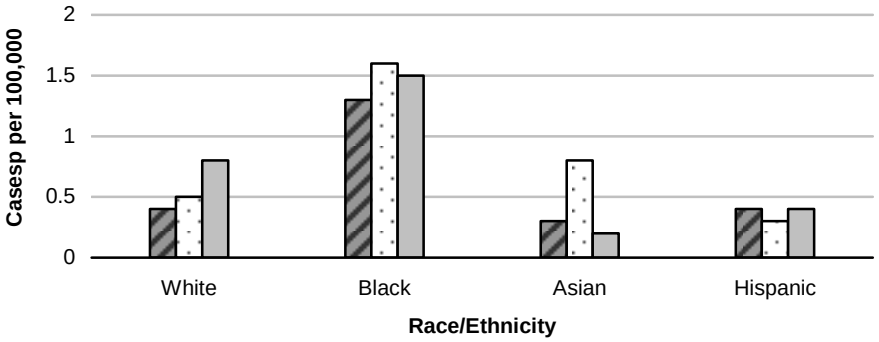
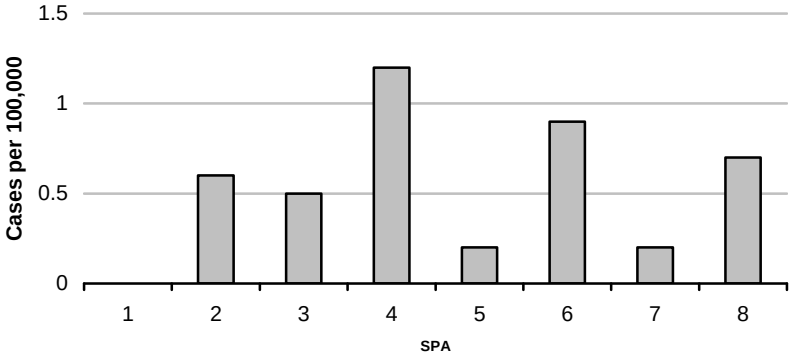
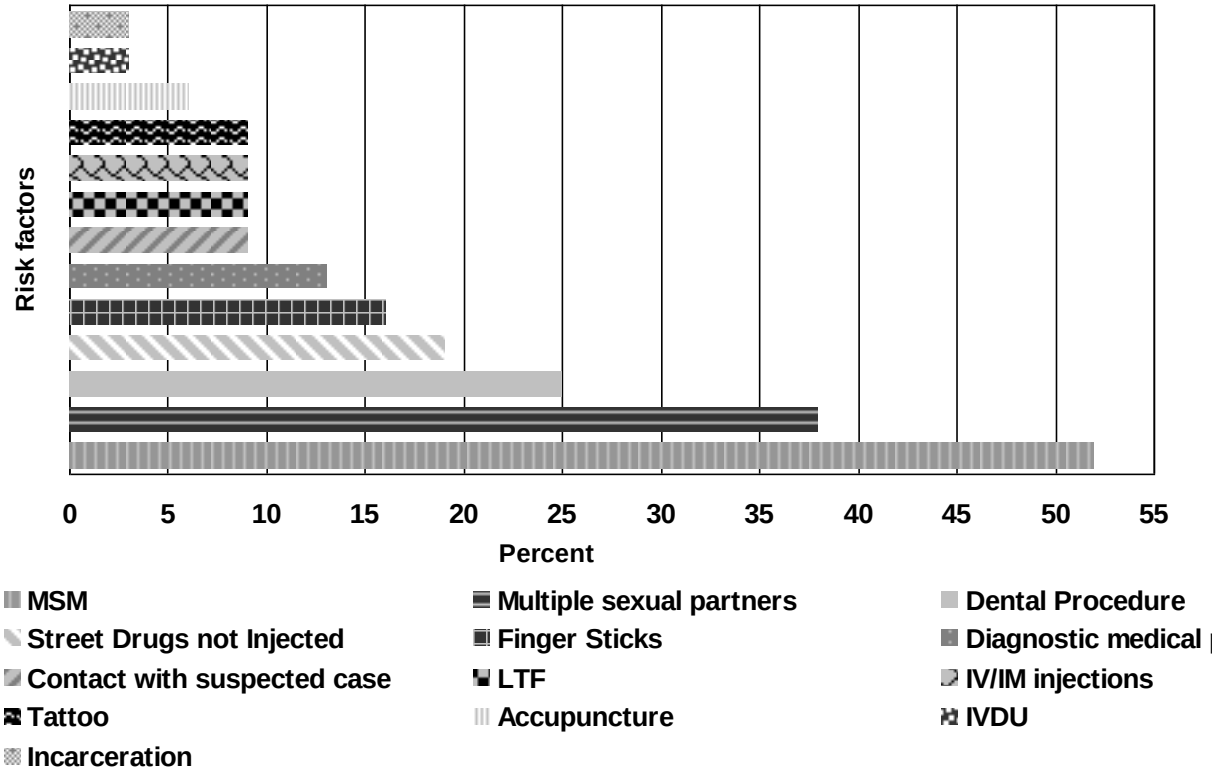


**Figure 4. Incidence Rates* of Acute Hepatitis B by SPA
LAC, 2011 (N=58)**



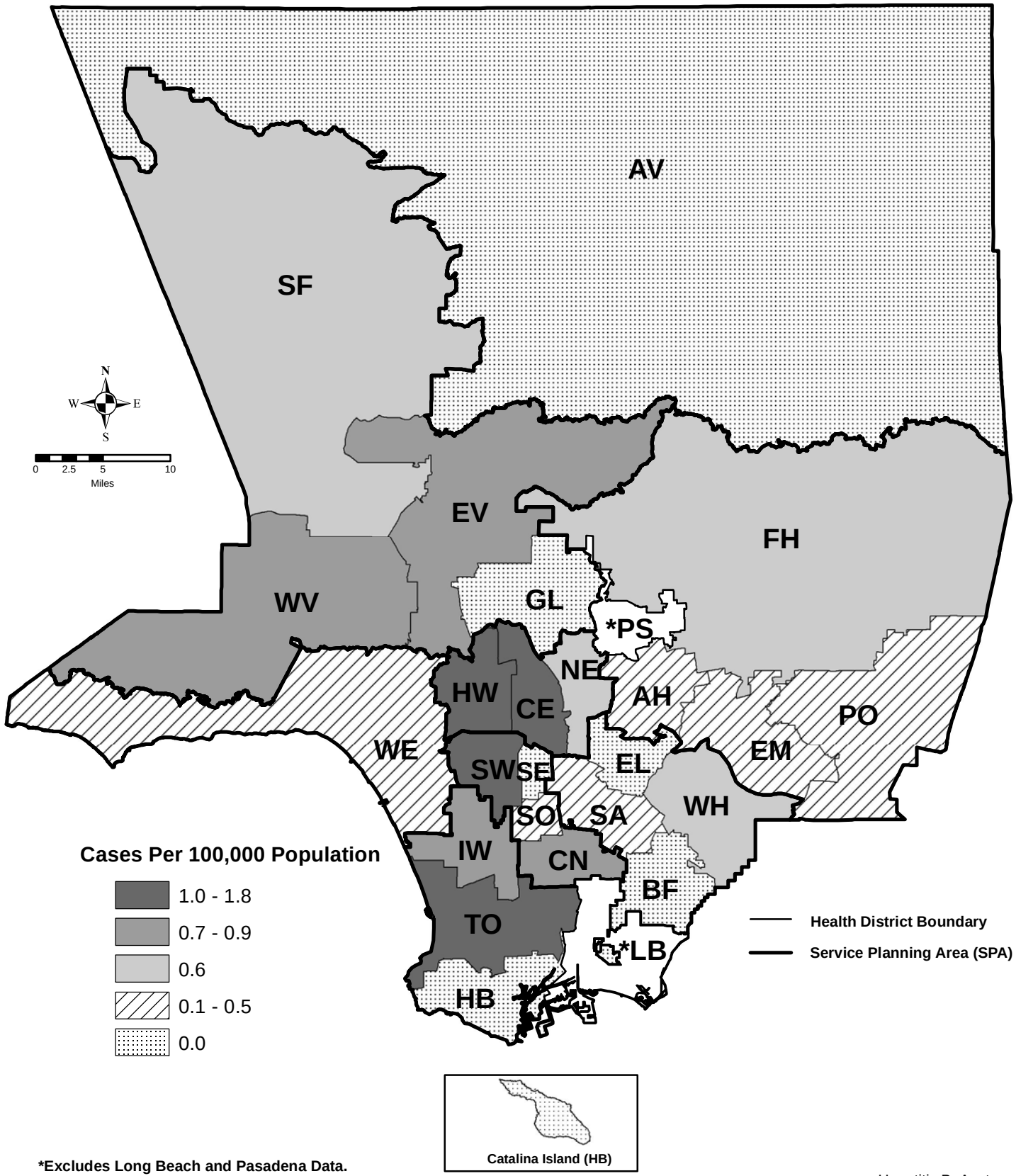
* Rates based on fewer than 19 cases are unreliable

Fig. 5. Hepatitis B Reported Risk Factors*
LAC, 2011 (n=32)



*Includes cases with multiple risk factors

Map 8. Hepatitis B
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, PERINATAL

CRUDE DATA	
Infants Born to HBsAg+ Mothers	710
HBsAg+ Infants[a]	1
Incidence of Exposure[b]	
LA County	5.3
Maternal Age at Diagnosis	
Mean	31.9 years
Median	32 years
Range	18-51years
Infant Age at Diagnosis	12 months

[a]Number of infants born to HBsAg-positive mothers per 1000 live births in 2011.
[b]Based on number of infants that had post vaccine serology testing.

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 pregnancy and from exposure to cervical secretions and blood during the birthing process. 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 three-dose vaccine series, has demonstrated 85 to 95% effectiveness 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 Unit (PHBPU) 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).

2011 TRENDS AND HIGHLIGHTS

- In 2011, 710 infants (this includes ten twins) were born to 700 HBsAg+ women.
- The incidence of exposure increased from 2010 by 10% from 4.8 to 5.3 per 1000 infants born in 2011 (Figure 1).
- Sixty-eight percent (n=476) of women screened for HBsAg were between 15 and 34 years of age.
- Eighty-three percent (n=583) of HBsAg+ women were born outside of the United States.
- In 2011, 79% (n=555) of HBsAg+ women were Asian followed by 8% (n=55) Hispanic, 5% (n=33) White, 3% (n=19) unknown, 4% (n=25) Black, 1% (n= 9) other and 1% (n=4) Pacific Islander. (Figures 2 and 3).
- Fifty-three percent (n=369) of the HBsAg+ women reside in Service Planning Area (SPA) 3, which has a large Asian population (Figure 4).
- Ninety-nine percent (n=703) of infants received the first dose of Hepatitis B vaccine and HBIG within 24 hours of birth (Figure 5).
- In 2011, 12% (n=82) 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. Infants born in the later part of 2011 are too young for PVS testing. One infant was HBsAg+, indicating infection (Figure 6).
- Among the HHCs, 37% (n=367) were 0-10 years and 31% (n=306) were 31-40 years (Figure 7).
- Hepatitis B virus marker status of HHCs (n=985): Fifty-eight percent (n=566) were previously immunized, 18% (n=150) were HBsAg negative, 15% (n=146) were immune 4% (n=36) were infected and 4% (n=35) had previous/ongoing infection. The Hepatitis B vaccine series was recommended for those who were susceptible (Figure 8).

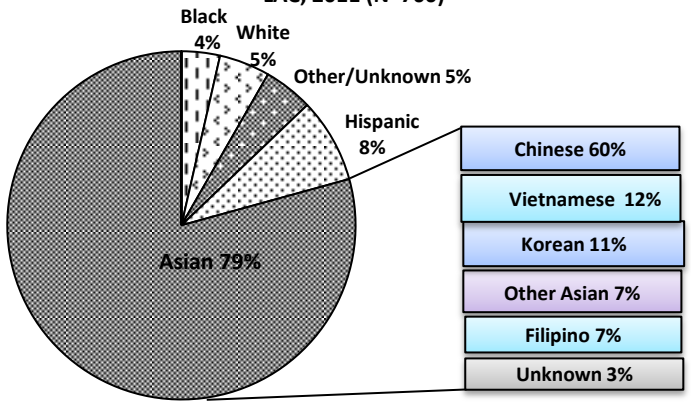
Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Maternal Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=774)			2008 (N=778)			2009 (N=760)			2010 (N=653)			2011 (N=700)		
	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	1	0.1	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	567	73.3	20.1	550	70.7	19.2	520	58.4	18.4	448	68.6	15.2	476	68	16.1
35-44	206	26.6	13.7	225	28.9	14.9	237	31.2	10.7	204	31.2	14.2	219	31.3	15.2
45-54	0	0.0	0.0	3	0.4	0.2	3	0.4	0.2	0	0	0	2	0.3	0.1
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		1	0.2		3	0.4	
Race/Ethnicity															
Asian	636	82.2	49.5	611	78.5	46.9	570	75.0	43.8	491	75.2	37.4	555	79.3	42.3
Black	28	3.6	3.3	32	4.1	3.7	33	4.0	3.9	22	3.4	2.6	25	3.6	2.9
Hispanic	70	9.0	1.5	71	9.1	1.5	76	10.0	1.6	50	7.7	1.1	55	7.9	1.2
White	29	3.7	1.0	30	3.9	1.0	40	5.0	1.4	38	5.8	1.3	33	4.7	1.2
Other	11	1.4	52.8	34	4.4	137	41	5.0	1.6	19	2.9	40.4	13	1.9	34.9
Unknown	0	0.0		0	0.0		0	0.0		33	5.1		19	2.7	
SPA															
1	8	1.0	2.2	4	0.5	1.1	6	0.8	1.6	9	1.4	2.4	10	1.4	2.7
2	100	12.9	4.6	96	12.3	4.4	117	15.4	5.3	85	13	3.8	78	11.1	3.5
3	392	50.6	22.7	394	50.6	22.7	355	46.7	20.5	329	50.4	19.0	369	52.7	21.3
4	88	11.4	7.0	96	12.3	7.5	83	10.9	6.7	83	12.7	6.6	74	10.6	5.9
5	33	4.3	5.2	37	4.8	5.7	32	4.2	4.9	19	2.9	2.9	30	4.3	4.5
6	33	4.3	3.2	43	5.5	4.1	38	5.0	3.6	19	2.9	1.8	29	4.1	2.7
7	54	7.0	3.9	55	7.1	4.0	50	6.6	3.6	42	6.4	3.0	46	6.6	3.3
8	66	8.5	5.9	50	6.4	4.4	75	9.9	6.7	58	8.9	5.2	47	6.7	4.2
Unknown	0	0.0		3	0.4		4	0.5		9	1.4		17	2.4	

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

**Figure 1. Perinatal Hepatitis B Incidence of Exposure
LAC, 2000-2011**

**Figure 2.
Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2011 (N=700)**



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

**Figure 3. Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2004-2011 (N= 5963)**

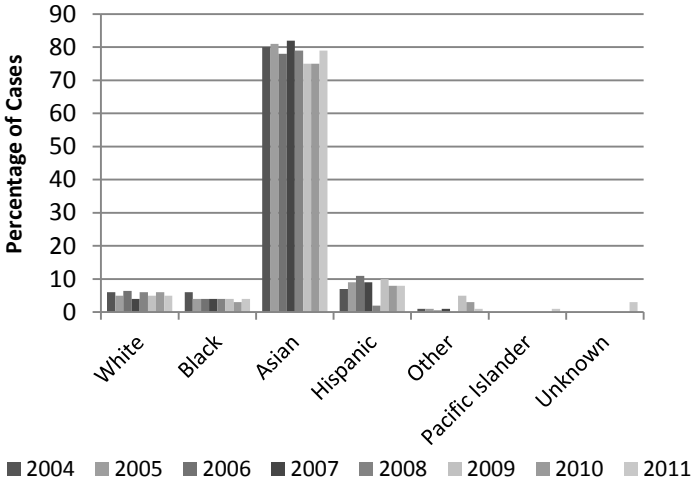


**Figure 4. Perinatal Hepatitis B Maternal by SPA
LAC, 2011 (N=700)**

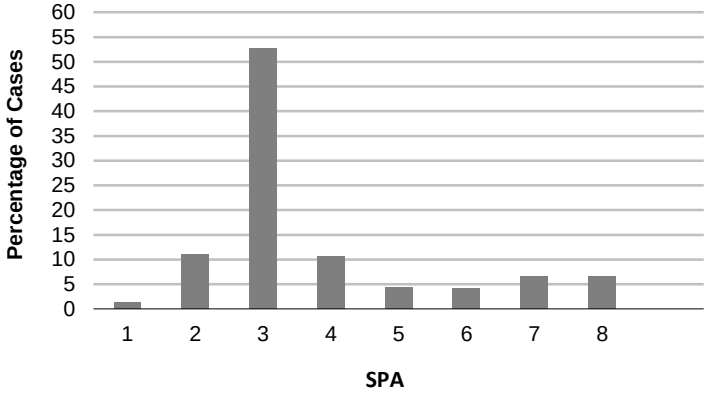
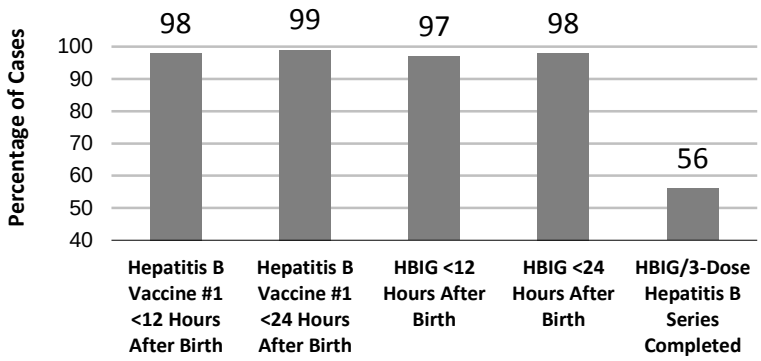
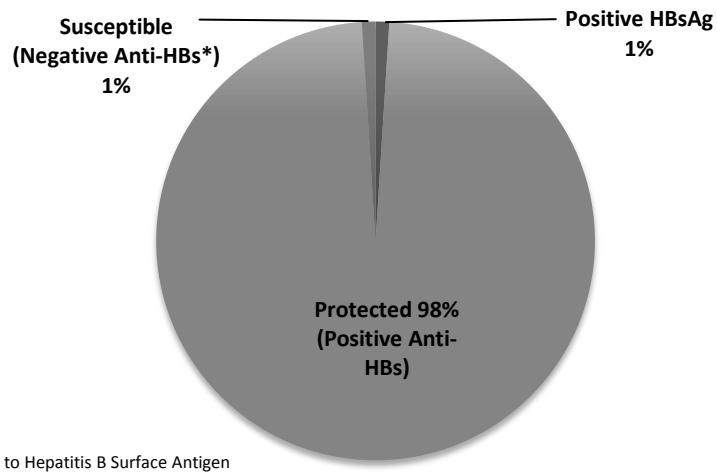


Figure 5. Perinatal Hepatitis B Summary of Infant Hepatitis B Immunoprophylaxis, LAC, 2011 (N=710)



Note: As of the date of this report, many infants born in the later part of 2011 are not due to receive the 3rd dose hepatitis B vaccine.

Figure 6. Perinatal Hepatitis B Infant Post Vaccination Serology (PVS) Results LAC, 2011 (N=82)



*Antibody to Hepatitis B Surface Antigen

Note: As of the date of this report, many infants born in the later part of 2011 are not eligible for PVS testing. PVS testing is recommended at 9-18 months of age after completion of at least 3 doses of hepatitis B vaccine.

Figure 7. Perinatal Hepatitis B Household & Sexual Contacts Age Range, LAC, 2011 (N=985)

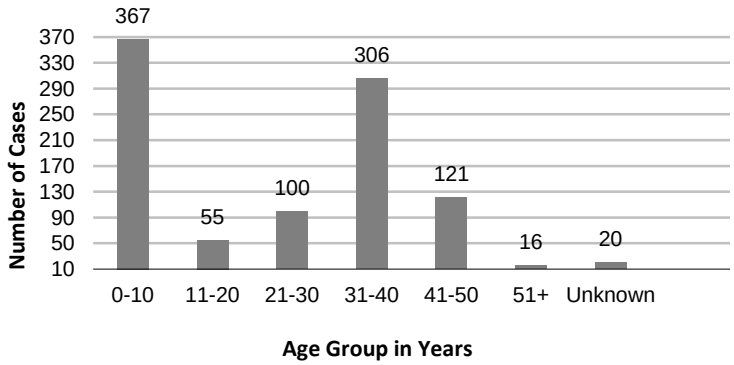
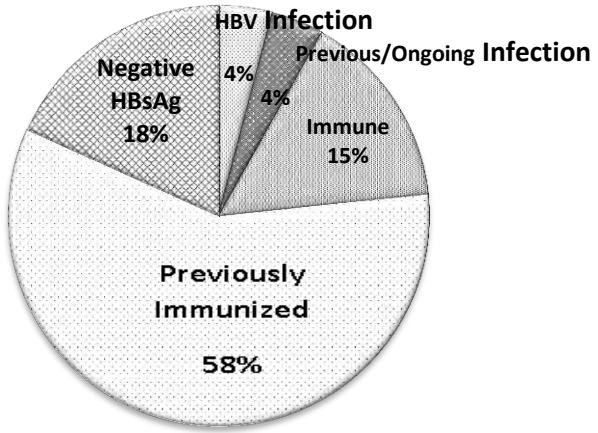


Figure 8. Hepatitis B Status of Household Contacts LAC, 2011 (N=985)



HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	10
Annual Incidence	
LA County	0.10[a]
California[b]	0.13
United States[b]	0.40
Age at Diagnosis	
Mean	43
Median	36
Range	21-75 years

[a]Rates calculated based on less than 19 cases or events are considered unreliable.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

DESCRIPTION

The Hepatitis C virus (HCV) is a RNA-virus primarily transmitted though percutaneous exposure to infectious blood. Traditional risk factors include: injection drug use (IDU), receipt of a blood transfusion prior to 1992, needle-stick injuries in healthcare settings, birth to infected mothers, having multiple sexual partners, tattoos or body-piercing and hemodialysis. The presence of HIV infection is associated with increased risk of infection among men engaging in certain sexual practices with other men. Household or familial contact does not appear to increase the risk of transmission of hepatitis C. An estimated 30% of cases have no identifiable exposure risk. Health-care related transmission has been documented and should be considered in persons without identified traditional risk factors for hepatitis C. HCV is the most common chronic bloodborne infection in the US.

The average incubation period is 4-12 weeks (range: 2-24 weeks). Up to 85% of persons with newly acquired HCV infection are asymptomatic but when symptoms occur they can include: fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored bowel movements, joint pain, and jaundice. After acute infection, 15%-25% of persons appear to resolve their infection, while chronic infection develops in 75%-85% of persons. Most studies have reported that medical complications occur decades after initial infection including cirrhosis, liver failure, and hepatic cancer.

Primary prevention activities are recommended for prevention and control of HCV infection including; screening and testing of blood donors, viral inactivation of plasma-derived products, risk-reduction counseling and screening of persons at risk for HCV infection, and routine practice of injection safety in health-care settings. There is no vaccine or post-exposure prophylaxis for HCV and vaccines for hepatitis A and B do not provide immunity against hepatitis C.

For the purpose of surveillance, ACDC uses the CDC/CSTE case definition 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 2011, the CDC/CSTE acute hepatitis C case definition also included documented seroconversion cases as acute hepatitis C cases (documented negative HCV test result within 6 months prior to HCV diagnosis).

2011 TRENDS AND HIGHLIGHTS

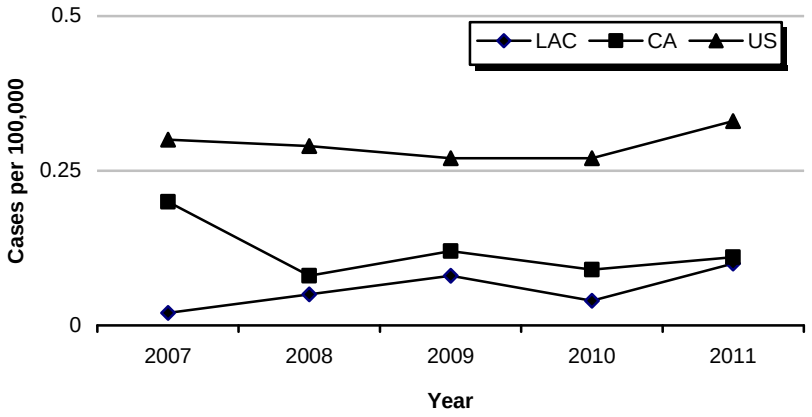
- Of the ten confirmed acute hepatitis C cases for 2011, six cases met the clinical case criteria for acute hepatitis C and four cases were documented seroconversions.
- The majority of cases were Hispanic (n=6, 60%), there were no black cases (Figure 3).
- The male to female ratio was 1:0.67.
- Risk factors were identified in 100% (n=8) of the confirmed cases interviewed (including some cases with multiple risk factors). Having any outpatient medical procedure or surgery was the most common risk factor reported (n=4, 50%), followed by injection of street drugs (n=3, 37.5%), having contact with a suspect or confirmed case (n=2, 25%), hemodialysis (n=2, 25%), exposure to someone else's blood (n=2, 25%), incarceration (n=2, 25%), resident of long term care facility (n=1, 12.5%), receiving fingersticks (n=1, 12.5%), having an accidental needle stick (n=1, 12.5%), receiving a transfusion (n=1, 12.5%), having multiple sexual partners (n=1, 25%).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=3)			2008 (N=5)			2009 (N=8)			2010 (N=4)			2011 (N=10)		
	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	
1-4	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	
15-34	2	66.7		1	20.0		1	12.5		1	25.0		4	40.0	0.1
35-44	0	0.0		1	20.0		2	25.0		2	50.0		2	20.0	0.1
45-54	0	0.0		2	40.0		3	37.5		1	25.0		1	10.0	0.1
55-64	0	0.0		0	0.0		1	12.5		0	0.0		1	10.0	0.1
65+	0	0.0		1	20.0		1	12.5		0	0.0		2	20.0	0.2
Unknown	1	33.3		0	0.0		0	0.0		0	0.0				
Race/Ethnicity															
Asian	0	0.0		1	20.0		1	12.5		0	0.0		1	10.0	0.1
Black	0	0.0		0	0.0		0	0		0	0.0		0	0.0	0.0
Hispanic	1	33.3		1	20.0		1	12.5		1	25.0		6	60.0	0.1
White	1	33.3		3	60.0		6	75.0		3	75.0		2	20.0	0.1
Other	0	0.0		0	0.0		0	0		0	0.0		0	0.0	0.0
Unknown	1	33.3		0	0.0		0	0		0	0.0		1	10.0	
SPA															
1	0	0.0		0	0.0		1	12.5		0	0.0		0	0.0	0.0
2	0	0.0		3	60.0		0	0.0		3	75.0		1	10.0	0.0
3	0	0.0		1	20.0		0	0.0		0	0.0		2	20.0	0.1
4	1	33.3		0	0.0		2	25.0		0	0.0		3	30.0	0.2
5	0	0.0		0	0.0		2	25.0		0	0.0		1	10.0	0.2
6	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
7	1	33.3		0	0.0		1	12.5		0	0.0		2	20.0	0.1
8	0	0.0		1	20.0		2	25.0		1	25.0		1	10.0	0.1
Unknown	1	33.3		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 Acute Hepatitis C
LAC, CA and US, 2007-2011**



*Rates based on fewer than 19 cases are unreliable

**Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2011 (N=10)**

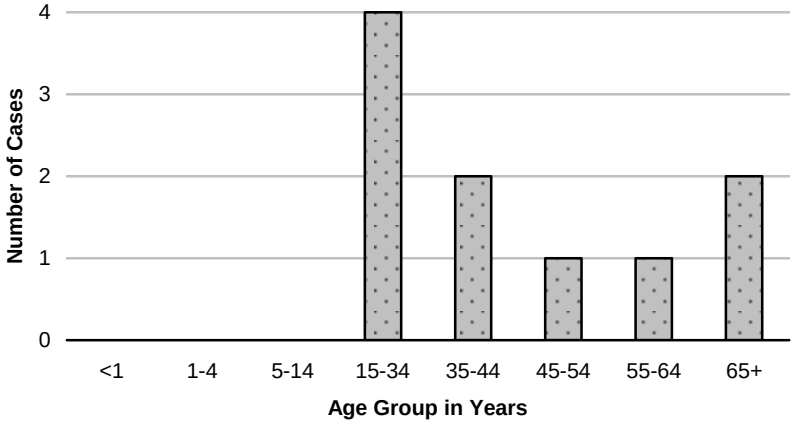
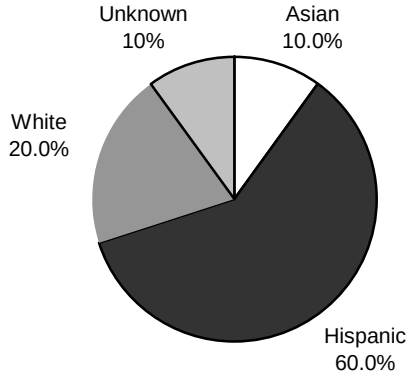


**Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2011 (N=10)**



KAWASAKI SYNDROME

CRUDE DATA	
Number of Cases	43
Annual Incidence	
LA County[a]	N/A
California[b]	N/A
Age at Diagnosis	
Mean	2.28
Median	2
Range	2 months – 7 years

The data were collected from 01/01/11 to 08/15/11.

[a]Rate not calculated due to surveillance ending as of August 15, 2011.
[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 in 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.

2011 TRENDS AND HIGHLIGHTS

- This report is not comparable with other annual reports because California Department of Public Health removed KS from the list of mandatory reportable diseases. KS surveillance in LAC ended August 16, 2011. For this reason, incidence rates are not reported for 2011 (Figure 1). Surveillance period for the report was from 01/01/2011 to 08/15/2011.
- A total of 43 cases including five with atypical KS, and one recurrent case met the CDC surveillance case definition.
- Eighty-four percent (n=36) of confirmed cases (N=43) were in children under five years old. Mean age was 2.3 years old, and the age range was from two months to seven years old.
- The male to female ratio was 2:1, 67% (n=29) of confirmed cases were male, 33% (n=14) were female.
- Hispanics had the highest number of cases (n=22, 51%) (Figure 3).
- KS occurs year-round, but more cases are reported in winter and spring. In 2011, 26% (n=11) of confirmed cases were reported in March (Figure 4).
- There were no fatal cases in 2011. Thirty-seven percent of cases (n=16) had cardiac complications including cardiac coronary aneurysms (37%, n=6), cardiac coronary artery dilatation (44%, n=7), and valvular abnormalities (19%, n=3).
- Failure to consider the possibility of atypical KS could lead to delayed or missed diagnosed and treatment with a consequent increased likelihood of coronary artery aneurysms development.

Reported Kawasaki Syndrome Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007 – August 15, 2011

	2007 (N=52)			2008(N=55)			2009 (N=70)			2010 (N=65)			August 15, 2011 (N=43)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	
Age Group															
<1	9	17.3	6.1	10	18.2	7.0	9	12.9	6.6	6	9.2	4.3	10	23.2	--
1-4	35	67.3	6.1	32	58.2	5.6	50	71.4	8.9	49	75.4	8.4	26	60.5	--
5-14	8	15.4	0.6	13	23.6	0.9	11	15.7	0.8	10	15.4	0.8	7	16.3	--
15-34	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	--
45-54	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	--
65+	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							
Race/Ethnicity															
Asian	13	25.0	1.0	17	30.9	1.2	15	21.4	1.2	22	33.9	1.6	13	30.2	--
Black	5	9.6	0.6	3	5.5	0.2	5	7.1	0.6	8	12.3	0.9	3	7.0	--
Hispanic	26	50.0	0.6	28	50.9	0.6	39	55.7	0.8	29	44.6	0.6	22	51.2	--
White	3	5.8	0.1	4	7.3	0.1	8	11.4	0.3	8	11.4	0.3	5	11.6	--
Other	3	5.8	14.4	3	5.5	12.2	3	4.3	-	5	7.7	0.2	0	0	--
Unknown	2	3.8		0	0.0		0	0.0	0	1	1.5				
SPA															
1	1	1.9	0.3	1	1.8	0.3	2	2.3	0.5	5	7.7	1.3	2	4.7	--
2	8	15.4	0.4	11	20.0	0.5	12	17.1	0.5	12	18.5	0.5	8	18.6	--
3	10	19.2	0.6	8	14.5	0.5	12	17.0	0.7	16	24.6	0.9	9	20.9	--
4	6	11.5	0.5	9	16.4	0.7	10	14.3	0.8	9	13.8	0.7	7	16.3	--
5	3	5.8	0.5	3	5.5	0.3	5	7.1	0.8	1	1.5	0.2	1	2.3	--
6	6	11.5	0.6	4	7.3	0.4	16	22.9	1.5	5	7.7	0.5	4	9.3	--
7	10	19.2	0.7	13	23.6	0.9	6	8.6	0.4	10	15.4	0.7	6	13.9	--
8	8	15.4	0.7	6	10.9	0.5	7	10.0	0.6	7	10.8	0.6	6	13.9	--
Unknown	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, 2001 - 2010

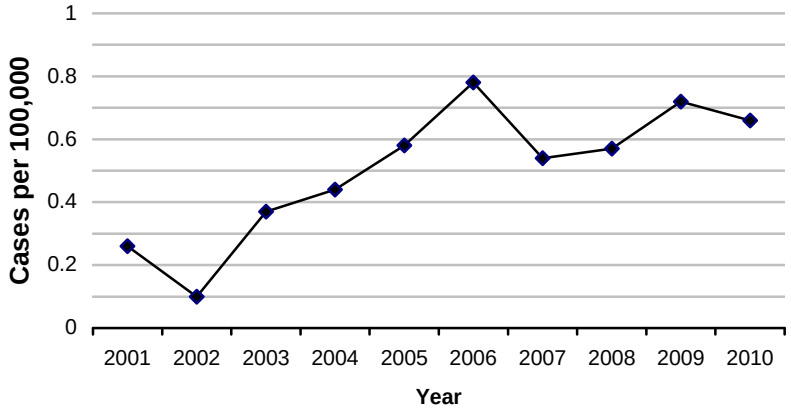


Figure 2. Number of Kawasaki Syndrome by Age Group LAC, August 15, 2011 (N=43)

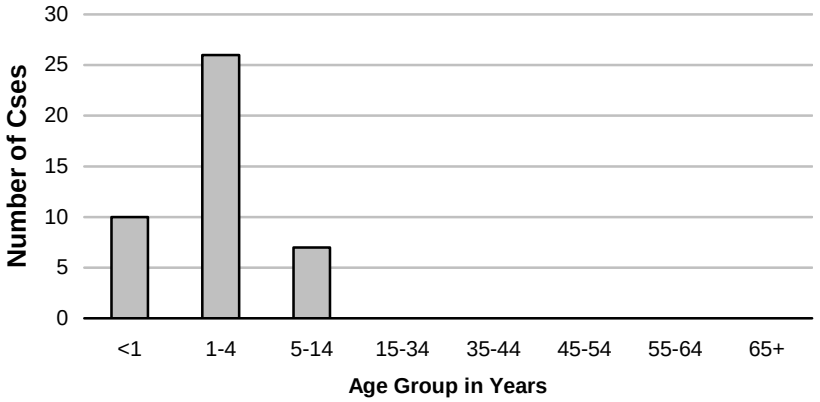


Figure 3. Percent Cases of Kawasaki Syndrome by Race/Ethnicity, LAC, August 15, 2011 (N=43)

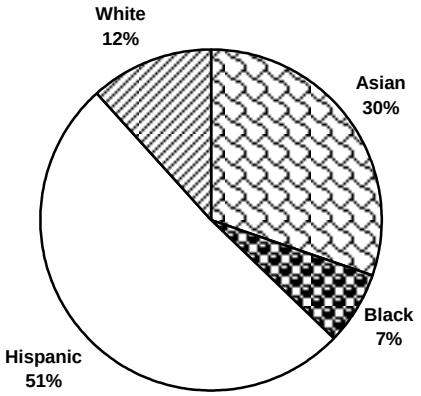
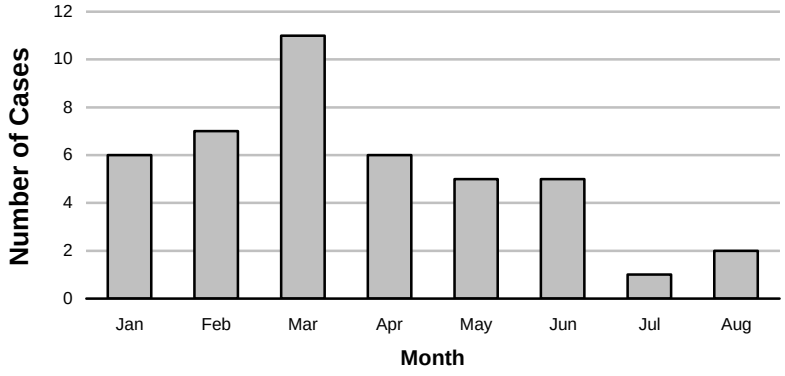


Figure 4. Reported Kawasaki Syndrome Cases by Month of Onset LAC, August 15, 2011 (N=43)



LEGIONELLOSIS

CRUDE DATA	
Number of Cases	116
Number of Deaths	18
Annual Incidence[a]	
LA County	1.18
California[b]	0.70
United States[b]	1.35
Age at Diagnosis	
Mean	65.3
Median	65
Range	25-98

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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, 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 periodic inspection of water sources, distribution systems, heat exchangers, and cooling towers. Prevention strategies include appropriate disinfection, monitoring, and maintenance of both cold and hot water systems, and setting the hot water temperature to 50 degrees Celsius or higher to limit bacterial growth. All healthcare-acquired LD case reports are investigated to identify potential outbreak situations. Early recognition and investigation is crucial for timely implementation of control measures.

2011 TRENDS AND HIGHLIGHTS

- Four cases of Pontiac fever were reported.
- The case fatality rate increased from 5.5% in 2010 to 15.5% in 2011.
- The most affected age group in Los Angeles county (LAC) was persons 65 years of age and older. Over the past few years there has also been a consistent upward trend in the incidence rates among the younger population (Figure 2).
- Service Planning Area (SPA) 6 had the highest incidence this year followed by SPA 5 who overall sustained the highest incidence since 2007 (Figure 3).
- The highest incidence rate occurred among blacks (2.3 per 100,000) followed by whites (1.6 per 100,000). Rates in all race categories have risen steadily since 2007 (Figure 5). Analysis demonstrated no geographic clustering by race (though number of cases was small).
- People staying overnight in hotels during the incubation period accounted for 3.4% of confirmed cases, a decrease from 7% in 2010. According to the CDC, more than 20% of all LD cases reported are associated with recent travel. No LAC resident was linked to any CDC reports of legionellosis found nationwide.
- Nosocomial legionellosis cases associated with skilled nursing facilities increased from 1.8% to 3.4% and from 3.7 % to 4.3% in retirement assisted living facilities. Investigation and active case finding found two outbreaks with one fatality in each setting. 6.8% of nosocomial legionella pneumonia occurred in acute care facilities which prompted two epidemiologic investigations, enhanced surveillance, and retrospective case finding. No additional cases were found with active surveillance at the two hospitals in the specified period.
- A lung transplant recipient was identified as a confirmed case. After an extensive review of donor records and consultation with CDC and California Department of Public Health, source of exposure of the case was not determined.

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=40)			2008 (N=59)			2009 (N=66)			2010 (N=108)			2011 (N=116)		
	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	1	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	--	--
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	2	5.0	0.1	1	1.7	0.0	2	3.0	0.1	3	3.0	0.1	5	4.0	0.2
35-44	4	10	0.3	5	8.5	0.3	3	4.5	0.2	9	8.0	0.6	7	6.0	0.5
45-54	10	25	0.8	7	11.9	0.5	11	16.6	0.8	25	23	1.8	21	18	1.6
55-64	5	12.5	0.6	12	20.3	1.3	14	21.2	1.5	27	25.0	2.8	22	19	2.3
65+	19	47.5	1.9	33	55.9	3.2	36	54.5	3.4	44	41	4.2	61	53	5.8
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race/Ethnicity															
Asian	0	0.0	0.5	5	8.5	0.4	7	10.6	0.5	15	14.0	1.1	8	7.0	0.6
Black	6	15.0	0.7	11	18.6	1.3	14	21.2	1.6	25	23.1	2.9	20	17.2	2.3
Hispanic	5	30.0	0.3	13	22.0	0.3	13	19.6	0.3	25	23.1	0.5	37	32	0.8
White	10	55.0	0.8	30	50.8	1.0	32	48.4	1.1	41	38	1.4	47	40.5	1.6
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	2.0	0.0	2	1.7	--
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		2	1.7	--
SPA															
1	0	0.0	0.0	1	1.7	0.3	0	0	0	2	1.8	0.8	2	1.7	0.5
2	8	20.0	0.4	18	30.5	0.8	14	21.2	0.6	22	20.3	1.0	19	16.3	0.9
3	6	15.0	0.3	9	15.3	0.5	7	10.6	0.4	13	12.0	0.7	15	13	0.9
4	7	17.5	0.6	7	11.9	0.5	9	13.6	0.7	15	13.8	1.2	13	11.2	1.0
5	7	17.5	1.1	8	13.6	1.2	13	19.6	2.0	12	11.1	1.8	8	7.0	1.2
6	7	17.5	0.7	4	6.8	0.4	10	15.1	1.0	12	11.1	1.1	23	19.8	2.2
7	4	10.0	0.3	4	6.8	0.3	8	12.1	0.6	13	12.0	0.9	15	13	1.1
8	1	2.5	0.1	8	13.6	0.7	5	7.5	0.4	16	14.8	0.4	19	16.3	1.7
Unknown	0			0	0.0		0	0.0		3	2.7	0.1	2	1.7	0.5

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

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 2002-2011

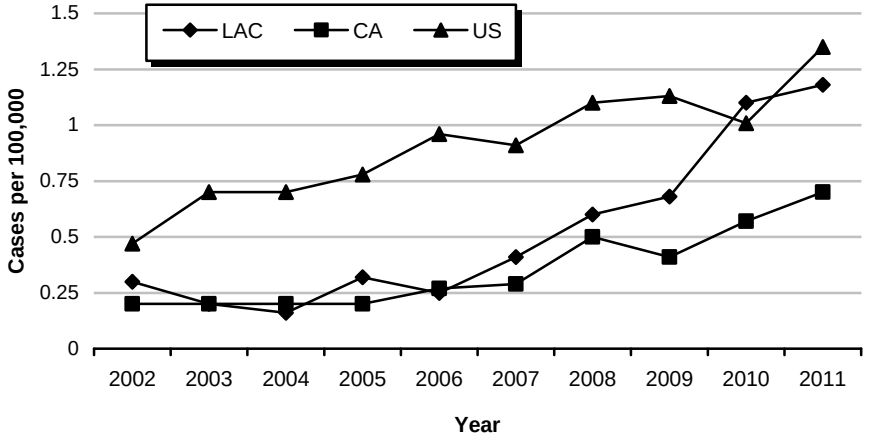


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2007-2011

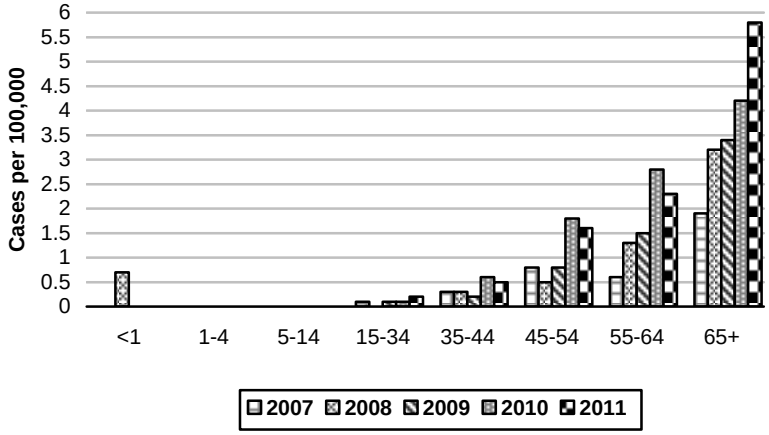


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2008-2011

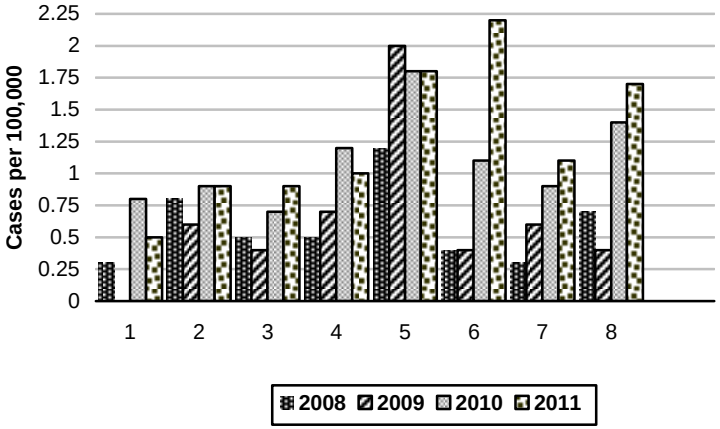


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2011 (N=116)

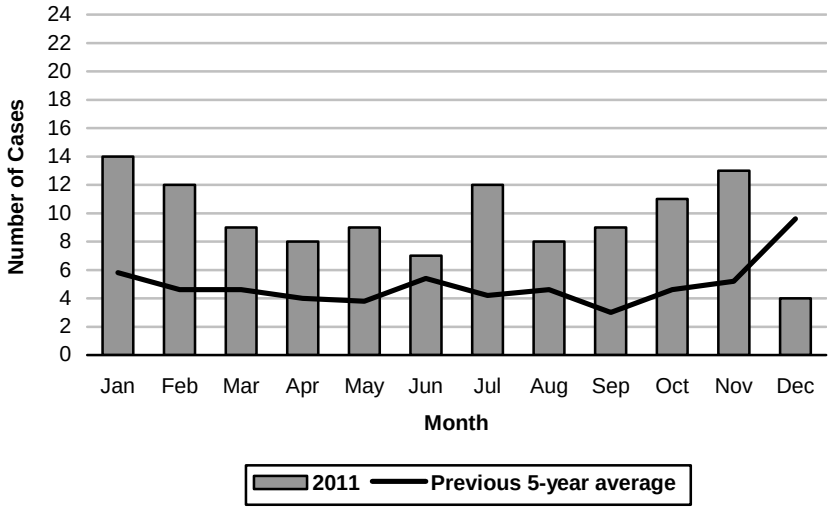
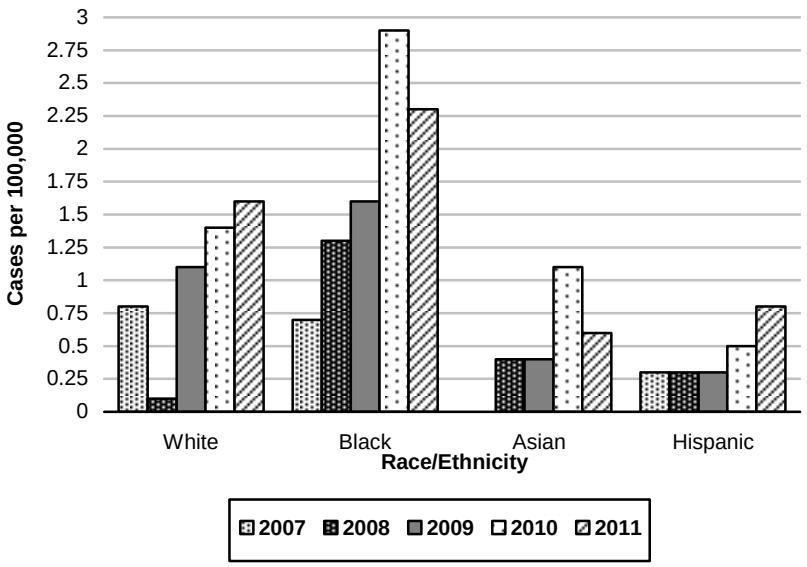
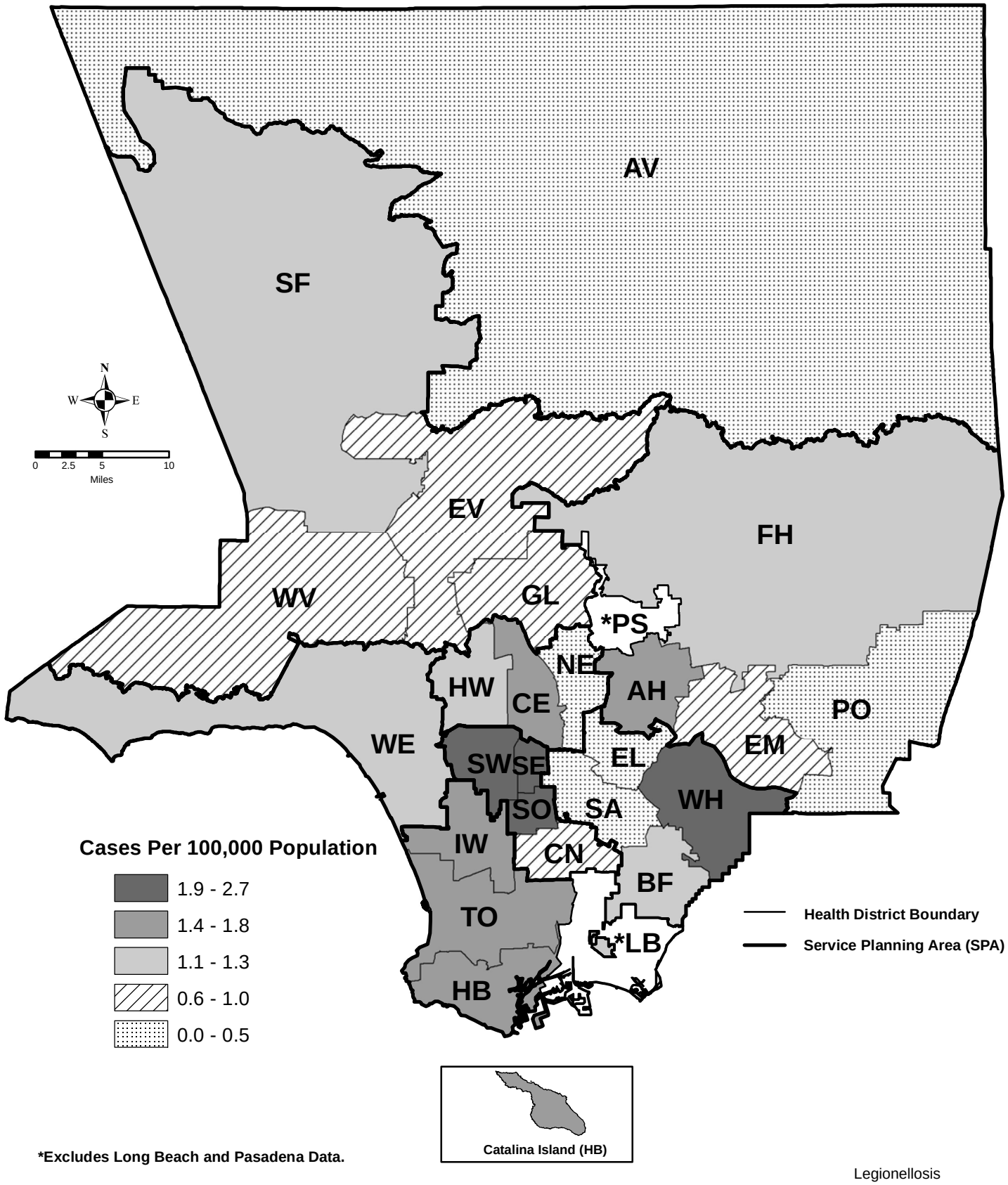


**Figure 5. Legionellosis Rates by Race/Ethnicity
LAC, 2007-2011**



Map 9. Legionellosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	19
Annual Incidence[a]	
LA County	0.19
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	68
Median	66
Range	50-95

[a]Cases per 100,000 population.
[b]California and US combine non-perinatal and perinatal cases, thus making non-comparable rates.

DESCRIPTION

Listeriosis is a disease caused by infection with *Listeria monocytogenes*, a Gram-positive rod 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, 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, meningitis with 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, infection 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.

Individuals at risk 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 heat cold cuts before eating.

2011 TRENDS AND HIGHLIGHTS

- White non-Hispanics comprised 68% of all non-perinatal listeriosis cases. Hispanics comprised 21% of the remaining cases, with Asians 10% of cases (Figure 3). Despite increased prevalence of conditions such as diabetes that predispose to listeriosis, blacks consistently make up a smaller than expected proportion of listeriosis cases. There were no black cases of listeriosis this year.
- Regionally there is greater incidence of listeriosis in Service Planning Area (SPA) 2 compared to other SPAs in LAC (Figure 4). However SPA 5 has the highest incidence, 0.6 per 100,000.
- Historically the occurrence of listeriosis cases peaks in August and September (Figure 5), and 2011 is consistent with these periodic trends. Most of the cases occurred during warm-weather months, but 42% of cases occurred during cooler months.
- Nonperinatal listeriosis disproportionately affects the elderly and immunocompromised. The mean and median age of nonperinatal listeriosis cases was 68 years in 2011, ranging from 50-95 years.
- In 2011, there was a nationwide outbreak of nonperinatal listeriosis associated with

cantaloupes grown in Colorado. One LAC nonperinatal listeriosis case carried an organism that matched the outbreak pattern. The case reportedly traveled to Colorado at the end of August and ate local cantaloupe while he was there. He survived, but his illness was complicated by pre-existing inflammatory bowel disease and resulted in a colectomy two months later.

- There were two deaths due to nonperinatal listeriosis, yielding a case-fatality rate of 10.5%.

Reported Listeriosis, nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2011

	2007 (N=21)			2008 (N=20)			2009 (N=15)			2010 (N=14)			2011 (N=19)		
	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
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	1	5.0	0.1	1	6.7		1	6.7		0	0.0	0.0
15-34	0	0.0	0.0	1	5.0	0.0	1	6.7		1	6.7		0	0.0	0.0
35-44	0	0.0	0.0	1	5.0	0.1	0	0.0		0	0.0		0	0.0	0.0
45-54	6	28.6	0.5	1	5.0	0.1	2	13.3		2	13.3		4	21.1	0.3
55-64	6	28.6	0.7	5	25.0	0.5	1	6.7		1	6.7		5	26.3	0.5
65+	9	42.9	0.9	11	55.0	1.1	10	66.7		10	66.7		10	52.6	0.9
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0		0	0.0		0	0.0	0.0
Race/Ethnicity															
Asian	3	14.3	0.2	6	30.0	0.5	0	0.0		0	0.0		2	10.5	0.1
Black	0	0.0	0.0	1	5.0	0.1	1	6.7		1	6.7		0	0.0	0.0
Hispanic	8	38.1	0.2	5	25.0	0.1	7	46.7		7	46.7		4	21.1	0.2
White	10	47.6	0.3	8	40.0	0.3	7	46.7		7	46.7		13	68.4	4.5
Other	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	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
2	6	28.6	0.3	3	15.0	0.1	4	26.7		4	26.7		5	26.3	0.2
3	4	19.0	0.2	6	30.0	0.3	2	13.3		2	13.3		4	21.1	0.2
4	1	4.8	0.1	3	15.0	0.2	3	20.0		3	20.0		1	5.3	0.1
5	4	19.0	0.6	1	5.0	0.2	0	0.0		0	0.0		4	21.1	0.6
6	3	14.3	0.3	2	10.0	0.2	2	13.3		2	13.3		0	0.0	0.0
7	3	14.3	0.2	3	15.0	0.2	2	13.3		2	13.3		2	10.5	0.2
8	0	0.0	0.0	2	10.0	0.2	2	13.3		2	13.3		3	15.8	0.3
Unknown	0	0.0	0.0	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 Nonperinatal Listeriosis LAC, 2002-2011

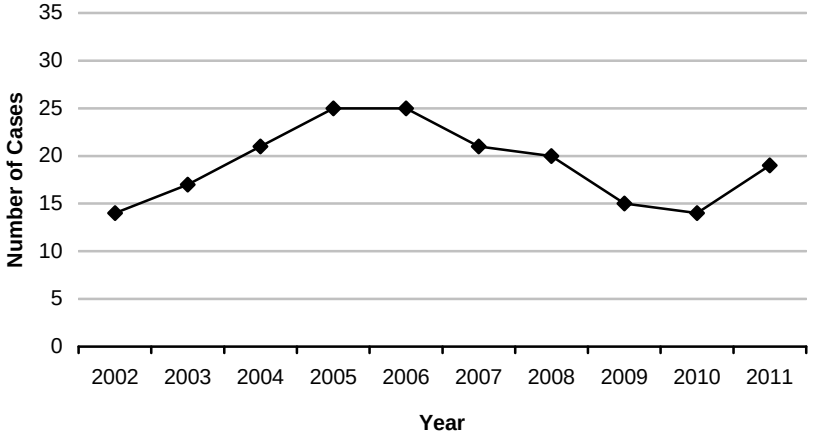


Figure 2. Reported Cases of Nonperinatal Listeriosis by Age Group, LAC, 2011 (N=19)

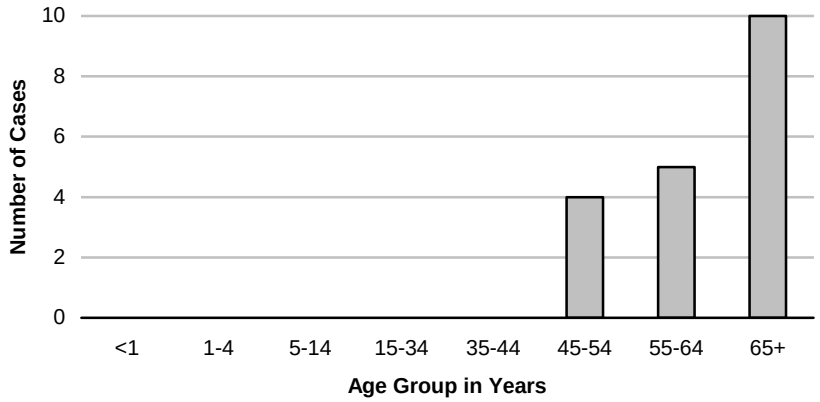


Figure 3. Percent Cases of Nonperinatal Listeriosis by Race/Ethnicity, LAC, 2011 (N=19)

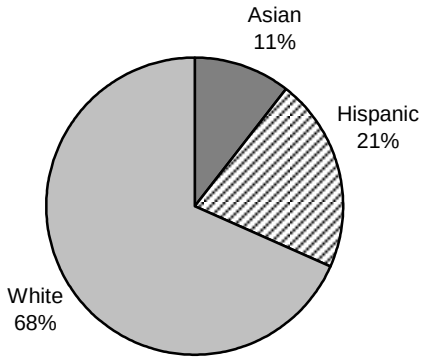


Figure 4. Reported Cases of Nonperinatal Listeriosis by SPA LAC, 2011 (N=19)

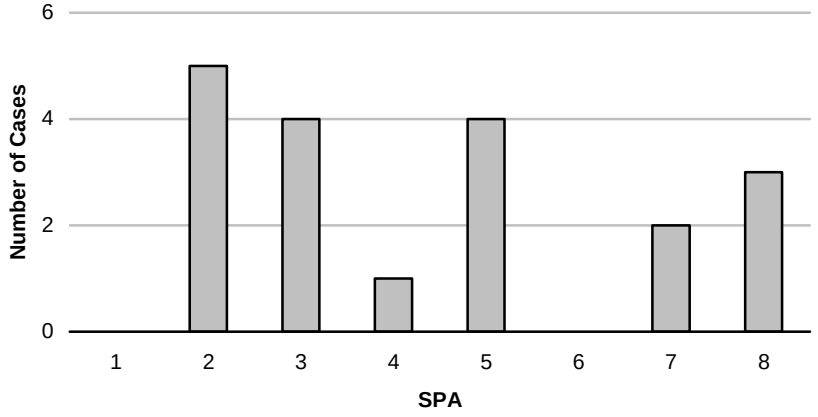
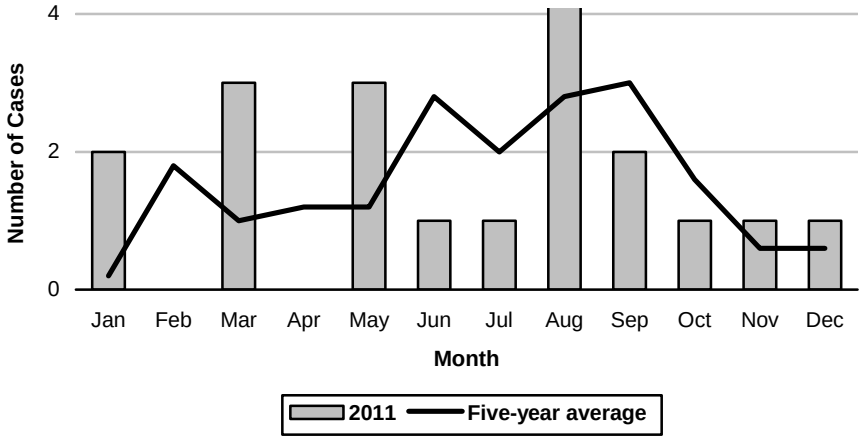


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset LAC, 2011 (N=19)



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	6
Annual Incidence[a]	
LA County[b]	4.95
California[c]	N/A
United States[c]	N/A
Age at Diagnosis	
Mean	26
Median	29
Range	20-38

[a]Cases per 100,000 live births.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]California and US combine non-perinatal and perinatal cases, thus making non-comparable rates.

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 heat cold cuts before eating.

Prevention strategies for healthcare providers include education during prenatal check-ups, outreach to Latino communities, and food safety notices at food and deli markets.

2011 TRENDS AND HIGHLIGHTS

- In 2011, there were six cases of perinatal listeriosis. Three cases were Hispanic expectant mothers; two cases were Asian and there was one case who was white non-Hispanic. All of the cases were single gestations. All of the babies were born sick, but none died.
- Maternal ages ranged from 20 to 38 years.
- The number of perinatal listeriosis cases in 2011 is within the range of listeriosis reported over the past ten years, 2006 (Figure 1).
- Hispanic women had the highest number of cases of perinatal listeriosis as in previous years (Figure 2). There have been no cases of perinatal listeriosis in black expectant mothers since 2006.
- None of the mothers reported eating raw milk or cheeses while pregnant.

Reported Perinatal Listeriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2011

	2007 (N=6)			2008 (N=2)			2009 (N=5)			2010 (N=4)			2011 (N=6)		
	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	
1-4	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	
15-34	5	83.3		2	100.		4	80.0		3	75.0		3	50.0	
35-44	1	16.7		0	0.0		1	20.0		1	25.0		3	50.0	
45-54	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	
65+	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	0.0		2	40.0		1	25.0		2	33.3	
Black	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Hispanic	5	83.3		2	100.		3	60.0		2	50.0		3	50.0	
White	1	16.7		0	0.0		0	0.0		1	25.0		1	16.7	
Other	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	
2	1	16.7		0	0.0		0	0.0		2	0.0		0	0.0	
3	0	0.0		1	50.0		0	0.0		0	0.0		3	50.0	
4	2	33.3		0	0.0		2	40.0		0	0.0		0	0.0	
5	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
6	1	16.7		0	0.0		1	20.0		1	25.0		1	16.7	
7	1	16.7		1	50.0		0	0.0		1	25.0		0	0.0	
8	1	16.7		0	0.0		2	40.0		0	0.0		2	33.3	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates are not calculated because rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Reported Cases of Perinatal Listeriosis LAC, 2002-2011

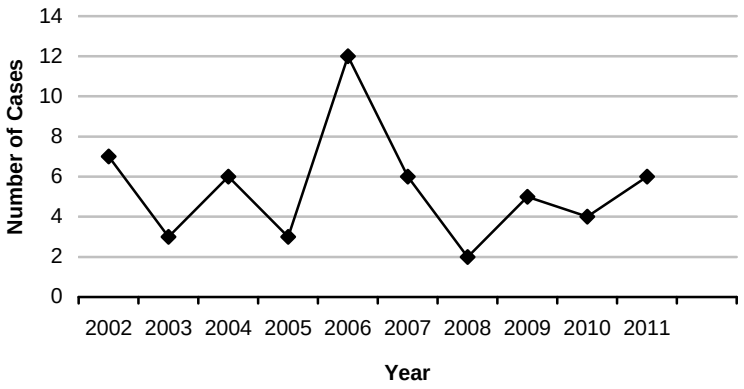


Figure 2. Perinatal Listeriosis Cases by Race/Ethnicity LAC, 2007-2011

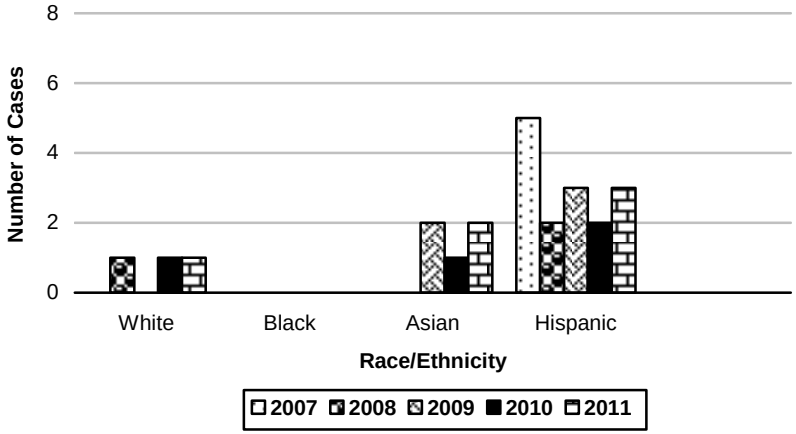
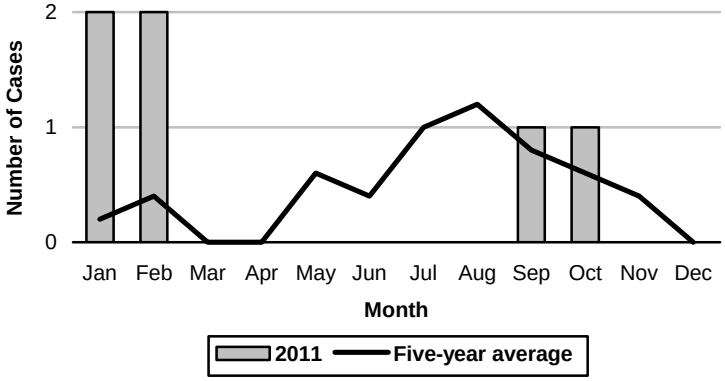


Figure 3. Reported Perinatal Listeriosis Cases by Month of Onset, LAC, 2011 (N=6)



LYME DISEASE

CRUDE DATA	
Number of Cases	6
Annual Incidence [a]	
LA County [b]	0.06
California	0.2
United States	7.8
Age at Diagnosis	
Mean	48.7
Median	47
Range	15-71

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

DESCRIPTION

Lyme disease (LD) is caused by the spirochete *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); most reported cases have been acquired in known endemic regions in the United States (US). The most common clinical presentation is a distinctive circular rash called erythema migrans (EM). When EM is not present, 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 conduction abnormalities 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) require a confirmed case of LD to have:

- Physician-diagnosed EM that is at least 5 cm in diameter with known tick exposure (laboratory evidence is necessary without tick exposure), or
- At least one late manifestation of LD with supporting laboratory results.

Laboratory criteria for case confirmation include a positive culture for *B. burgdorferi* or demonstration of diagnostic IgM or IgG to *B.* burgdorferi in serum or cerebral spinal fluid. A coalition of several public health and medical organizations recommends a two-step serologic testing procedure for LD: an initial enzyme immunoassay or immunofluorescent antibody 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 LD. 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; tucking shirts into pants; using tick repellant; 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.

2011 TRENDS AND HIGHLIGHTS

- Even as the national incidence increased (from 6.0 per 100,000 in 1999 to 9.9 per 100,000 in 2010), the incidence in LAC (0.06 per 100,000) has remained relatively stable and well below the national and state rates (Figure 1).
- Of the six confirmed cases of LD, all were likely exposed in highly endemic LD regions outside of LAC (Figure 3).
- Three cases (50%) recalled an insect bite prior to onset of EM rash, two of whom reported the insect as a tick.

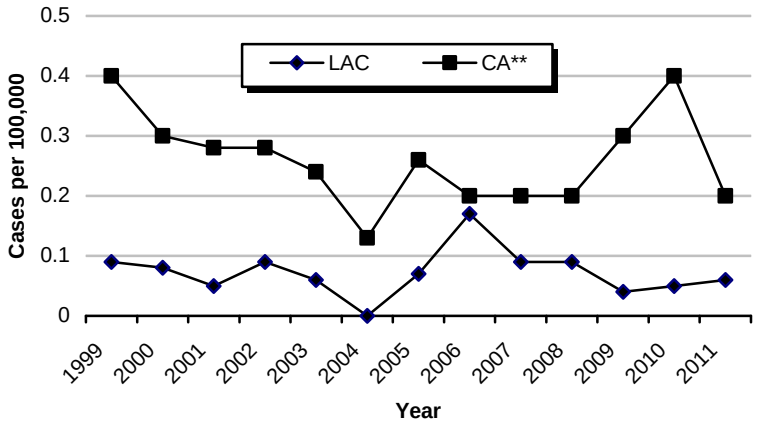
[1] Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. MMWR August 11, 1995/44(31);590-591, http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=8)			2008 (N=9)			2009 (N=4)			2010 (N=5)			2011 (N=6)		
	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	
1-4	0	0.0		2	22.2		0	0.0		0	0.0		0	0.0	
5-14	2	25.0		1	11.1		1	25.0		1	20.0		0	0.0	
15-34	3	37.5		1	11.1		0	0.0		2	40.0		1	16.7	
35-44	0	0.0		1	11.1		2	50.0		1	20.0		0	0.0	
45-54	2	25.0		3	33.3		0	0.0		0	0.0		3	50	
55-64	0	0.0		0	0.0		1	25.0		1	20.0		1	16.7	
65+	1	12.5		1	11.1		0	0.0		0	0.0		1	16.7	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	12.5		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	
Hispanic	1	12.5		0	0.0		0	0.0		1	20.0		0	0.0	
White	3	37.5		9	100		4	100		4	80.0		6	100	
Other	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Unknown	3	37.5		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	
2	3	37.5		2	22.2		1	25.0		0	0.0		2	33.3	
3	1	12.5		0	0.0		0	0.0		0	0.0		1	16.7	
4	2	25.0		1	11.1		0	0.0		2	40.0		0	0.0	
5	2	25.0		4	44.4		1	25.0		2	40.0		3	50.0	
6	0	0.0		0	0.0		1	25.0		1	20.0		0	0.0	
7	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
8	0	0.0		2	22.2		1	25.0		0	0.0		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

*Rates were not calculated because rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Lyme Disease LAC* and CA, 1999-2011



*Rates calculated based on less than 19 cases or events are considered unreliable.
**Beginning 2008, CA case count includes probable cases.

Figure 2. Reported Lyme Disease Cases by Month of Onset LAC, 2011

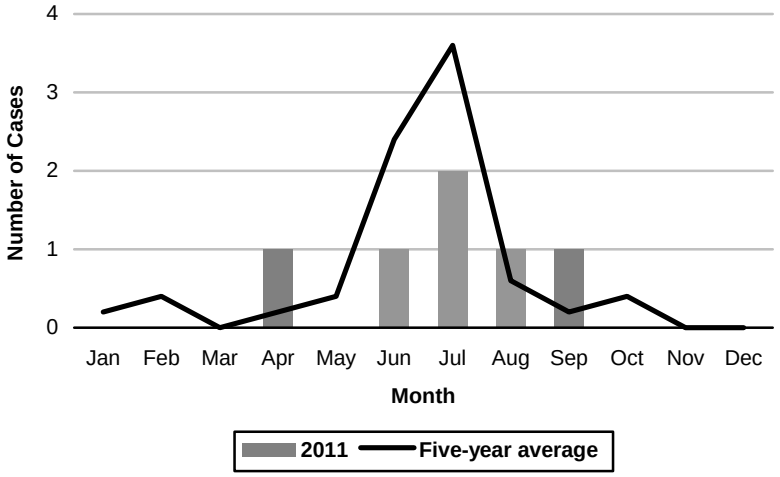
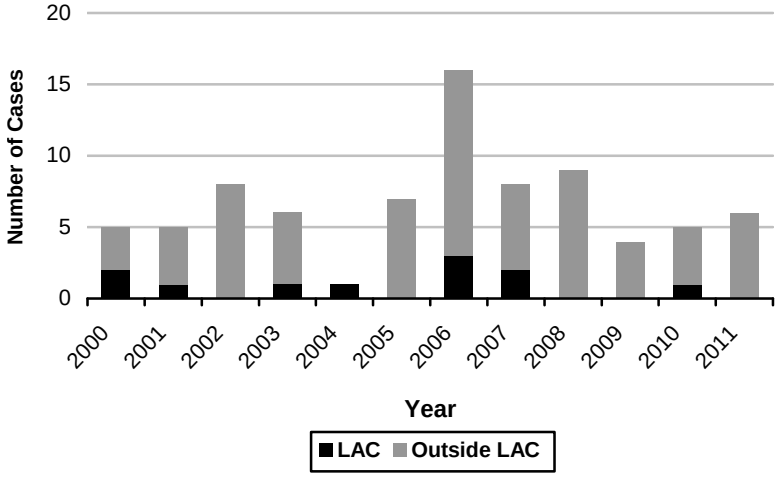


Figure 3. Locations of Tick and Outdoor Exposure in Lyme Disease Cases LAC, 2000-2011



MALARIA

CRUDE DATA	
Number of Cases	22
Annual Incidence[a]	
LA County	0.25
California	0.35
United States	0.56
Age at Diagnosis	
Mean	38.9
Median	47
Range	6-74

[a]Cases per 100,000 population.

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,* or *P. ovale*). Recently *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*, yet to be named, has also been recently discovered as a human pathogen. 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.

For the purpose of surveillance, confirmation of malaria requires the demonstration of parasites in thick or thin blood smears or the detection of *Plasmodium* sp. by nucleic acid test, 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 exposed, 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.

2011 TRENDS AND HIGHLIGHTS

- The number of reported cases continues to decrease in LAC from a peak of 60 cases in 2003 to only 22 cases in 2011, of which all but one were confirmed by blood smear. A single case was confirmed by PCR.
- Over half of all cases (n=12, 55%) were caused by *P. falciparum* (Figure 5). A substantial portion of *Plasmodium* sp. were not determined (n=4, 18%).
- All cases reported a travel history to a country with endemic malaria (Table 1). This year, travelers to Africa represented 73% (n=16) of all cases and 83% (n=10) of *P. falciparum* cases.
- Four of thirteen US resident cases (31%) used prophylaxis during their travels; only one of whom reported completing their regimen (Table 2). All four traveled for personal reasons such as visiting family and friends.

Reported Malaria Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=26)			2008 (N=30)			2009 (N=24)			2010 (N=25)			2011 (N=22)		
	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	3	12.5	0.5	1	4.0	0.2	0	0.0	0.0
5-14	2	7.7	0.1	1	3.3	0.1	0	0.0	0.0	1	4.0	0.1	5	22.7	0.4
15-34	11	42.3	0.4	12	40.0	0.4	6	25.0	0.2	12	48.0	0.4	3	13.6	0.1
35-44	3	11.5	0.2	6	20.0	0.4	2	8.3	0.1	4	16.0	0.3	2	9.1	.01
45-54	5	19.2	0.4	7	23.3	0.5	5	20.8	0.4	4	16.0	0.3	8	36.4	0.6
55-64	5	19.2	0.6	4	13.3	0.4	7	29.2	0.7	3	12.0	0.3	3	13.6	0.3
65+	0	0.0	0.0	0	0.0	0.0	1	4.2	0.1	0	0.0	0.0	1	4.5	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	7	26.9	0.5	4	13.3	0.3	3	12.5	0.2	8	32.0	0.6	2	9.1	0.1
Black	11	42.3	1.3	16	53.3	1.9	8	33.3	0.9	10	40.0	1.2	12	54.5	1.4
Hispanic	4	15.4	0.1	1	3.3	0.0	9	37.5	0.2	1	4.0	0.0	1	4.5	0.0
White	1	3.8	0.0	4	13.3	0.1	2	8.3	0.1	2	8.0	0.1	2	9.1	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	0.0
Unknown	3	11.5		5	16.7		2	8.3		4	16.0		5	22.7	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	2	8.0	0.5	2	9.1	0.5
2	10	38.5	0.5	8	26.7	0.4	6	25.0	0.3	3	12.0	0.1	6	27.3	0.3
3	2	7.7	0.1	3	10.0	0.2	1	4.2	0.1	4	16.0	0.2	3	13.6	0.2
4	4	15.4	0.3	2	6.7	0.2	0	0.0	0.0	2	8.0	0.2	2	9.1	0.2
5	2	7.7	0.3	3	10.0	0.5	4	16.7	0.6	5	20.0	0.8	1	4.5	0.2
6	3	11.5	0.3	5	16.7	0.5	4	16.7	0.4	5	20.0	0.5	2	9.1	0.2
7	1	3.8	0.1	1	3.3	0.1	1	4.2	0.1	1	4.0	0.1	1	4.5	0.1
8	2	7.7	0.2	6	20.0	0.5	7	29.2	0.6	3	12.0	0.3	5	22.7	0.4
Unknown	2	7.7		2	6.7		0	0.0		0	0.0		0	0.0	

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

Figure 1. Number of Malaria Cases
LAC and US, 1999-2011

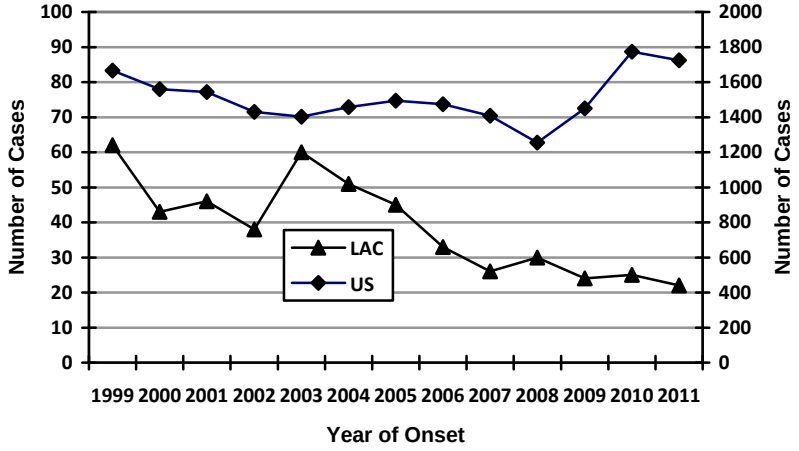


Figure 2. Malaria Cases by Age Group
LAC, 2011 (N=22)

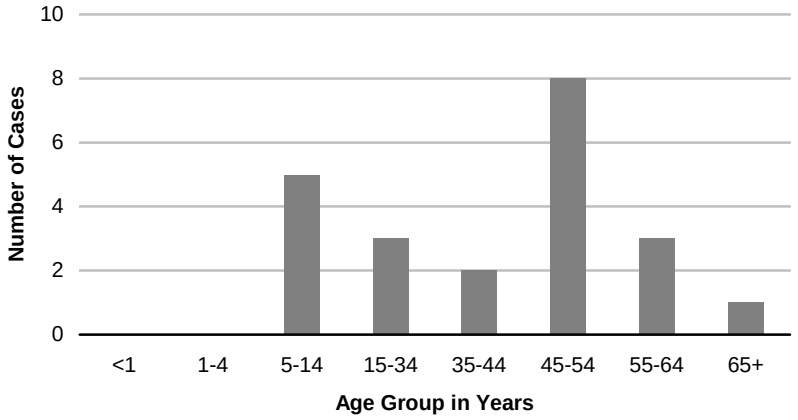


Figure 3. Percent of Malaria Cases by Race/Ethnicity
LAC, 2011 (N=22)

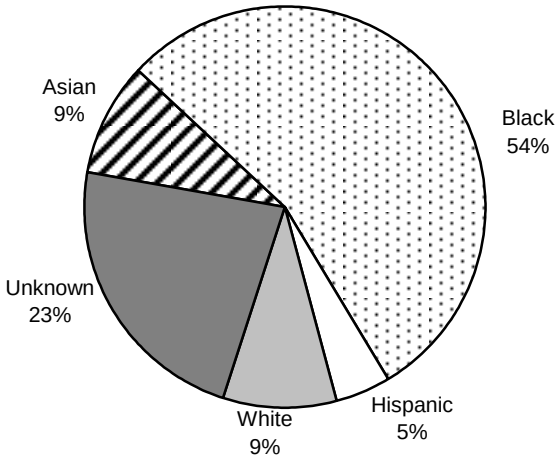


Figure 4. Number of Reported Malaria Cases by Race/Ethnicity
LAC, 2007-2011

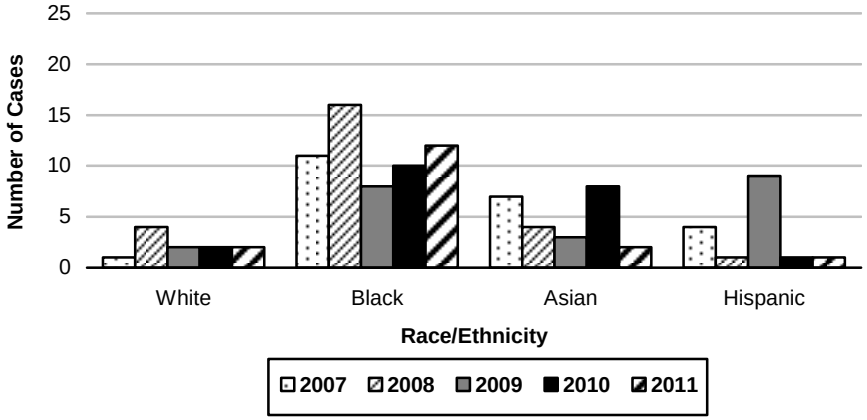


Figure 5. Percent Cases of Malaria by Species LAC, 2011

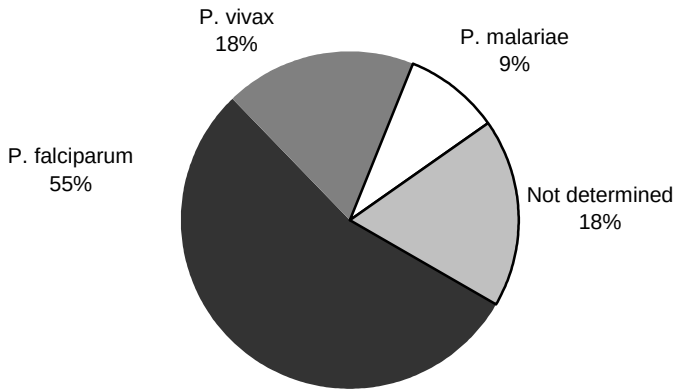


Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* species, 2011

Country of Acquisition	*P. falciparum*	*P. vivax*	*P. malariae*	Not determined	Total
Africa	**10**	**0**	**2**	**4**	**16**
- Cameroon	1	0	0	0	1
- Congo	1	0	0	0	1
- Ghana	1	0	0	1	2
- Kenya	1	0	0	0	1
- Nigeria	5	0	0	1	6
- Sierra Leone	0	0	0	2	2
- Uganda	1	0	2	0	3
Asia/Oceania	**1**	**2**	**0**	**0**	**3**
- India	0	1	0	0	1
- Pakistan	1	1	0	0	2
Latin America	**1**	**2**	**0**	**0**	**3**
- Colombia	1	0	0	0	1
- Honduras	0	2	0	0	2
Overall Total	**12**	**4**	**2**	**4**	**22**

Table 2. Prophylaxis Use Among US Residents with Malaria, 2011

Reason for Travel	Total Cases (n)	Prophylaxis Use (n)	Prophylaxis Use (%)
Pleasure	11	4	36
Work	1	0	0
Other/Unknown	1	0	0
Total	**13**	**4**	**31**

MEASLES

CRUDE DATA	
Number of Cases	8
Annual Incidence[a]	
LA County	0.08[b]
California[c]	0.08
United States[c]	0.07
Age at Diagnosis	
Mean	15.5 years
Median	18.5 years
Range	1 – 32 years

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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/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 healthcare workers, persons attending post-high school educational institutions, 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.
- Measles is common in most regions of the world outside of North and South America. Large outbreaks have been reported in Europe, Africa, and Asia. All international travelers who are not immune to measles should be vaccinated, ideally 2 weeks prior to travel. Unvaccinated infants age ≥6 months should be vaccinated if they are traveling out of the country. Infants who are vaccinated before age 12 months should receive two more doses at the recommended schedule.

2011 TRENDS AND HIGHLIGHTS

- Eight cases were reported in LAC in 2011, which, like last year, is the highest incidence of cases reported since 2001 (Figure 1, Figure 2).
- During May and June 2011, the CDC and California Department of Public Health issued health alerts about increased measles cases related to international travel. All the LAC cases were associated with travel. Four cases had traveled to/from Asia. Two cases had traveled to Europe. One case was an airport customs officer who processed one of the ill international cases. One case traveled to Nevada.
- Four of the cases were epidemiologically linked. A newly arriving refugee from Asia infected an airport customs officer and two passengers on the same flight. The outbreak is described in a June 2012 MMWR article.
- Similar to previous years, all cases were <45 years of age (Figure 3). All of the cases were eligible for vaccination but were not up-to-date (Figure 7). Two of the cases traveled internationally before 12 months of age. However, because of the increased risk of exposure, these infants should have received a first dose of MMR prior to travel.
- Unlike previous years, the majority of cases were Asian (n=4) (Figure 4).
- The cases resided in SPA 2, SPA 3, SPA 4, and SPA 5 (Figure 5).
- Unlike previous years when cases occurred primarily in later winter and spring, all of the cases occurred during the summer months of June to September, which coincides with the summer travel season (Figure 6).

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=0)			2008 (N=1)			2009 (N=1)			2010 (N=8)			2011 (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	-	1	12.5	0.7	0	0.0	-
1-4	0	0.0	-	1	100.	0.2	0	0.0	-	1	12.5	0.2	3	37.5	0.5
5-14	0	0.0	-	0	0.0	-	0	0.0	-	2	25.0	0.2	0	0.0	-
15-34	0	0.0	-	0	0.0	-	0	0.0	-	2	25.0	0.1	5	62.5	0.2
35-44	0	0.0	-	0	0.0	-	1	100.	0.1	2	25.0	0.1	0	0.0	-
45-54	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	-
65+	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	0.0	-	0	0.0	-	0	0.0	-	4	50.0	0.3
Black	0	0.0	-	0	0.0	-	0	0.0	-	2	25.0	0.2	0	0.0	-
Hispanic	0	0.0	-	1	100.	-	0	0.0	-	4	50.0	0.1	2	25.0	-
White	0	0.0	-	0	0.0	-	1	100.	-	2	25.0	0.1	1	12.5	-
Other	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		1	12.5	
SPA															
1	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
2	0	0.0	-	1	100.	-	1	100.	-	4	50.0	0.2	1	12.5	-
3	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	2	25.0	0.1
4	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	2	25.0	0.2
5	0	0.0	-	0	0.0	-	0	0.0	-	1	12.5	0.2	2	25.0	0.3
6	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	-	3	37.5	0.2	0	0.0	-
8	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		1	12.5	

*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").

**Figure 1. Incidence Rates of Measles
LAC, CA and US, 2002-2011**

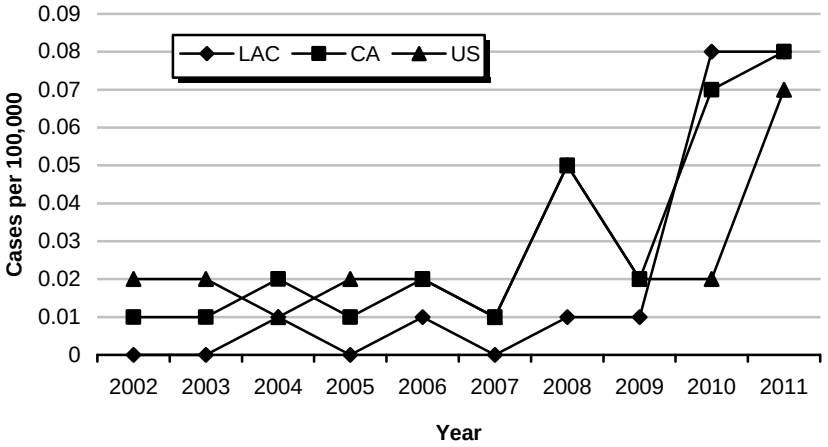


**Figure 2. Reported Measles Cases
LAC, 2002-2011**

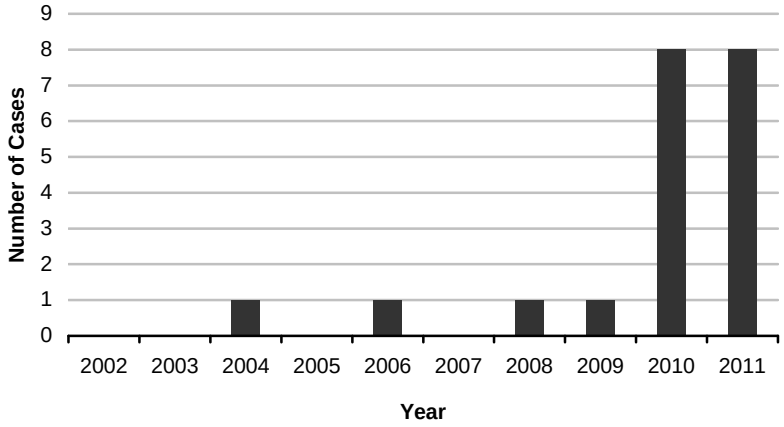


**Figure 3. Reported Confirmed Measles Cases by Age Group
LAC, 2011 (N=8)**

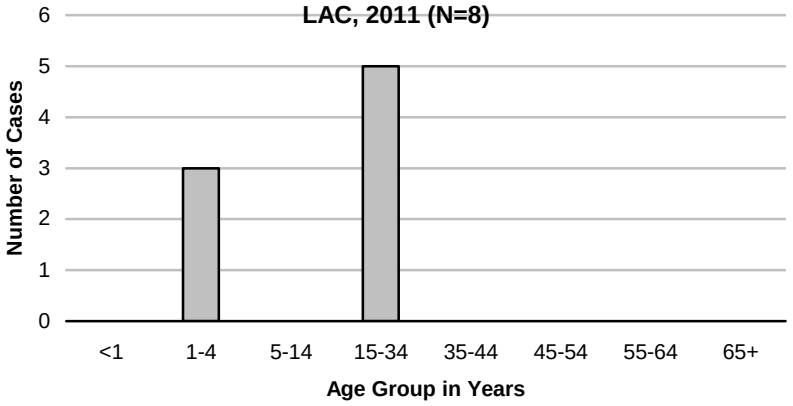


Figure 4. Percent Cases of Confirmed Measles by Race/Ethnicity LAC, 2011 (N=8)

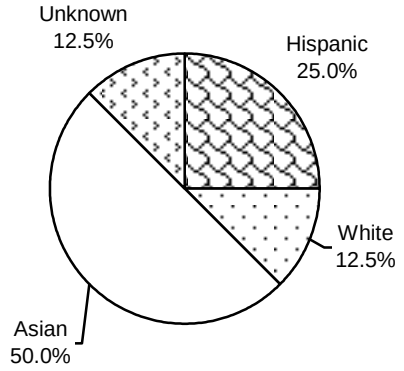
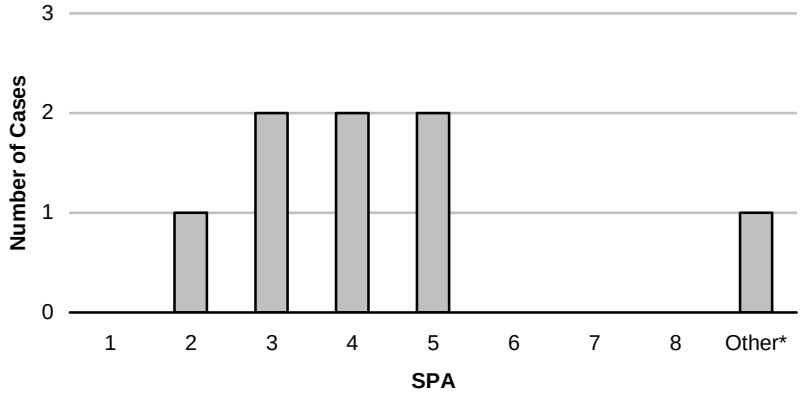


Figure 5. Reported Confirmed Measles Cases by SPA LAC, 2011 (N=8)



*One case was a refugee that was diagnosed in Long Beach and moved to another state in accordance with the resettlement plan. Case was counted as a LAC case because of extensive contact investigation in LAC.

Figure 6. Reported Confirmed Measles Cases by Month of Onset LAC, 2011 (N=8) vs. Previous Five-Year Average

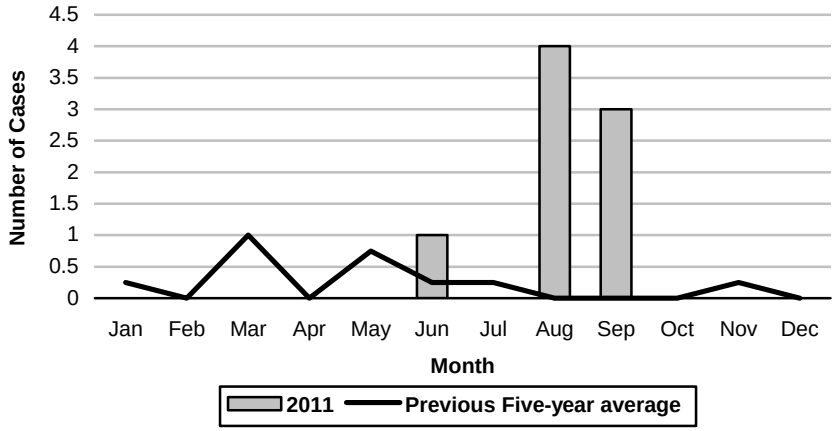


Figure 7. Vaccination Status of Reported Measles Cases LAC, 2011

	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=4)
No.	**8**	**0**	**0**	**8**	**0**
%	**100%**	**0.0%**	**0.0%**	**100%**	**0.0%**

[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	317
Annual Incidence[a]	
LA County	3.23
Age at Diagnosis	
Mean	29.8
Median	27
Range	0-88

[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, confusion, nausea and vomiting and usually last from seven to ten days.

The most common cause of viral meningitis is the 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 (HSV), 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, only supportive measures are available; several are vaccine-preventable. Antiviral agents are available for herpes simplex and varicella-zoster viruses. Recovery is usually complete and associated with low mortality rates. Several are vaccine-preventable (VZV, mumps, influenza, measles).

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

2011 TRENDS AND HIGHLIGHTS

- In 2011, viral/aseptic meningitis incidence decreased from 5.8 cases to 3.2 cases per 100,000 in 2010 (Figure 1).
- The incidence of viral/aseptic meningitis decreased across nearly all age groups in 2011 compared to 2010. The <1 year old age group decreased in incidence from 68.8 cases to 23.6 cases per 100,000 from 2010 to 2011, respectively, but maintained the highest age-specific incidence rate compared to other age groups.
- SPA 1 (Antelope Valley) continued to report the highest rates of viral meningitis in LAC (8.8 cases per 100,000 in 2011) (Figure 4). However, this is likely due to better public health reporting by the area's main hospital compared to other LAC acute care facilities. This may have resulted from the Varicella Active Surveillance Project (see Special Studies Reports).
- The incidence of viral/aseptic meningitis among blacks decreased from 7.5 cases to 4.3 cases per 100,000 in 2010 and 2011, respectively. Blacks had the highest incidence rate of viral/aseptic meningitis of race/ethnicity groups (Figure 6).
- Of the 49 cases (15%) in with an identified viral etiology, 21 (43%) were caused by WNV, 16 (33%) by an enterovirus, and 10 (20%) by HSV.
- Two deaths (<1%) were reported; their etiologies were not determined.

Reported Viral Meningitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=395)			2008 (N=597)			2009 (N=399)			2010 (N=570)			2011 (N=317)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	75	19.0	50.7	80	13.4	57.3	53	13.3	38.6	89	15.6	63.8	33	10.4	23.6
1-4	11	2.8	1.9	24	4.0	4.2	14	3.5	2.5	33	5.8	5.7	6	1.9	1.0
5-14	45	11.4	3.1	148	24.8	10.5	71	17.8	5.2	138	24.2	10.4	53	16.7	4.0
15-34	120	30.4	4.3	164	27.5	5.7	148	37.1	5.2	164	28.8	5.6	102	32.2	3.5
35-44	58	14.7	3.9	52	8.7	3.4	42	10.5	2.8	56	9.8	3.9	39	12.3	2.7
45-54	42	10.6	3.2	44	7.4	3.3	34	8.5	2.5	39	6.8	2.9	41	12.9	3.0
55-64	14	3.5	1.6	29	4.9	3.2	18	4.5	1.9	17	3.0	1.8	24	7.6	2.5
65+	29	7.3	2.9	51	8.5	5.0	19	4.8	1.8	33	5.8	3.1	18	5.7	1.7
Unknown	1	0.3		5	0.8		0	0.0		1	0.2				
Race/Ethnicity															
Asian	30	7.6	2.3	37	6.2	2.8	21	5.3	1.6	36	6.3	2.7	21	6.6	1.6
Black	28	7.1	3.3	43	7.2	5.0	23	5.8	2.7	64	11.2	7.5	37	11.7	4.3
Hispanic	179	45.3	3.9	275	46.1	5.9	208	52.1	4.4	259	45.4	5.5	147	46.4	3.1
White	108	27.3	3.7	121	20.3	4.2	80	12.5	2.7	112	19.6	3.9	78	24.6	2.7
Other	6	1.5	28.8	20	3.4	81.1	4	1.0		13	2.3		7	2.2	
Unknown	44	11.1		101	16.9		63	15.8		86	15.1		27	8.5	
SPA															
1	35	8.9	9.8	69	11.6	18.8	46	11.5	12.5	45	7.9	12.1	33	10.4	8.8
2	84	21.3	3.9	80	13.4	3.7	88	22.1	4.0	86	15.1	3.9	67	21.1	3.0
3	63	15.9	3.6	86	14.4	5.0	63	15.8	3.6	98	17.2	5.6	75	23.7	4.3
4	16	4.1	1.3	24	4.0	1.9	18	4.5	1.4	29	5.1	2.3	14	4.4	1.1
5	13	3.3	2.0	29	4.9	4.5	22	5.5	3.4	13	2.3	2.0	15	4.7	2.3
6	42	10.6	4.0	79	13.2	7.5	45	11.3	4.3	76	13.3	7.1	26	8.2	2.4
7	73	18.5	5.3	131	21.9	9.5	62	15.5	4.5	92	16.1	6.7	48	15.1	3.5
8	63	15.9	5.6	90	15.1	8.0	53	13.3	4.7	121	21.2	10.8	35	11.0	3.1
Unknown	6	1.5		9	1.5		2	0.5		10	1.8		4	1.3	

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

**Figure 1. Incidence Rates of Viral Meningitis
LAC, 1999-2011**

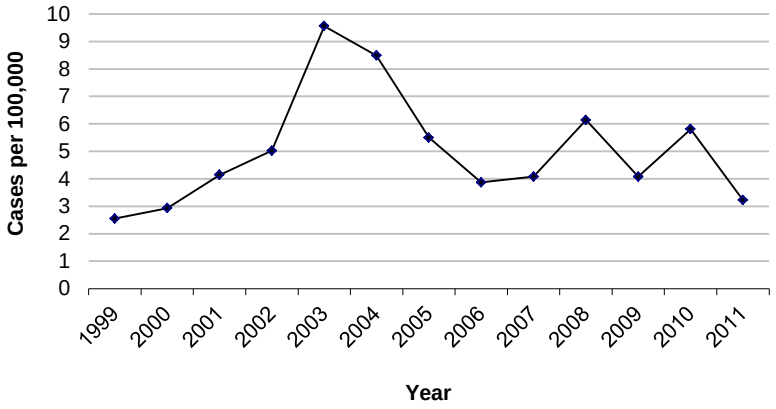


**Figure 2. Incidence Rates of Viral Meningitis by Age Group
LAC, 2011 (N=317)**

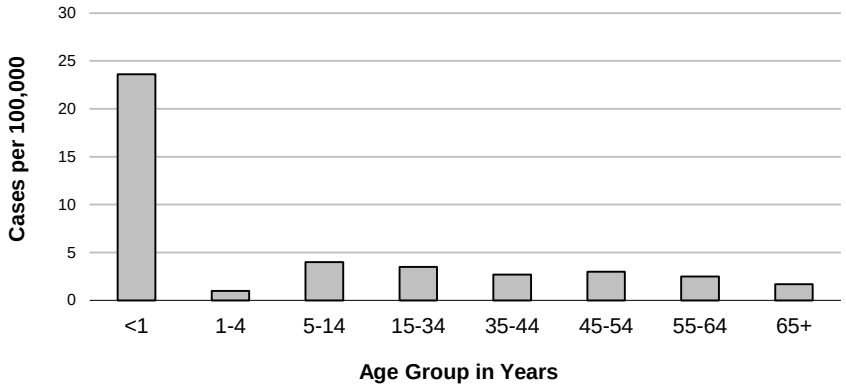


**Figure 3. Percent Cases of Viral Meningitis
by Race/Ethnicity, LAC, 2011 (N=317)**

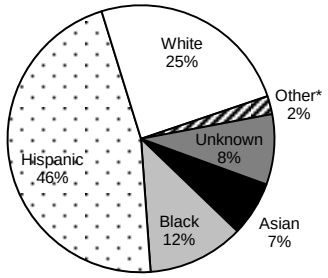
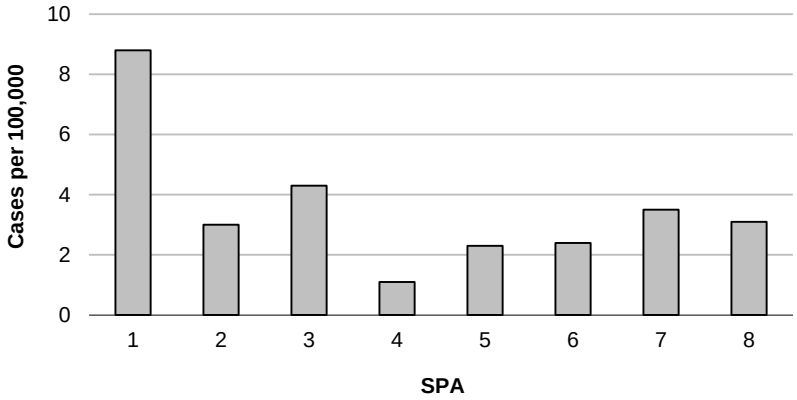


**Figure 4. Incidence Rates of Viral Meningitis by SPA
LAC, 2011 (N=317)**



* 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, 2011 (N=317)**

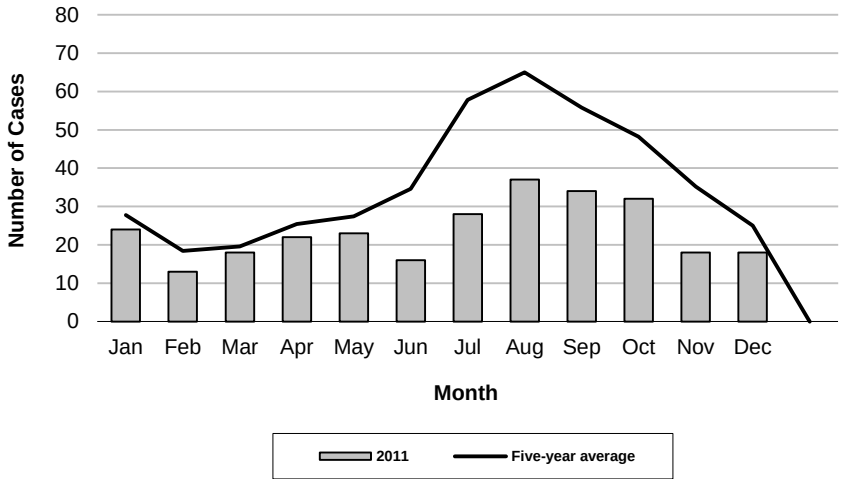
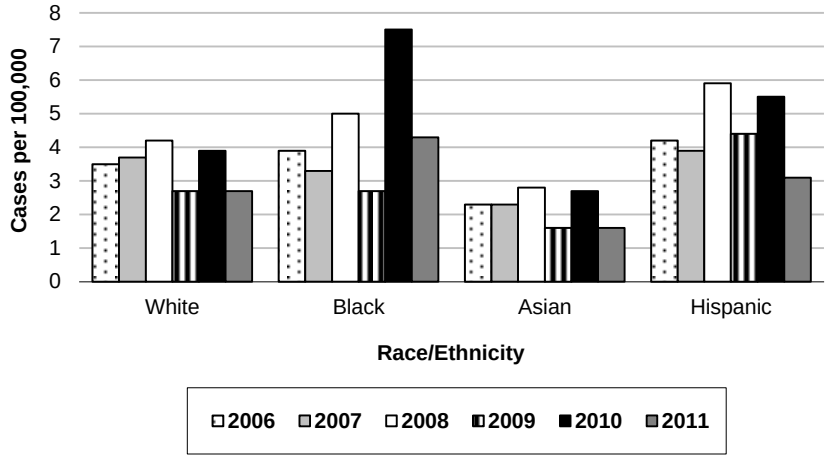
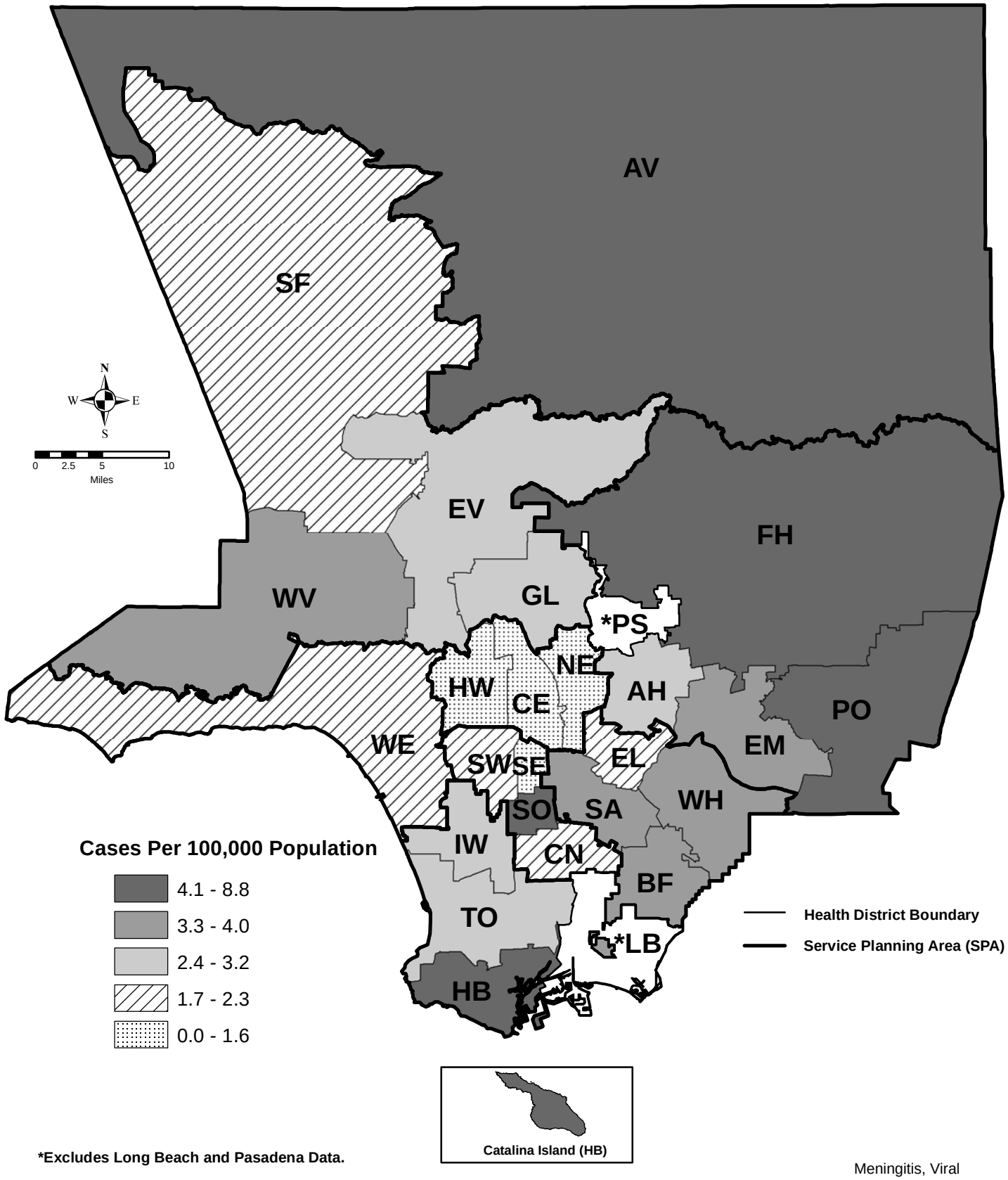


**Figure 6. Incidence Rates of Viral Meningitis by Race/Ethnicity
LAC, 2006-2011**



Map 10. Meningitis, Viral
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	37
Annual Incidence[a]	
LA County	0.38
California	0.30
United States	0.25
Age at Diagnosis	
Mean	41.5
Median	40.5
Range	3-80

[a]Cases per 100,000 population.

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. Despite effective antibiotic therapy, the mortality rate remains between 10%-15%. 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 13 serogroups, only A, B, C, Y, and W-135 are vaccine-preventable in the US.

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 consistent clinical symptoms and evidence of the bacteria in a normally sterile site by gram staining, polymerase chain reaction (PCR) analysis, or CSF antigen test.

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. Two quadrivalent conjugate vaccines, MenACWY-D (Menactra®) and MenACWY-CRM (Menveo®), are licensed for use in persons aged 2 to 55 years; MenACWY-D is also licensed for used in children age 9 through 23 months. Both vaccines are recommended for all adolescents between ages 11-18 years, preferably at 11 or 12 years, and for those between 2-55 years who are at increased risk for meningococcal disease. An additional booster dose is needed if the primary dose was given before 16 years old. Routine vaccination is recommended for college freshman living in dormitories, persons at increased risk for meningococcal disease. Quadrivalent meningococcal polysaccharide vaccine (Menomune®) is approved for use among those ≥2 years old and is acceptable for use when MCV4 and MenACWY-CRM are not available (e.g., for those >55 years old).

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 >10 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.

2011 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease rose 37% this past year from 0.27 per 100,000 in 2010 to 0.38 per 100,000, reversing a general decline occurring since 2001 when there was a peak of 0.64 cases per 100,000 (Figure 1).
- There were no cases reported among infants <1 year old. The highest incidence occurred among 35-44 year old adults. This deviates from the typical distribution curve for meningococcal disease, where the peak incidence occurs among <1 year old. (Figure 2).
- The incidence of meningococcal disease among blacks, 1.4 per 100,000, is at its highest in recent decades (Figure 4). There was a 75% increase from 2010, when there were 0.08 cases per 100,000. Of note, an outbreak occurred this year in which 3 of 4 patients were black (see 2011 Special Reports for details). The exclusion of these outbreak cases does

not diminish the increasing trend.

- There were 36 (97%) culture-confirmed cases: 26 (3%) cultured from blood, 6 (16.7%) from cerebrospinal fluid (CSF), and 4 (11%) from both CSF. One case was probable by PCR. Thirty-five of the culture-confirmed cases (97%) had serogroup identified; 23 (66%) were serogroup C, 8 (23%) serogroup Y, 4 (11%) serogroup B, and 1 (3%) serogroup W-135. Serogroup C accounted for more cases than usual (Figure 7).
- The case fatality rate, 16% (n=6), is higher than what has been usually recorded for LAC.
- In March 2011, an outbreak of serogroup C meningococcal disease occurred among 4 individuals with associations to the homeless. One fatality occurred. Antibiotic prophylaxis was disseminated to close contacts and homeless shelter staff; health alerts were distributed to local shelters and emergency care providers (see 2011 Special Reports for details).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=24)			2008 (N=30)			2009 (N=21)			2010 (N=26)			2011 (N=37)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7	2	7.7	1.4	0	0.0	0.0
1-4	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2	2	7.7	0.3	1	2.7	0.2
5-14	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1	1	3.8	0.1	1	2.7	0.1
15-34	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4	8	30.8	0.3	12	32.4	0.4
35-44	5	20.8	0.3	5	16.7	0.3	0	0.0	0.0	4	15.3	0.3	10	27.0	0.7
45-54	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3	5	19.2	0.4	3	8.1	0.2
55-64	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4	1	3.8	0.1	5	13.5	0.5
65+	2	8.3	0.2	2	6.7	0.2	0	0.0	0.0	3	11.5	0.3	5	13.5	0.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	4.2	0.1	1	3.3	0.1	0	0.0	0.0	1	3.8	0.1	4	10.8	0.3
Black	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5	7	26.9	0.8	12	32.4	1.4
Hispanic	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2	11	42.3	0.2	11	29.7	0.2
White	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2	7	26.9	0.2	10	27.0	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	
Unknown	0	0.0		1	3.3		1	4.8		0	0.0		0	0.0	
SPA															
1	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3	1	3.8	0.3	1	2.7	0.3
2	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2	3	11.5	0.1	9	24.3	0.4
3	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1	3	11.5	0.2	2	5.4	0.1
4	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2	2	7.7	0.2	5	13.5	0.4
5	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3	2	7.7	0.3	1	2.7	0.2
6	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5	6	23.1	0.6	9	24.3	0.8
7	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1	3	11.5	0.2	4	10.8	0.3
8	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3	6	23.1	0.5	6	16.2	0.5
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 Meningococcal Disease LAC and US, 1999-2011

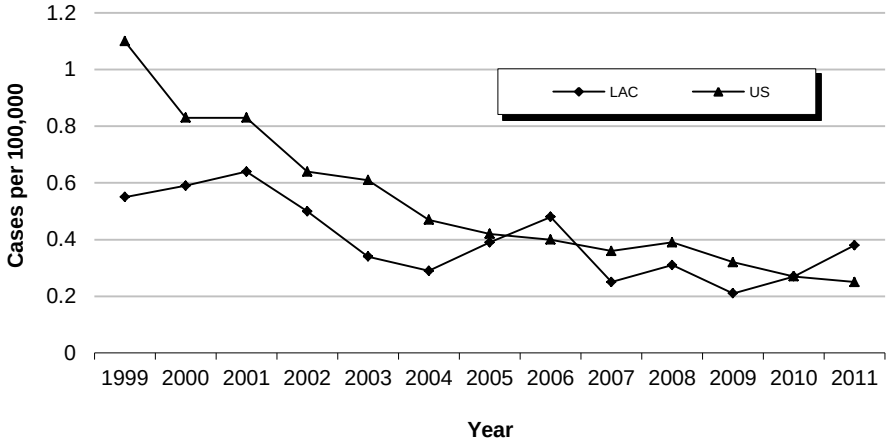


Figure 2. Incidence Rates of Meningococcal Disease Cases by Age Group, LAC, 2011 (N=37)

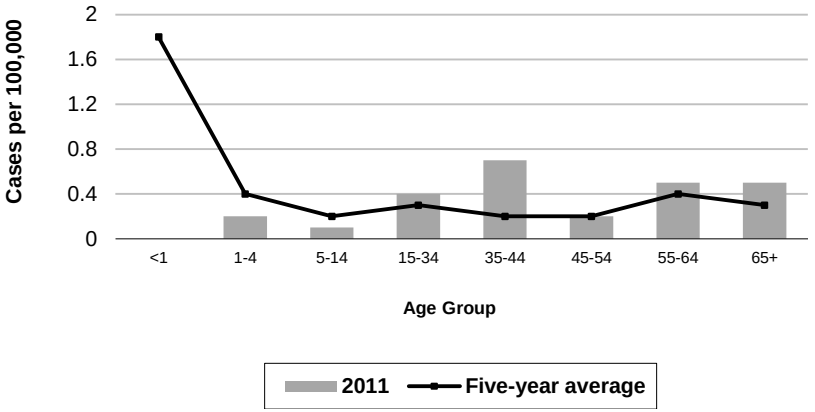


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2011 (N=37)

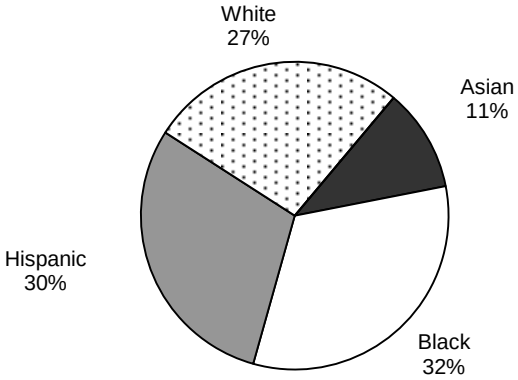


Figure 4. Incidence Rates of Meningococcal Disease Cases by Race/Ethnicity, LAC, 2006-2011

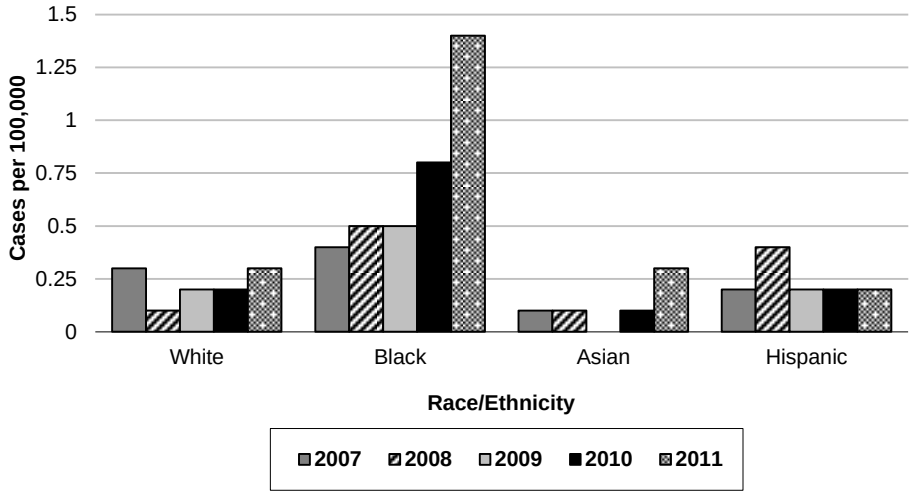


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2011 (N=37)

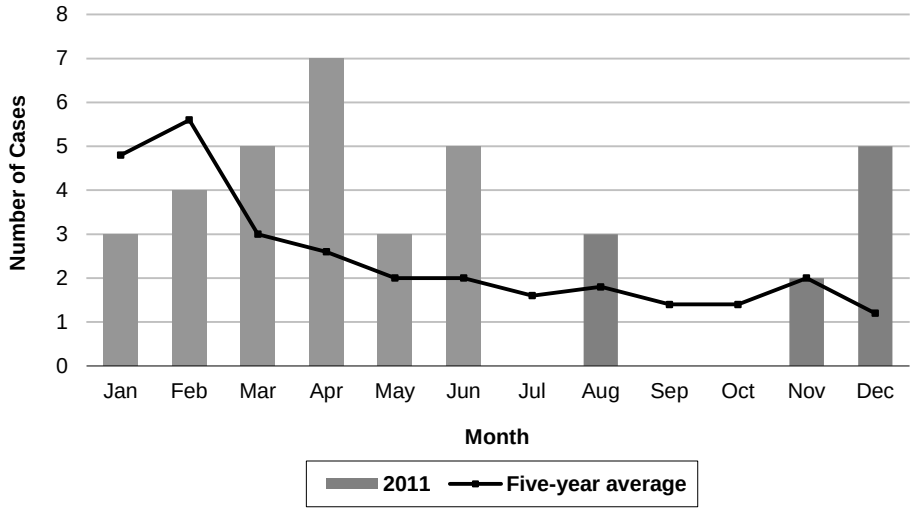


Figure 6. Incidence Rates of Meningococcal Disease by SPA LAC, 2011 (N=37)

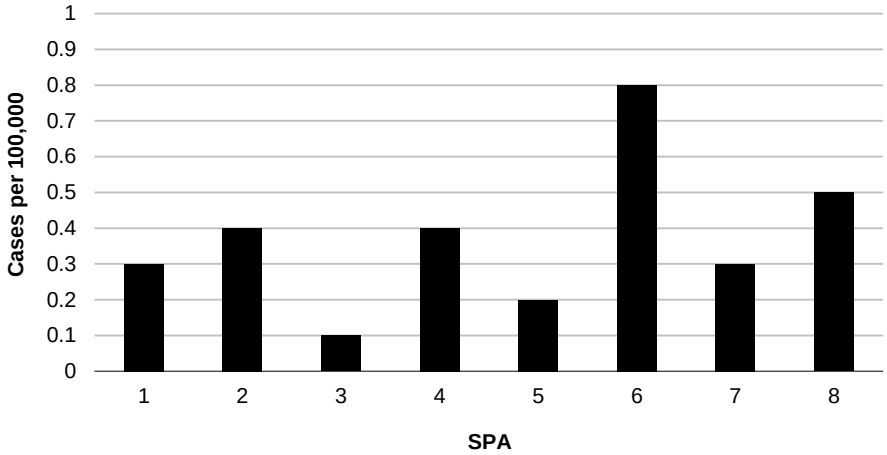
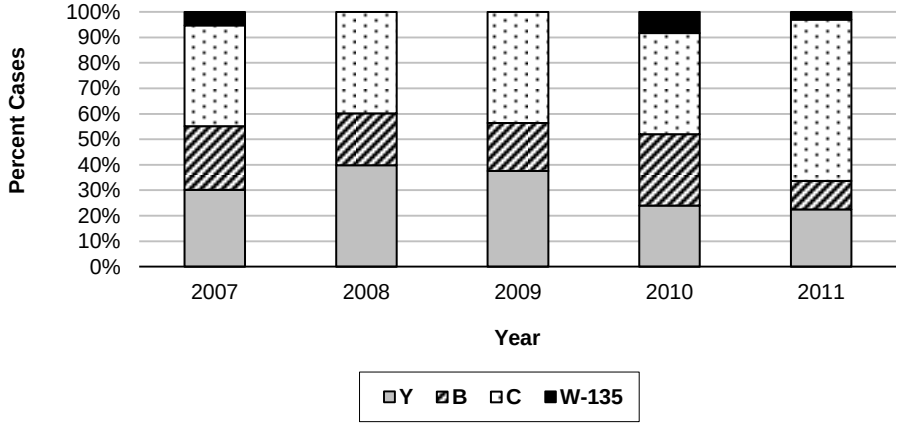


Figure 7. Meningococcal Disease by Serogroup LAC, 2007–2011



MUMPS

CRUDE DATA	
Number of Cases	3
Annual Incidence[a]	
LA County	0.03
California[b]	0.12
United States[b]	0.13
Age at Diagnosis	
Mean	36.0 years
Median	20.0 years
Range	18.0 – 70.0 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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, detection of viral RNA (RT-PCR), or epidemiological linkage to a confirmed case.

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. Vaccine effectiveness for the mumps component is about 88% after two doses. 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 (e.g., healthcare facility, daycare, college/university, or correctional facility).
- Pregnant women and individuals who are severely immunocompromised for any reason should not be given MMR or MMRV vaccine.

2011 TRENDS AND HIGHLIGHTS

- In 2009-2010, the second largest mumps outbreak in the US in ten years occurred in Observant Jewish communities (Figure 1). In October 2011, a large mumps outbreak was identified in a Northern California university campus.
- Los Angeles County released a health alert in October 2011 recommending heightened surveillance for mumps on college campuses. Three confirmed mumps cases were reported in 2011, which was lower than pre-2010 baseline levels (Figure 2, Figure 8). Although none of the cases were epidemiologically linked to the Northern California outbreak, all three had disease onset from September to December (Figure 6).
- The mean and median ages of the cases in 2011 (mean=36.0 years, median=20.0 years) increased compared to 2010 (mean=20.0 years, median=17.5 years). All confirmed cases were adults. Although persons born prior to 1957 are generally considered to be immune to mumps, one of the cases was in the 65+ age group (Figure 3).
- All of the confirmed cases were white (Figure 4).
- Although none of the cases were directly linked to each other, two of the cases attended the same local university. SPA 3, SPA 5, and SPA 8 reported one case each (Figure 5).
- None of the confirmed cases had documentation of receiving mumps vaccine prior to disease onset (Figure 7). Yet all three cases were in groups for whom vaccination with two MMR doses is highly recommended: persons attending post-high school education institutions (n=2) and international travelers (n=1). The international traveler had visited Nicaragua within 25 days of disease onset. More work needs to be done to increase mumps vaccination coverage to prevent transmission.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=5)			2008 (N=7)			2009 (N=7)			2010 (N=20)			2011 (N=3)		
	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	-
1-4	0	0.0	-	0	0.0	-	2	28.6	0.4	1	5.0	0.2	0	0.0	-
5-14	1	20.0	0.1	1	14.3	0.1	0	0.0	-	8	40.0	0.6	0	0.0	-
15-34	1	20.0	-	2	28.6	0.1	4	57.1	0.1	8	40.0	0.3	2	66.7	0.1
35-44	1	20.0	0.1	1	14.3	0.1	0	0.0	-	0	0.0	-	0	0.0	-
45-54	2	40.0	0.2	3	42.9	0.2	0	0.0	-	2	10.0	0.1	0	0.0	-
55-64	0	0.0	-	0	0.0	-	0	0.0	-	1	5.0	0.1	0	0.0	-
65+	0	0.0	-	0	0.0	-	1	14.3	0.1	0	0.0	-	1	33.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	3	60.0	0.2	1	14.3	0.1	3	42.8	0.2	0	0.0	-	0	0.0	-
Black	0	0.0	-	0	0.0	-	1	14.3	0.1	1	5.0	0.1	0	0.0	-
Hispanic	2	40.0	-	3	42.9	0.1	2	28.6	-	3	15.0	0.1	0	0.0	-
White	0	0.0	-	3	42.9	0.1	1	14.3	-	16	80.0	0.6	3	100	0.1
Other	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	20.0	0.3	1	14.3	0.3	1	14.3	0.3	0	0.0	-	0	0.0	-
2	1	20.0	-	2	28.6	0.1	1	14.3	-	4	20.0	0.2	0	0.0	-
3	1	20.0	0.1	1	14.3	0.1	1	14.3	0.1	1	5.0	0.1	1	33.3	0.1
4	0	0.0	-	1	14.3	0.1	0	0.0	-	7	35.0	0.6	0	0.0	-
5	0	0.0	-	2	28.6	0.3	2	28.6	0.3	2	10.0	0.3	1	33.3	0.2
6	1	20.0	0.1	0	0.0	-	1	14.3	0.1	0	0.0	-	0	0.0	-
7	1	20.0	0.1	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
8	0	0.0	-	0	0.0	-	1	14.3	0.1	6	30.0	0.5	1	33.3	0.1
Unknown	0	0.0		0	0.0		0	0.0							

*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").

Figure 1. Incidence Rates of Confirmed Mumps LAC, CA and US, 2002-2011

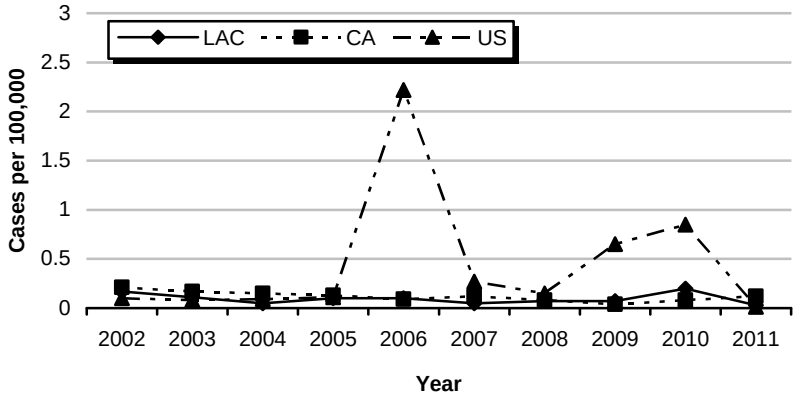


Figure 2. Reported Confirmed Mumps Cases LAC, 2002-2011

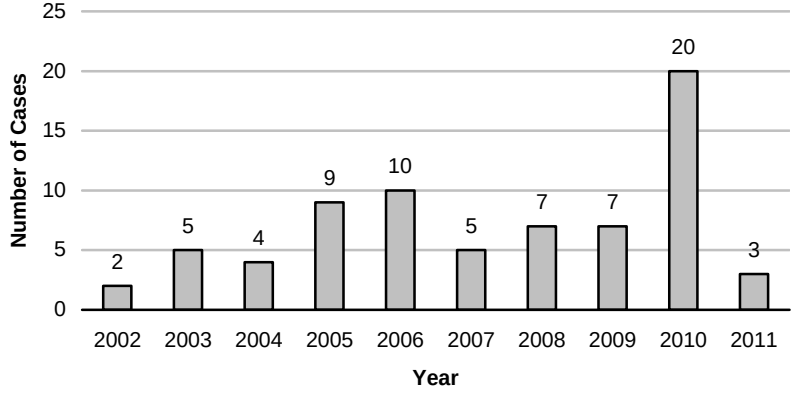


Figure 3. Reported Confirmed Mumps Cases by Age Group LAC, 2011 (N=3)

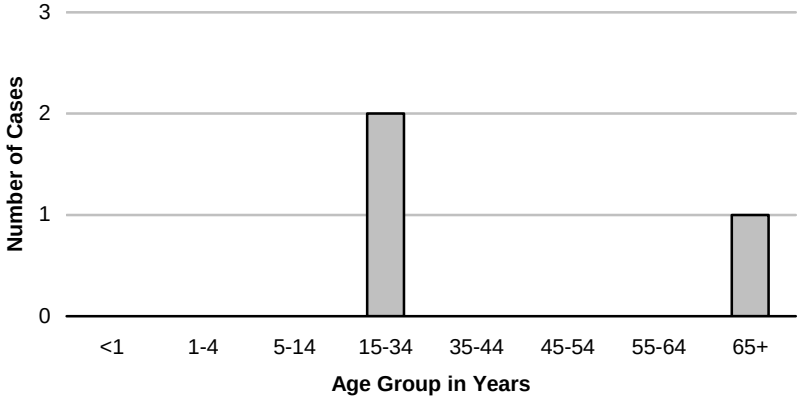


Figure 4. Percent Cases of Confirmed Mumps by Race/Ethnicity LAC, 2011 (N=3)

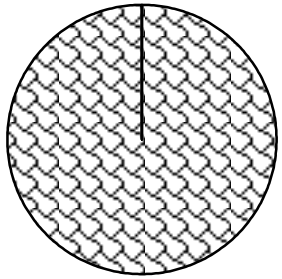


Figure 5. Reported Confirmed Mumps Cases by SPA LAC, 2011 (N=3)

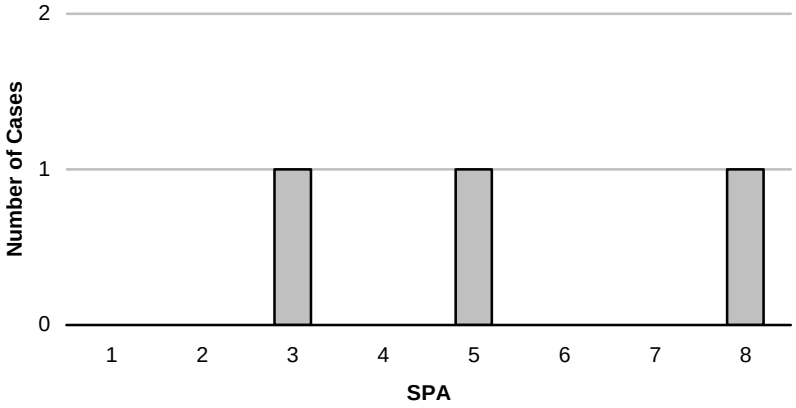


Figure 6. Reported Confirmed Mumps Cases by Month of Onset LAC, 2011 (N=3) vs. Previous Five-Year Average

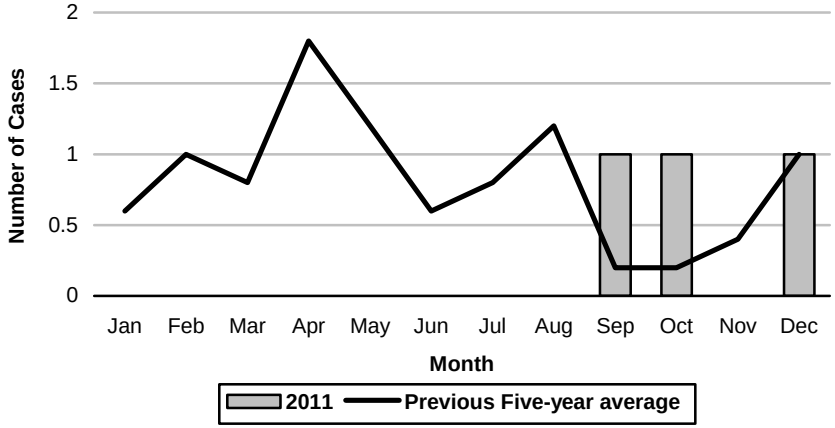


Figure 7. Vaccination Status of Reported Confirmed Mumps Cases, LAC, 2011

	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.	3	0	0	3	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 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, 2011 vs. Previous Three-Year Average*

	Confirmed		Probable	
	2011	2008-2010 Average	2011	2008-2010 Average
Total Cases	3	11.3	0	1
Age at Onset (years)				
Mean	36.0	27.1	--	7.0
Median	20.0	27.8	-	7.0
Range	18.0 – 70.0	2.0 – 67.0		5.0 – 12.0

*CDC changed the probable case definitions in 2008 so comparing the current year with years prior to 2008 would not be meaningful.

PERTUSSIS (WHOOPING COUGH)

CRUDE DATA	
Number of Cases	453
Annual Incidence[a]	
LA County	4.6
California[b]	6.22
United States[b]	6.06
Age at Diagnosis	
Mean	12.4 years
Median	7.0 years
Range	Birth – 79 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 (DTP/DTaP) 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 to 10 years following their last dose. Two Tdap vaccines are licensed for use in adolescents and adults.
- Tdap vaccine should be substituted for a single dose of Td in the catch-up series for children aged 7 to 10 years. Persons older than 65 years of age may also get Tdap.
- In July 2011, a new California school immunization law required all 7th-12th grade students to have Tdap vaccination.

2011 TRENDS AND HIGHLIGHTS

- In 2011, Los Angeles County (LAC) experienced the second highest pertussis incidence in over 50 years with 453 cases (347 confirmed, 106 probable) (4.6 cases per 100,000), a decrease of more than 50% compared to the 2010 resurgence in cases (Figures 1 and 2). After a peak in disease incidence in January, most likely due to the declining 2010 resurgence, reported cases decreased, falling below the previous 5-year average from August to December (Figure 7). No deaths were reported.
- Similar to previous years, infants less than one year of age had the highest incidence rate (99.6 cases per 100,000) (Figure 3). However, infants accounted for a smaller proportion of reported cases (30.7%) compared to an average of 44.1% from 2007-2010. More cases continue to be identified among adolescents and adults. For the second year in a row, the 5-14 year age group accounted for nearly the same proportion of cases (29.4%) as the <1 year age group. The new school immunization law is cause for great optimism. Widespread vaccination of adolescents will also protect other age groups from exposure.
- Similar to previous years, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5).
- Similar to 2010, SPA 6 had the highest incidence rate (Figure 6). However, the highest proportion of cases was observed in SPA 2 (21.8%) and SPA 3 (19.0%). Among 75 cases that had epidemiological linkages (i.e., household or school) to other cases, nearly half resided in SPA 2 (n=19) and SPA 3 (n=15).
- Of the total 453 cases, 54.5% (n=247) cases were either too young to be vaccinated (10.1%) or were not up-to-date with the immunization recommendations for their age (44.4%) indicating that more work needs to be done to increase pertussis vaccination rates. Additionally, 8.0% (n=29) of the cases age less <18 years had personal beliefs exemption school vaccine waivers which is nearly double the percentage reported in 2010 (4.2%) (Figure 8).

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=69)			2008 (N=80)			2009 (N=156)			2010 (N=972)			2011 (N=453)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	31	44.9	21.0	42	52.5	30.1	79	50.7	57.6	273	28.1	195.	139	30.7	99.6
1-4	4	5.8	0.7	7	8.8	1.2	10	6.4	1.8	158	16.2	27.2	73	16.1	12.6
5-14	13	18.8	0.9	13	16.3	0.9	18	11.5	1.3	304	31.3	22.9	133	29.4	10.0
15-34	14	20.3	0.5	12	15.0	0.4	20	12.8	0.7	122	12.5	4.1	48	10.6	1.6
35-44	4	5.8	0.3	1	1.3	0.1	9	5.8	0.6	40	4.1	2.8	26	5.7	1.8
45-54	1	1.4	0.1	2	2.5	0.1	12	7.7	0.9	28	2.9	2.1	14	3.1	1.0
55-64	2	2.9	0.2	2	2.5	0.2	5	3.2	0.5	24	2.5	2.5	9	2.0	0.9
65+	0	0.0	-	1	1.3	0.1	3	1.9	0.3	23	2.4	2.2	11	2.4	1.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	8	11.6	0.6	4	5.0	0.3	10	6.4	0.8	32	3.3	2.4	17	3.8	1.3
Black	1	1.4	0.1	4	5.0	0.5	6	3.9	0.7	50	5.1	5.9	24	5.3	2.8
Hispanic	42	60.9	0.9	52	65.0	1.1	100	64.1	2.1	655	67.4	13.8	286	63.1	6.0
White	18	26.1	0.6	18	22.5	0.6	39	25.0	1.3	216	22.2	7.5	110	24.3	3.8
Other	0	0.0	-	0	0.0	-	1	0.6	3.9	2	0.2	7.7	0	0.0	-
Unknown	0	0.0		2	2.5		0	0.0		17	1.8		16	3.5	
SPA															
1	1	1.4	0.3	2	2.5	0.5	9	5.8	2.4	19	1.9	5.1	19	4.2	5.1
2	16	23.2	0.7	12	15.0	0.5	21	13.5	0.9	209	21.5	9.4	99	21.8	4.5
3	8	11.6	0.5	4	5.0	0.2	24	15.4	1.4	147	15.1	8.5	86	19.0	5.0
4	9	13.0	0.7	17	21.3	1.3	18	11.5	1.4	162	16.7	12.9	51	11.3	4.1
5	8	11.6	1.2	10	12.5	1.5	17	10.9	2.6	57	5.8	8.6	27	6.0	4.1
6	9	13.0	0.9	9	11.3	0.9	24	15.4	2.3	158	16.3	14.8	63	13.9	5.9
7	8	11.6	0.6	13	16.3	0.9	22	14.1	1.6	129	13.3	9.4	60	13.2	4.4
8	10	14.5	0.9	13	16.3	1.2	21	13.5	1.9	90	9.3	8.0	48	10.6	4.3
Unknown	0	0.0		0	0.0		0	0.0		1	0.1		0	0.0	

*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").

Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2002-2011

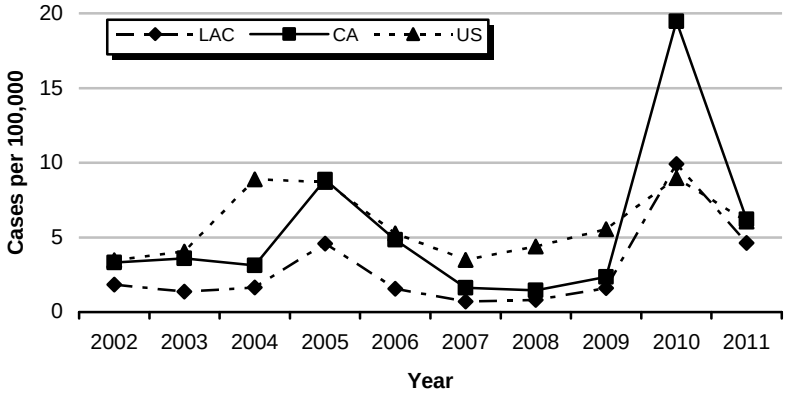


Figure 2. Reported Cases of Pertussis
LAC, 2002-2011

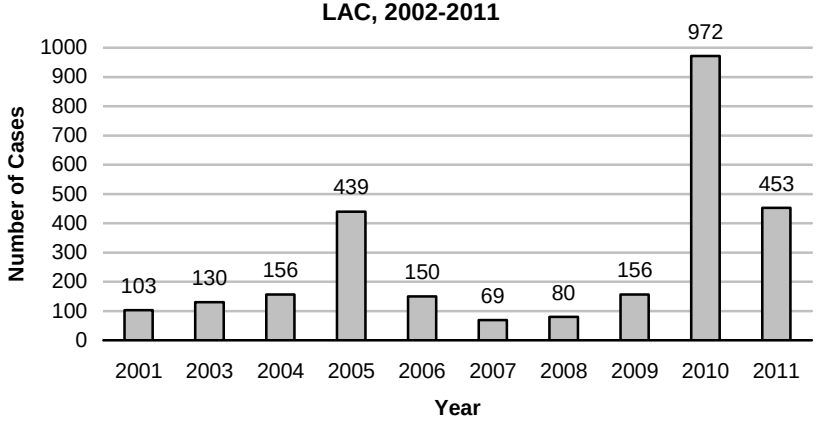


Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2011 (N=453)

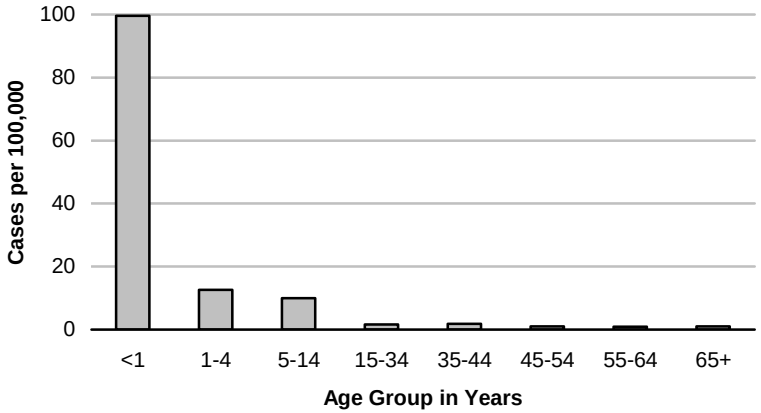
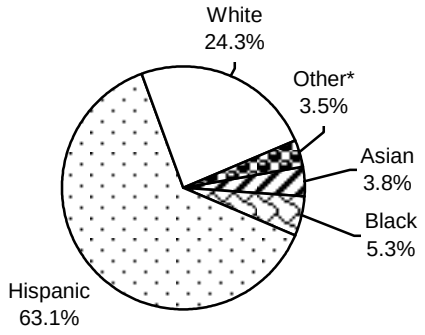
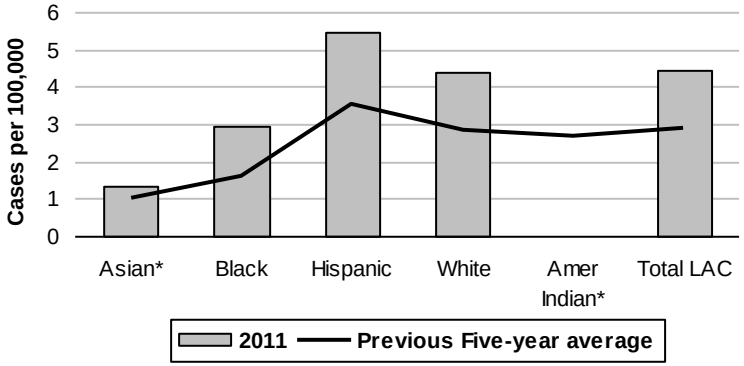


Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2011 (N=453)



* 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, 2011 (N=453) vs. Previous Five-Year Average



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

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2011 (N=453)

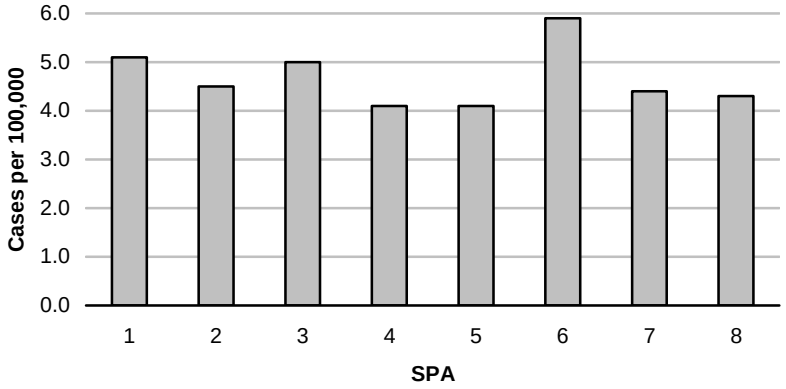


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2011 (N=453) vs. Previous Five-year Average

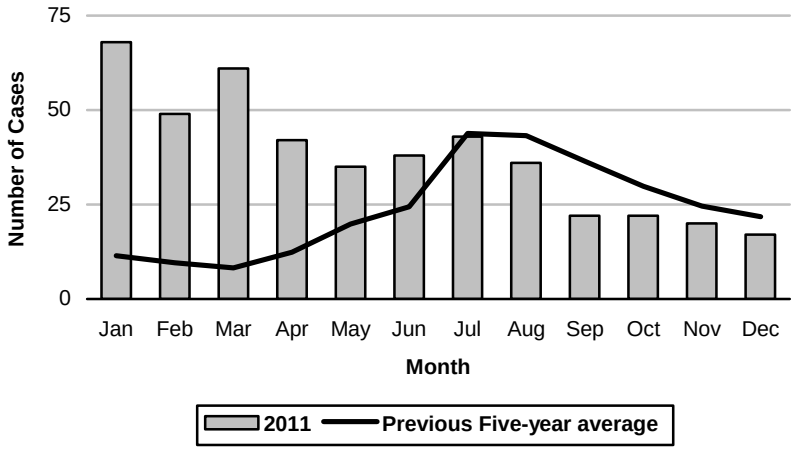
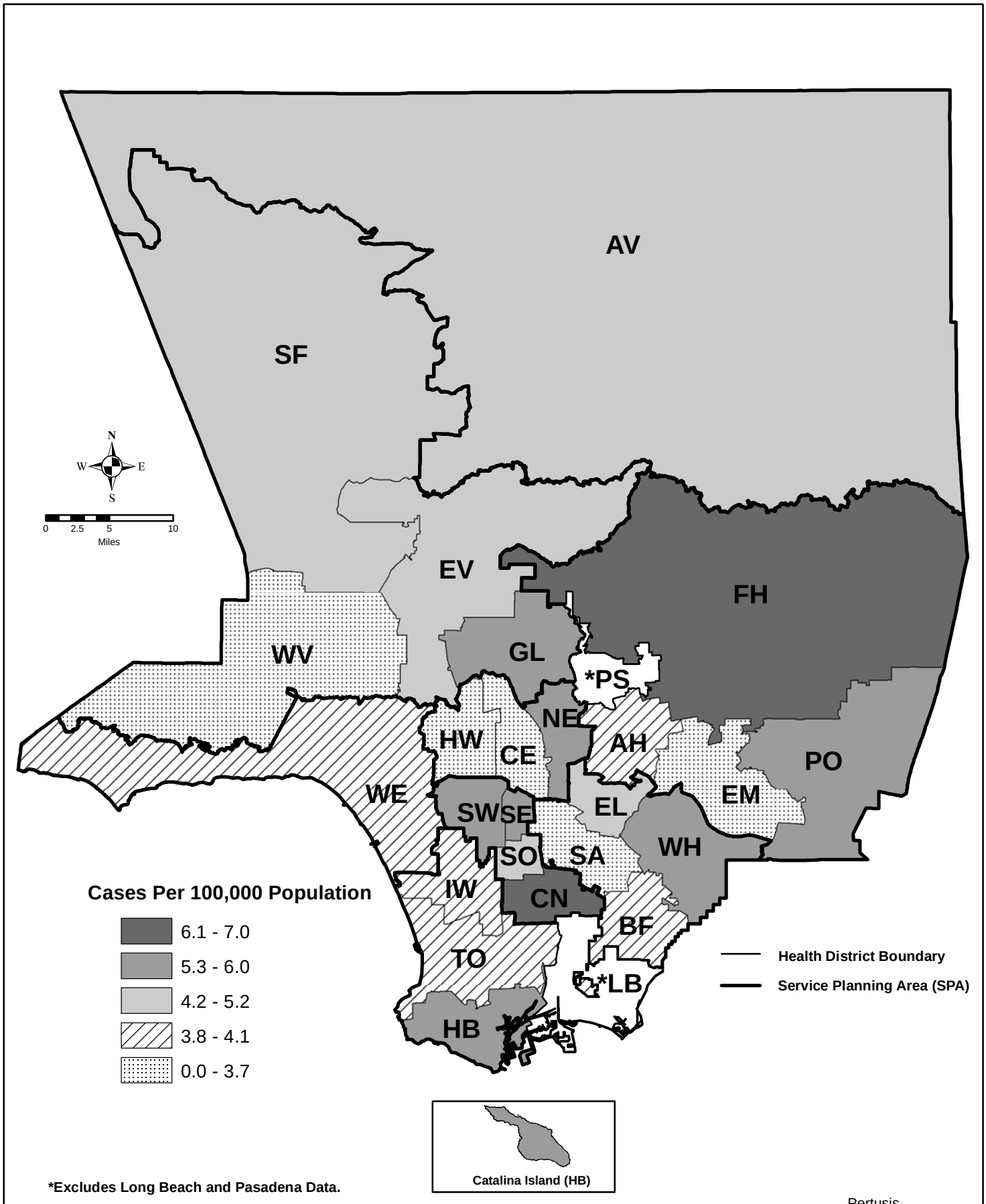


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2011

	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=363)
No.	453	46	206	201	29
%	100%	10.1%	45.5%	44.4%	8.0%

[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 11. Pertussis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	657
Annual Incidence[a]	
LA County	7.1
California[b]	N/A
United States[b]	12.9
Age at Diagnosis	
Mean	53
Median	56
Range	1 mos – 107 yrs

[a]Cases per 100,000 population.
[b]Not notifiable, 2010 rate based on CDC ABCs report.

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. In February 2010, the 13-valent pneumococcal conjugate vaccine (Prevnar13®) was licensed and is recommended by the Advisory Committee on Immunization Practices (ACIP) for all children aged 2-59 months, and for children aged 60-71 months at high risk of invasive pneumococcal infections. The 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults ≥65 years and those >2 years at high risk of IPD. For children aged 2 to 5 years at high risk of invasive pneumococcal infections, ACIP recommends the use of pneumococcal conjugate vaccine followed at least 2 months later by the 23-valent pneumococcal polysaccharide vaccine. This regimen provides protection against a broader range of serotypes, although supporting data are limited. Between 2006 and 2009, increases in the rate of IPD were seen in LAC, followed by a decrease in 2010. In 2011, IPD incidence has increased.

2011 TRENDS AND HIGHLIGHTS

- The incidence (N=657) rate this year of 7.1 cases per 100,000 people was similar to the average annual incidence of 6.6 cases per 100,000 people of the past five years (range 5.5-8.0 cases per 100,000) (Figure 1). This year's incidence rate was 14% higher than last year's rate (6.2 cases per 100,000, N=576).
- Mortality in 2011 (12.8%, n=84 deaths) was lower than in 2010 (15.3%, n=88 deaths). Annual mortality during 2006-2009 ranged from 14.3% to 17.4% (34–88 deaths) among cases with known disease outcome; however, validating and interpreting a mortality trend is difficult because disease outcome data were missing for 50% of the cases during 2006-2009 versus 2% and 0% of the cases in 2010 and 2011, respectively.
- In 2011, 93% (n=608) of cases were reported hospitalized, which is a similar percentage of 2010 (91%, n=524). In 2006-2009, the annual percentage of cases hospitalized ranged from 89% to 94% among cases with hospitalization data; however, trend analysis may be inaccurate because 20% of cases during 2006-2009 were missing hospitalization data, versus 0% of cases in 2010 and 2011 missing such data.

- Median length of hospital stay was 6 days (n=608 cases; mean=9.5 days and range=0-159 days). Median length of hospital stay was the same as in 2010 (n=502 cases; mean=10 days and range=0-130 days). Length of hospital stay was not recorded for most of 2009 and all of 2006-2008.
- Incidence rates varied amongst all age groups compared to the previous 5-year average (Figure 2). Amongst cases <1 year old, the incidence rate was 51% lower (from 12.0 to 5.9 cases per 100,000) and the number of cases was 58% lower (from 16.6 to 7 cases) than the previous 5-year average. Similarly, amongst cases 1-4 years of age, the incidence rate decreased 21% (from 9.2 to 7.3 cases per 100,000) and the number of cases decreased 31% (from 51.0 to 35 cases). These age groups are the target population for the new 13-valent pneumococcal conjugate vaccine released in the spring of 2010. The decreases in incidence (Table) in these two age groups are indicative of vaccine effectiveness.
- Compared to the previous 5-year average, incidence rates increased amongst age groups 5-14 (68%), 15-34 (52%) and 45-54 (12%). The number of cases also increased amongst age groups 5-14 (49%, from 20.8 to 31 cases), 15-34 (50%, from 42.6 to 64 cases), and 55-64 (17%, from 108.0 to 128 cases).
- Incidence rate and number cases for the other age groups remained within 10% of their previous 5-year averages.
- Cases aged 65 years and older and 55-64 years had the highest incidence rates (21.5 and 12.9 per 100,000, respectively) (Table, Figure 2), consistent with previous years.
- Similar to previous years, the 2011 incidence rate in blacks was the highest compared to rates of the other race/ethnic groups (Table, Figure 3). Compared to 2010, there was a 57% increase in 2011 incidence rate (from 10.7 to 16.8 cases per 100,000) and number of cases (from 83 to 130 cases) amongst blacks.
- In comparing 2011 to 2010, incidence rate and number of cases increased amongst Hispanics by 13% (from 4.8 to 5.4 cases per 100,000) and 15% (from 213 to 244 cases), respectively. Similarly, incidence rate and number of cases increased amongst whites by 12% (from 7.8 to 8.8 cases per 100,000) and 11% (from 209 to 233 cases), respectively.
- Valid comparisons cannot be made across 5-year averages as race information was missing for 32% to 46% of cases in previous years. Percent of cases missing race/ethnicity information was similar for 2010 (4%) and 2011 (0.2%).
- As in previous years, Service Planning Area (SPA) 6 had the highest incidence rate of IPD (8.9 cases per 100,000; Table, Figure 4).
- Compared to the previous 5-year average, the incidence rate and number of cases in SPA 4 both increased by 44% (from 5.8 to 8.3 cases per 100,000) and 32% (from 70.6 to 93 cases), respectively (Table).
- IPD peaked in January (51% increase in cases, n=127, compared to the previous 5-year average for January) instead of December as seen in the previous five years (Figure 5). While incidence is typically high in February, in 2011 there were substantially more February cases (n=125, 42% more than the previous 5-year average for February of 88.2). Compared to the average monthly incidence of the previous five years, the numbers of IPD cases in 2011 were substantially lower in November (30% lower, n=38) and December (25% lower, n=68).
- The percentage of isolates susceptible to penicillin increased 12% compared to the previous five years. Susceptibility to erythromycin (80% of isolates) was slightly lower than the previous 5 years (84%, Figure 6).
- Improvements in data quality have been made in 2011; outcome, hospitalization, and/or race-ethnicity were missing for ≤1% of cases compared to up to 63% missing in the previous five years.

Reported Invasive Pneumococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=624)			2008 (N=662)			2009 (N=785)			2010 (N=576)			2011 (N=657)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	23	3.7	15.6	19	2.4	11.5	20	2.5	14.6	12	2.1	10.0	7	1.1	5.9
1-4	48	7.7	8.3	57	8.6	10.1	56	7.1	10.0	48	8.3	9.9	35	5.3	7.3
5-14	23	3.7	1.6	11	1.8	0.9	33	4.2	2.4	21	3.6	1.7	31	4.7	2.6
15-34	47	7.5	1.7	30	4.4	1.0	64	8.1	2.3	38	6.6	1.4	64	9.7	2.3
35-44	67	10.7	4.5	67	10.6	4.6	75	9.5	5.0	47	8.2	3.5	57	8.7	4.3
45-54	90	14.4	6.8	98	14.2	7.0	136	17.3	9.9	84	14.6	6.5	107	16.3	8.3
55-64	106	17.0	11.9	114	17.4	12.6	123	15.6	12.9	108	18.8	11.3	128	19.5	12.9
65+	214	34.3	21.2	264	40.2	26.1	278	34.4	26.2	218	37.8	21.7	227	34.6	21.5
Unknown	6	1.0		2	0.3		1	0.1		0	0.0		1	0.2	
Race/Ethnicity															
Asian	33	5.3	2.6	32	4.8	2.5	50	6.4	3.8	46	8.0	3.5	49	7.5	3.7
Black	70	11.2	8.2	76	11.5	8.9	86	10.9	10.1	83	14.2	10.7	130	19.8	16.8
Hispanic	135	21.6	2.9	124	18.7	2.6	197	25.1	4.2	213	37.0	4.8	244	37.1	5.4
White	102	16.3	3.5	135	20.4	4.6	192	24.4	6.6	209	36.3	7.8	233	35.5	8.8
Other	0	0.0	0.0	0	0.0	0.0	9	1.1	35.4	2	0.3	11.4	0	0	0.0
Unknown	284	45.5		295	44.6		252	32.1		23	4.0		1	0.2	
SPA															
1	24	3.8	6.7	18	2.7	4.9	25	3.2	6.8	13	2.3	3.4	17	2.6	4.4
2	100	16.0	4.6	137	20.7	6.3	156	19.8	7.0	130	22.6	6.1	127	19.3	5.9
3	104	16.7	6.0	99	15.0	5.7	116	14.8	6.7	80	13.9	5.0	85	12.9	5.3
4	66	10.6	5.2	62	9.4	4.9	103	13.1	8.3	70	12.2	6.3	93	14.2	8.3
5	36	5.8	5.6	48	7.3	7.4	54	6.9	8.3	44	7.6	6.9	49	7.5	7.7
6	92	14.7	8.8	107	16.2	10.1	111	14.1	10.6	79	13.7	7.9	90	13.7	8.9
7	79	12.7	5.7	73	11.0	5.3	102	13.0	7.4	69	12.0	5.3	81	12.3	6.3
8	98	15.7	8.8	78	11.8	6.9	89	11.3	7.9	77	13.4	7.3	90	13.7	8.5
Unknown	25	4.0		40	6.0		30	3.8		14			25	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, 2000-2011

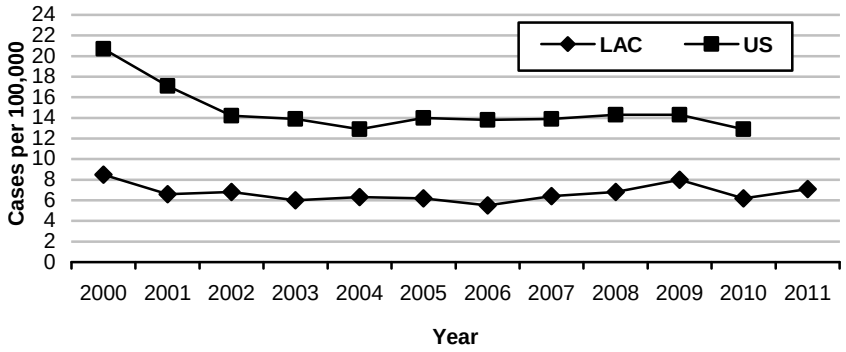


Figure 2. Annual Incidence Rates of Invasive Pneumococcal Disease 2006-2011

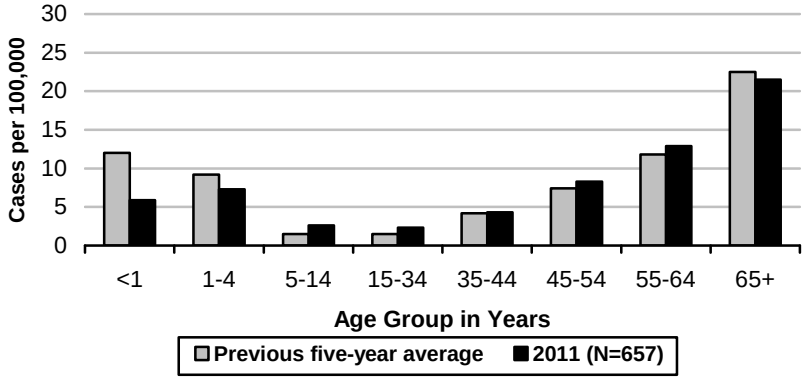


Figure 3. Annual Incidence Rates of Invasive Pneumococcal Disease by Race/Ethnicity, LAC, 2006-2011

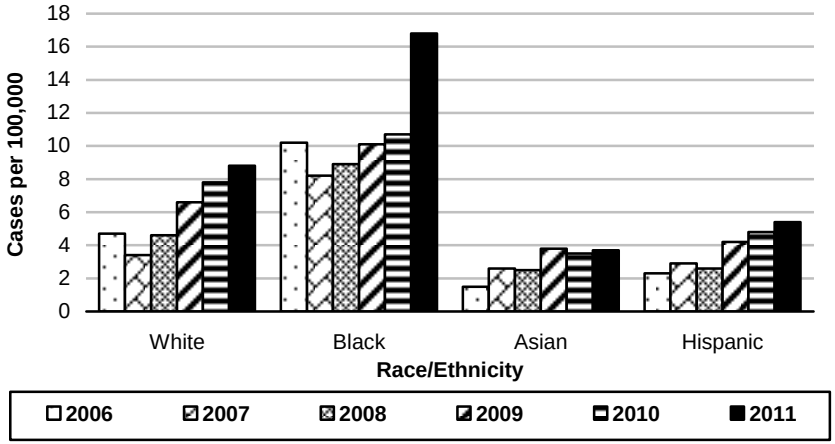
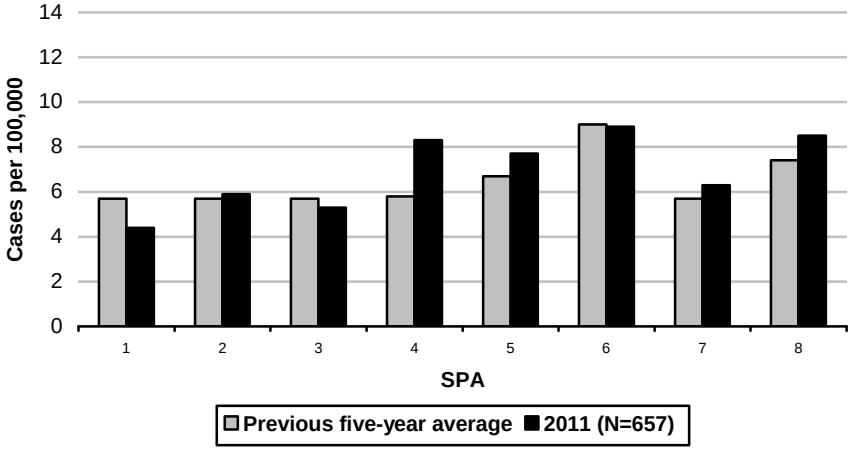


Figure 4. Annual Incidence Rates of Invasive Pneumococcal Disease by SPA, LAC, 2006-2011



* For 2006, 2007, 2008, 2009, 2010, and 2011, total numbers of cases (and percent with race-ethnicity missing) were 533 (35%), 624 (46%), 662 (45%), 785(32%), 576 (5%) and 657 (0%), respectively.

Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2006-2011

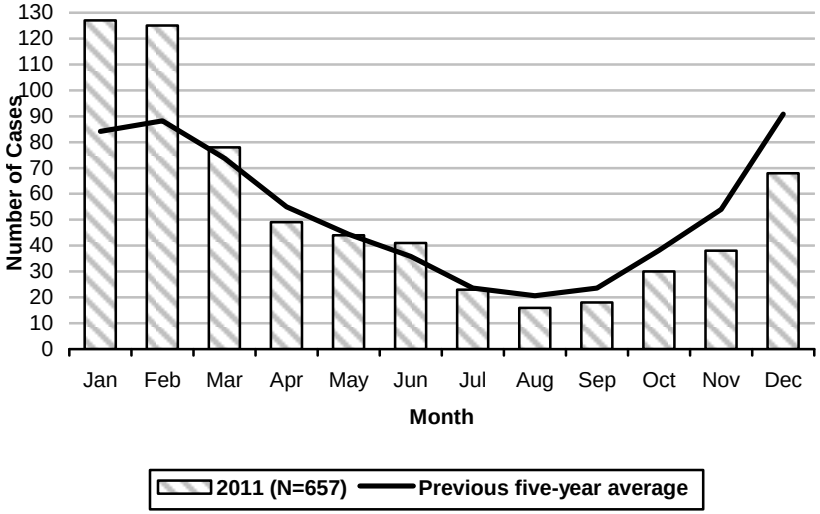
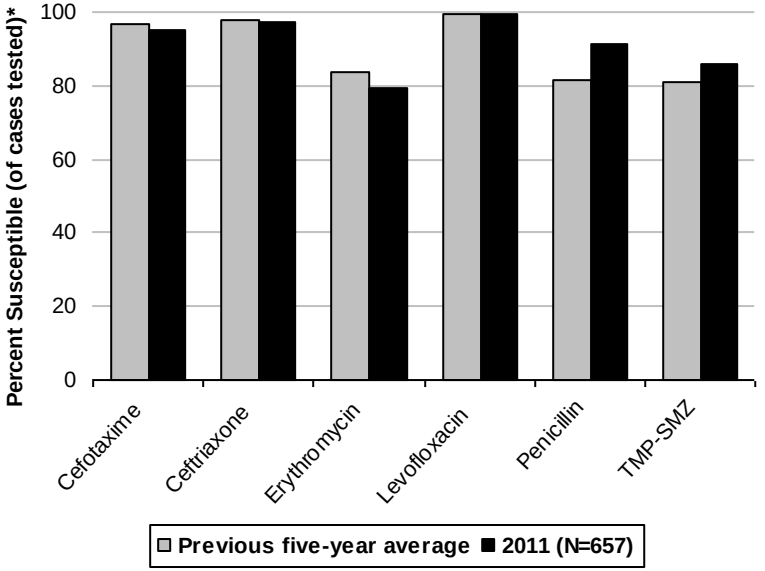
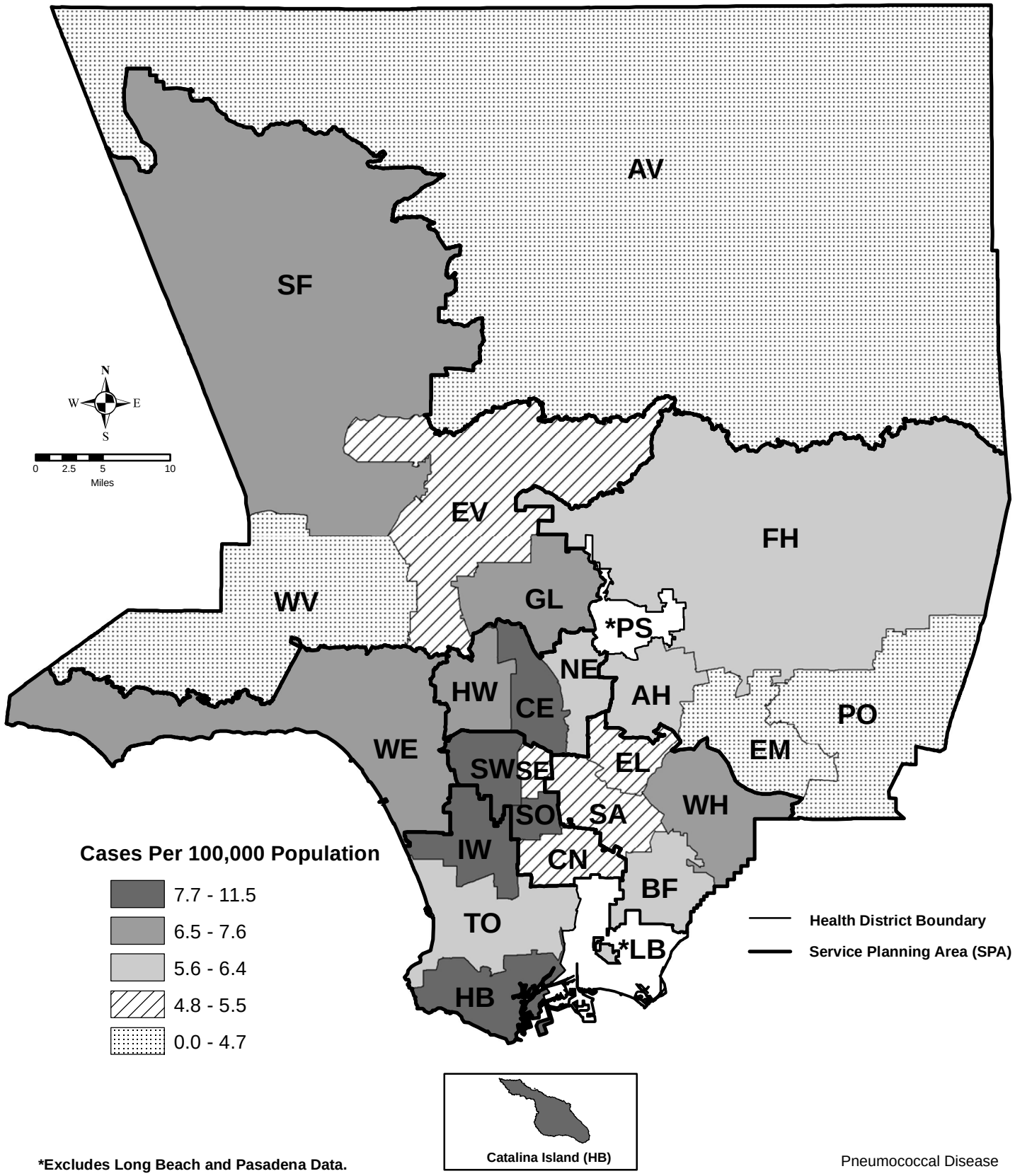


Figure 6. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2006-2011



*Range of number of isolates tested 2006-2011: Cefotaxime (297-389), Ceftriaxone (279-485), Erythromycin (268-455), Levofloxacin (261-394), Penicillin (486-667), and TMP-SMZ (149-330).

Map 12. Pneumococcal Disease, Invasive
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

SALMONELLOSIS

CRUDE DATA	
Number of Cases	900
Annual Incidence[a]	
LA County	9.2
California[b]	10.9
United States[b]	16.7
Age at Diagnosis	
Mean	30.1
Median	25
Range	<1 - 95

[a] Cases per 100,000 population.
[b] Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

DESCRIPTION

Salmonellosis is caused by the 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. Travel is also a factor.

Reptile-associated salmonellosis (RAS) increased from 6.2% (n=66) of non-outbreak related cases in 2010 to 8.8 % (n=77) in 2011. Among RAS cases, turtle related cases increased from 44% to 57%. LAC residents were part of a national outbreak related to small turtles. Interventions of an interdisciplinary RAS working group established in 2007 to address the issue continue. Interventions are described in the ACDC Special Reports 2009, and 2010. Interventions include:

- Development and launching of a *fotonovela* and readers theater to educate families of at-risk persons;
- Outreach activities to target groups and the general public to educate on the risk of RAS; and
- Targeted education programs to reach practitioners, educators, and stakeholders in at-risk areas.

2011 TRENDS AND HIGHLIGHTS

- There were four salmonellosis outbreaks investigated in 2011; three were foodborne. For more information see the Foodborne Outbreak summary in this ACDC Annual Morbidity Report 2011.
- SPA rates ranged from 6.4 (SPA 4) to 10.6 (SPA 5) (Figure 4). In 2010, SPA 2 had the highest rate.
- Twenty-three percent of cases were hospitalized for two or more days.
- There were eleven deaths in persons diagnosed with salmonellosis. Ages ranged from 29 to 89 years with a mean of 58 years. One elderly case had cardiac insufficiency and all other cases had chronic liver or kidney disease or cancer.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=1081)			2008 (N=1638)			2009 (N=1194)			2010 (N=1142)			2011 (N=900)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	99	9.2	66.9	89	5.4	63.7	89	7.5	64.9	56	4.9	40.1	61	6.8	43.7
1-4	183	16.9	31.7	613	37.4	108.	229	19.2	40.8	186	16.2	32.0	134	14.9	22.9
5-14	172	15.9	12.0	170	10.4	12.1	195	16.3	14.3	174	15.2	13.1	148	16.4	11.1
15-34	226	20.9	8.0	278	17.0	9.7	271	22.7	9.6	262	22.9	8.9	186	20.7	6.3
35-44	114	10.5	7.6	151	9.2	10.0	110	9.2	7.4	131	11.5	9.1	93	10.3	6.5
45-54	85	7.9	6.4	116	7.1	8.6	101	8.5	7.4	87	7.6	6.4	86	9.5	6.4
55-64	75	6.9	8.5	91	5.6	10.0	76	6.4	8.0	100	8.8	10.4	86	9.5	8.9
65+	124	11.5	12.3	127	7.8	12.4	123	10.3	11.6	146	12.8	13.8	106	11.8	10.0
Unknown	3	0.3		3	0.2					0					
Race/Ethnicity															
Asian	114	10.5	8.9	114	7.0	8.7	103	8.6	7.9	115	10.0	8.6	64	7.1	4.8
Black	64	5.9	7.5	77	4.7	9.0	75	6.3	8.8	50	4.4	5.9	53	5.9	6.2
Hispanic	539	49.9	11.6	1071	65.4	22.9	620	52.0	13.3	570	50.1	12.0	465	51.7	9.8
White	339	31.4	117.	326	19.9	11.2	367	30.7	12.6	387	33.9	13.5	279	31.0	9.7
Other	10	0.9	48.0	3	0.2	12.2	10	0.8		3	0.3		8	0.9	
Unknown	15	1.4		47	2.9		19	1.6		17	1.5		31	3.4	
SPA															
1	39	3.6	10.9	35	2.1	9.5	40	3.4	10.9	36	3.2	9.6	24	2.7	6.4
2	243	22.5	11.3	657	40.1	30.0	316	26.5	14.3	303	26.5	13.7	215	23.9	9.7
3	186	17.2	10.8	204	12.5	11.8	179	15.0	10.3	221	19.4	12.7	162	18.0	9.3
4	148	13.7	11.7	135	8.2	10.6	138	11.6	11.1	156	13.7	12.4	80	8.9	6.4
5	74	6.8	11.5	46	2.8	7.1	107	9.0	16.4	86	7.5	13.0	70	7.8	10.6
6	132	12.2	12.6	123	7.5	11.7	134	11.2	12.7	86	7.5	8.0	107	11.9	10.0
7	146	13.5	10.6	309	18.9	22.3	152	12.7	11.0	140	12.3	10.2	122	13.5	8.9
8	113	10.5	10.1	129	7.9	11.5	128	10.7	11.4	114	10.0	10.2	117	13.0	10.4
Unknown	0	0.0		0	0.0								3	0.33	

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

Figure 1. Reported Salmonellosis Rates by Year
LAC, CA and US, 2002-2011

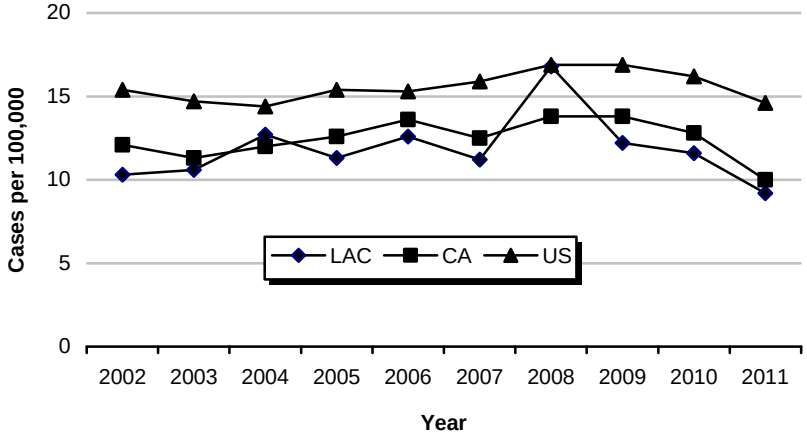


Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2011 (N=900)

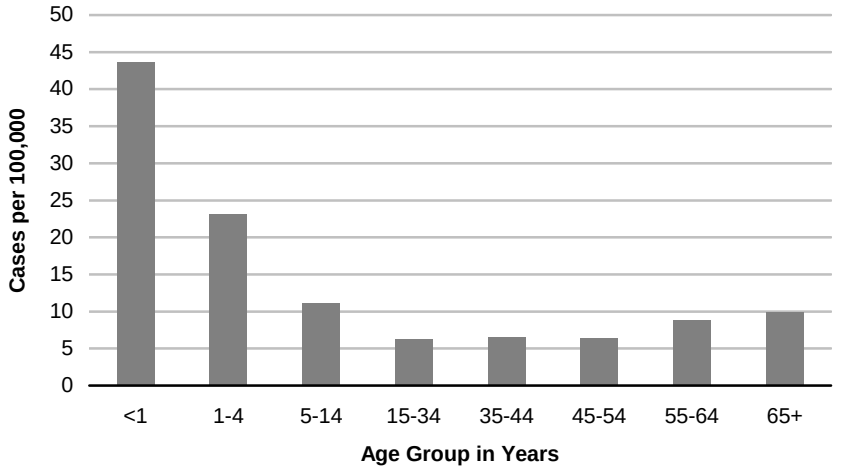


Figure 3. Reported Cases of Salmonellosis by Race/Ethnicity
LAC, 2011 (N=900)

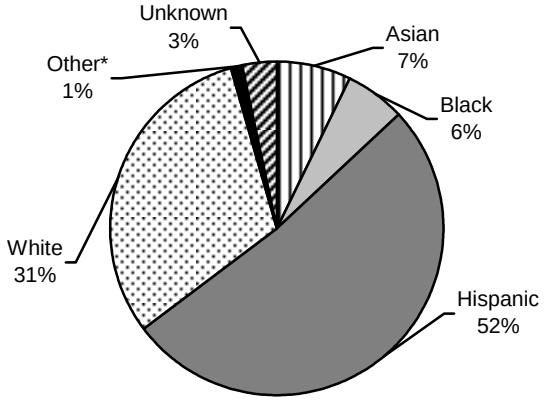
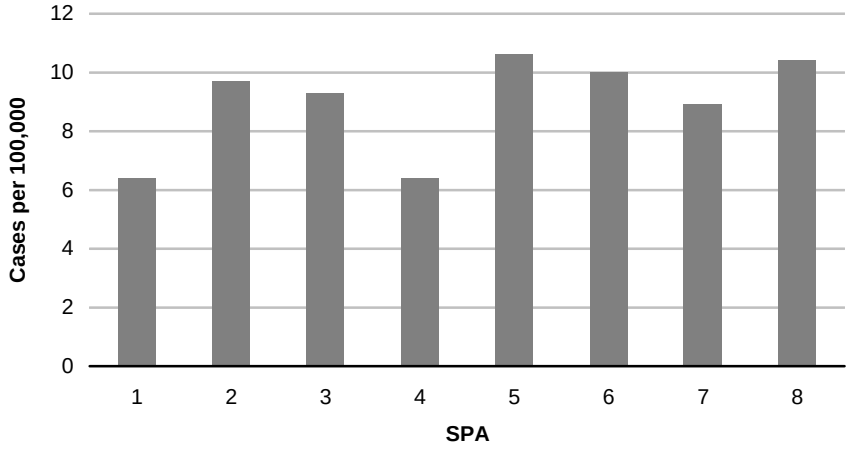
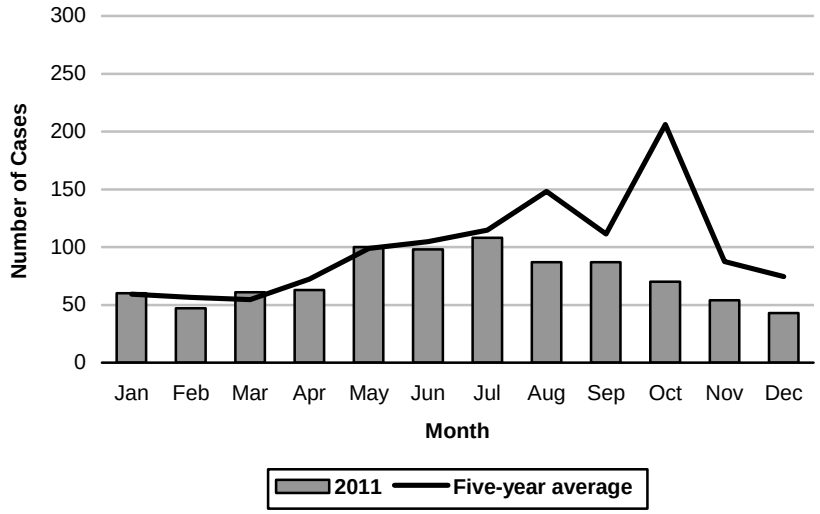


Figure 4. Reported Salmonellosis Rates by SPA
LAC, 2011 (N=900)

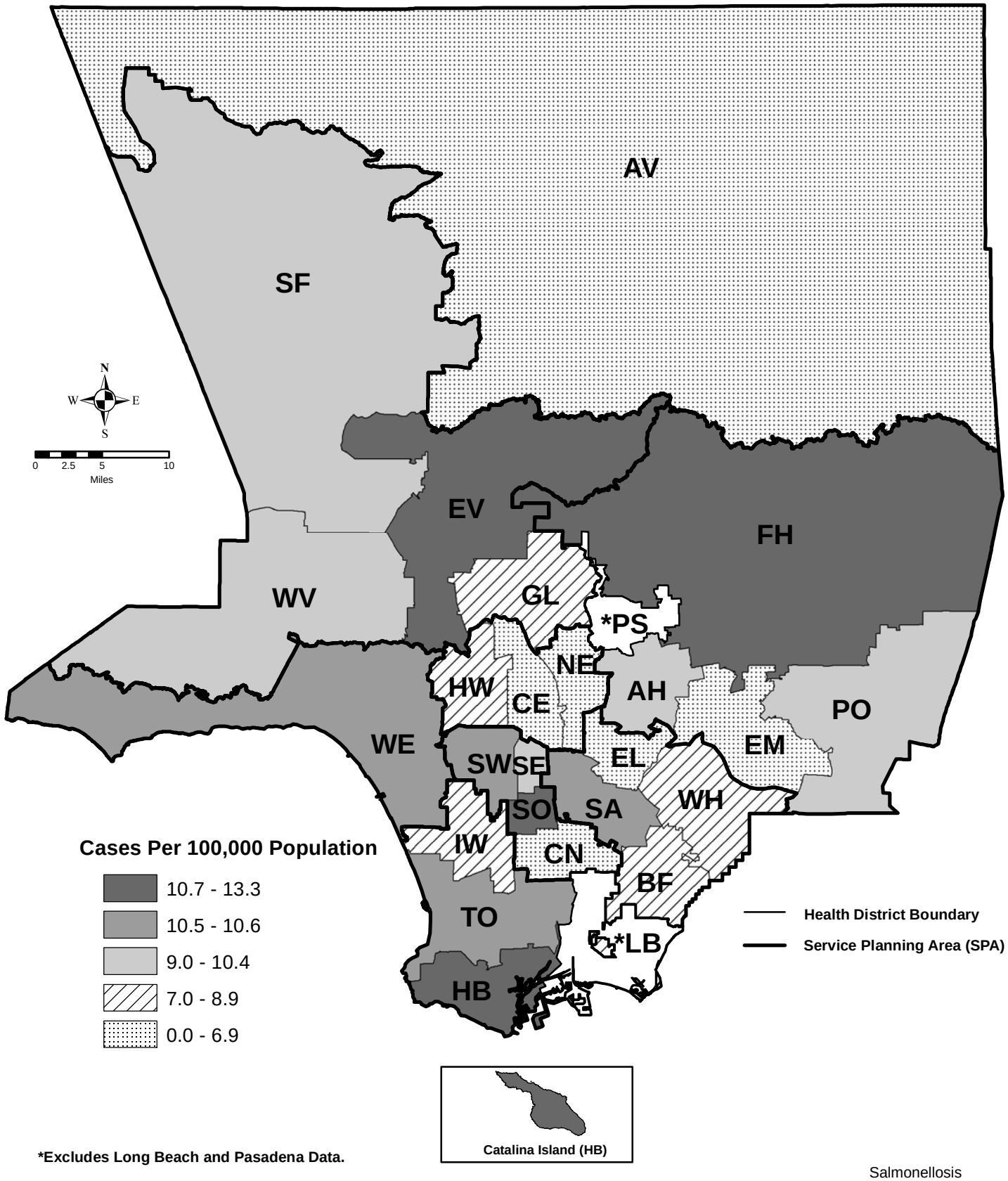


* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2011 (N=900)



Map 13. Salmonellosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	264
Annual Incidence[a]	
LA County	2.69
California[b]	2.44
United States[b]	4.32
Age at Diagnosis	
Mean	30
Median	30
Range	0-101

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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. 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 their stool specimen cultures are negative when tested in the LAC Public Health Laboratory.

2011 TRENDS AND HIGHLIGHTS

- There was a 26% decrease in reported cases in 2011 after a 37% increase in cases during 2010 (Figure 1). These decreases were observed among all races (Figure 6).
- The highest age group incidence rate was observed in the 1 to 4 years age group (5.2 per 100,000) (Figure 2) (not adjusted for race/ethnicity).
- The shigellosis rate in the 1 to 4 years age group in LAC this year has decrease when compared to the last four years (range: 5.2 versus 20.8 per 100,000).
- The incidence of shigellosis among the Hispanic population (56% of cases, 3.1 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 sustained the highest rate (6.5 per 100,000), followed by SPA 6 (3.6 per 100,000) (Figure 4).
- In 2011, the monthly incidence peaked in August, however the incidence during 2011 was below the five-year average, except for the early spring (Figure 5).
- Two shigellosis cases were part of an out-of-county outbreak involving a church group that traveled to Mexico.
- In 2011, the percentage of shigellosis cases hospitalized for at least two days has remained consistent from 14.7% (N=39) to 13.2% (N=47) in 2010. One death was reported among diagnosed shigellosis cases; the fatal case had other medical problems including congestive heart failure and diabetes, contributing to the death.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=463)			2008 (N=498)			2009 (N=259)			2010 (N=355)			2011 (N=264)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	13	2.8	8.8	8	1.6	5.7	4	1.5	2.9	1	1.1	0.7	4	1.5	2.9
1-4	100	21.6	17.3	118	23.7	20.8	34	13.1	6.1	79	22.2	13.6	30	11.3	5.2
5-14	90	19.4	6.3	137	27.5	9.8	47	18.1	3.4	68	19.1	5.1	37	14.0	2.8
15-34	104	22.5	3.7	122	24.5	4.3	67	25.9	2.4	75	21.1	2.5	80	30.3	2.7
35-44	67	14.5	4.5	42	8.4	2.8	51	19.7	3.4	63	17.7	4.4	41	15.5	2.8
45-54	43	9.3	3.3	26	5.2	1.9	33	12.7	2.4	36	10.1	2.7	44	16.6	3.3
55-64	20	4.3	2.3	23	4.6	2.5	12	4.6	1.3	17	4.7	1.8	15	5.6	1.6
65+	26	5.6	2.6	22	4.4	2.2	11	4.2	1.0	15	4.2	1.4	12	4.5	1.1
Unknown	0	0.0		0	0.0		0	0	0	0	0	0			
Race/Ethnicity															
Asian	26	5.6	2.0	10	2.0	0.8	6	2.3	0.5	15	4.2	1.1	4	1.5	0.3
Black	27	5.8	3.2	25	5.0	2.9	17	6.6	2.0	31	8.7	3.6	24	9.0	2.8
Hispanic	281	60.7	6.1	376	75.5	8.0	154	59.5	3.3	203	57.1	4.3	149	56.4	3.1
White	56	12.1	1.9	71	14.3	2.4	69	26.6	2.4	94	26.4	3.3	78	29.5	2.7
Other	4	0.9	19.2	3	0.6	12.2	0	0	0	0	0	0	0	0	0
Unknown	69	14.9		13	2.6		13	5.0	0	12	3.3	--	0	0	0
SPA															
1	10	2.2	2.8	11	2.2	3.0	5	1.9	1.9	3	0.8	0.8	7	2.6	1.9
2	93	20.1	4.3	89	17.9	4.1	46	17.7	2.1	61	17.2	2.8	40	15.1	1.8
3	72	15.6	4.2	66	13.3	3.8	23	8.9	1.3	33	9.2	1.9	32	12.1	1.8
4	87	18.8	6.9	71	14.3	5.6	74	28.6	5.9	91	25.6	7.2	82	31.0	6.51
5	29	6.3	4.5	23	4.6	3.6	22	8.5	3.4	30	8.4	4.5	14	5.3	2.1
6	80	17.3	7.7	109	21.9	10.3	41	15.8	3.9	58	16.3	5.4	38	14.3	3.6
7	64	13.8	4.6	93	18.7	6.7	33	12.7	2.4	54	15.2	3.9	24	9.1	1.7
8	28	6.0	2.5	34	6.8	3.0	14	5.4	1.2	25	7.0	2.2	26	9.8	2.3
Unknown	0	0.0		2	0.4		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 Shigellosis Rates by Year
LAC, CA and US, 2002-2011

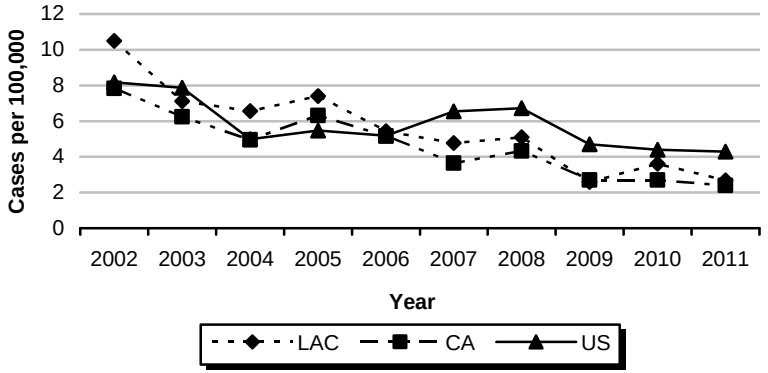


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2011 (N=264)

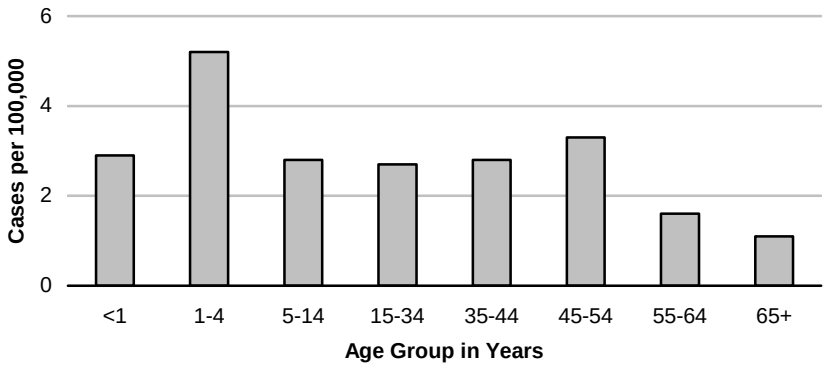


Figure 3. Percent Cases of Shigellosis by Race/Ethnicity
LAC, 2011 (N=264)

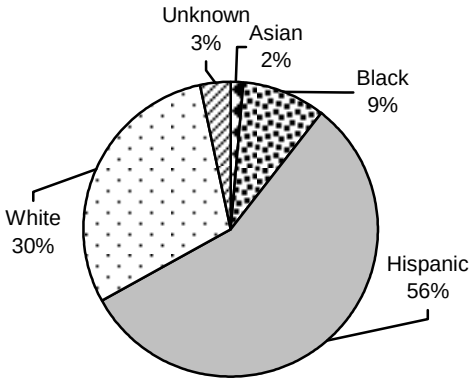


Figure 4. Reported Shigellosis Rates by SPA
LAC, 2011 (N=264)

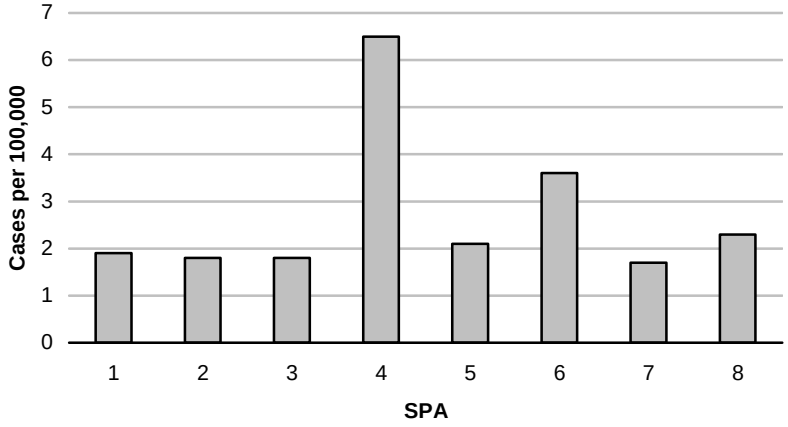


Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2011 (N=264)

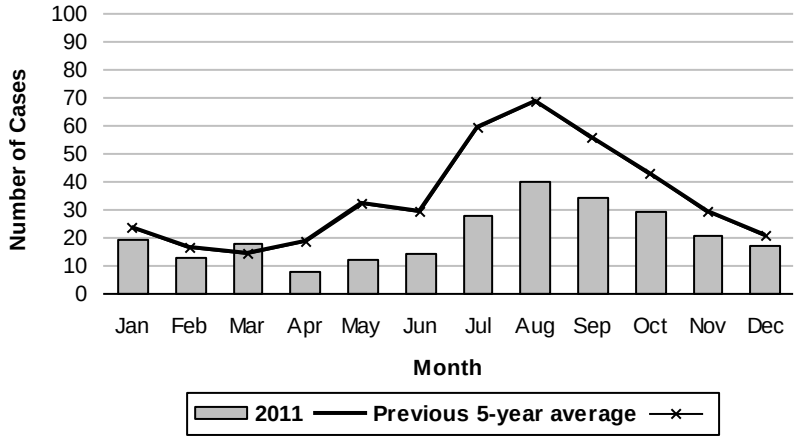
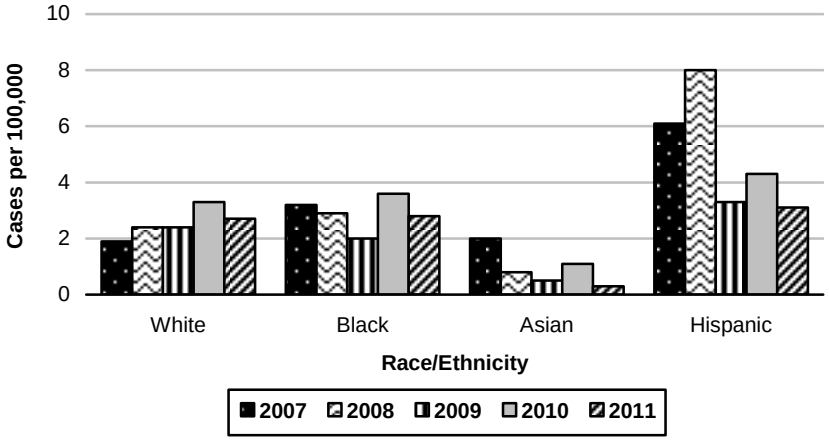
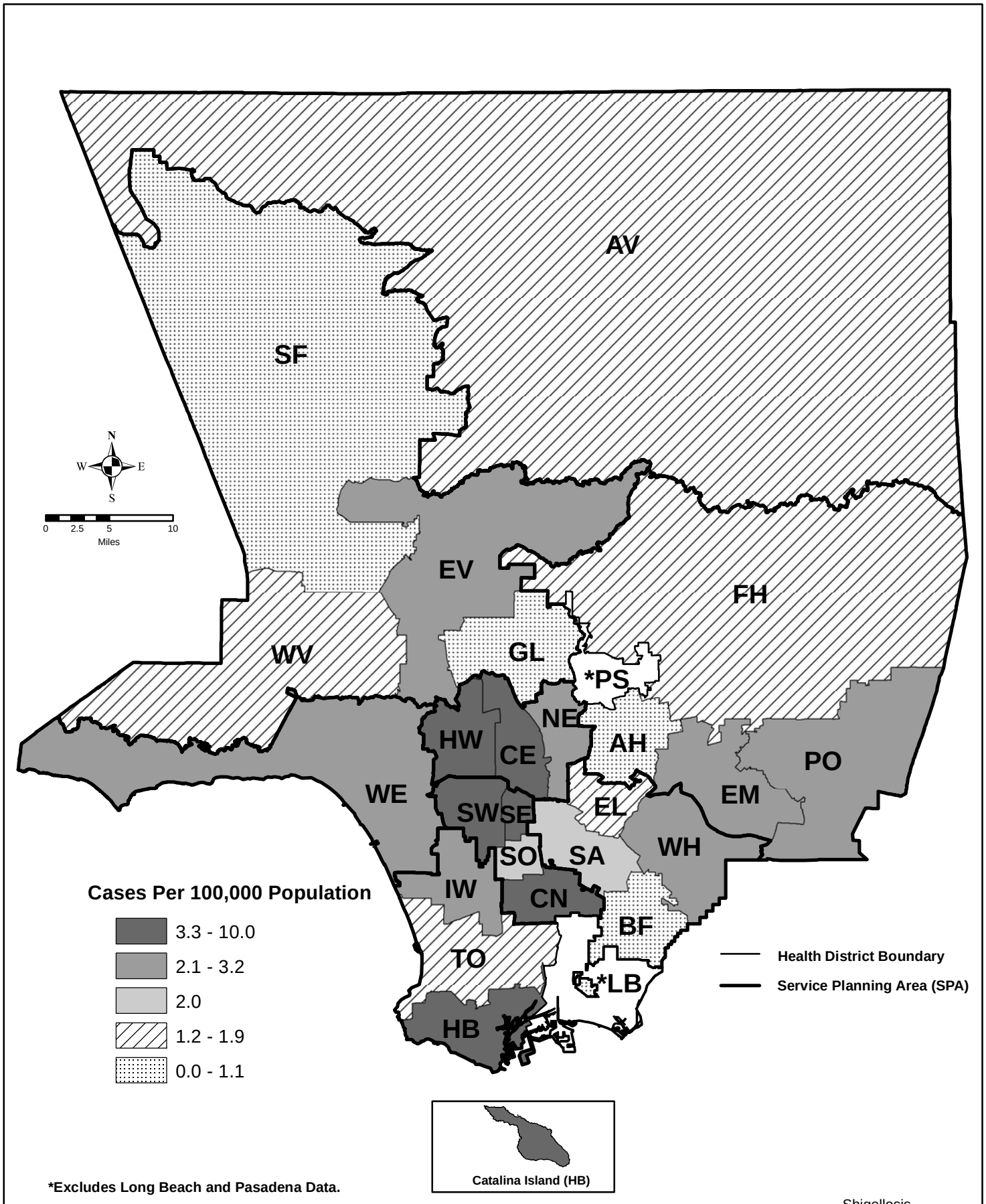


Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2007-2011



Map 14. Shigellosis
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

SEVERE *STAPHYLOCOCCUS AUREUS* INFECTION IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	44
Annual Incidence	
LA County[a]	0.45
California[b]	--
United States[c]	N/A
Age at Diagnosis	
Mean	53
Median	51
Range	12-96 years

[a]Cases per 100,000 population
[b]See Yearly Summary Reports of Selected General Communicable Diseases in California at: http://www.cdph.ca.gov/data/statistics/Pages/CD-YearlyTables.aspx
[c]Not notifiable.

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. 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) as a result of their infection with *S. aureus*. 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).

S.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).

2011 TRENDS AND HIGHLIGHTS

- Cases in the 65+ age group had the highest rate (1.2 per 100,000) followed by cases aged 55-64 years (0.8 per 100,000), there were no cases in the <1 and 1-4 year age groups for 2011 (Figure 1).
- The incidence rate of Hispanics in 2011 (0.4 per 100,000) increased four-fold compared to last year (0.1 per 100,000) (Figure 2).
- For 2011, incidence rates increased in five of eight SPAs compared with 2010, the highest incidence rate was in SPA 6 (1.0 per 100,000). (Figure 3).
- The percentage of *S. aureus* infections resistant to methicillin was 36% (Figure 5).
- Diabetes and being a current smoker were reported more than any other risk factors (Table 1).
- Severe *S. aureus* cases presented most often with bacteremia and pneumonia (Table 2).
- Thirty-two percent of cases were reported by just one hospital in LAC. Thus, underreporting of severe *S. aureus* infections in LAC is likely.

Reported Severe *Staphylococcus Aureus* Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2008-2011

	2007			2008 (N=25)			2009 (N=27)			2010 (N=28)			2011 (N=44)		
	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	1	4.0	0.7	0	0.0	0.0	1	4.0	0.7	0	0.0	0.0
1-4	N/A	N/A	N/A	0	0.0	0.0	1	3.7	0.2	0	0.0	0	0	0.0	0.0
5-14	N/A	N/A	N/A	2	8.0	0.1	2	7.4	0.1	3	10.7	0.2	2	4.5	0.2
15-34	N/A	N/A	N/A	1	4.0	0.0	5	18.5	0.2	6	21.4	0.2	6	13.6	0.2
35-44	N/A	N/A	N/A	2	8.0	0.1	3	11.1	0.1	3	10.7	0.2	6	13.6	0.4
45-54	N/A	N/A	N/A	7	28.0	0.5	6	22.2	0.4	7	25.0	0.5	9	20.4	0.7
55-64	N/A	N/A	N/A	4	16.0	0.4	4	14.8	0.4	3	10.7	0.3	8	18.2	0.8
65+	N/A	N/A	N/A	8	32.0	0.8	6	22.2	0.6	5	17.9	0.5	13	29.5	1.2
Unknown	N/A	N/A	N/A	0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	N/A	N/A	N/A	3	12.0	0.2	1	3.7	0.1	4	14.2	0.3	7	15.9	0.5
Black	N/A	N/A	N/A	4	16.0	0.5	3	11.1	0.4	4	14.2	0.5	3	6.8	0.4
Hispanic	N/A	N/A	N/A	5	20.0	0.1	12	44.4	0.3	7	25.0	0.1	17	38.6	0.4
White	N/A	N/A	N/A	13	52.0	0.4	11	40.7	0.4	13	46.4	0.5	15	34.1	0.5
Other	N/A	N/A	N/A	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	2.3	
Unknown	N/A	N/A	N/A	0	0.0		0	0.0		0	0.0		1	2.3	
SPA															
1	N/A	N/A	N/A	2	8.0	0.5	3	11.1	0.8	1	4.0	0.3	0	0.0	0.0
2	N/A	N/A	N/A	5	20.0	0.2	2	7.4	0.1	6	21.4	0.3	12	27.3	0.5
3	N/A	N/A	N/A	8	32.0	0.5	4	14.8	0.3	6	21.4	0.3	7	15.9	0.4
4	N/A	N/A	N/A	1	4.0	0.1	3	11.1	0.2	4	14.2	0.3	2	4.5	0.2
5	N/A	N/A	N/A	3	12.0	0.5	1	3.7	0.2	2	7.1	0.3	5	11.4	0.8
6	N/A	N/A	N/A	2	8.0	0.2	9	33.3	0.9	2	7.1	0.2	11	25.0	1.0
7	N/A	N/A	N/A	1	4.0	0.1	2	7.4	0.1	4	14.2	0.3	5	11.4	0.4
8	N/A	N/A	N/A	3	12.0	0.3	2	7.4	0.2	2	7.1	0.2	1	2.3	0.1
Unknown	N/A	N/A	N/A		0.0		1			1			1	2.3	

*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, 2010-2011

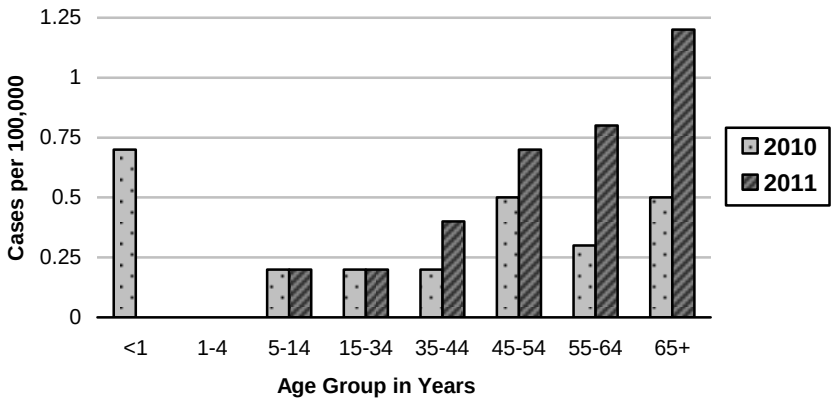


Figure 2. Severe *S. aureus* Infection Incidence Rates* by Race/Ethnicity LAC, 2010 -2011

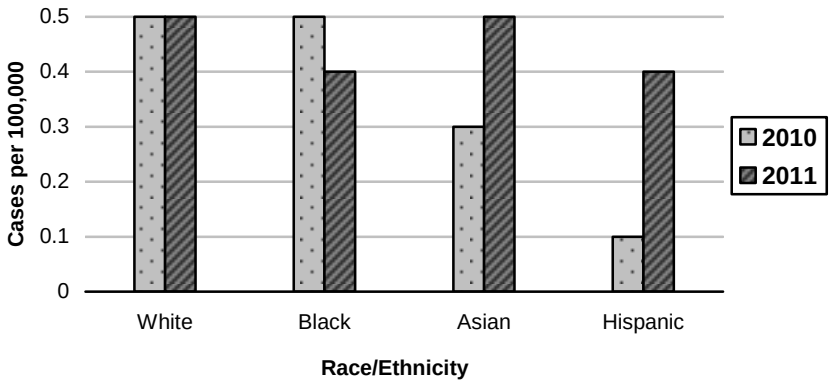


Figure 3. Incidence Rates* of Severe *S. aureus* Infection by SPA LAC, 2010-2011

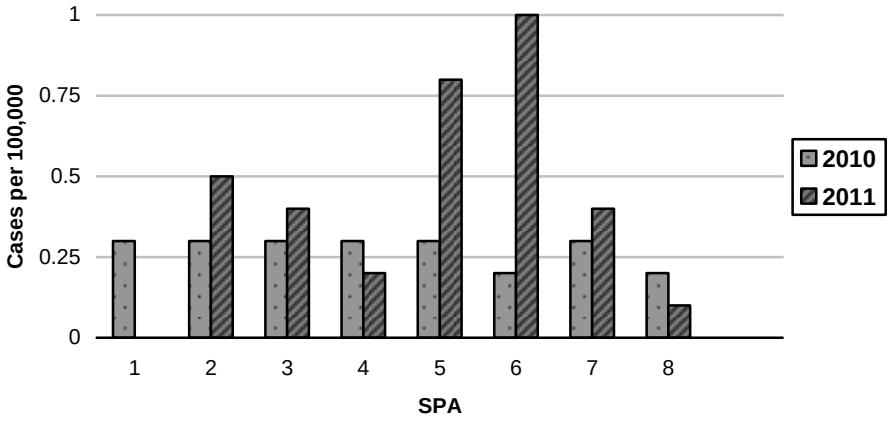
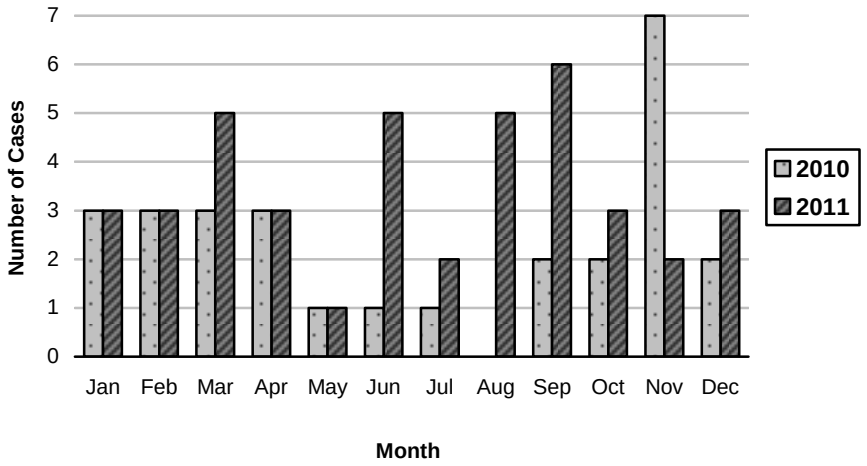
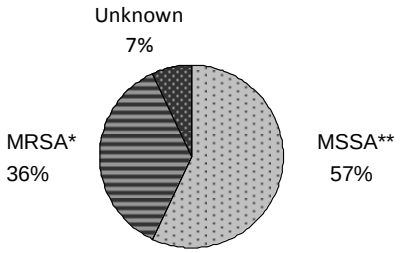


Figure 4. Reported Severe *S. aureus* Cases by Month of Onset LAC, 2010-2011



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

Figure 5. Percent Cases of Severe *S. aureus* Infection by Methicillin-Resistance Type LAC, 2011 (N=44)



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

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2011

Syndrome	Number	Percent*
Bacteremia (without focus)	26	59
Pneumonia	19	43
Septic emboli	5	11
Wound Infection	4	9
Skin Infection	3	7
Endocarditis	2	5
Osteomyelitis	1	2
Meningitis	1	2
Other	7	16

*Overlapping syndromes will total over 100%.

Table 1. Severe *S. aureus* Risk Factors by Date of Onset, 2010-2011

	2010 N = 28	2011 N = 44
	%*	%*
Diabetes	32	32
Current Smoker	4	16
Intravenous Drug Use	4	11
Heart Failure/CHF	0	9
Liver Disease	14	9
Alcohol Abuse	4	9
Asthma	4	9
Emphysema	0	7
Malignancy	0	5
HIV/AIDS	4	2
Chronic Renal Insufficiency	0	2
Other Skin Condition	4	0
Other	29	39
None	39	18

*Overlapping risk factors will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	175
Annual Incidence[a]	
LA County	1.78
California[b]	N/A
United States[c]	--
Age at Diagnosis	
Mean	51
Median	53
Range	0–96 years

[a]Cases per 100,000 population.
[b]Not notifiable.
[c]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

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 occurs 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 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.

2011 TRENDS AND HIGHLIGHTS

- The incidence rate of reported IGAS was 1.78 per 100,000 during 2011, slightly lower than the previous year (2010) but slightly higher than the previous five-year average (Figure 1).
- Cases aged 65 years and older had the highest rate of IGAS (4.3 per 100,000) followed by cases aged 55 to 64 years (3.7 per 100,000) (Figure 2). The age group <1 years had the largest decrease in incidence rate relative to 2010: 2.9 per 100,000 in 2010 to 0.7 per 100,000 in 2011.
- Blacks continued to have the highest rate of IGAS although the rate in 2011 is lower relative to three recent years (2007, 2008, and 2010). Rates of all race/ethnicities in 2011 are lower compared to 2010 except Hispanics. In 2011 Hispanics had a higher rate of disease compared to the previous 4 years (2006-2010) (Figure 3).
- SPA 4 and 8 both had the highest incidence rate at 2.5 cases per 100,000 (Figure 4). SPA 8 had the largest increased incidence rate compared to 2010, 1.2 per 100,000 in 2010 and 2.5 per 100,000 in 2011.
- In 2011, the number of reported cases peaked in February with 29 cases, closely followed by 26 cases in March. August, September and November had the lowest number of reported cases, with eight cases. The number of reported cases throughout the year was lower overall than the previous five-year average (Figure 5).
- IGAS cases presented most often with bacteremia and cellulitis, the same as 2010 (Table 1).
- Diabetes was reported more than any other risk factor followed by chronic heart disease and history of blunt trauma. A large percentage of cases (55%) 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, 2007-2011

	2007 (N=173)			2008 (N=156)			2009 (N=129)			2010 (N=191)			2011 (N=175)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	3	1.7	2.0	2	1.3	1.4	1	0.8	0.7	4	2.1	2.9	1	0.6	0.7
1-4	6	3.5	1.0	6	3.8	1.1	3	2.3	0.5	6	3.1	1.0	6	3.4	1.0
5-14	8	4.6	0.6	14	9.0	1.0	9	7.0	0.7	6	3.1	0.5	10	5.7	0.8
15-34	20	11.6	0.7	24	15.4	0.8	15	11.6	0.5	33	17.3	1.1	16	9.1	0.5
35-44	18	10.4	1.2	22	14.1	1.5	14	10.9	0.9	21	11.0	1.5	28	16.0	1.9
45-54	33	19.1	2.5	13	8.3	1.0	29	22.5	2.1	34	17.8	2.5	32	18.3	2.4
55-64	29	16.8	3.3	27	17.3	3.0	23	17.8	2.4	29	15.2	3.0	36	20.6	3.7
65+	56	32.4	5.5	48	30.8	4.7	35	27.1	3.3	58	30.4	5.5	46	26.3	4.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	11	6.4	0.9	14	8.3	1.1	10	7.8	0.8	16	8.4	1.2	13	7.4	1.0
Black	34	19.7	4.0	30	17.8	3.5	16	12.4	1.9	25	13.1	2.9	22	12.6	2.6
Hispanic	49	28.3	1.1	50	29.6	1.1	43	33.3	0.9	52	27.2	1.1	49	28.0	1.0
White	52	30.1	1.8	49	29.0	1.7	40	31.0	1.4	53	27.7	1.8	45	25.7	1.6
Other	4	2.3	19.2	0	0.0	0.0	1	0.8	3.9	3	1.6	11.6	0	0.0	0.0
Unknown	23	13.3		26	15.4		19	14.7		42	22.0		46	26.3	
SPA															
1	5	2.9	1.4	4	2.6	1.1	3	2.3	0.8	2	1.0	0.5	3	1.7	0.8
2	43	24.9	2.0	35	22.4	1.6	22	17.1	1.0	34	17.8	1.5	34	19.4	1.5
3	20	11.6	1.2	19	12.2	1.1	17	13.2	1.0	30	15.7	1.7	22	12.6	1.3
4	15	8.7	1.2	24	15.4	1.9	9	7.0	0.7	38	19.9	3.0	31	17.7	2.5
5	15	8.7	2.3	17	10.9	2.6	6	4.7	0.9	12	6.3	1.8	14	8.0	2.1
6	35	20.2	3.3	14	9.0	1.3	14	10.9	1.3	29	15.2	2.7	22	12.6	2.1
7	18	10.4	1.3	15	9.6	1.1	16	12.4	1.2	12	6.3	0.9	20	11.4	1.5
8	17	9.8	1.5	22	14.1	2.0	12	9.3	1.1	13	6.8	1.2	28	16.0	2.5
Unknown	5	2.9		6	3.8		30	23.3					1	0.57	

*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, 2000-2011

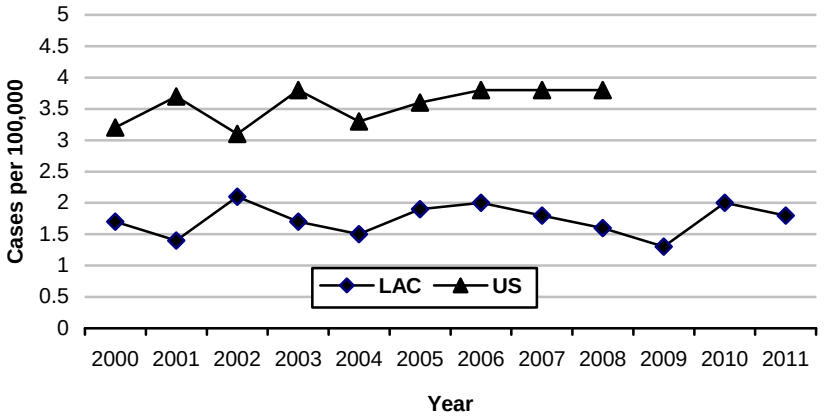
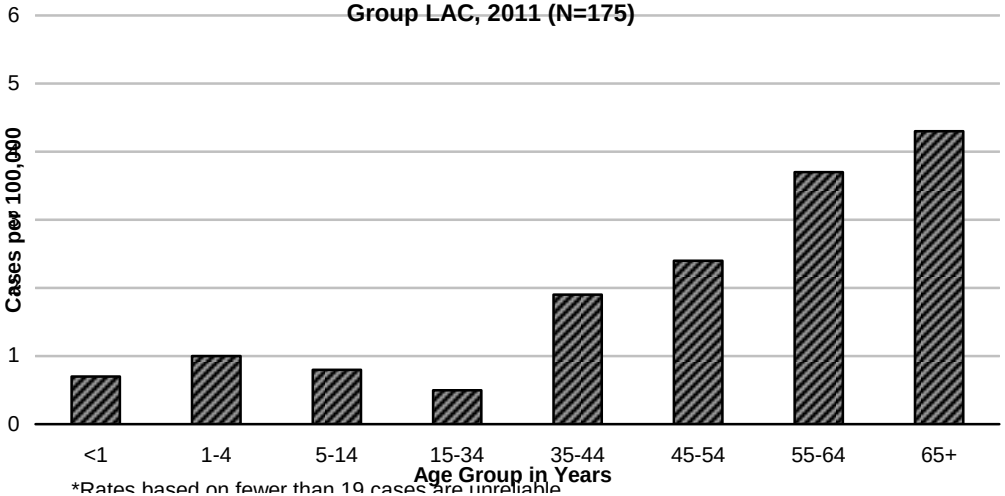
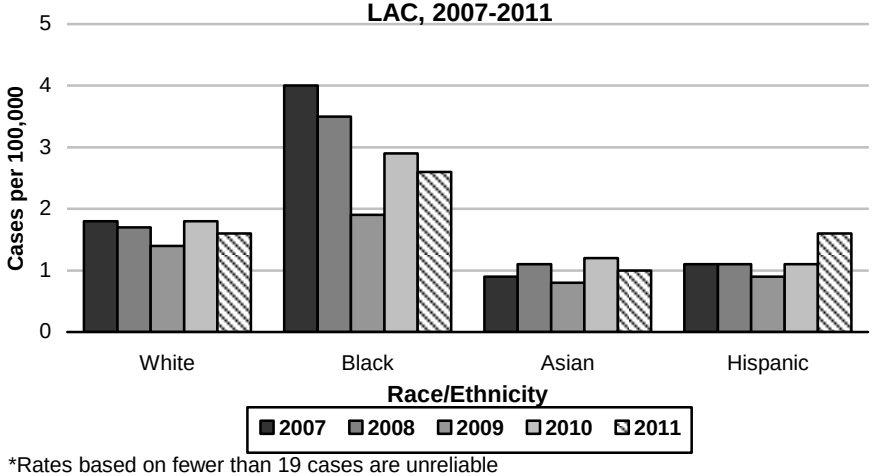


Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2011 (N=175)



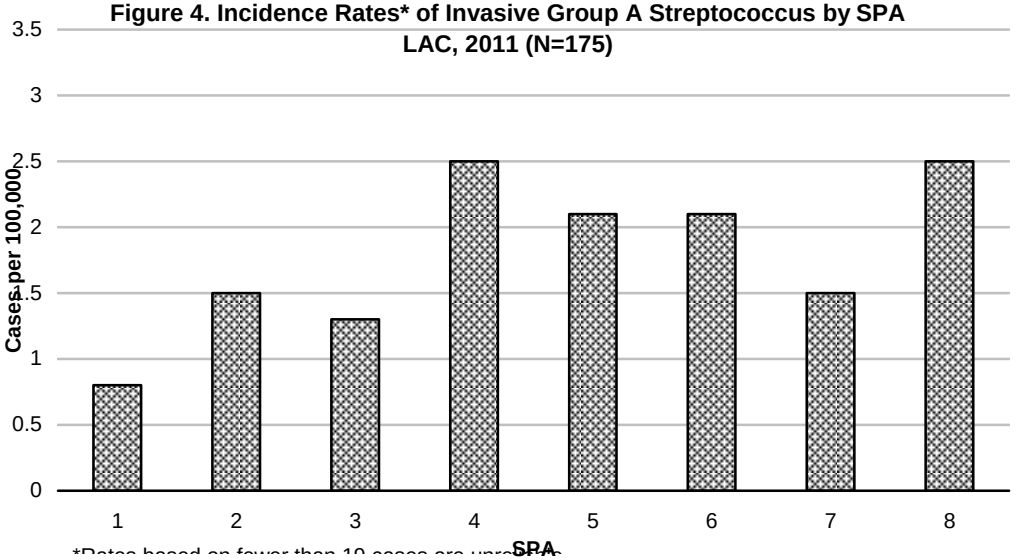
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence Rates* by Race/Ethnicity LAC, 2007-2011



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates* of Invasive Group A Streptococcus by SPA LAC, 2011 (N=175)



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2011 (N=175)

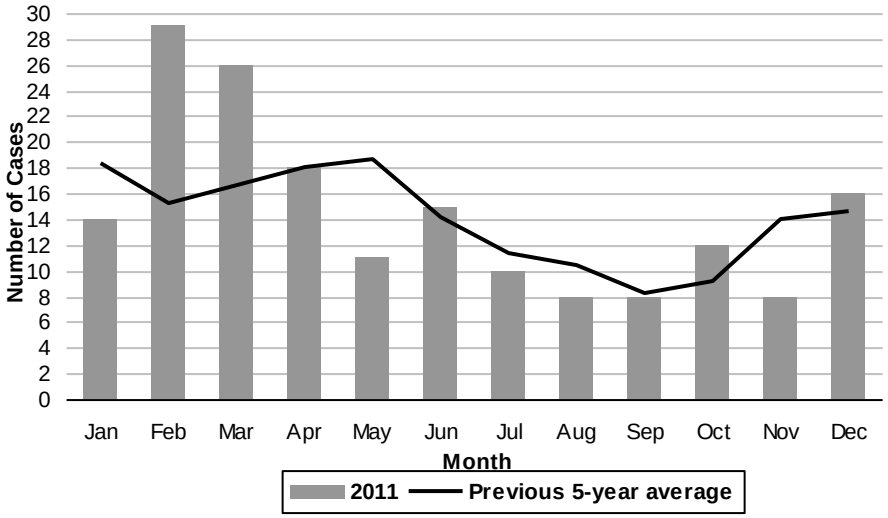


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2011 (N=175)

Syndrome	Number	Percent*
Cellulitis	118	67
Bacteremia (without focus)	99	57
Pneumonia	55	31
STSS	5	3
Non-Surgical Wound Infection	31	18
Necrotizing Fasciitis	33	19
Other	78	45

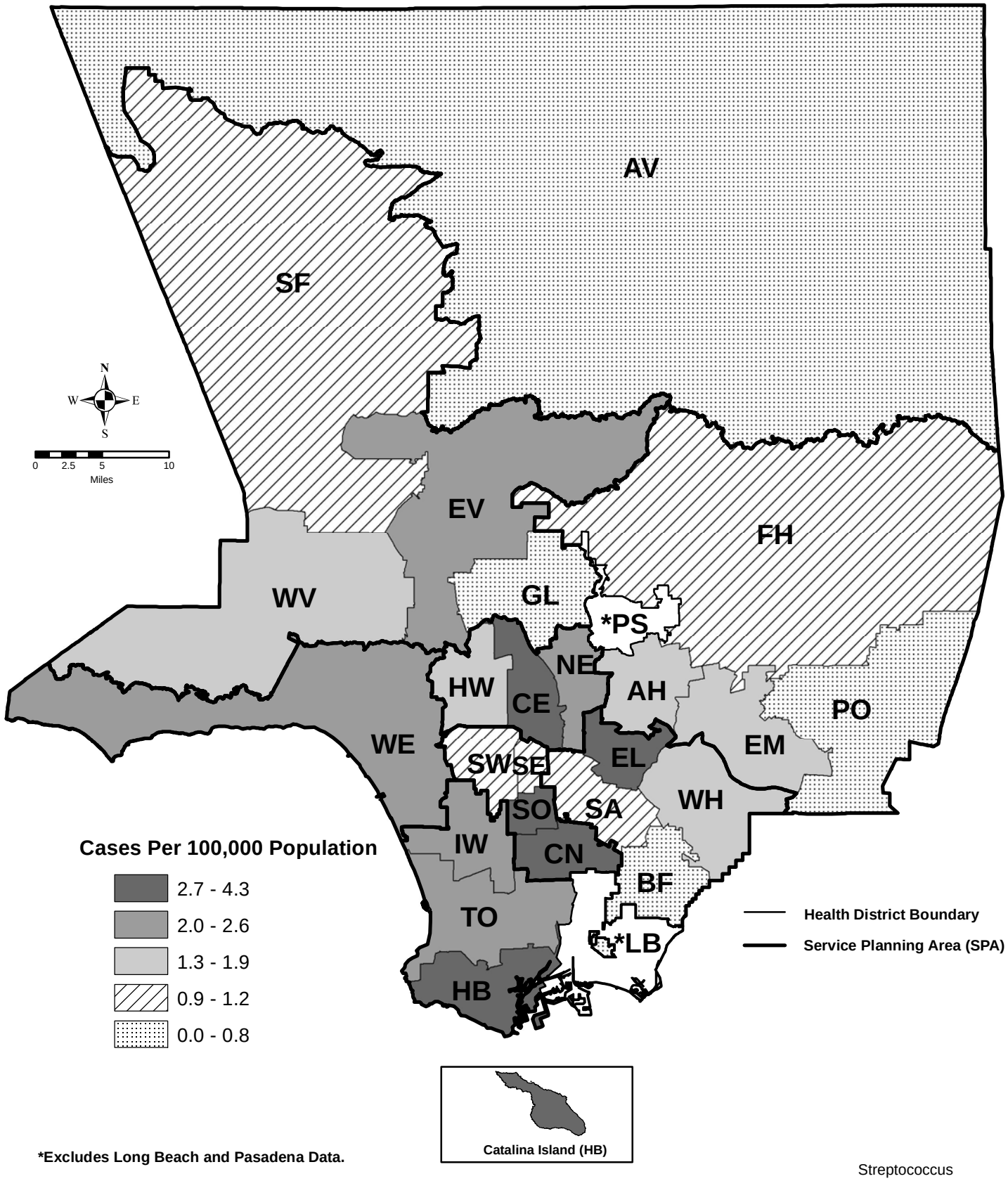
*Overlapping syndromes will total over 100%.
**Cases with unknown symptoms excluded.

Table 2. Percentage of IGAS Risk Factors – Based on Date of Onset Between 1/1/09-12/31/2011

Risk Factors*	2009 (N=113)	2010 (N = 191)	2011 (N =175)
	%**	%**	%**
Alcohol Abuse	16	6	16
Chronic Heart Disease	12	12	23
Chronic Lung Disease	4	6	12
Cirrhosis	3	4	8
Diabetes	33	23	45
History of Blunt Trauma	8	10	33
HIV/AIDS	2	1	6
IV Drug Use	3	3	5
Malignancy	10	5	14
Other	17	26	41
None	30	30	55

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

Map 15. Streptococcus, Group A Invasive Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

TYPHOID FEVER, ACUTE AND CARRIER

ACUTE TYPHOID CRUDE DATA	
Number of Cases	15
Annual Incidence[a]	
LA County[b]	0.15
California[c]	0.26
United States[c]	0.13
Age at Diagnosis	
Mean	35.4
Median	34
Range	0-69

[a]Cases per 100,000 population.
[b]Rates based on less than 19 observations are considered unreliable.
[c]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 from close exposure to a typhoid carrier in the house or travel to developing 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 direct or intimate contact with others is important in preventing the spread of typhoid. When traveling to locations where sanitary practices are uncertain, foods should be thoroughly cooked; bottled water should be used for drinking, brushing teeth, and making ice. Vaccination should be considered when traveling in endemic areas. Los Angeles County (LAC) Department of Public Health (DPH) screens 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 such isolation order and offers the case the chance to clear the infection with antibiotics.

2011 TRENDS AND HIGHLIGHTS

- The LAC rate for acute typhoid fever cases is comparable to the US rate (Figure 1).
- In 2011, Hispanics had the highest percentage of acute cases, however, in previous years this disease was most prevalent among the Asian population (Figure 3).
- Service Planning Areas (SPAs) 2 and 4 had the highest number of acute cases (Figure 4). Cases were reported in all SPAs except SPA 3.
- Typically, most cases occur in the summer, however, in 2011 cases were also observed in early spring and fall (Figure 5).
- Three new chronic carriers were identified. They were added to the state typhoid registry to be monitored by LAC semi-annually until cleared of infection (Figure 6).

Reported Acute Typhoid Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=17)			2008 (N=14)			2009 (N=17)			2010 (N=15)			2011 (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		1	6.6	
1-4	0	0.0		1	7.1		0	0		3	20.0		0	0	
5-14	1	5.9		5	35.7		3	17.6		4	26.6		1	6.6	
15-34	10	58.8		5	35.7		6	35.2		5	33.3		6	40.0	
35-44	0	0.0		1	7.1		3	17.6		1	6.6		2	13.3	
45-54	2	11.8		0	0.0		4	23.5		1	6.6		3	20.0	
55-64	3	17.6		1	7.1		1	5.8		1	6.6		1	6.6	
65+	1	5.9		1	7.1		0	0		0	0		1	6.6	
Unknown	0	0.0		0	0.0		0	0		0	0		0	0	
Race/Ethnicity															
Asian	9	52.9		8	57.1		9	52.9		11	73.3		7	46.6	
Black	0	0.0		0	0.0		0	0		0	0		0	0	
Hispanic	7	41.2		5	35.7		8	47.0		3	20		8	53.3	
White	1	5.9		1	7.1		0	0		1	0		0	0	
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	2	11.8		0	0.0		0	0		1	6.6		1	6.6	
2	6	35.3		5	35.7		4	23.5		6	40		4	26.6	
3	4	23.5		3	21.4		3	17.6		2	13.3		0	0	
4	1	5.9		3	21.4		2	11.7		2	13.3		4	26.6	
5	0	0.0		0	0.0		3	17.6		1	6.6		3	20.0	
6	2	11.8		1	7.1		2	11.7		2	13.3		1	6.6	
7	1	5.9		2	14.3		0	0		1	6.6		1	6.6	
8	1	5.9		0	0.0		3	17.6		3	20.0		1	6.6	
Unknown	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, 2007-2011

	2007 (N=1)			2008 (N=4)			2009 (N=1)			2010 (N=4)			2011 (N=3)		
	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	0	0.0		0	0.0		0	0		0	0		0	0	
5-14	0	0.0		0	0.0		1	100		0	0		0	0	
15-34	0	0.0		1	25.0		0	0		0	0		0	0	
35-44	0	0.0		2	50.0		0	0		2	50.0		1	33.3	
45-54	1	100.		0	0.0		0	0		0	0		1	33.3	
55-64	0	0.0		0	0.0		0	0		2	50.0		1	33.3	
65+	0	0.0		1	25.0		0	0		0	0		0	0	
Unknown	0	0.0		0	0.0		0	0		0	0		0	0	
Race/Ethnicity															
Asian	0	0.0		1	25.0		0	0		2	50.0		0	0	
Black	0	0.0		0	0.0		0	0		0	0		0	0	
Hispanic	1	100.		3	75.0		1	100		2	50.0		3	33.3	
White	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	
Unknown	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	
2	1	100.		1	25.0		0	0		0	0		0	0	
3	0	0.0		1	25.0		0	0		1	0		0	0	
4	0	0.0		2	50.0		0	0		0	0		1	33.3	
5	0	0.0		0	0.0		0	0		2	0		0	0	
6	0	0.0		0	0.0		0	0		1	0		1	33.3	
7	0	0.0		0	0.0		0	0		0	0		0	0	
8	0	0.0		0	0.0		1	100		0	100		1	33.3	
Unknown	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 Year of Onset of Acute Typhoid Fever LAC and US, 2002-2011

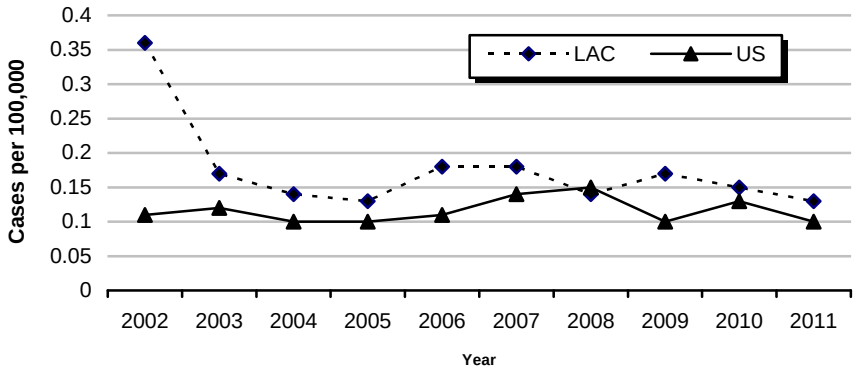


Figure 2. Acute Typhoid Fever Cases by Age Group LAC, 2011 (N=15)

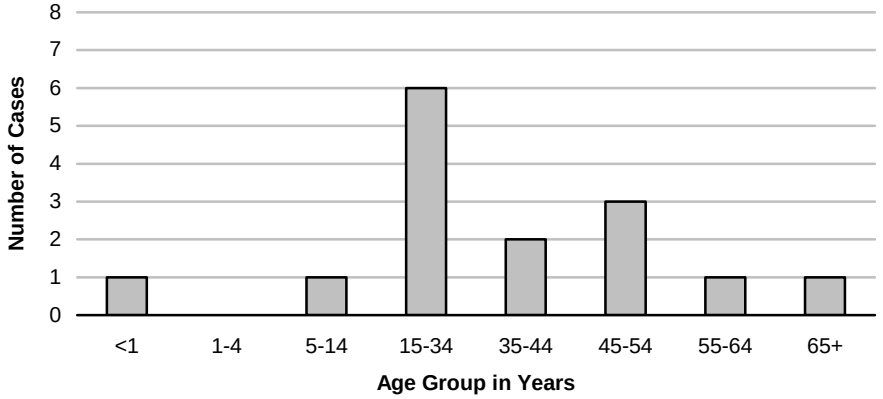


Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity LAC, 2011 (N=15)

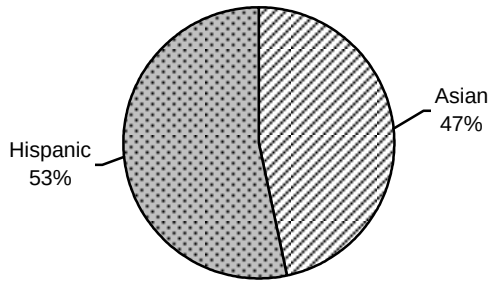


Figure 4. Reported Acute Typhoid Fever Cases by SPA LAC, 2011 (N=15)

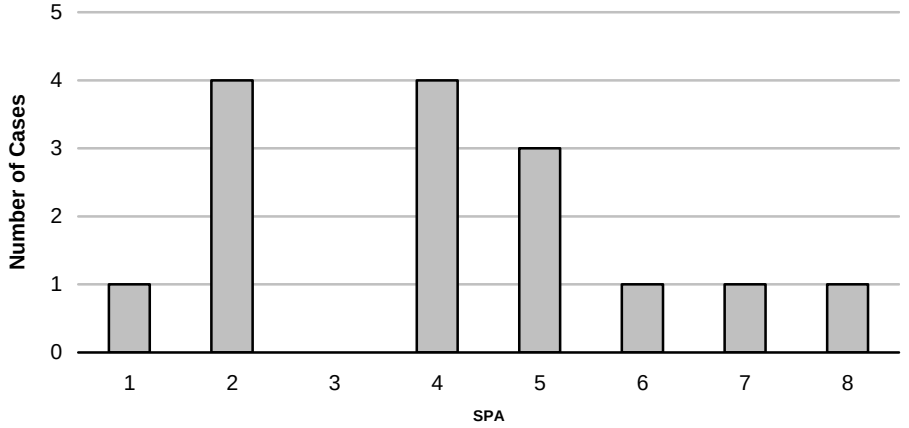


**Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2011 (N=15)**

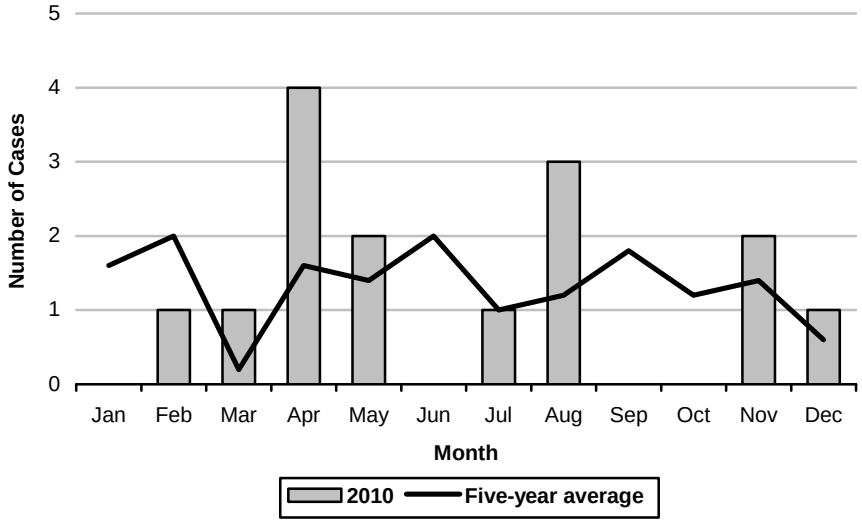
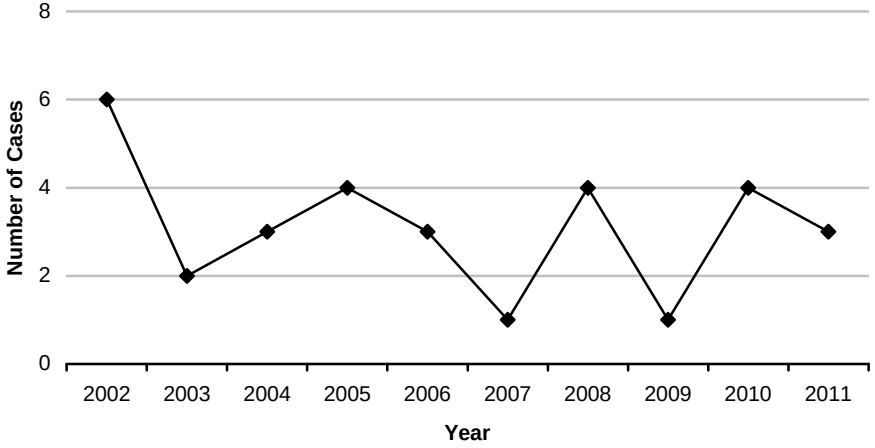


**Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 2002-2011**



TYPHUS FEVER

CRUDE DATA	
Number of Cases	38
Annual Incidence[a]	
LA County	0.39
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	47.6
Median	52
Range	2-77

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

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, opossums, and feral cats. 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 is not vaccine preventable, but can be treated with antibiotics.

Because typhus fever is not a nationally reportable disease, there is no national case definition. In Southern California, a workgroup 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 are considered 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.

2011 TRENDS AND HIGHLIGHTS

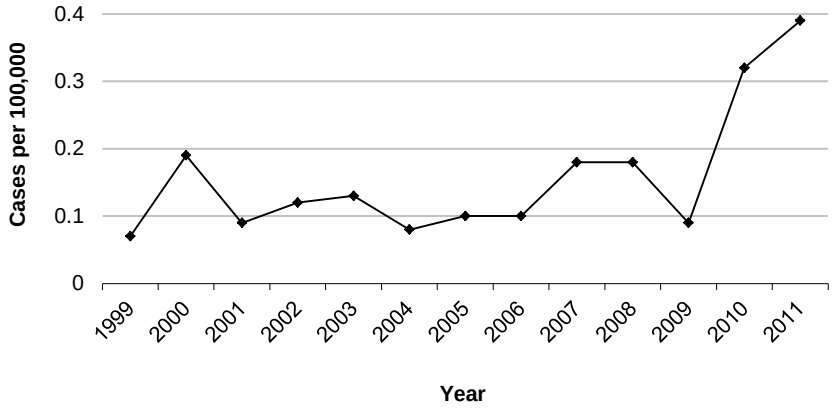
- LAC continues to document record numbers of typhus fever. There were 38 cases (0.39 per 100,000) in 2011, up from the previous recent record of 31 cases (0.32 per 100,000) in 2010 (Figure 1).
- The incidence of typhus continued to be highest in SPA 5 at 0.8 per 100,000 (Figure 3). Typhus cases resided in all eight SPAs with the exception of 1 and 6, indicating that typhus has established itself in new areas where it has not been usually seen for decades.
- Most typhus cases had symptom onsets within the summer through winter, with cases being documented in 9 of 12 months (Figure 4). Physicians and residents should assume that there is risk of typhus infection throughout the entire year in LAC.
- Most cases report an exposure to fleas and animals, and particularly to owning a pet dog or cat (n=27, 71%) (Table 1).
- The increase in cases may be due to a number of factors including the relocation of host animals (possums and feral cats) to regions not previously enzootic for typhus; changes in weather that favor flea survival; increased testing and reporting due to better educated physicians; and increase reporting to public health department by electronic laboratory reporting.

Reported Typhus Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=17)			2008 (N=18)			2009 (N=9)			2010 (N=31)			2011 (N=38)		
	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	
1-4	1	5.9		0	0.0		0	0		0	0.0		1	2.6	
5-14	1	5.9		3	16.7		2	0.2		3	9.7		3	7.9	
15-34	3	17.6		3	16.7		1	0.1		4	12.9		5	13.2	
35-44	3	17.6		4	22.2		0	0		7	22.6		5	13.2	
45-54	6	35.3		4	22.2		4	0.4		5	16.1		9	23.7	
55-64	2	11.8		3	16.7		2	0.2		10	32.3		9	23.7	
65+	1	5.9		1	5.6		0	0		2	6.5		6	15.8	
Unknown	0	0.0		0	0.0		0	0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	5.9		1	5.6		1	0.1		2	6.5		1	2.6	
Black	0	0.0		0	0.0		0	0		2	6.5		2	5.3	
Hispanic	1	5.9		5	27.8		1	0.1		10	32.3		9	23.7	
White	13	76.5		12	66.7		7	0.7		14	45.2		23	60.5	0.8
Other	0	0.0		0	0.0		0	0		0	0.0		0	0.0	
Unknown	2	11.8		0	0.0		0	0		3	9.7		3	7.9	
SPA															
1	0	0.0		0	0.0		0	0		0	0.0		0	0.0	
2	2	11.8		2	11.1		1	0.1		5	16.1		9	23.7	
3	8	47.1		9	50.0		5	0.6		9	29.0		13	34.2	
4	1	5.9		1	5.6		3	0.3		5	16.1		5	13.2	
5	4	23.5		3	16.7		0	0		6	19.4		5	13.2	
6	0	0.0		1	5.6		0	0		4	12.9		0	0.0	
7	1	5.9		2	11.1		0	0		0	0.0		5	13.2	
8	1	5.9		0	0.0		0	0		2	6.5		1	2.6	
Unknown	0	0.0		0	0.0		0	0		0	0.0		0	0.0	

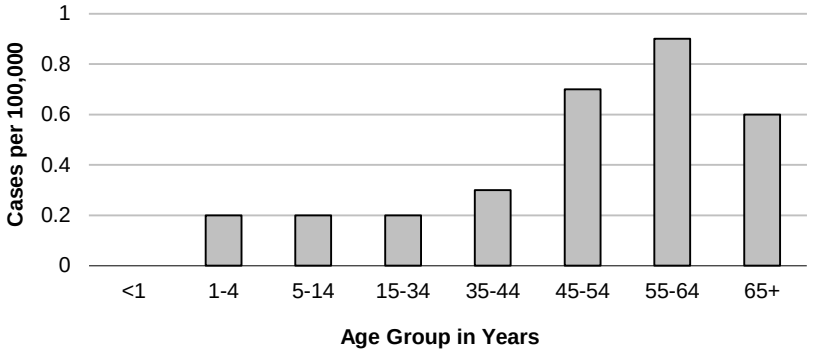
*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates* of Typhus Fever
LAC, 1999-2011**



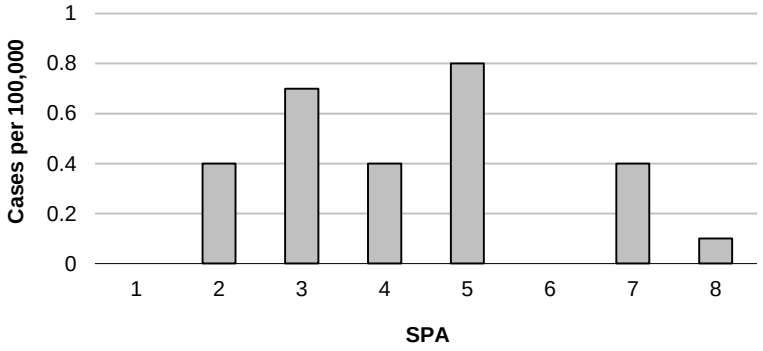
*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 2. Incidence Rates* of Typhus Fever by Age Group
LAC, 2011 (N=38)**



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

**Figure 3. Incidence Rates* of Typhus Fever by SPA
LAC, 2011 (N=38)**



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

**Figure 4. Reported Typhus Fever Cases by Month of Onset
LAC, 2011 (N=38)**

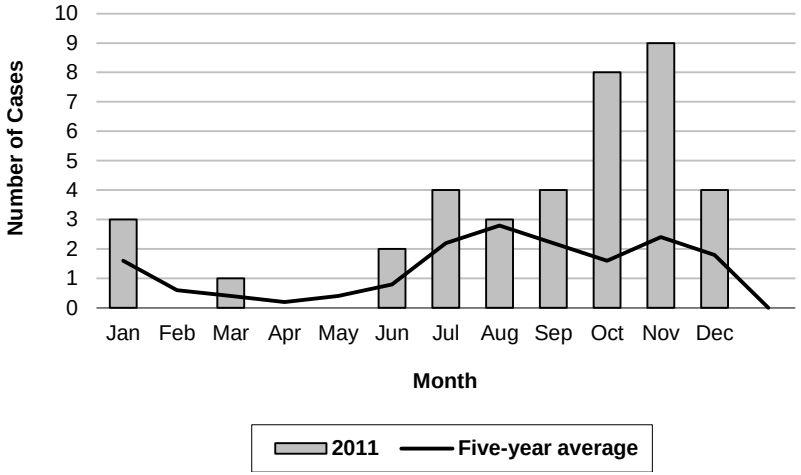


Figure 5. Reported Typhus Fever Cases by Race/Ethnicity LAC, 2007-2011

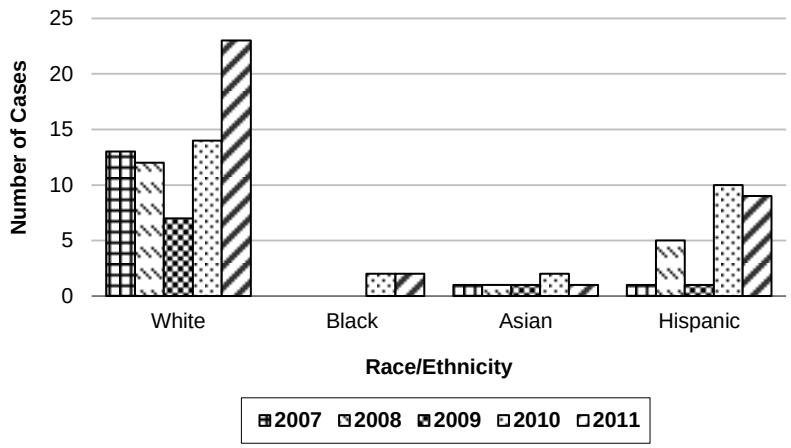


Table 1. Flea and Animal Exposure of Cases, LAC, 2006-2011

	2006-2010 N=85 n (%)	2011 N=38 n (%)
Fleas	29 (34)	7 (18)
Pet Dog/Cat	70 (84)	27 (71)
Opossums*	36 (42)	6 (6)
Rodents*	32 (38)	12 (32)
Denies Recent Exposures	4 (5)	4 (11)

*In and around house or neighborhood.

VIBRIOSIS

CRUDE DATA	
Number of Cases	19
Annual Incidence[a]	
LA County[b]	0.19
California[c]	0.27
United States[c]	0.27
Age at Diagnosis	
Mean	44
Median	45
Range	11-85

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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* – O1 and O139 -- 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 shellfish. Many vibriosis patients often have recent history of travel to developing countries.

2011 TRENDS AND HIGHLIGHTS

- Eleven cases of vibriosis occurred among women, while eight cases occurred among men. Historically, vibriosis cases have predominantly male, but in recent years, women have made up a greater proportion of cases.
- Whites and Hispanics comprised equally large proportions of all vibriosis cases (48% each) (Figure 3). There was one confirmed case in a black person, and no cases among Asians.
- SPA 2, 4 and 6 each had four confirmed cases of vibriosis in 2011. This is a radical change from previous years when vibriosis cases were most likely to reside in SPA 5 or 8 near the coast.
- Typically vibriosis cases peak during July and August. In 2011, the summer peak in vibriosis cases was delayed to August and September, with only one case in July.
- *V. parahæmolyticus* was the most common etiologic agent reported (n=13). There was one confirmed case of *V. alginolyticus* in an elderly man who lived on the coast and walked on the beaches regularly. *V. choleræ* non-O1, non-O139 was isolated from two cases who both reported eating raw seafood while traveling in Mexico.
- No cases of cholera were reported.
- There was one vibriosis fatality in a confirmed case of *V. vulnificus*. The decedent was man with a history of alcohol abuse who ate oysters while visiting Florida.
- There was one case of vibriosis septicemia; *V. cincinnatiensis* was isolated from blood. *V. cincinnatiensis* is exceedingly rare, only reported three times to the CDC since 2001.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=13)			2008 (N=18)			2009 (N=26)			2010 (N=13)			2011 (N=19)		
	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	1	3.8	0.2	0	0.0	0.0	0	0.0	0.0
5-14	1	7.7	0.1	2	11.1	0.1	0	0.0	0.0	2	15.4	0.2	1	5.3	0.1
15-34	4	30.8	0.1	3	16.7	0.1	11	42.3	0.4	5	38.5	0.2	5	26.3	0.2
35-44	2	15.4	0.1	3	16.7	0.2	4	15.4	0.3	0	0.0	0.0	3	15.8	0.2
45-54	1	7.7	0.1	3	16.7	0.2	5	19.2	0.4	3	23.1	0.2	5	26.3	0.4
55-64	3	23.1	0.3	5	27.8	0.5	3	11.5	0.3	2	15.4	0.2	3	15.8	0.3
65+	2	15.4	0.2	2	11.1	0.2	2	7.7	0.2	1	7.7	0.1	2	10.5	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0	0.0	0	0.0	0.0
Race/Ethnicity															
Asian	2	15.4	0.2	2	11.1	0.2	1	3.8	0.1	1	7.7	0.1	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	1	5.3	0.1
Hispanic	6	46.2	0.1	4	22.2	0.1	8	30.8	0.1	4	30.8	0.1	9	47.4	0.2
White	2	15.4	0.1	12	66.7	0.4	15	57.7	0.5	4	30.8	0.1	9	47.4	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	3	23.1		0	0.0		2	7.7		4	30.8	--	0	0.0	--
SPA															
1	0	0.0	0.0	1	5.6	0.3	2	7.7	0.5	0	0.0	0.0	0	0.0	0.0
2	1	7.7	0.0	4	22.2	0.2	6	23.1	0.3	1	7.7	0.0	4	21.1	0.2
3	1	7.7	0.1	3	16.7	0.2	3	11.5	0.2	0	0.0	0.0	2	10.5	0.1
4	4	30.8	0.3	0	0.0	0.0	4	15.4	0.3	1	7.7	0.1	4	21.1	0.3
5	1	7.7	0.2	3	16.7	0.5	5	19.2	0.8	4	30.8	0.6	1	5.3	0.2
6	1	7.7	0.1	1	5.6	0.1	0	0.0	0.0	2	15.4	0.2	4	21.1	0.3
7	1	7.7	0.1	0	0.0	0.0	2	7.7	0.1	1	7.7	0.1	2	10.5	0.1
8	4	30.8	0.4	5	27.8	0.4	3	11.5	0.3	3	23.1	0.3	2	10.5	0.2
Unknown	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, 2002-2011

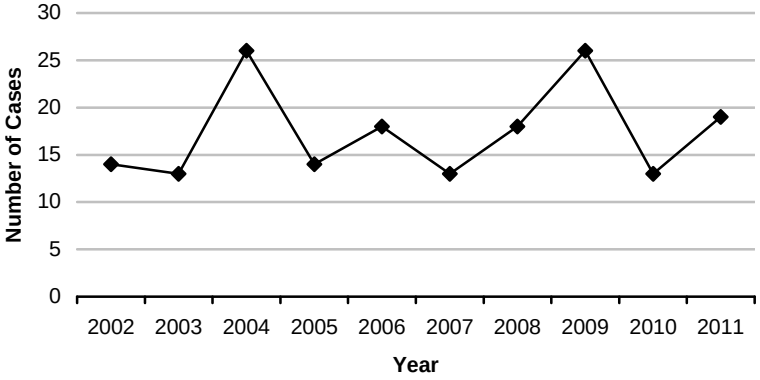


Figure 2. Reported Cases of Vibriosis by Age Group
LAC, 2011 (N=19)

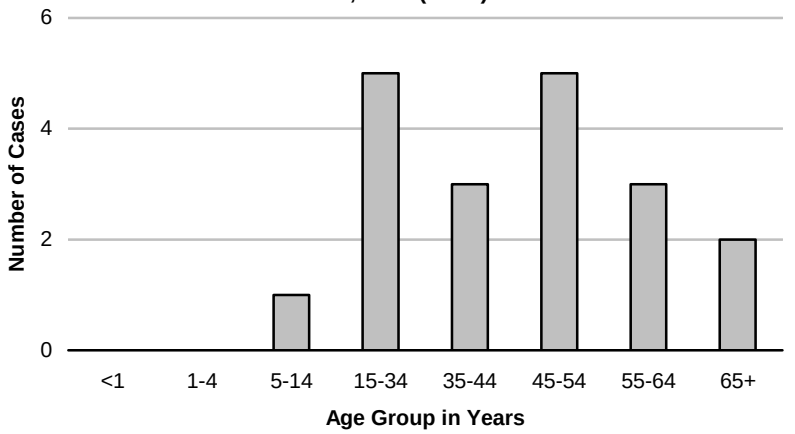


Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2011 (N=19)

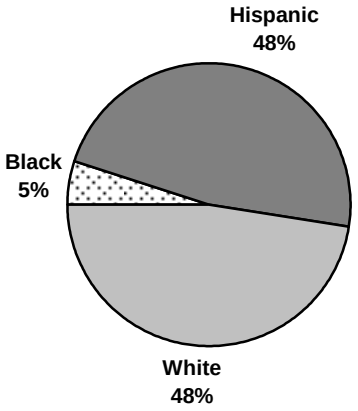


Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2011 (N=19)

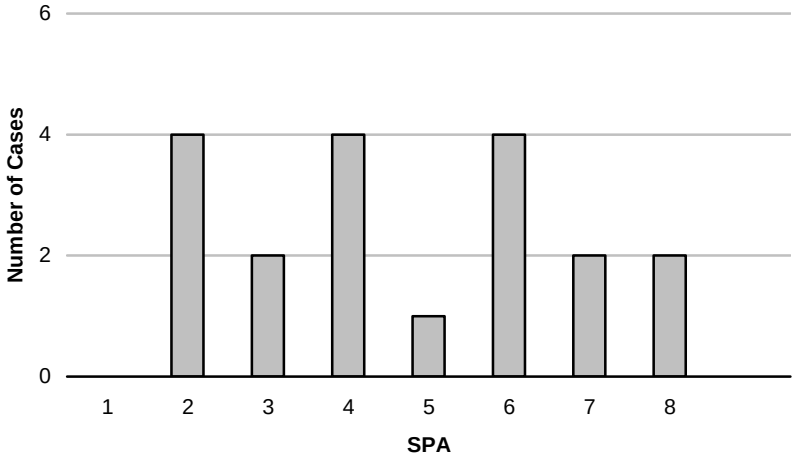


Figure 5. Reported Vibriosis Cases by Month of Onset LAC, 2011 (N=19)

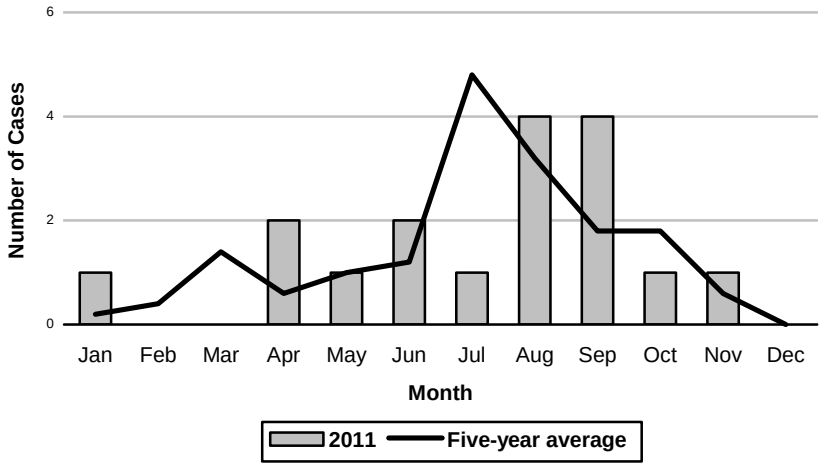
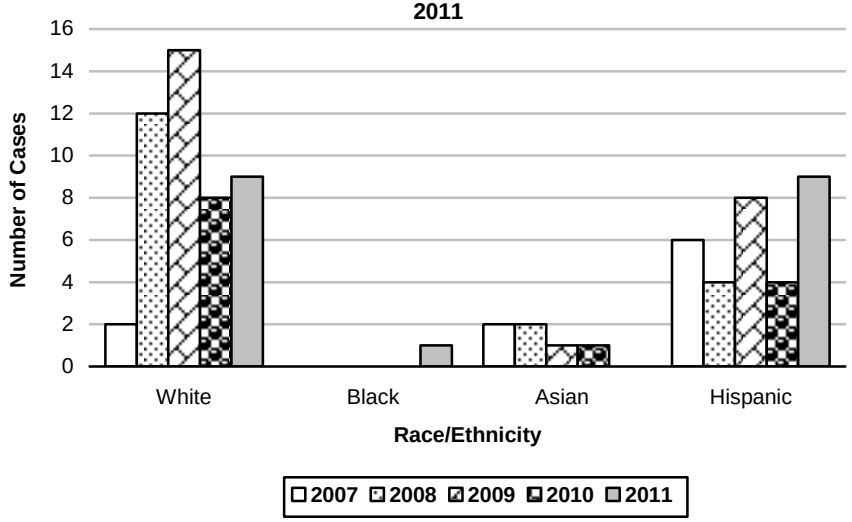


Figure 6. Reported Cases of Vibriosis by Race/Ethnicity LAC, 2007-2011



WEST NILE VIRUS

CRUDE DATA	
Number of Cases	63
Annual Incidence[a]	
LA County	0.64
California	0.42
United States	0.23
Age at Diagnosis	
Mean	57.1
Median	57
Range	14-88

[a]Cases per 100,000 population.
[b]Calculated from Final 2011 Reports of Nationally Notifiable Infectious Disease. MMWR 61(32);625-637.

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 establishment as an enzoonotic disease 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), including meningitis, encephalitis, and acute flaccid paralysis. 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. Long-term neurological and cognitive sequelae are not uncommon.

Since most persons infected with WNV will not develop clinical illness or symptoms, transmission via blood donation is problematic. Beginning 2003, blood products have been screened for WNV utilizing polymerase chain reaction (PCR) testing.
To date, there have been no blood transfusion-associated secondary WNV infections from asymptomatic WNV-infected blood donors from Los Angeles (LAC) residents. However, four cases of WNV-associated infection including three cases of NID were documented from a LAC organ donor, not known to be infected with WNV infection at the time of organ donation. Additional routes of transmission that can occur include vertical transmission transplacentally, occupational exposure, and through breast milk.

Prevention and control of WNV and other arboviral diseases are 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.

2011 TRENDS AND HIGHLIGHTS

- The number of WNV infections reported in 2011 (N=63) was nearly 16 times that of the number reported the previous year, bouncing back from an all-time low of four cases in 2010. This reaffirms that WNV remains entrenched in the ecology of Los Angeles County.
- Of 58 reported symptomatic WNV infections, there were 17 cases of WNV fever and 41 (65%) neuro-invasive disease cases (21 meningitis, 15 encephalitis, and 5 acute flaccid paralysis). Five asymptomatic blood donors were reported from local blood banks. Four (6%) WNV- associated deaths were reported.
- An LAC resident organ donor with WNV fever, unknown at time of organ donation to four recipients, resulted in three cases of encephalitis (with two deaths) and one asymptomatic WNV infection in a liver recipient from LAC. LAC Department of Public Health worked with Centers for Disease Control and Prevention, the local Southern California organ procurement agency, and other institutions to ensure no additional organs were transplanted from this donor. Additional testing of the organ donor tissue included the lymph nodes and spleen confirmed WNV infection by PCR.

Reported West Nile Virus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2007-2011

	2007 (N=43)			2008 (N=170)			2009 (N=25)			2010 (N=4)			2011 (N=63)		
	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	0.6	0.2	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	1	1.6	0.1
15-34	3	7.0	0.1	19	11.2	0.7	5	20.0	0.2	1	25.0	0.0	5	7.9	0.2
35-44	0	0.0	0.0	15	8.8	1.0	0	0.0	0.0	0	0.0	0.0	3	4.8	0.2
45-54	9	20.9	0.7	34	20.0	2.5	10	50.0	0.7	1	25.0	0.1	16	25.4	1.2
55-64	12	27.9	1.4	36	21.2	3.9	4	16.0	0.4	0	0.0	0.0	17	27.0	1.8
65+	19	44.2	1.9	65	38.2	6.4	6	24.0	0.6	2	50.0	0.2	21	33.3	2.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race/Ethnicity															
Asian	0	0.0	0.0	6	3.5	0.5	1	4.0	0.1	0	0.0	0.0	1	1.6	0.1
Black	0	0.0	0.0	5	2.9	0.6	0	0.0	0.0	0	0.0	0.0	1	1.6	0.1
Hispanic	12	27.9	0.3	68	40.0	1.5	5	20.0	0.1	1	25.0	0.01	26	41.3	0.5
White	29	67.4	1.0	75	44.1	2.6	16	64.0	0.5	3	75.0	0.1	30	47.6	1.0
Other	0	0.0	0.0	3	1.8	12.2	0	0.0	0.0	0	0.0	0.0	2	3.2	
Unknown	2	4.7		13	7.6		3	12.0		0	0.0		3	4.8	
SPA															
1	1	2.3	0.3	5	2.9	1.4	12	48.0	3.3	0	0.0	0.0	1	1.6	0.3
2	27	62.8	1.3	37	21.8	1.7	9	36.0	0.4	0	0.0	0.0	39	61.9	1.8
3	9	20.9	0.5	61	35.9	3.5	2	8.0	0.1	2	50.0	0.1	16	25.4	0.9
4	2	4.7	0.2	12	7.1	0.9	1	4.0	0.1	0	0.0	0.0	1	1.6	0.1
5	0	0.0	0.0	1	0.6	0.2	1	4.0	0.2	0	0.0	0.0	1	1.6	0.2
6	1	2.3	0.1	6	3.5	0.6	0	0.0	0.0	0	0.0	0.0	1	1.6	0.1
7	2	4.7	0.1	44	25.9	3.2	0	0.0	0.0	2	50.0	0.1	4	6.3	0.3
8	1	2.3	0.1	4	2.4	0.4	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		

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

**Figure 1. Incidence Rates of West Nile Virus
LAC, 2006-2011**

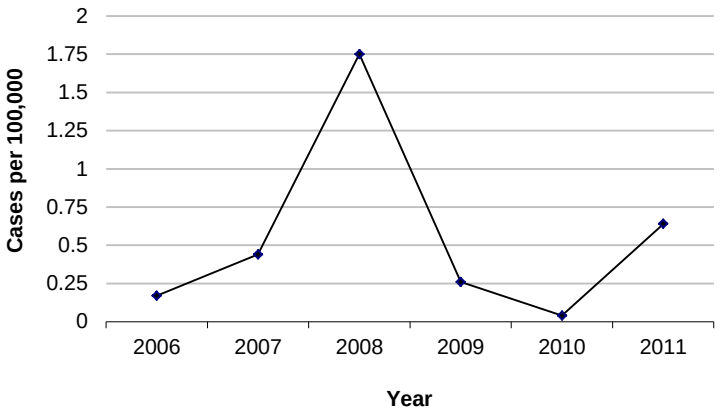


**Figure 2. Incidence Rates of West Nile Virus by Age Group
LAC, 2011 (N=63)**

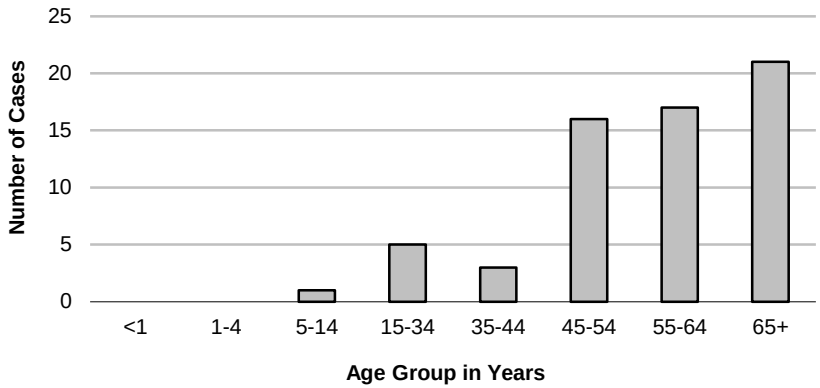
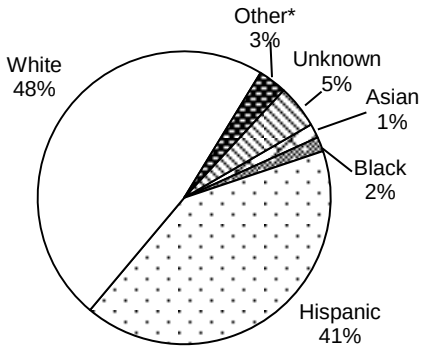


**Figure 3. Percent Cases of West Nile Virus by Race/Ethnicity
LAC, 2011 (N=63)**



* 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, 2011 (N=63)**

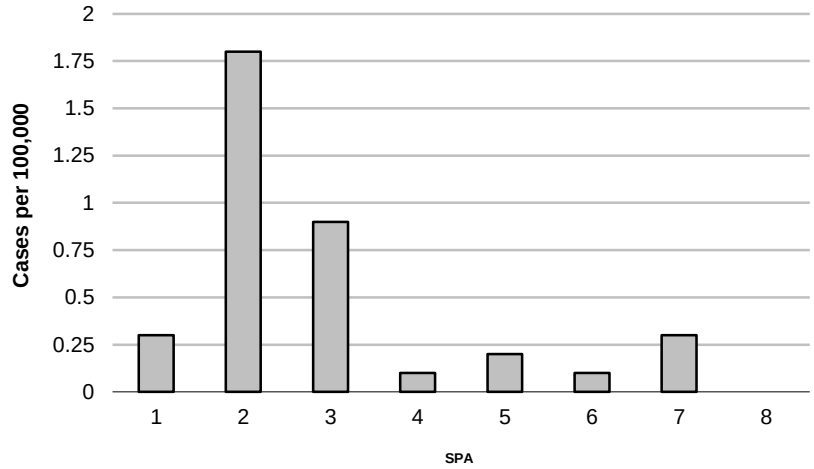


**Figure 5. Reported West Nile Virus Cases by Month of Onset
LAC, 2011 (N=63)**

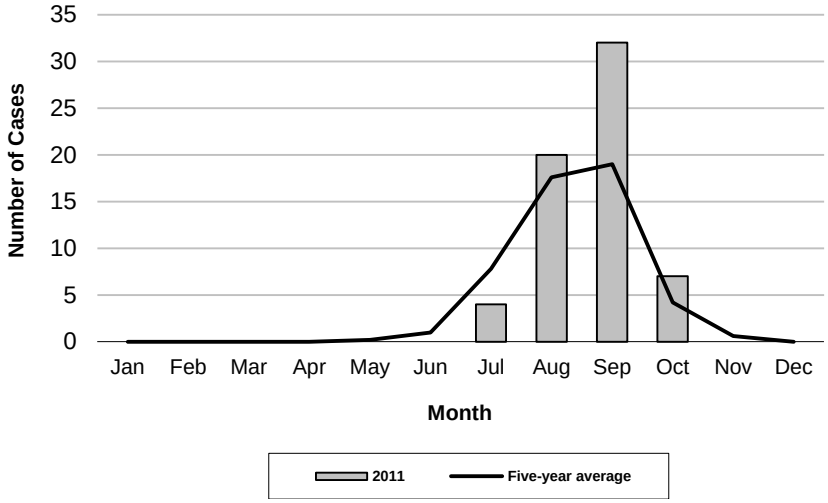
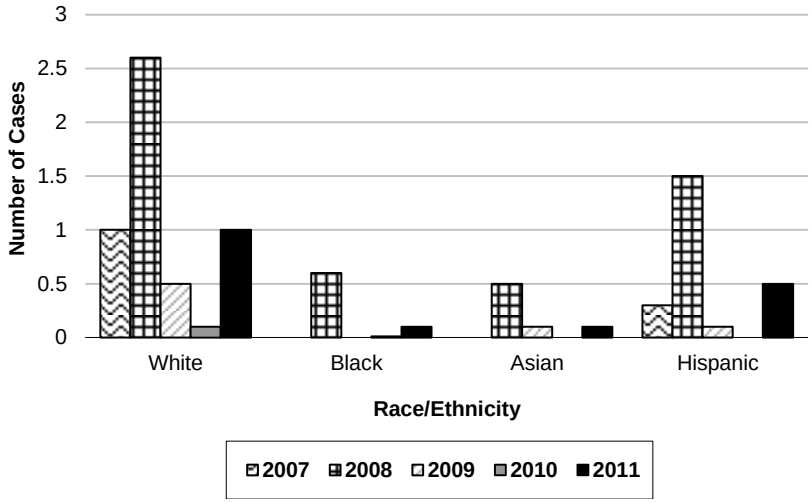
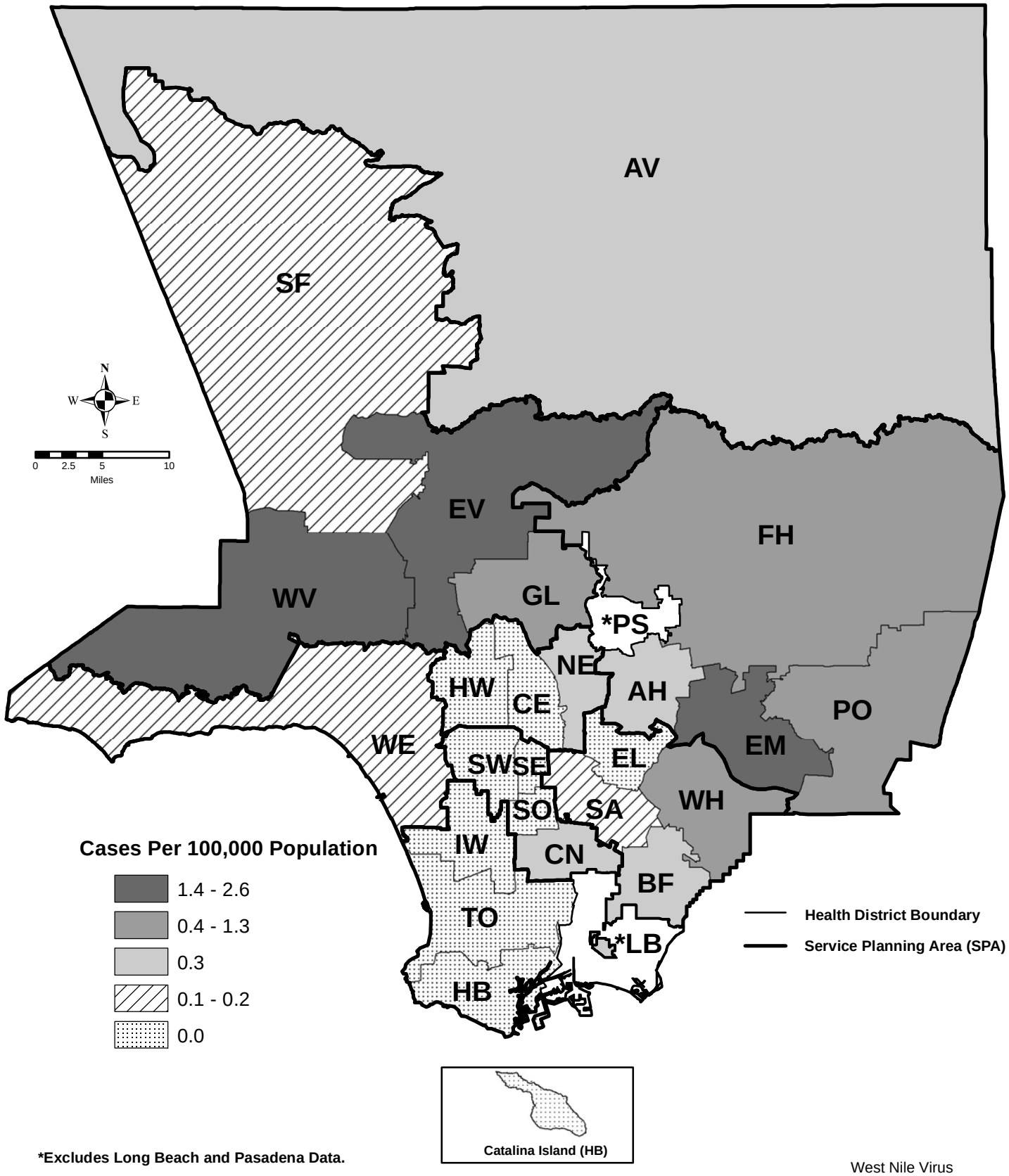


**Figure 6. West Nile Virus Incidence by Race/Ethnicity
LAC, 2007-2011**



Map 16. West Nile Virus
Rates by Health District, Los Angeles County, 2011*



*Excludes Long Beach and Pasadena Data.

DISEASE OUTBREAK SUMMARIES

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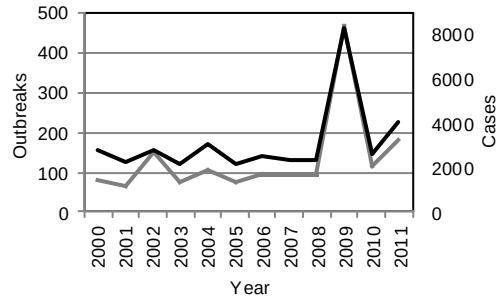
COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2011, 227 community-acquired non-foodborne disease outbreaks accounted for at least 3261 cases of illness. This is higher than most previous years but may represent realignment to customary levels after the unprecedented increase reporting of respiratory outbreaks during the 2009 H1N1 influenza season (Figure 1).
- Three disease categories accounted for 74% (169) of all outbreak causes. Top disease categories were gastroenteritis, respiratory, and ectoparasites with 34%, 22% and 18% of total outbreaks, respectively.
- The percentage of community respiratory outbreaks has varied dramatically from 79% in 2009, 8% in 2010 to 22% in 2011 (Figure 2).
- Three outbreak settings account for almost all (93%) of the reported outbreaks. Schools, pre-schools, and group/assisted living settings are the most common settings of community-acquired outbreaks, with 39%, 37% and 17%, respectively. (Figure 3, Table 2)

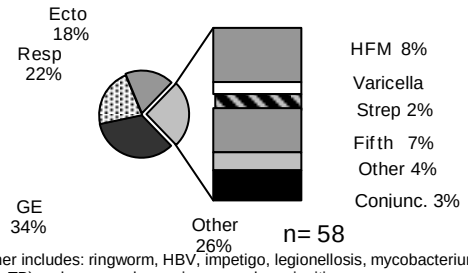
Figure 1
Community Acquired Outbreaks
Number of Persons Affected
LAC, 2000–2011



DATA

Disease outbreaks are defined as clusters of an illness that occur in a similar time or place, with case numbers above expected for a specified population or location. Depending on the nature of the outbreak, investigation responsibility is maintained by either 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 Outbreaks section) or regulated facilities specifically licensed to provide medical care (see Healthcare Associated Outbreaks section).

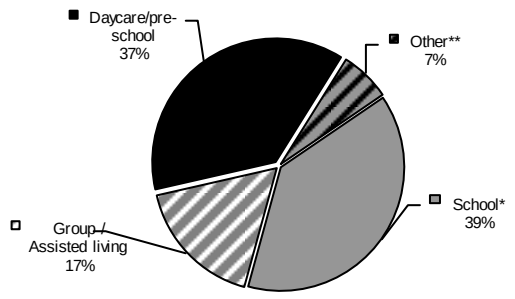
Figure 2
Community-Acquired Outbreaks by Type of Disease* LAC, 2011 (N=227)



*Other includes: ringworm, HBV, impetigo, legionellosis, mycobacterium (non-TB), unknown rash, meningococcal meningitis.

The location of outbreaks often has an effect on type of disease being reported. While gastroenteritis (GE) outbreaks were mostly reported in the preschool setting (37), GE outbreaks made up over half of the location-specific reports from the group/assisted living settings and 'Other' settings. Ectoparasites have historically been a major cause of outbreaks and also show a location preference; group/assisted living settings tend to report scabies, while schools and pre-schools are affected more often by head lice. Respiratory illness outbreaks were still seen predominately in the school setting – 82%.

Figure 3
Community Outbreaks by Setting
LAC, 2011 (N=227)



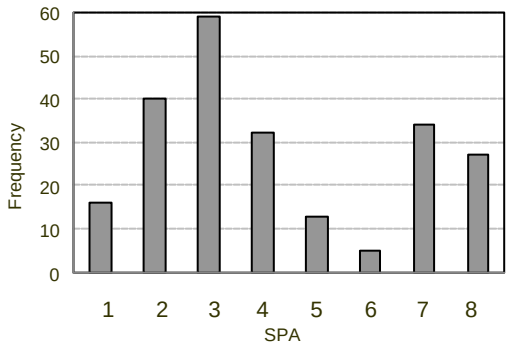
* School includes: Elementary (82), Middle (1) and High School (3), and Univerisity (2)
**Other includes: camps, work or home events, community, surgery center, disabled/spec. ed. sites

Most respiratory outbreaks were of unknown etiology, most often due to a lack of specific laboratory testing, but ten were confirmed influenza in 2011. Respiratory outbreaks had the highest incident-specific case average of 27 cases per outbreak—confirmed influenza outbreaks having 40 cases per outbreak. The single outbreak with the highest number of cases (148) was an influenza outbreak at an international

work conference. Outbreaks caused by norovirus (n=13) or of undetermined GE etiology (n=63) had a mean of 20 and 14 cases per outbreak, respectively. Many of the undetermined GE outbreaks had characteristics similar to the confirmed norovirus outbreaks, but were not tested for confirmation. These figures highlight the continuing circulation of norovirus and reflect the ease this agent can be transmitted from person-to-person in community settings. (Table 1, 2).

The predominance of outbreaks affecting children in educational settings has been recognized for several years. In 2011 the most common outbreak settings were again pre-schools and schools accounting for 76% of all outbreaks. (Figure 3, Table 2).

Figure 4
Community Outbreaks by SPA
LAC, 2011 (n=226*)

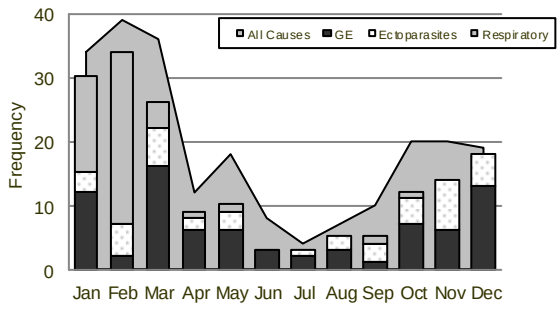


* 1 outbreak community-wide

Outbreaks were reported from all eight SPAs (Figure 4). SPA 3, San Gabriel (59) and SPA 2, San Fernando (40) had the most outbreaks for 2011—they also had the most outbreaks for 2010.

The graph of community-acquired outbreaks by report month (Figure 5) further illustrates the impact of GE, respiratory, and ectoparasite infections. These three disease categories dominated the outbreak epidemic curve each month throughout the year. The summer months of June, July, and August were low, perhaps affected by disease-specific seasonality and vacations (i.e., many schools out of session).

Figure 5
Community Outbreaks by Selected Diseases by Report Month
LAC, 2011 (N=227)



COMMENTS

Only three percent of outbreaks were due to diseases that would be individually reported to the local health department (Tables 1, 2). Outbreaks are most often reported by institutions with the ability to recognize an unusual incidence of disease in a group of individuals and have a procedure in place to report to the local health department. The result is that most outbreaks are reported by pre-schools, schools and residential facilities.

While illness is often linked to schools, it must be noted that a school association might be serendipitous to the real etiologic location. Children who share a school setting often have other social interactions that could account for the infection or infestation (e.g., sleepovers, birthday parties, play dates, after school sports, etc.). But whatever the original source exposure, schools need to be vigilant to prevent further transmission and can be greatly aided by the expertise of public health nurses in this effort.

Community-acquired outbreaks result from interactions among particular age groups, locations, and specific diseases. A profile emerges where the very young and early adolescent acquire infection or infestation at school (76% in pre-school, elementary, or high school). Gastroenteritis, respiratory and pediculosis (head lice), were most common in this young group. The second age group affected by outbreaks is an older population, often associated with group and assisted living settings. In this age category, GE and scabies are the most common causes (Table 2). While community transmission of disease occurs in other settings or locations, many such outbreaks do not get recognized or reported to Public Health.

Table 1. Community-Acquired Outbreaks by Disease— LAC, 2011

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Varicella	4	23	6	4-7
Streptococcus, Group A	5	17	3	2-6
Scabies	9	36	4	2-13
Hand, foot & mouth disease	18	114	6	2-33
Pediculosis	33	292	9	2-54
GE illness-Norovirus	13	258	20	6-62
GE illness-Shigella	0	0	0	0
GE illness-Salmonella	1	3	3	3
GE illness-Unknown	63	864	14	2-100
Fifth disease	15	167	11	3-32
Conjunctivitis-Unknown	6	95	16	2-66
Influenza	10	396	40	9-148
Respiratory-Unknown	39	959	25	1-126
Other*	11	37	3	2-6
Total	**227**	**3261**	**14**	**2–148**

* Includes: ringworm (3), legionellosis (2), hepatitis B, impetigo, meningococcal disease, mycobacterium (nonTB), RSV and unk. rash (1 each).

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2011

Disease	Group Home[a]	School[b]	Preschool or Daycare	Other[c]	TOTAL
Varicella	1	2	0	1	**4**
Streptococcus, Group A	0	4	1	0	**5**
Scabies	7	0	2	0	**9**
Hand, foot & mouth disease	0	3	15	0	**18**
Pediculosis	3	15	15	0	**33**
GE illness-Norovirus	8	1	3	1	**13**
GE illness-Shigella	0	0	0	0	**0**
GE illness-Salmonella	0	0	0	1	**1**
GE illness-Unknown	12	10	34	7	**63**
Fifth disease (Parvovirus)	0	10	5	0	**15**
Conjunctivitis-Unknown	0	2	4	0	**6**
Influenza	1	8	0	1	**10**
Respiratory-Unknown	2	32	4	1	**39**
Other	5	1	2	3	**11**
Total	**39**	**88**	**85**	**15**	**227**

[a] Includes centers for retirement/assisted living (29), Group homes (7) and rehabilitation (3)
[b] Includes elementary (82) middle school (1) high school (3), and universities (2).
[c] Includes home events (2), work events (4) special ed. sites (2), camps (2), restaurant (2), gym (1), surgery center (1), and community(1).

FOODBORNE ILLNESS OUTBREAKS

DESCRIPTION

Foodborne outbreaks are caused by a variety of bacterial, viral, and parasitic pathogens, as well as toxic substances. To be considered a foodborne 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 system used by Los Angeles County (LAC) Department of Public Health (DPH) for detection of foodborne outbreaks begins with a foodborne illness report (FBIR). This surveillance system monitors complaints from residents, illness reports associated with commercial food facilities, and foodborne exposures uncovered during disease-specific case investigations (e.g., salmonellosis, shigellosis, toxigenic *E. coli*). LAC Environmental Health's Food and Milk Program (F&M) investigates each FBIR, contacting the reporting individual and evaluating the public health importance and need for expanded follow-up. When warranted, a thorough inspection of the facility is conducted. This public health action is often sufficient 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 FBIRs with the greatest public health importance to identify possible foodborne outbreaks. 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 extent of the outbreak, identify a food vehicle or processing error, determine the agent of infection, and take actions to protect the public's health.

RESULTS

The number of FBIRs received in 2011 (1786) was similar to that received in 2010 (1754). Public reporting via the web accounted for 58% (n=1037) of FBIRs this year. F&M contacted each person making the FBIR and performed a site inspection on 27% of reports that were deemed high priority (n=487). The remainder of the complaints were referred to district Environmental Health offices (n=1094, 68%), specialty programs or outside LAC agencies (n=118, 7%), or were lost to follow-up or duplicate reports (n=145, 8%).

The ACDC Food Safety Unit conducted 30 outbreak investigations in 2011; 23 were initiated by FBIR complaints and seven were initiated through other surveillance activities. Of these 30 investigations, nine (30%) were not considered to be foodborne as the evidence collected during the investigations did not support a foodborne source (OB#136, 173, 189, 194, 208, 233, 235, 239, 304). Many of these outbreaks were due to norovirus which can easily be spread person to person in a food service setting if one guest is sick when attending. In some of these investigations an ill guest at the party was identified. In other investigations an assessment is 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 cases there is not enough participation from those affected to conduct a thorough case-control study. Determining whether a food item was the source of these outbreaks can be challenging as well as time and resource consuming.

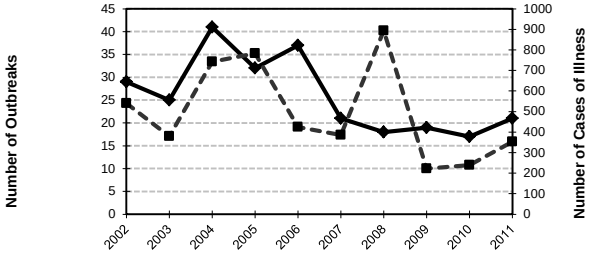
The 21 outbreaks determined to be foodborne are listed in Table 1 and summarized below. These outbreaks represent 353 cases of foodborne illness and 12 hospitalizations (Figure 1). No deaths were identified. Outbreaks occurred throughout the year, with slightly more occurring in the winter and spring months (Figure 2).

[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

Causes of Foodborne Outbreaks

A meal was epidemiologically implicated in 13 investigations this year (62%) with a specific food item implicated in 12 of these. Implicated food items included poultry (n=1), beef (n=1), fish (n=1), cut fruit (n=1), green salad (n=2), salsa (n=1), hummus (n=1), refried beans (n=1) and dishes with multiple ingredients (n=3). An ill food handler was implicated as the cause of four foodborne outbreaks investigated this year. F&M inspections identified contributing factors such as temperature violations, contamination, or proliferation issues that contributed to six other outbreaks (29%).

Figure 1.
Foodborne Outbreaks
Number of Persons Affected
LAC, 2002–2011



Cooked food items

There were two outbreaks involving cooked food items where *Salmonella* was identified as the etiologic agent. One of these involved turkey sandwiches and the other involved beef tacos. An ill food handler was identified with laboratory confirmation as the source of the contaminated beef tacos and improper cooking or handling of raw turkey meat as the source in the other outbreak. Raw meats such as poultry or beef may become contaminated during slaughter or processing and the contaminant can be sustained or proliferate due to mishandling meat while raw or due to improper cooking. Animals are the primary reservoir for *Salmonella* (excluding *S. Typhi*); however humans may also carry it asymptomatically for many months after exposure. For this reason, a food handler with asymptomatic infection and not practicing proper hygiene may contaminate food during preparation.

There were two outbreaks involving cooked food items where a bacterial toxin such as *Clostridium perfringens* or *Bacilus cereus* was suspected. One involved beef chili sauce and the other involved refried beans. These toxins form when foods are held at unsafe temperatures. Some *B. cereus* toxins are heat-stable and cooking will not destroy the toxin.

Cooked tuna was identified in one outbreak. Certain fish such as tuna may naturally contain histidine that converts to histamine when stored at improper temperatures. Histamine is heat stable so that cooking does not destroy this compound, and when ingested in sufficient amounts results in scombroid fish poisoning.

Bread was identified as the vehicle in one outbreak where the etiologic agent was suspected to be a calicivirus, probably norovirus. Humans are the primary reservoir for these viruses and the bread likely became contaminated when handled by someone lacking proper hygiene and infected with the virus. Cooking at proper temperatures kills the virus, but cooked food items such as breads that are often served at room temperature can be contaminated after cooking.

Uncooked food items

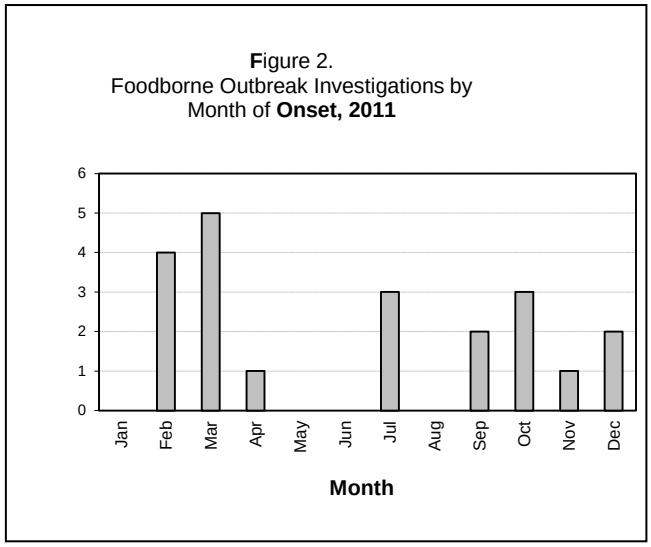
There were six outbreaks involving uncooked food items where the etiologic agent was suspected to be a calicivirus such as norovirus. These foods included green salads (n=2), coleslaw, salsa, cut fruit and hummus. These food items require a fair amount of hand manipulation and it is suspected that a food-handler lacking proper hygiene and infected with the virus contaminated these foods. An ill food handler was laboratory confirmed as the source of three of these outbreaks.

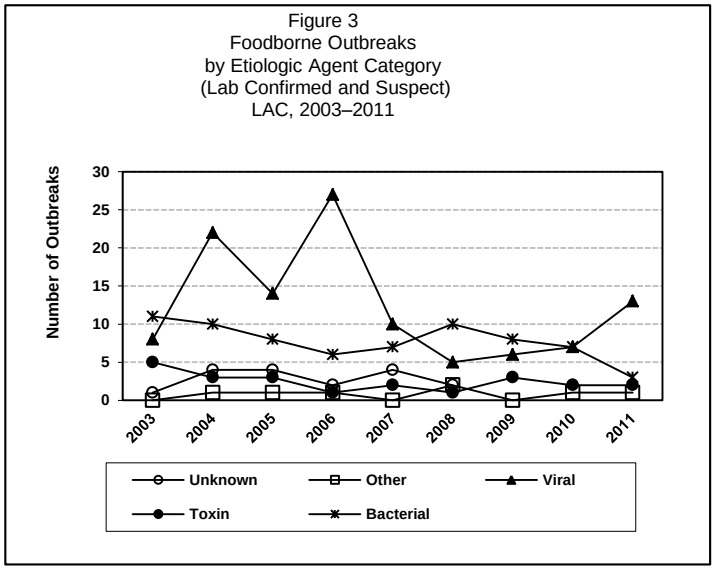
Condiments

A dipping sauce was identified in an investigation of rapid onset of oral burning; it had been prepared with an improper concentration of acetic acid.

Foodborne Agents

An etiological agent was identified in all of the foodborne outbreak investigations this year (n=21) and confirmed in 43% (n=10) (Figure 3). A viral agent was responsible for 13 outbreaks, bacterial agents were responsible for three outbreaks, bacterial toxin for two outbreaks, fish toxin for one outbreak and chemical toxin for one outbreak (Figure 3).





Salmonellosis Outbreaks

Salmonella was responsible for all three bacterial foodborne outbreaks this year, accounting for fewer outbreaks than in previous years.

One of the *Salmonella* outbreaks involved 12 salmonellosis cases eating food from a mobile food production unit (MFPU or taco truck) (OB# 177). A public health nurse with Community Health Services reported to ACDC several salmonellosis cases clustering in one public health district. ACDC identified a particular taco truck in common with these cases and also determined that all case isolates shared the same PFGE pattern. All cases reported eating food from this MFPU over a five week period. An asymptomatic food handler on the truck tested positive for *Salmonella* bearing the outbreak PFGE pattern. This outbreak was likely due to a *Salmonella* carrier working as a food handler on this MFPU who contaminated multiple food items. This food handler was removed from work until clearance of infection was laboratory confirmed.

ACDC identified another *Salmonella* outbreak involving 18 cases eating food from an LAC burger stand over a one-month period (OB#213). All food handlers at this burger stand tested negative for salmonella. Possible sources include cross contamination in the kitchen between raw chicken and ready-to-eat food items or an ill food handler who had cleared their infection at time of testing. No additional illnesses were reported.

Norovirus Outbreaks

Norovirus was confirmed or suspected in 13 foodborne outbreaks this year (62%), which is higher than seen in 2010 (N=7), but a considerable drop from the peak number seen in 2006 (N=25)..

The largest laboratory-confirmed foodborne norovirus outbreak this year involved 27 cases eating catered food at an office retirement party (OB#66). The incubation times were consistent with a point-source outbreak and both cilantro and salsa were associated with illness. Two food handlers and six patrons

tested positive for norovirus. The source of this outbreak was likely food contaminated with norovirus by an ill food handler. Norovirus education was provided to the management.

Another laboratory-confirmed norovirus outbreak involved 14 cases eating take-out food at a family birthday party (OB#54). The incubation times were consistent with a point-source outbreak and hummus was associated with illness. Five food handlers and one patron tested positive for norovirus. The source of this outbreak was likely food contaminated with norovirus by an ill food handler. Norovirus education was provided to the management.

Another laboratory-confirmed norovirus outbreak involved 15 cases eating catered food in two separate office groups (OB#110/123). Incubation times for both groups were consistent with a point-source outbreak and food items made with lettuce were found to be associated with illness. One employee at the caterer tested positive for norovirus. The source of this outbreak was likely food contaminated with norovirus by an ill food handler. Norovirus education was provided to the management.

Other Foodborne Outbreaks

An outbreak of chemical food contamination occurred this year, involving eight cases eating food at an LAC restaurant (OB#254). The DPH Toxics Epidemiology program conducted this investigation. The symptoms and duration of illness reported by cases were consistent with the ingestion of a chemical toxin. The chef reported using industrial grade acetic acid in place of vinegar as an ingredient in the dipping sauce prepared at this restaurant. The source of the outbreak was likely the concentrated acetic acid. EH instructed the restaurant to dispose of all sauce and to use only ingredients approved for human consumption.

A suspect scombroid outbreak occurred in LAC involving 5 cases eating ahi tuna burgers at an LAC restaurant (OB#268). The symptoms and durations reported by cases were consistent with scombroid intoxication and the onsets were consistent with a point-source outbreak. The investigation found that the vendor supplying the restaurant's tuna was operating without a license and without proper documentation to detail its purchases and sales transactions. The management was instructed to purchase food only from approved sources. The source of this outbreak was likely the tuna served at this facility (see Special Studies Report for details).

State and National Investigation Involving Los Angeles County

LAC assisted state and federal investigators with 11 *Salmonella* cluster investigations. Clusters are identified when bacterial genotypes are matched in the CDC's PulseNet Surveillance System. Additional interviews are then conducted by ACDC staff in conjunction with state and federal investigators. One of these clusters involved a PFGE pattern linked two LAC outbreaks, one foodborne outbreak (OB#246) and one person to person spread of *Salmonella* (OB#208), however, no connection could be drawn between these two outbreaks or additional cluster cases. There were also eight additional *Salmonella* clusters where ACDC provided existing information to CDC on previously interviewed local cases, but no additional interviews were required.

LAC had one case that was part of a national listeriosis outbreak involving cantaloupes contaminated with *Listeria* (Reference 1). A total of 146 persons infected with any of the four outbreak-associated strains of *Listeria monocytogenes* were reported to CDC from 28 states. There was no distribution of contaminated cantaloupes to LAC. The only outbreak associated case in LAC had traveled to Colorado where it was believed his exposure occurred.

Outbreak Locations

Locations for reported foodborne outbreaks included residents' homes (6), hotel or banquet halls (5), restaurants (5), and the workplace (5). The largest number of outbreaks was reported from Service Planning Area (SPA) 2 (27%), as was the case in 2010 (Table 2). There was one multi-district outbreak and one multi-state outbreak investigation.

Table 1. Foodborne Outbreak Investigations 2011 (N=21)

	Agent	Laboratory Confirmed	OB#	Setting	Cases	Health District	Food Implicated
1	Norovirus	No	193	Banquet	24	West	Beet Salad
2	Norovirus	Yes	54	Residence	14	San Fernando Valencia	Hummus
3	Norovirus	Yes	66	Workplace	27	San Fernando Valencia	Cilantro/Salsa
4	Norovirus	No	87	Restaurant	8	West	None
5	Norovirus	Yes	88	Residence	18	West	Cole Slaw
6	Norovirus	Yes	101	Workplace	8	NE	None
7	Norovirus	Yes	106	Banquet	30	San Fernando Valencia	None
8	Norovirus	Yes	110	Workplace	8	Glendale	None
9	Norovirus	Yes	123	Workplace	7	South	Salad
10	Norovirus	No	211	Restaurant	10	San Fernando Valencia	None
11	Norovirus	No	236	Residence	28	Antelope Valley	Fruit
12	Norovirus	No	237	Residence	30	West	None
13	Norovirus	No	302	Workplace	49	West Valley	None
14	Scombroid	No	268	Restaurant	3	Humphrey	Tuna
15	*Salmonella* Enteritidis	Yes	213	Restaurant	9	Torrance	None
16	*Salmonella* Heidelberg	Yes	246	Banquet	8	Multi-state	Turkey
17	*Salmonella* Typhimurium	Yes	177	Truck	12	Multi-district	Beef Tacos
18	Bacterial Toxin	No	294	Hotel	11	Harbor	Bread
19	Bacterial Toxin	No	118	Residence	19	Bellflower	Refried Beans
20	Bacterial Toxin	No	198	Residence	22	East Valley	Beef Green Chili
21	Chemical	No	254	Restaurant	8	Central	Dipping sauce

Table 2. Frequency of Foodborne Outbreaks by Service Planning Area or Location, LAC, 2011 (N=21)

SPA	Frequency	Percent
1	1	5%
2	6	29%
3	0	0%
4	2	10%
5	4	19%
6	3	14%
7	1	5%
8	2	10%
Multi-county	1	5%
Multi-state	1	5%

References

1. Multistate Outbreak of Listeriosis Linked to Whole Cantaloupes from Jensen Farms, Colorado http://www.cdc.gov/listeria/outbreaks/cantaloupes-jensen-farms/index.html

ADDITIONAL RESOURCES

LAC resources:

- Communicable Disease Reporting System
  Hotline: (888) 397-3993
  Fax: (888) 397-3779
- For reporting and infection control procedures consult the LAC DPH ACDC:
  http://publichealth.lacounty.gov/acd/index.htm

CDC:

- Division of Foodborne, Waterborne, and Environmental Diseases (DFWED)–
  http://www.cdc.gov/ncezid/dfwed/
- Outbreak Response and Surveillance Team
  http://www.cdc.gov/foodborneoutbreaks
- FoodNet
  http://www.cdc.gov/foodnet
- Norovirus Information
  http://www.cdc.gov/norovirus/index.html

Other national agencies:

- FDA Center for Food Safety and Applied Nutrition
  http://www.fda.gov/AboutFDA/CentersOffices/OrganizationCharts/ucm135675.htm
- Gateway to Government Food Safety Information
  http://www.FoodSafety.gov

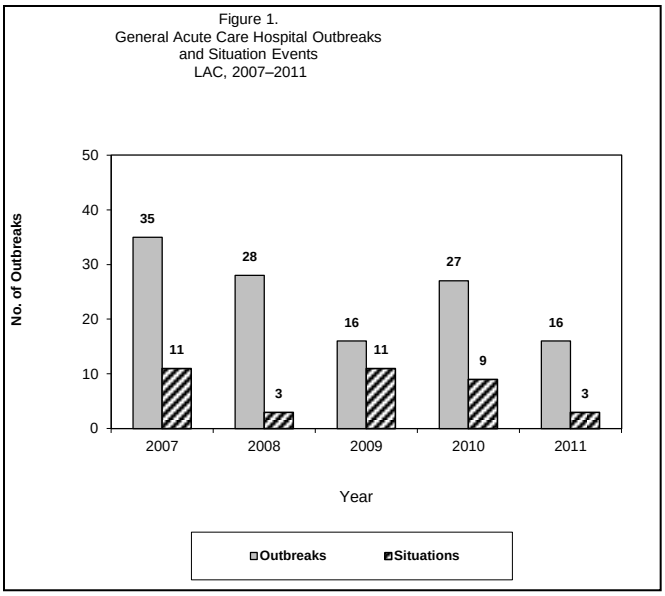
HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITALS

DEFINITION

This chapter will discuss healthcare-associated outbreaks and situation events that occurred 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 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 infections in the setting of a general acute care hospital that may not clearly meet all outbreak criteria defined above, for which additional information is required to determine if an outbreak has occurred.

Figure 1.
General Acute Care Hospital Outbreaks
and Situation Events
LAC, 2007–2011



ABSTRACT

There were 16 confirmed outbreaks reported in acute care hospitals in 2011 (Figure 1), a decrease of 41% from 2010. Sixty-three percent (n=10) occurred in a unit providing intensive or focused specialized care (e.g., neonatal intensive care, hematology/oncology and definitive observation units). Thirteen percent (n=2) occurred in a sub-acute unit located within the acute care hospital (Table 1). Scabies outbreaks (n=3) accounted for 19% of all outbreaks. Fifty-six percent (n=9) of acute care hospital outbreaks were of bacterial etiology (Table 2) from a multidrug-resistant organism (MDRO) such as *Acinetobacter baumannii (A. baumannii)*, carbapenem-resistant *Klebsiella pneumoniae*, (*CRKP*) and *Clostridium difficile* (*C. difficile*) (Figure 2). The etiologic agents contributing the largest number of cases in acute care hospital outbreaks were norovirus (74, 34%) followed by scabies (45, 21%), unknown gastrointestinal (GI) (22, 10%) and *A. baumannii* (21, 10%). There were three situation events reported in acute care hospitals in 2011; two were of bacterial etiology and caused by MDROs (Table 4).

Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2011

Outbreak Location	No. of Outbreaks
Administrative Office	1
Definitive Observation Unit	1
Hematology/oncology	1
Intensive Care – Adult	3
Intensive Care- Neonatal	3
Medical/Surgical	2
Multiple Units	3
Sub-acute Unit within a Hospital - Pediatric	2
Total	**16**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition—LAC, 2011

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
A. baumannii	2	21
C. difficile	2	19
Carbapenem-resistant *Klebsiella pneumoniae*	2	11
Methicillin-resistant *Staphylococcus aureus*	1	3
Norovirus	2	74
Parainfluenza	1	3
Pseudomonas aeruginosa	1	2
Scabies	3	45
Unknown Gastroenteritis	1	22
Vancomycin-resistent Enterococci	1	17
Total	**16**	**217**

Table 3. General Acute Care Hospital Situation Events by Unit—LAC, 2011

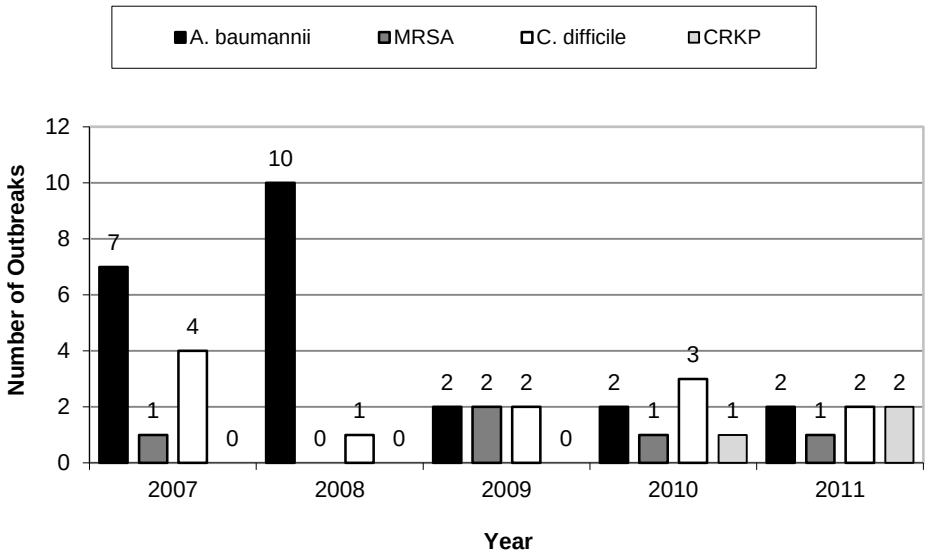
Outbreak Location	No. of Events
Intensive Care – Adult	1
Intensive Care - Neonatal	1
Office	1
Total	**3**

Table 4. General Acute Care Hospital Situation Events by Disease/Condition—LAC, 2011

Disease/Condition/ Etiologic Agent	No. of Events	No. of Cases
A. baumannii	1	9
*Klebsiella oxytoca**	1	0
Mixed GI & respiratory	1	8
Total	**3**	**17**

*K. oxytoca identified in formula only, no human cases.

Figure 2.
Outbreaks of Selected Bacterial Infections
by Year, LAC 2007-2011



COMMENTS

Multidrug-resistant organisms (MDRO) are well established in many healthcare facilities, and hospitals continue to struggle with healthcare associated infections (HAIs) caused by MDROs.[1] *A. baumannii*, methicillin-resistant *Staphylococcus aureus* (MRSA), *C. difficile*, CRKP and other multidrug-resistant pathogens frequently cause longer hospitalization and increased morbidity and mortality in medically complex hospitalized patients.[2]

In 2011, all nine bacterial outbreaks in LAC acute care hospital outbreaks were caused by MDROs. Of these, 62% (n=10) occurred in an intensive care or other specialized hospital unit. *Acinetobacter* outbreaks peaked in 2008, when 10 outbreaks were reported. This number has decreased by 80% (n=2) each subsequent year. The reasons for the decrease in MDRO outbreaks in 2011 are unknown.

The California Department of Public Health Healthcare Associated Infections program has established multiple prevention collaboratives to address HAIs, multi-drug resistance and related patient safety issues. These include *C. difficile*, MRSA, central line associated bloodstream infection prevention collaboratives (CLABSI) and catheter associated urinary tract infections (CAUTI).[3]

On the local level, ACDC staff participates in the Southern California Patient Safety Collaborative's HAI prevention, sepsis management and surgical care improvement project track along with hospital infection preventionists, administrators and other key staff.

REFERENCES

1. Hidron, A., Edwards, J., and Patel, J., et al., Antimicrobial-Resistant Pathogens Associated With Healthcare-Associated Infections: Annual Summary of Data Reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2006-2007 Infection Control and Hospital Epidemiology, November 2008, vol. 29, No. 11.

2. Siegel, J., Rhinehart, E and Jackson, M., et al., Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006. Centers for Disease Control and Prevention (CDC)/Healthcare Infection Control Practices Advisory Committee (HICPAC).

3. Centers for Disease Control and Prevention, California Activities to Prevent Healthcare-associated Infections. http://www.cdc.gov/HAI/state-hai-plans/ca.html.

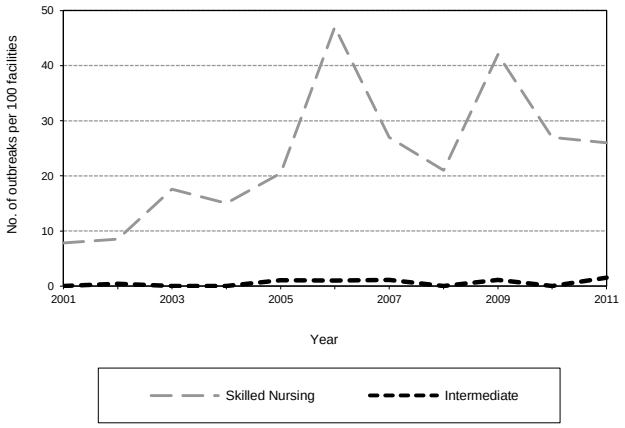
HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

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 free standing dialysis centers, skilled nursing facilities, 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, 2001 – 2011



ABSTRACT

- Total confirmed sub-acute care associated outbreaks declined substantially from a peak of 169 outbreaks in 2009, with 104 outbreaks and 2010 and 2011.This was largely due to a decrease in gastrointestinal and respiratory outbreaks.
- There was a slight increase in the number of skilled nursing facility outbreaks in 2011 from 110 outbreaks compared to 104 outbreaks in 2010 (Table 1). The rate of skilled nursing facility outbreaks is nearly consistent with 2010 with 26 per 100 facilities in 2011 (Figure 1).
- There were outbreaks in all four categories of subacute healthcare facilities in 2011.

Table 1. Number of Reported Outbreaks in Sub-acute **Healthcare Facilities LAC, 2007–2011**

	YEAR				
Type of Facility	**2007**	**2008**	**2009**	**2010**	**2011**
Intermediate Care Facilities	3	-	3	-	4
Psychiatric Care Facilities	3	2	-	-	3
Dialysis Centers	-	-	-	-	1
Skilled Nursing Facilities	110	85	166	104	102
Total	116	87	169	104	110

Intermediate Care Facilities: Four outbreaks were reported in intermediate care facilities in 2011, the largest number in the past five years. No outbreaks were reported in intermediate care facilities in 2010. These four investigations included norovirus, scabies, and unknown rash, and unknown respiratory illness.

Psychiatric Facilities: Three outbreaks were reported in psychiatric care facilities in 2011. This is an increase from 2009 and 2010, as no outbreaks were reported in psychiatric facilities. All outbreaks investigated at psychiatric care facilities were either scabies or unknown rash.

Dialysis Centers: One outbreak of *Stenotrophomonas* bacteremia was reported in 2011.This outbreak investigation is described in detail in the special reports 2011.

Skilled Nursing Facilities: Scabies and other rashes accounted for 60% of outbreaks. However, gastrointestinal outbreaks accounted for the most illness, 769 (51%) cases. No *Clostridium difficile* outbreaks were reported in 2011 compared to three such outbreaks reported in 2010. The total number of respiratory outbreaks was a third of those seen in 2009 and is consistent with the number reported in 2010 (Table 2).

Table 2. Skilled Nursing Facility (SNF) Outbreaks by Disease/Condition—LAC, 2011

Disease/Condition	No. of Outbreaks	No. of Cases
Invasive Group A *Streptococcus*	1	6
Stenotrophomonas maltophilia	1	3
Legionellosis	1	2
Gastroenteritis • Unspecified (n=8) • Norovirus (n=26)	34	769
Scabies	35	368
Scabies, atypical	1	4
Unknown Rash	30	270
Respiratory illness • Unspecified (n=2) • Influenza (n=4) • Varicella (n=1)	7	88
Total	**110**	**1510**

COMMENTS

LAC skilled nursing facilities experienced a decrease in the total number of reported outbreaks. There was a 36% increase in gastrointestinal outbreaks in 2011 compared to 2010. No outbreaks due to *Clostridium difficile* were reported in 2011. 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 compared to previous years. An invasive group A *Streptococcus* (IGAS) outbreak investigation was conducted by ACDC in 2011. Six cases were identified with IGAS, three of which resulted in death, and an additional two cases were identified with non-invasive GAS. Investigation revealed several breaches in infection control including improper hand washing and infection control policies that were not standardized to CDC guidelines.

The confirmed influenza outbreaks occurred in January and February 2011. The outbreaks affected a total of 60 people. Cases included 22 staff and 38 residents. Laboratory investigation revealed influenza A subtype H3 for a total of four respiratory illness outbreaks; the 2010-2011 seasonal influenza vaccine protected against this virus. Several studies have reported diminished vaccine effectiveness in the elderly. Timely administration of post exposure influenza prophylaxis to the elderly is critical.

Twenty-two LAC DPH districts investigated at least one healthcare facility outbreak during 2010. The Glendale (14, 13%), Pomona (13, 12%) and West (12, 11%) health districts investigated a larger proportion of outbreaks compared with other districts. Facilities in Service Planning Area (SPA) 2 (26, 26%) SPA 3 (21, 21%) and SPA 4 (19, 19%) reported the largest proportion of outbreaks in 2010.

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 influenza.

In 2009, the Scabies Task Force within ACD 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 that 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 accessed at: http://publichealth.lacounty.gov/acd/Diseases/Scabies.htm.
http://www.FoodSafety.gov

Acute Communicable Disease Control Program

Special Studies Report

2011

Los Angeles County
Department of Public Health

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

ACDC SPECIAL STUDIES REPORT 2011

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BOTULISM CASE REPORT SUMMARY
LOS ANGELES COUNTY, 2011

David Dassey, MD, MPH

Six suspected botulism cases (excluding infant botulism) were reported in 2011 to Los Angeles County Department of Public Health—three were laboratory confirmed, all due to toxin type A. Two of the three confirmed cases were classified as having unspecified botulism, defined as a clinically compatible case that is laboratory confirmed in a patient aged greater than or equal to one year who has no history of ingestion of suspect food and has no wounds.[1] In the first case, a middle aged man with metastatic cancer and history of stroke became ill and ultimately died. His serum was shown to have type A toxin, but tests of stool and gastric specimens were negative for both *Clostridium botulinum* and toxin. Home inspection did not uncover suspicious food items. The second confirmed case was an elderly woman who became ill while out of the country. She was transported home 12 days later, where tests ultimately detected *C. botulinum* producing type A toxin in her stool; her serum was negative for toxin. Tests of suspect food items was not possible since she was exposed while out of the country, but several homeopathic products she was using were screened to rule them out as a source of intoxication.

The third botulism case was an injection drug user with recent skin infection. His serum tested positive for type A toxin, while a culture of his wound was negative; thus his case was classified as wound botulism. According to recently revised botulism surveillance definitions, cases of wound botulism may now be classified as either confirmed or probable. A confirmed case has laboratory evidence of botulism while a probable case is a patient with a clinically compatible illness who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms, or a history of injection drug use within the 2 weeks before onset of symptoms.

The other three suspect cases were eventually diagnosed with Guillain-Barré syndrome (GBS). Two received antitoxin treatment and underwent testing of serum or stool, all of which was negative. One GBS case did not receive antitoxin and was not tested due to the delay in reporting his case; he too responded to GBS-specific therapy.

The California Infant Botulism Treatment and Prevention Program[2] reported eight confirmed Los Angeles County cases of infant botulism in infants ranging from 18 days to 36 weeks of age. Six were female; five were Hispanic white, one was non-Hispanic white, one was black, and the last was not specified. Three cases were due to type A toxin and five cases to type B toxin. All survived.

The Centers for Disease Control and Prevention (CDC) research study titled Use of an Investigational New Drug, Heptavalent Equine-Based Botulinum Antitoxin[3] was ongoing in 2011. Heptavalent botulinum antitoxin consists of equine-derived antibody to the seven known botulinum toxin types (A-G). State and local public health agencies, along with the treating physicians, are monitoring the clinical efficacy and adverse events associated with this product. Botulinum antitoxin for treatment of naturally occurring noninfant botulism is available only from CDC. BabyBIG (botulism immune globulin) is available for treating infant botulism through the Infant Botulism Treatment and Prevention Program. BabyBIG consists of human-derived botulism antitoxin antibodies and is approved by FDA for the treatment of infant botulism types A and B.

[1] Centers for Disease Control and Prevention. Botulism (*Clostridium botulinum*) 2011 Case Definition. http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/botulism_current.htm
[2] Infant Botulism Treatment and Prevention Program. Division of Communicable Disease Control, California Department of Public Health. http://www.infantbotulism.org/
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LOS ANGELES COUNTY'S 2010-2011 INFLUENZA SEASON: SUMMARY AND HIGHLIGHTS

Sadina Reynaldo, PhD and Elizabeth Bancroft, MD, SM

OVERVIEW

The 2010-2011 respiratory illness season in Los Angeles County (LAC), occurring approximately 18 months following the emergence of pandemic influenza H1N1 (pH1N1), was a moderate season with a return to LAC's typical cycle of influenza and respiratory illness activity. Unlike pH1N1 which yielded significant peaks in influenza illness at atypical times (late spring and early fall 2009), 2010-2011 returned to a usual respiratory illness season of bimodal peaks: a smaller peak in activity just prior to the New Year, increasing to a more substantial peak in mid-February. Influenza and respiratory syncytial virus (RSV) continued to be the dominant viruses and the unique consequences of pH1N1 virus remained: such as a shift in influenza deaths affecting younger individuals and a high prevalence of obesity among those fatalities.

RESPIRATORY VIRUS SURVEILLANCE IN LAC

Tracking the incidence of influenza, and other respiratory viruses, in LAC is unique and challenging—foremost because identifying all individual cases and requiring that all cases be reported to LAC Department of Public Health (DPH), is not possible. For example, influenza affects numerous individuals each year; on average during a mild season, roughly 10% of the population can contract this disease. Thus in LAC, with a population of roughly 10 million, even light seasons can result in roughly 1 million residents affected by this disease—an amount that would overwhelm any health department. Therefore, without the capability to identify the full gamut of individual cases of influenza, or other respiratory virus infections in LAC, the LAC DPH implements a broad range of surveillance methods that successfully determine the impact these diseases have in our communities. A summary of LAC DPH's annual surveillance activities is updated yearly and posted on LAC DPH's website.[1]

The cornerstone to LAC DPH's surveillance is our summary of viral test results sent weekly by several sentinel laboratories throughout LAC. Most laboratories report both influenza and RSV; several laboratories also report results on parainfluenza, adenovirus, entero/rhinovirus, and the emerging pathogen human metapneumovirus. Our participating sentinel laboratories generate and submit thousands of viral test results every year; nearly 22,000 in the 2010-2011 season alone (Table 1). Aggregating the findings from these sentinel sites enhances LAC DPH's ability to determine the onset, peak and decline of influenza and respiratory illness activity. LAC DPH's surveillance is also instrumental in characterizing the prevalent viral strains circulating in our communities (Figures 2-4). LAC DPH also monitors and investigates reports of illness clusters and outbreaks due to respiratory illnesses; a total of 50 respiratory illness outbreaks due to a range of etiologies were confirmed by LAC DPH during the 2010-11 season (Table 1 and 2). In addition, LAC DPH conducts several special studies. For instance, in 2010-2011 LAC DPH initiated a study, funded by the Centers for Disease Control and Prevention (CDC) and the Council of State and Territorial Epidemiologists, assessing rates of influenza-like illness (ILI) among several outpatient facilities across LAC.[2] This study included viral tests to determine the etiology of the illness. LAC DPH also conducts extensive year-round syndromic surveillance that enhances our influenza surveillance including an assessment of ILI rates among emergency department visits across LAC (Figure 1). These aggregated longitudinal findings further support LAC DPH's assessment of the severity of the season as well as the onset, peak and decline of respiratory illness activity.

CHANGES IN REPORTING FATAL AND SEVERE CASES OF INFLUENZA

While, as described previously, individual reports of influenza cases are not reportable in LAC, there are two exceptions: 1) cases likely to due to a novel strain of influenza should be reported immediately so that

[1] http://publichealth.lacounty.gov/acd/FluSurveillance.htm
[2] See "Overview of Influenza Incidence Surveillance Project" in the 2011 ACDC Special Reports

LACDPH can assist in determining the true cause and etiology of illness, and 2) fatalities that are confirmed to have resulted from influenza. The reporting of influenza fatalities and severe cases has changed over the past several years. In 2003, the California Department of Public Health (CDPH) mandated the reporting of pediatric influenza-related fatalities and cases in intensive care units. As such, LACDPH has been able to track the impact of this disease among our children for several years. In 2009, with the advent of pH1N1, the mandatory reporting of severe cases and fatalities was expanded to all ages. However, as the impact of pH1N1 declined, reporting was streamlined. In October 2010, LAC DPH removed the reporting requirement for cases in intensive care units, but retained the requirement that ***all*** fatalities, of any age, with confirmation of influenza infection should be reported to LACDPH within 7 days of identification. This reporting standard differs from CDPH which only requires reports for fatalities among those younger than 65 years of age. LACDPH's reporting standard allows for an understanding of the impact of influenza across the full age spectrum and will be especially useful as pH1N1, which tends to affect younger individuals, is supplanted by other strains of influenza.

SEASON SUMMARY: A RETURN TO NORMAL CYCLES OF INFLUENZA

Overall for the 2010-2011 influenza season, LAC experienced moderate and fairly typical flu activity. The advent of pandemic H1N1 in April 2009 produced atypical peaks of activity in the spring and fall of that year,[3] but 2010-2011 saw the return to a "typical" influenza season with a peak of positive influenza tests occurring in February. By mid-February nearly one-fourth (24.5%) of all submitted viral tests from our sentinel laboratories were positive for influenza (Table 1). Furthermore, the positive percentage of influenza in March (~10%) was just as high as in December, which illustrates the importance of continuing influenza vaccination past the New Year and into spring.

In addition during this season, there were aspects of LAC's influenza activity that were unique to our jurisdiction as compared to the rest of the nation. While the same three primary influenza strains were identified across the nation, overall, LAC saw significantly more type B influenza than the rest of the US. As shown in Table 1, from the beginning to the end of the season (August 29, 2010 to May 21, 2011) nearly 22,000 respiratory specimens were tested in sentinel laboratories in LAC; of these specimens, 2,122 (9.7%) tested positive for flu, and of these slightly less than half (43%) tested as type B. In contrast, the CDC's national surveillance collected a total of 137,139 specimens throughout the season, yielding 27,186 (19.8%) positive for flu and further identifying only 26% as type B (Figure 2). This season, treatment and prophylaxis recommendations for influenza were identical for all circulating strain types—but this is not always the case. The differences that can occur in LAC as compared to the rest of the nation demonstrate the importance of maintaining local surveillance for influenza and to tailor influenza guidance to match local findings.

OTHER RESPIRATORY VIRUSES

Beyond influenza, several other respiratory viruses were prevalent during 2010-2011, and these viruses contributed to the overall burden of respiratory illness. As shown in Figure 4, RSV peaked several weeks earlier in the season (around week 1) than influenza and yielded similar rates of detection. Levels of enterovirus/rhinovirus, parainfluenza, human metapneumovirus, and adenovirus, did not increase substantially until both RSV and influenza declined; more importantly, these viruses continued to circulate and cause illness long after the "influenza" season was considered over. This expanded viral surveillance illustrates that several viruses, other than just influenza, comprise what is commonly referred to as "flu season," and ILI activity can have a range of causes.

RESPIRATORY OUTBREAKS SUMMARY

Another aspect of LAC DPH's illness surveillance that greatly assists with our understanding of the severity and impact of disease is the reporting and investigation of respiratory illness outbreaks. During 2010-2011, respiratory outbreaks were reported from across LAC. As shown in Table 2, of the 50 confirmed respiratory outbreaks in "community" settings (non-healthcare settings), most (84%) occurred

[3] Summarized at http://publichealth.lacounty.gov/acd/docs/Flu/Season09-10/IW_Summary.pdf

in elementary schools. The average duration of the outbreaks was 12 days with a range of 2 to 41 days. Only 30% of the outbreaks had a laboratory confirmed etiology: of those, most (86%) were due to the vaccine preventable viruses, influenza A and B. Of the 48 confirmed outbreaks in schools, only four reported offering the influenza vaccine at the school prior to the outbreak. To prevent outbreaks, it is important to get vaccinated to be protected against influenza, especially for elementary and school-aged children.

CHARACTERISTICS OF CONFIRMED INFLUENZA DEATHS

LAC DPH's monitoring and investigation of influenza-related fatalities provides valuable insight into those who are most affected by this disease. While 2010-2011 was no longer considered a "pandemic" season, and the impact of novel pH1N1 was lessened (Figure 5), the unique groups predominantly affected by this virus continued, as was especially evident in the season's flu fatalities (Table 3).

Table 1. LAC Influenza Surveillance Summary (2010-2011)

LAC Surveillance Summary	Influenza Peak Week Week 7 (2/13/11-2/19/11)	2010-11 Season Summary (8/29/10-5/21/11)
Positive Flu Tests / Total Tests (Percent Positive Flu Tests)	354 / 1,442 (24.5%)	2,122 / 21,987 (9.7%)
Percent Flu A / B	56% / 44%	57% / 43%
Positive RSV Tests / Total Tests (Percent Positive RSV Tests)	100 / 730 (13.7%)	1,304 / 12,720 (10.3%)
Community-Based Respiratory Outbreaks*	3	50
Flu Deaths, Confirmed* (Pediatric Deaths, Confirmed*)	3 (0)	34 (3)

* By date of onset.

Figure 1
Influenza-like Illness ED Visits in LA County (2007-2011)
Surveillance Week 20

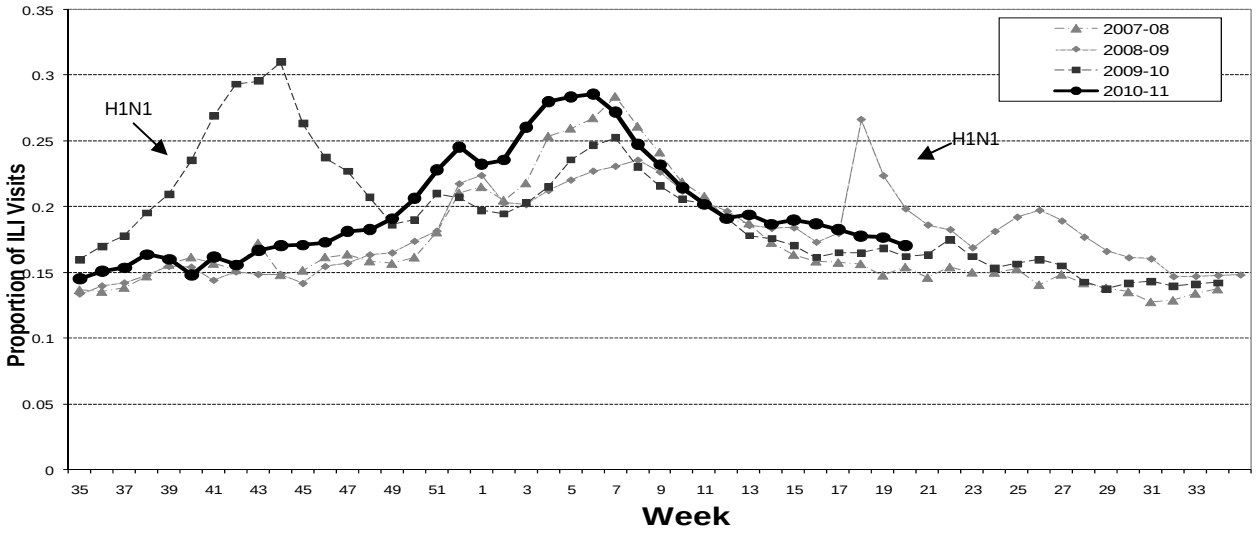

Figure 2
Percentage of Type A versus Type B Influenza
LA County and Nationwide
(2010-2011)

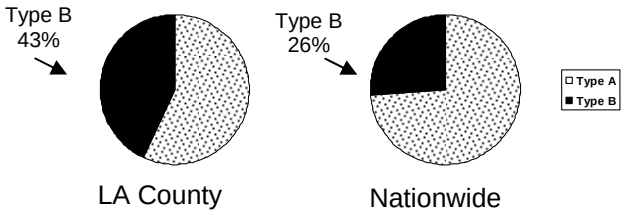

Figure 3
Percent Positive Flu (All Types, Type A, Type B)
LA County (2010-2011)

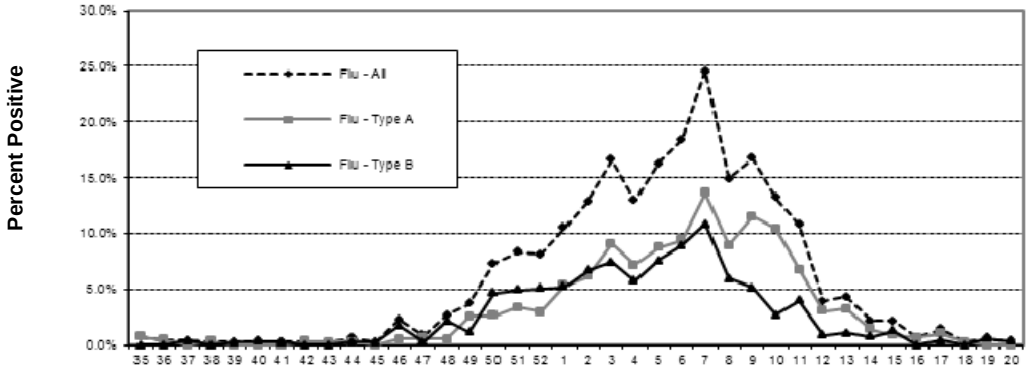

Figure 4
Percent Positive for Seven Respiratory Viruses from Three Laboratories by MMWR Week
LA County (2010-2011)

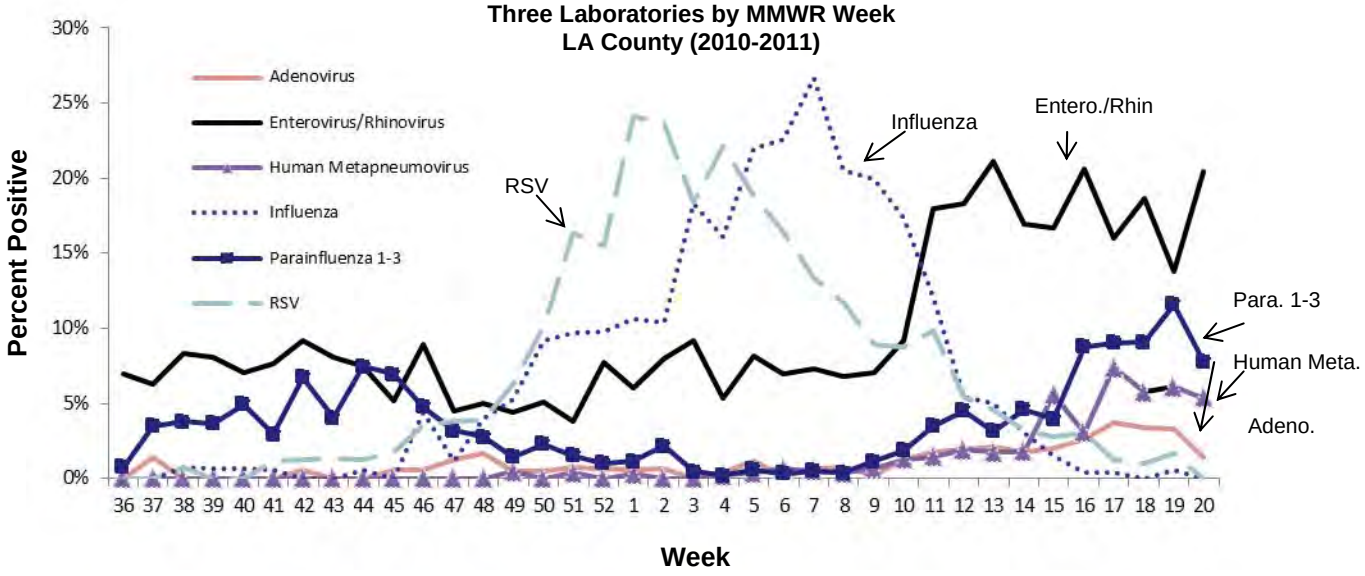

Table 2. Confirmed Community-Based Respiratory Outbreaks LAC 2010-2011 (n=50)		
Location of Outbreak	n	%
Childcare	3	6
Elementary School	42	84
High School	2	4
K-12 School	1	2
Assisted Living	2	4
Etiology		
Influenza A	2	4
Influenza B	7	14
Streptococcal	2	4
Mixed *	3	6
Unknown	36	72
* All the mixed outbreaks reported involved influenza.		

Figure 5
Number of Influenza-Related Deaths by Week of Onset
LA County (2009-2011)

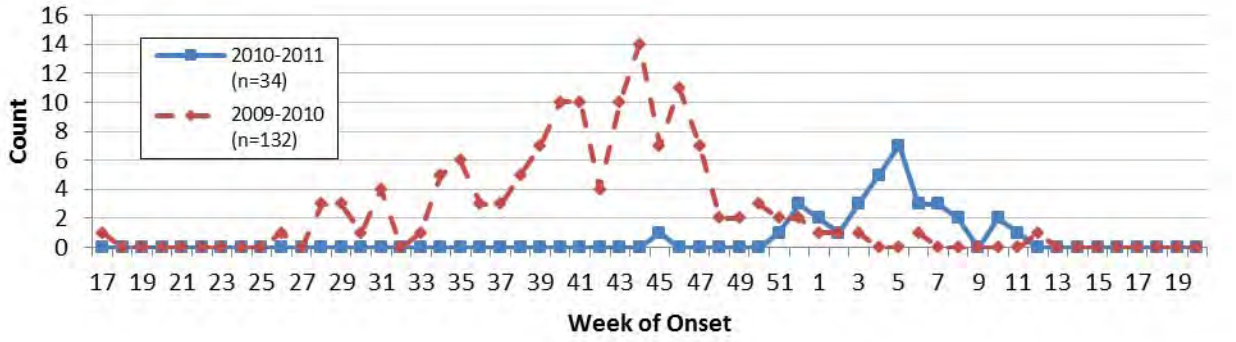

Table 3. Characteristics of Confirmed Influenza-Related Deaths LAC 2010-211		
Demographic Characteristics		Number (%)
Age Group	0-18	3 (8.8%)
	19-64	28 (82.4%)
	65+	3 (8.8%)
	Median	46.5
	Range	4-92
Race	Hispanic	21 (61.8%)
	White Non-Hispanic	7 (20.6%)
	Asian	4 (11.8%)
	African-American	2 (5.9%)
Gender	Female	18 (52.9%)
	Male	16 (47.1%)
Viruses Associated with Influenza Fatalities		
	Type A (all)	30 (88%)
	- pH1N1	- 15 (44%)
	- A (no subtype)	- 14 (41%)
	- H3N2	- 1 (3%)
	Type B	4 (12%)
Underlying Medical Condition*		Number (%)
	Obesity	18 (52.9%)
	Cardiac	16 (47.1%)
	Metabolic (Diabetes, Kidney Failure)	13 (38.2%)
	Overweight	9 (26.5%)
	Pulmonary	7 (20.1%)
	Current Smoker	6 (17.6%)
	Past Smoker	3 (8.8%)
	Acquired Neurologic Disease	3 (8.8%)
	Immunosuppression	1 (2.9%)
	Developmental Disability	
* Individuals may have more than one condition.		

There were only 34 deaths due to influenza in 2010-2011 versus 139 during the pandemic of 2009-2010. Despite the difference in magnitude of deaths, there were some significant similarities between the two respiratory seasons. In both seasons, people older than 65 years represented a very small minority of the reported cases, which may represent pre-existing immunity to the pH1N1 virus and/or decreased testing in the elderly. Another unique and significant continuing risk category is obesity. Obesity (BMI >30) was first identified in 2009 with the advent of pH1N1 as independent risk factor for influenza death, and this condition continued to be highly prevalent this season 2010-2011 among LAC fatalities, occurring in more than half of the deaths—combining both the categories of obesity and overweight (BMI >25) accounted

for almost 80% of LAC's influenza fatalities. However, there were some notable differences between the two seasons: in 2009-2010, the majority of the fatalities occurred early in the flu season (October-December) versus this past year when the majority of the fatalities had onset in February during our normal peak influenza season (Figure 4). Also compared to the previous season,[4] during 2010-2011 the proportion of severe influenza cases in pregnant women or people with developmental disabilities decreased. Finally, while last season almost all deaths were due to pH1N1, or influenza A which was presumed to be pH1N1, in 2010-2011 additional influenza strains regained prominence; for instance, this season there were several (n-4, 12%) deaths associated with influenza B.

CONCLUSION

The influenza virus is always mutating, always changing—new strains emerge almost every season. As such, influenza, including its impact and severity, is also always unpredictable. This phenomenon was clearly illustrated by pH1N1; not only did it emerge unexpectedly, it yielded significant peaks of illness during atypical times in the year. Another unpredictable consequence of pH1N1 is that this strain tends to predominantly affect, and continued to impact, younger, as opposed to older, individuals.

Despite the unpredictability of influenza, there are several factors illustrated by the 2010-2011 season that should serve as a basis for future education, prevention and policy. First, while LAC DPH urges all residents to be vaccinated to protect themselves and their loved ones from contracting influenza, and LAC DPH urges that vaccination occur as early in the season as possible, LAC's cycle of influenza activity, which persists well into the spring, should encourage physicians and the public to continue to provide and receive influenza vaccination even in January and February. Second, LAC DPH's surveillance also revealed that our influenza activity in 2010-2011 differed from the rest of the nation. As such, our residents, and especially our medical communities, should focus on local guidance and recommendations which might differ from state and federal statements.

Finally, as demonstrated from the findings from 2010-2011, it is also especially important to improve vaccination and other preventive strategies for LAC's children and other high risk groups including people that are obese: the vast majority of LAC's influenza fatalities (80%) were either overweight or obese. While there were limited fatalities in children this season, the predominance of influenza outbreaks in elementary schools is evidence that this virus can circulate in the young and possibly spread the virus to those more vulnerable. Traditional and past influenza campaigns tend to focus mostly on other groups, such as the elderly and those with medical risk factors (such as those with respiratory issues). For future efforts, it is critical to improve outreach, education and policies that can advance vaccination and other preventive strategies for both for people who are at risk for severe consequences of influenza as well as healthy individuals who are likely to spread this disease through our communities.

ACKNOWLEDGMENT

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Monica Sovero, MPH—Acute Communicable Disease Control Program, Epidemiology Analyst

[4] Summarized at http://publichealth.lacounty.gov/acd/docs/Flu/Season09-10/IW_Summary.pdf

DETERMINING INFLUENZA AND OTHER RESPIRATORY VIRUS ACTIVITY IN OUTPATIENT HEALTHCARE SETTINGS: THE INFLUENZA INCIDENCE SURVEILLANCE PROJECT IN LOS ANGELES COUNTY

Brittany Wurtz, MPH

BACKGROUND

During peak weeks of influenza, 5-8% of all outpatient visits in primary care settings are for influenza-like-illness (ILI) [1]. Although difficult to determine at the community level, ILI data help public health officials understand the impact of influenza and other respiratory pathogens on a community. In order to determine the weekly incidence of ILI and the contributions of select respiratory viruses in causing ILI in patients who go to the doctor for illness, in 2009 the Centers for Disease Control (CDC) and the Council of State and Territorial Epidemiologists (CSTE) initiated the Influenza Incidence Surveillance Project (IISP). IISP uses systematic surveillance for medically-attended ILI and laboratory-confirmed infections due to a variety of viral pathogens including influenza in broad geographic areas over several states and major municipal areas in the US. Los Angeles County (LAC) Department of Public Health (DPH) joined IISP in 2010. This report summarizes the LAC IISP from August 2010-April 2012.

METHODS

Acute Communicable Disease Control Program (ACDC) recruited multiple health care providers (HCP) with a moderate patient volume (approximately 100-150 patients per week) whose practices represent all age groups, geographic and socio-economic diversity.

HCPs reported weekly data electronically through Surveymonkey™ on the total number of patient visits and ILI visits by age groups: <1 year, 12-23 months, 2-4 years, 5-17 years, 18-24 years, 25-49 years, 50-64 years, and >65 years of age. The IISP case definition for ILI in patients aged ≥2 years was: measured or reported fever along with cough or sore throat in the absence of a known cause other than influenza. Among patients aged <2 years ILI was defined as measured or reported fever with at least one symptom including cough, sore throat, coryza, rhinorrhea, anorexia, chills, myalgia, or malaise, in the absence of a known cause other than influenza.

HCPs collected a nasopharyngeal (NP) swab, along with brief demographic and clinical data on a case history form, from the first ten consenting ILI patients seen each week. No names or addresses were collected; patients were assigned unique alphanumeric codes by HCPs when data or specimens were sent to LAC DPH. HCPs received from $300-$500 in gift cards per month for their participation in IISP to reimburse them for their time in collecting specimens, filling out paperwork, and reporting results.

Specimens were analyzed by the LAC DPH Public Health Laboratory (PHL) using the Luminex® instrument and xTAG® respiratory viral panel (RVP) which tests for non-specific influenza A (subtypes seasonal H1, H3), influenza B, RSV (A&B), adenovirus, Human metapneumovirus (hMPV), parainfluenza 1-3, and rhinovirus. Influenza A specimens that could not be typed by RVP were analyzed by RT-PCR to determine if the influenza A specimen was the 2009 pandemic H1N1 strain (pH1N1). Final results were sent by PHL to ACDC and to the submitting HCP.

Data were stored in MS® Access 2010 and analyzed using SAS® version 9.2. ACDC sent weekly reports to the CDC using a secure File Transfer Protocol server of aggregate demographic and laboratory data collected. Data were analyzed periodically by ACDC to determine incidence of ILI, influenza, and other respiratory viral pathogens in ILI patients.

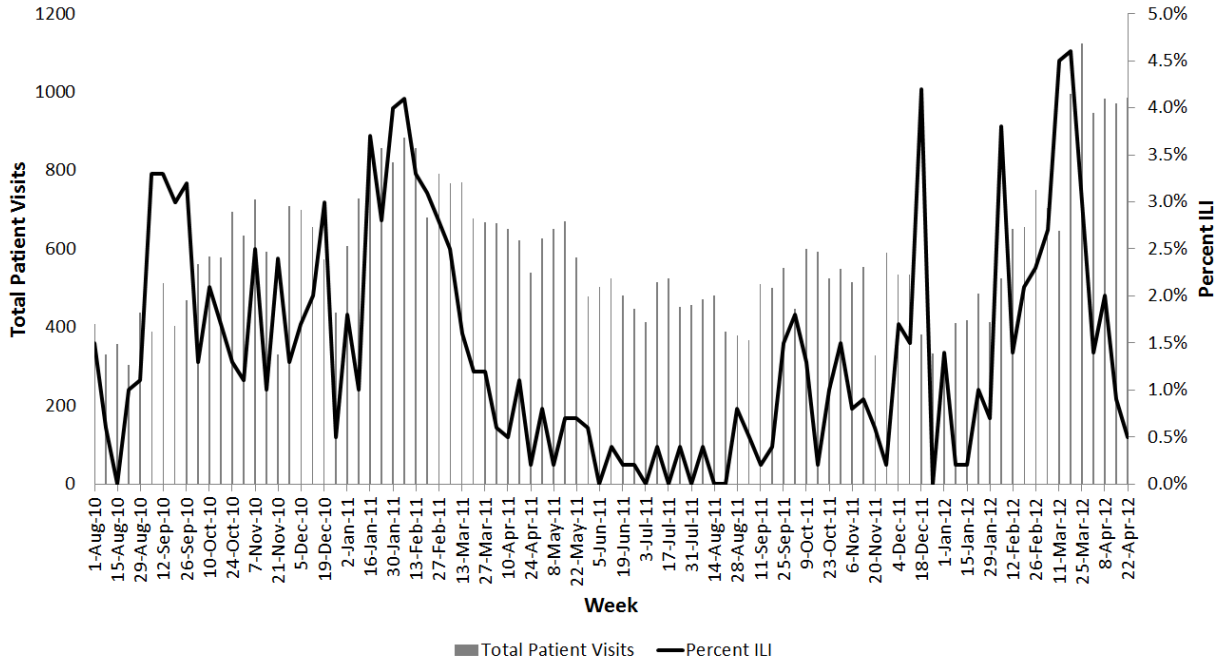
The LACDPH Institutional Review Board reviewed the IISP protocol and deemed the project to be exempt because it was considered routine public health surveillance. All personal health information protections were followed.

RESULTS

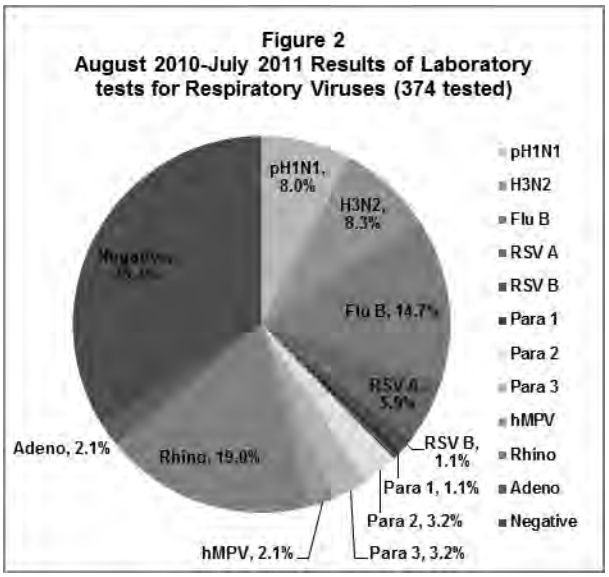
In the first year of the project (August 2010-July 2011), ACDC recruited six HCPs to the project (not all of the HCPs participated during the whole surveillance period). By May of the second year of the project there were eight HCPs participating, including five that had participated in the first year (not all of the HCPs participated in the project for the entire second surveillance year). Of the eight HCPs, five served underserved populations in LAC which include four family practice clinics serving predominately minority, indigent populations; a healthcare setting which served the LAC juvenile detention system; and two family practice residency clinics. Other HCPs include two pediatricians' offices and a family practice site in an area of LAC with individuals of a higher socioeconomic status.

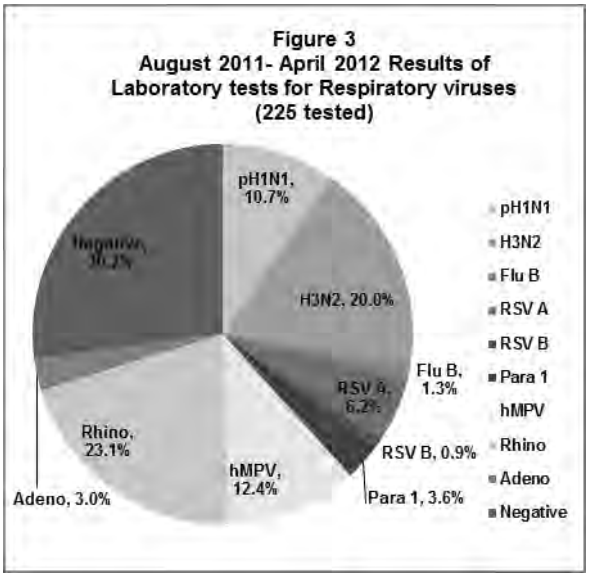
In the first surveillance year (August 2010-July 2011) the proportion of outpatient visits for ILI among HCPs in LAC reached peak activity in the week starting February 6, 2011 with 4.1%. In the second year of surveillance (August 2011-April 2012) the peak week of ILI activity was the week starting March 18, 2012 with 4.6% of outpatient visits for ILI (Figure 1).

Figure 1
Percent of ILI Visits/Total Patient Visits by Week, August 2010-April 2012



From August 2010 to April 2012, a total of 613 specimens were collected, of which 601 have been analyzed by May 25, 2012. Figures 2 and 3 demonstrate the incidence of viral pathogens among IISP specimens tested by Luminex®. Overall, more specimens were collected in the first year versus the second year (374 versus 225); the same percentage of specimens from the first to the second surveillance year had a virus detected (64.7% versus 69.7%). Influenza as a whole was the most common pathogen in both years but there were notable differences between the years. The first year saw a much higher incidence of influenza B (14.7%) versus 1.3% in the second year. hMPV in the first year accounted for only 2.1% of positive collected specimens compared to the second year at 12.4%.





Virus incidence by age group for year one of surveillance demonstrates that rhinovirus was the most common cause of ILI in children <5 years. Influenza (all types) was the primary cause of ILI among patients ages 5-17 years old, 18-24 years old, and 50 years and older (Table 1). Rhinovirus and influenza were equally prevalent in those aged 25-49 years. The data from year two are sparser but show the same trend, with rhinovirus being the most prevalent agent causing disease in those < 5 years, and influenza mainly affecting those 5 and older. (Table 2),

Table 1
Top 3 Viruses by Age Group (with at least 15% prevalence), August 2010-July 2011

	0-11 mos (n=15)	12-23 mos (n=37)	2-4 yrs (n=59)	5-17 yrs (n=186)	18-24 yrs (n=25)	25-49 yrs (n=35)	≥ 50 yrs (n=14)
1	Rhinovirus (8)	RSV (8); Rhinovirus (8)	Rhinovirus (17)	Influenza B (43)	Influenza A* (6); Rhinovirus (6)	Rhinovirus (9)	Rhinovirus (2); Influenza A* (2)
2	Influenza B (2); Parainfluenza (2)	Parainfluenza (4)	RSV (9)	Influenza A* (41)		Influenza A* (5)	
3			Parainfluenza (6)	Rhinovirus (21)		Influenza B (4)	

* Includes both Influenza A pH1N1 and H3N2

Table 2

Top 3 Viruses by Age Group (with at least 15% prevalence), August 2011- April 2012

	0-11 mos (n=9)	12-23 mos (n=24)	2-4 yrs (n=67)	5-17 yrs (n=100)	18-24 yrs (n=1)**	25-49 yrs (n=14)	≥ 50 yrs (n=10)
1	Rhinovirus (3)	Rhinovirus (10)	Rhinovirus (18)	Influenza A* (44)		Influenza A* (5)	Rhinovirus (3); Influenza A* (3)
2	Human Metapneumovirus (2)	Human Metapneumovirus (4)	Influenza A* (14)	Rhinovirus (17)		Human Metapneumovirus (2)	Human Metapneumovirus (1)
3	Influenza A* (1); RSV (1)	RSV (3)	Human Metapneumovirus (9)	Human Metapneumovirus (10)			

* Includes both Influenza A pH1N1 and H3N2
** Specimen Tested Negative

DISCUSSION

IISP uses outpatient healthcare settings to estimate influenza and other respiratory viral pathogens at the community level. In LAC, IISP data demonstrated variability in the incidence of ILI throughout the year and the difference in the incidence of viruses from year to year. Trends found in IISP data are consistent with LAC wide surveillance. Each month during influenza season the LAC *Influenza Watch* report demonstrates county-wide trends on influenza and other respiratory viruses [2]. IISP data consistently showed similar trends of peak ILI activity and incidence of viruses causing such activity although pulling from a smaller number of sentinel providers. During the second year of surveillance both IISP and LAC wide data showed ILI activity peaking later in the season. Both systems showed that influenza was the predominant virus causing illness and that there was a higher level of hMPV in 2011-2012 than 2010-2012. The benefit of IISP is that it permits analysis by age group, demonstrating that rhinovirus is of particular concern in those <5 years.

Of note, more than 60% of patients who presented to an outpatient healthcare setting with ILI have a virus identified that could have been the cause of their illness. Upper respiratory infections are the single most common condition for which antibiotics are prescribed. Most medical societies counsel against using antibiotics for these infections because most are presumed to be due to viral causes where antibiotics are not useful [3]. Data such as these from the LAC IISP may convince healthcare providers locally that most ILI is due to a viral cause and may help reduce the prescription of unnecessary antibiotics.

There are limitations to our data. In recruiting HCPs to participate in IISP we strove to have an accurate representation of LAC residents but we preferentially recruited clinics caring for underserved populations. This may contribute to an IISP population with a large number of influenza unvaccinated individuals which would result in a higher incidence of influenza than the general population. However, the IISP data tracked well with the sentinel laboratory data used for standard surveillance in LAC so it is unlikely that this was a significant bias. Until the spring of 2012, when several more family practice HCPs were recruited, there was a disproportionate number of pediatric HCPs in the LAC IISP cohort. Generally, different age groups are susceptible to different viruses. Thus we presented both the overall incidence of viruses and the age stratified incidence of viruses. Those data clearly show that rhinovirus is more prevalent in those <5 years whereas influenza is more prevalent in those >5 years. Only recently, in 2010, has the Advisory Committee on Immunization Practices recommended influenza vaccine for all ages in the US. As more adults become vaccinated against influenza, we might start to see the role of influenza in outpatient ILI decline [4].

Overall, the ability of IISP to successfully collect surveillance in outpatient healthcare settings demonstrates for future studies the opportunities provided public health researchers to use these settings for other surveillance.

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SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI* IN LOS ANGELES COUNTY, 2006-2011: AN EXAMPLE OF THE GROWING ROLE OF NONCULTURE METHODOLOGIES IN DISEASE SURVEILLANCE

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Shiga toxin-producing *Escherichia coli* (STEC) is a gram-negative bacteria responsible for approximately 175,000 illnesses and 20 deaths per year in the United States[1]. It is associated with a wide variety of exposures that have in common contact with feces, including eating undercooked ground beef, unpasteurized milk and juice, and contaminated produce, as well as direct contact with animals or fomites contaminated with STEC. STEC can cause a spectrum of illness, ranging from asymptomatic infection to the classic presentation of bloody diarrhea and abdominal pain. Approximately 5-10% of STEC infections may lead to hemolytic uremic syndrome (HUS), a severe complication characterized by hemolytic anemia and acute renal dysfunction that may be fatal.

Historically, STEC illness, especially with severe complications such as HUS, has been associated with the STEC serotype O157:H7. However, increasing attention has been paid to the non-O157 serogroups of STEC in human illness. To better study this, non-O157 STEC was made nationally notifiable in 2000. In California, Shiga toxin in feces, even without further characterization, is also reportable. The widespread STEC outbreak in Germany in 2011 was due to a non-O157 serotype, O104:H4. This outbreak, linked to fenugreek sprout consumption, caused illness in over 4000 people, with development of HUS in over 800 patients, highlighting the pathogenic potential of non-O157 strains[2]. Furthermore, reflecting growing recognition of non-O157 serotypes in human illness, the U.S. Department of Agriculture added to its longstanding ban on O157:H7-tainted ground beef by imposing a similar ban on the "Big Six" group of non-O157 strains (specifically, O26, O111, O103, O121, O45, and O145), effective sometime during 2012.

Los Angeles County (LAC) has historically had lower rates of STEC than rates seen nationwide, although the reasons for this are unclear. This study was undertaken to better characterize the epidemiology of O157 versus non-O157 STEC in the LAC community.

METHODS

A reportable case of STEC in LAC is defined as laboratory confirmation of any STEC serogroup by culture **or** detection of Shiga toxin in feces by enzyme immunoassay (EIA) or polymerase chain reaction (PCR) for Shiga toxin genes; positive specimens are forwarded to the LAC Public Health Laboratory (PHL) for further testing. For those cases for which only Shiga toxin-positive stool is received, LAC PHL confirms the positive result by EIA and initiates serogroup identification by culture. LAC PHL is equipped to identify O157 and four of the most prevalent non-O157 serogroups: O26, O103, O111, and O126. Any specimens that cannot be identified are forwarded to the California Department of Public Health Microbial Diseases Laboratory (CDPH MDL) or to the Centers for Disease Control and Prevention (CDC) for further testing, if the clinical history is compatible with likely STEC illness.

Cases included in this study are LAC residents with illness reported to LAC Department of Public Health (DPH) between January 1, 2006, when a systemic database for non-O157 STEC data was initiated, through June 30, 2011. Of note, clinical suspicion for HUS is also reportable in LAC, while confirmatory tests for STEC are underway. However, HUS cases that were ultimately not confirmed to be related to STEC infection were not included in this study. Data was stored in Microsoft Access and Excel, and Fisher's exact test and chi-square analysis comparing O157 to non-O157 cases was performed using SAS® v9.2. National STEC rates were obtained from the CDC FoodNet website[3].

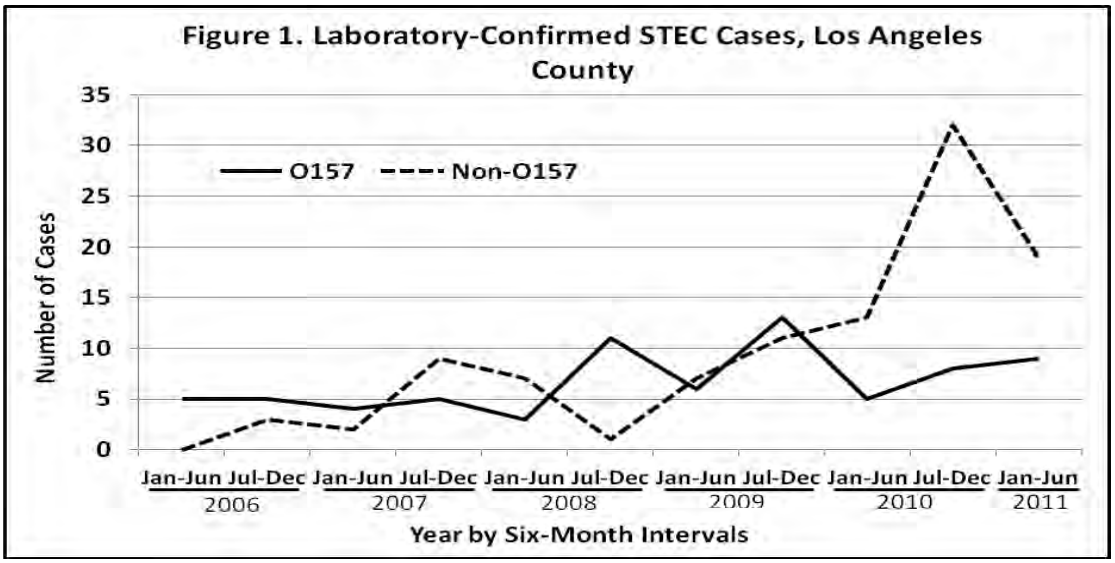
RESULTS

Between January 1, 2006, and June 30, 2011, there were a total of 217 reported STEC cases in LAC; 178 are included in this study due to incomplete reporting of data. Of these 178, 74 were O157 and 104 were non-O157. Overall, 86 cases (48.3%) were female; among non-O157 patients only, 47 (45.2%) were female, but a slight female predominance was noted among O157 cases, with 39 (52.7%) females (Table 1). Children under the age of 6 represented the largest age group among both O157 and non-O157 cases, although this was most dramatic among non-O157 cases where children under 6 years of age represented 61.5% of all non-O157 patients (versus 37.8% in O157).

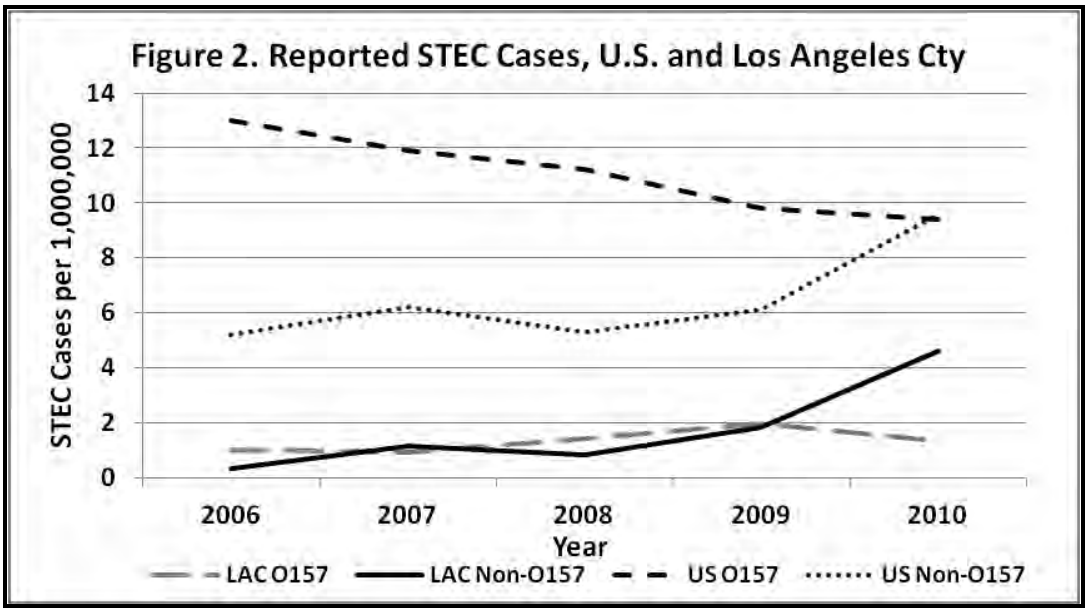
TABLE 1. Demographic Data of STEC Cases, Los Angeles County, Jan 2006-Jun 2011.

			Age			
		Female	<6 years	6-18 years	19-64 years	>64 years
STEC serotype	Total	n (%)	n (%)	n (%)	n (%)	n (%)
O157	74	39 (52.7)	28 (37.8)	19 (25.7)	20 (27)	7 (9.5)
Non-O157	104	47 (45.2)	64 (61.5)	13 (12.5)	22 (21.2)	5 (4.8)

Figure 1 displays the trend in laboratory-confirmed STEC cases from January 2006 through June 2011. While O157 cases have remained relatively stable during this time period, the number of diagnosed and reported non-O157 cases has overall steadily increased, with a dramatic increase in the second half of 2010.



Both national and LAC rates of reported STEC cases are depicted in Figure 2. Even with the marked increase in non-O157 STEC reporting in LAC in 2010, rates of both O157 and non-O157 in LAC are still markedly lower than the respective rates seen nationwide, with rates of 1.3 cases/million and 4.6 cases/million, respectively, compared to nearly 10 cases/million for both O157 and non-O157 nationally.



Clinical characteristics of illness severity, including presence of bloody diarrhea, hospitalization, HUS, and death are listed in Table 2. More severe illness overall was noted among O157 STEC infections, with significant differences noted with respect to all of these parameters except death. Two deaths in patients with STEC illness were reported during this time period: a 57 year old man with O157:H7 illness who developed HUS in 2011, and a 66 year old woman with non-O157 illness (specifically, O118:H16) in 2008.

TABLE 2. Clinical Characteristics of Illness Severity, O157 vs Non-O157 STEC, Los Angeles County, Jan 2006-Jun 2011.

		Bloody Diarrhea	Hospitalized	HUS	Death
STEC serotype	**Total**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
O157	74	64 (86.5)*	28 (37.8)*	5 (6.8)**	1 (1.4)
Non-O157	104	30 (28.8)	5 (4.8)	0 (0)	1 (<1)

*P<0.0001
**P<0.01

Table 3 lists risk factors associated with illness in O157 versus non-O157 STEC cases in LAC during this time period. Examined risk factors include those associated with recent STEC outbreaks or associated with disproportionate illness in other studies. However, in this study population, there were no significant differences between O157 and non-O157 STEC cases who ate ground beef, ate sprouts, drank raw milk or unchlorinated water, visited a farm, or recently traveled.

TABLE 3. Risk Factors Associated with Illness, O157 vs Non-O157 STEC, Los Angeles County, Jan 2006-Jun 2011.

		Ate ground beef	Ate sprouts	Drank raw milk	Drank unchlor. water	Visited farm	Recent travel
STEC serotype	Total	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
O157	74	33 (44.6)*	1 (1.4)*	1 (1.4)*	1 (1.4)*	2 (2.7)*	7 (9.5)*
Non-O157	104	43 (41.3)	4 (3.8)	4 (3.8)	5 (4.8)	6 (5.8)	16 (15.4)

*P>0.05

DISCUSSION

Overall, LAC experiences a lower rate of STEC illness than that seen nationally, although other studies have not identified a clear explanation. STEC illness occurred in an approximately equal frequency among males and females. Many cases are noted among children for both O157 and non-O157. Most striking about the age profile is the large proportion of non-O157 STEC seen among young children under the age of 6 years, much greater than the proportion of O157 diagnosed in this age group. This likely reflects increasing usage of Shiga toxin screening in a population who is already more apt to undergo diagnostic testing, with concerned parents bringing their ill children for medical evaluation more often than adults might self-present.

The advent of diagnostic testing methods for Shiga toxin in 1995 is the key change in testing practices that led to the recognition of non-O157 STEC serotypes in human illness. These rapid assays, which include both EIA for Shiga toxin or PCR for Shiga toxin genes, are highly sensitive and designed to detect the presence of Shiga toxin from any STEC serotype, unlike traditional culture methods used to identify O157 that were the prior mainstay of STEC surveillance. However, although much faster than culture, Shiga toxin testing is unable to provide specific STEC serogroup or molecular data necessary to identify an outbreak. Thus, despite the rapidity of these assays, reliance on Shiga toxin testing as a diagnostic tool may actually delay the detection of an outbreak because it defers serogroup testing to a later stage.

In response to this, in 2006[4] and 2009[5] CDC issued formal laboratory diagnostic guidelines for STEC detection, recommending that stool specimens from patients suspected to have STEC undergo concurrent Shiga toxin testing (via EIA or PCR) plus culture for O157. Subsequent culture for non-O157 from a Shiga toxin-positive specimen may occur at a higher-level public health laboratory, such as LAC PHL, as smaller laboratories may not be equipped for these tests. However, the implementation of these guidelines has not proceeded smoothly. In LAC, two commercial reference laboratories are responsible for the majority of local STEC testing. One laboratory began testing all suspected stool for Shiga toxin by EIA in 2005; the other followed suit in mid-2010. This increased capability for Shiga toxin testing is the likely explanation for the increase in non-O157 STEC cases seen in LAC during the second half of 2010, rather than a true increase in incidence. However, neither laboratory routinely performs simultaneous O157 culture in accordance with CDC guidelines; O157 culture often only occurs if specifically ordered by the healthcare provider. Experience has suggested that inconsistent O157 culture practices are prevalent throughout all laboratories in LAC, forcing LAC PHL to take on a greater proportion of initial diagnostic screening when adherence to CDC best practice guidelines would require LAC PHL to perform just focused confirmatory testing and wide screening only on uncharacterized Shiga toxin-positive broths forwarded from reference laboratories. On a national level, in 2007, one year after initial publication of CDC guidelines, researchers from the FoodNet Working Group surveyed FoodNet catchment-area laboratories for adherence to testing protocol, finding that only 2% of surveyed laboratories were using both culture and non-culture methods simultaneously, with over one-third (36%) referring their specimens to off-site laboratories for STEC testing, practices that can delay STEC detection[6]. The Association of Public Health Laboratories and the Council of State and Territorial Epidemiologists are meeting this year to discuss the impact of these nonculture methodologies on disease surveillance and outbreak detection, not only for STEC but for other enteric organisms as well.

The growing use of Shiga toxin testing has had the positive effect of exposing the prevalence of illness due to non-O157 STEC, affording an opportunity to better characterize the epidemiology of these infections. Recent studies in both Minnesota[7] and Connecticut[8] comparing statewide non-O157 and O157 STEC cases from 2000 through 2006 (Minnesota) or 2009 (Connecticut) noted similar decreased disease severity trends among non-O157 cases to those trends observed in LAC. Interestingly, both the Minnesota and Connecticut studies found a greater frequency of international travel among non-O157 STEC cases than O157, although this was not observed in our population. Additionally, in Connecticut, some non-O157 STEC strains were noted to have exposure profiles more similar to O157 than the other non-O157 strains under study, but our small numbers of STEC cases in LAC do not allow for closer examination of individual strains in this manner. Nevertheless, these studies, which all capitalize on the increasing use of Shiga toxin testing, collectively add to the growing body of knowledge of the epidemiology of non-O157 STEC. Further study of STEC trends in LAC will be facilitated by greater implementation of CDC testing guidelines, which will also allow for timely, thorough disease reporting crucial in outbreak detection and response.

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CLINICAL PRESENTATION AND VARICELLA VACCINATION HISTORY IN LABORATORY CONFIRMED VARICELLA CASES USING PCR-BASED TESTING FROM AN ACTIVE SURVEILLANCE PROJECT

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BACKGROUND

The Varicella Active Surveillance Project (VASP) of Antelope Valley (AV) in Los Angeles County has conducted population-based active surveillance for varicella disease since January 1995 when the one-dose childhood varicella vaccination program was initiated in the US [1]. One-dose varicella vaccine effectiveness is approximately 85% [2] such that vaccinated persons may still develop varicella and may cause outbreaks of natural disease in both unvaccinated and previously vaccinated persons. However, varicella in vaccinated persons is generally mild with fewer lesions, shorter duration of illness and characterized by maculopapular rather than vesicular rash [2].

From 1995 to 2005, varicella incidence in the AV declined by 89.8% from 10.3 cases per 1000 population to 1.1 cases per 1000 population ($P<0.001$) [3]. In June 2006 the Advisory Committee on Immunization Practices (ACIP) recommended administration of a second varicella vaccine dose to children 4 to 6 years of age and second dose catch up varicella vaccination to older children who had received one varicella vaccine dose [4]. From 2006 to 2011 varicella disease incidence in the AV declined by 81.8% from 1.1 cases per 1000 population to 0.2 cases per 1000 population ($P<0.01$). By 2005, one-dose varicella vaccine coverage among children 19 to 35 months of age in the AV had reached 92% [3]. In 2010, two-dose varicella vaccine coverage in the AV was approximately 84% in entry level kindergarten children within AV [5]. With declines in disease incidence and milder clinical presentation of varicella, the clinical diagnosis of varicella became increasingly challenging.

In 2003, Polymerase Chain Reaction (PCR) laboratory testing of varicella skin lesions for confirmation of varicella cases, particularly among vaccinated children and others, was emphasized in the AV surveillance site and another VASP site in West Philadelphia to help with diagnosis of vaccinated varicella cases. PCR assay is the most sensitive and specific method for detecting varicella-zoster virus (VZV) DNA [6-9]. In this report, we summarize our PCR-based testing results of varicella cases with symptom onset from January 1, 2003 through December 31, 2011.

METHODS

Varicella cases were reported to VASP on a bi-weekly basis from over 300 surveillance sites which included daycare, schools, households, public health clinics, hospitals, skilled nursing facilities, private practice physicians, health maintenance organizations and correctional facilities. Details of the active surveillance for VASP have been described elsewhere [6].

A standardized telephone interview was conducted with each varicella case age 18 years or older or with the case's parent/guardian to collect demographic, clinical and health impact data and to determine if additional cases or susceptible contacts resided in the household. If the parent/guardian was not available for the interview, medical charts were used for verification of varicella diagnosis. Vaccination information was confirmed by immunization records, parents/guardians, schools or healthcare providers (HCPs). Susceptible household contacts of varicella cases were re-interviewed four weeks after the initial contact to identify additional cases.

Laboratory Testing

Since 2003, specimen collection kits have been distributed to all HCPs participating in the project to encourage and facilitate specimen collection. Prior to 2009, skin scrapings for PCR-based testing were collected only by participating HCPs. VASP staff have also collected specimens since 2009 to increase laboratory confirmation of varicella disease. PCR-based testing was conducted by the Centers for Disease Control and Prevention (CDC)'s National Varicella Zoster Virus (VZV) Laboratory in Atlanta, Georgia. PCR-based testing methods were conducted using standardized methodology [10 -16]. A β-Actin test was used as a control on all skin lesion specimens. A negative β-Actin test indicated undetectable actin DNA and an inadequate specimen.

Case Definitions

A verified varicella case was defined as an illness in a child or adult residing in the AV with an acute onset of a diffuse maculopapulovesicular rash without other known cause diagnosed by a licensed HCP, school nurse or parent. Cases had a completed varicella case report confirming the diagnosis of varicella disease. Breakthrough (BT) disease was defined as a varicella-like rash in a child or adult vaccinated at least 42 days before rash onset [2]. A PCR-positive varicella case was defined as a clinically diagnosed varicella case that had a lesion specimen positive for VZV DNA and a positive β-Actin gene. PCR-negative varicella case was a clinically diagnosed varicella case with a skin lesion specimen with a negative VZV DNA and positive for the β-Actin gene. If a varicella case tested negative for both VZV DNA and the β-Actin gene it was considered as having an inadequate specimen [17][10][18]. Varicella cases were categorized as clinically diagnosed did not have diagnostic testing or had a skin lesion specimen with an inadequate specimens.

Data Analysis

Data were entered into Microsoft Access and data analysis was performed using SAS 9.2. All verified varicella cases with symptom onset from January 1, 2003 through December 31, 2011 with and without PCR testing were included in the analysis.

RESULTS

From January 1, 2003 through December 31, 2011, 2679 verified varicella cases were reported in AV. Two hundred and fifty-three or 9% of all verified cases had skin lesions tested using PCR. The proportion of verified varicella cases with PCR testing increased from 1% in 2003 to 24% in 2011. From the 253 verified cases, adequate specimens were collected from 228 (90%) for PCR testing; 196 (79%) were PCR-positive, 32 (11%) were PCR-negative.

Of the 226/228 (99%) PCR tested cases with adequate specimens, 78 (34%) were unvaccinated, 126 (60%) were one-dose BT cases, and 12 (5%) were two-dose BT cases. Ten PCR- positive cases with one-dose of vaccine were classified as non-breakthrough and were excluded from this analysis. Nearly all 77 of 78 (99%) of the unvaccinated cases were PCR- positive. Of the 138 BT varicella cases, one-dose cases were primarily PCR positive, with 104 (83%) one-dose cases and five (42%) two-dose BT cases compared with PCR-negative cases which comprised 22 (17%) one-dose cases and seven (58%) two-dose cases (Table 1).

Table 1. Varicella disease occurring 0-42 days and >42 days after vaccination, Antelope Valley, VASP, 2003 - 2011 , N=226			
Vaccination Status	PCR+	PCR-	Total
	N=194*	N=32	N=226
	N(%)	N(%)	N(%)
Unvaccinated	77(99)	1(1)	78(100)
1-dose			
0-42 days	8(80)**	2(20)	10(100)
>42 days	104(83)	22(17)	126(100)
2-dose			
>42 days	5(42)	7(58)	12(100)

* Two vaccinated cases were excluded from analysis as vaccine doses were unknown

** 5 cases were vaccine strain and 2 were wild type strain

Specimen Collection Time

The median time of specimen collection and symptom onset was two days (range: 0-34 days). Of 195 specimens collected within five days of symptom onset, 172 (88%) were PCR-positive while 23 (12%) were PCR-negative. Of 24 cases whose specimens were collected within six to ten days of symptom onset, 17 (71%) were PCR-positive and seven (29%) were PCR-negative. Most of the cases, tested after five days of symptom onset were unvaccinated 11 (65%). Five (71%) of seven cases that had specimens collected more than ten days after rash onset were PCR-positive and two (29%) were PCR-negative. Of five PCR-positive cases collected over ten days after rash onset, two were unvaccinated and three were one-dose BT cases (Table 2).

Table 2. Time of Specimen Collection after rash onset by PCR Result, Antelope Valley, VASP, 2003-2011, N=226						
Days from rash onset	≤ 5 (n=195)		6 to 10 (n=24)		>10 (n=7)	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
	PCR+	PCR-	PCR+	PCR-	PCR+	PCR-
Vaccine Status						
Unvaccinated	64(37)	1(4)	11(65)	0	2(40)	0
1-dose	104(60)	17(74)	5(29)	5(71)	3(60)	2(100)
2-dose	4(2)	5(22)	1(6)	2(29)	0	0
Total tested	172(88)	23(12)	17(71)	7(29)	5(71)	2(29)

* 2 cases were not included in the analysis as vaccine status was unknown

Demographic Information and Vaccination History

Most (193/226; 89%) of the PCR-tested cases were in the 1 to 14 year age-group. Of the 126 PCR-tested cases that received one-dose of varicella vaccine, 56 (44%) cases were in the 5-9 year of age group had PCR- testing completed, of which 47 (84%) were PCR-positive and 54 (43%) were 10-14 years of age had PCR-testing completed, of which 50 (93%) were PCR-positive. Of the five PCR-positive cases with two-doses of vaccine, 4 (80%) were in 5-9 years and one (20%) was in the 10-14 year age group.

The median age of PCR-positive unvaccinated cases was younger than that of cases clinically diagnosed cases, 10 (range: 0-39) versus 11 (range: 0-69) years, respectively. The median ages of PCR-positive cases with a history of one or two doses of varicella vaccination were similar to clinically diagnosed cases, nine (range: 2-15) for PCR-tested cases versus for clinically diagnosed cases 8 years (range: 1-45) . The gender, race and age distribution of the cases that had PCR-testing were similar to that of cases that were clinically diagnosed for case category (unvaccinated, one- and two-dose recipients).

Clinical Presentation

Cases with greater lesion counts were more likely to be PCR-positive. Among the cases reporting < 50 lesions, 78 (77%) were PCR-positive and 23 (23%) were PCR-negative, whereas those presenting with >50 lesions had a much higher proportion of PCR-positivity; 102 (94%) were PCR-positive. Additionally, 75 (95%) of cases presenting with vesicular lesions were PCR positive compared with 106 (82%) of those presenting with macular/papular lesions (Table 3).

Table 3. Clinical Presentation of PCR+ vs. PCR- Varicella cases, Antelope Valley, VASP, 2003-2011, N=216*

PCR Lab Result	Lesion Grading**		Character of Lesions***	
	< 50	> 50	Macular/Papular	Vesicular
	N=101	N=108	N=129	N=79
	n(%)	n(%)	n(%)	n(%)
PCR+	78(77)	102(94)	106(82)	75(95)
PCR-	23(23)	6(6)	23(18)	4(5)
Vaccine Status	**Lesion Grading**		**Character of Lesions**	
	< 50	> 50	Macular/Papular	Vesicular
	n(%)	n(%)	n(%)	n(%)
PCR+	N=78	N=102	N=106	N=75
Unvaccinated Cases	14(18)	61(60)	32(30)	40(53)
Vaccinated Cases	64(82)	41(40)	74(70)	35(47)
PCR-	N=23	N=6	N=23	N=4
Unvaccinated Cases	0	1(17)	1(4)	0
Vaccinated Cases	23(100)	5(83)	22(96)	4(100)

*Excludes 10 non breakthrough cases

**7 cases excluded from the analysis as lesion grading was unknown

***8 cases excluded from analysis as character of lesions was unknown

The majority of PCR-tested cases were vaccinated, had <50 lesions and presented with macular/papular lesions, with 64 (82%) and 74 (70%) for PCR-positive cases and 23 (100%) and 22 (96%) for PCR-negative cases. For PCR-positive cases, vesicular lesions comprised 40 or 53% of unvaccinated cases and 35 or 47% vaccinated cases while all PCR-negative cases four (100%) were vaccinated and had vesicular lesions.

DISCUSSION AND CONCLUSION

In 2004, following an increase of the number of outbreaks of varicella disease in schools in the AV, it became increasingly challenging to clinically diagnose vaccinated cases. Specimen collection was strongly encouraged for laboratory confirmation of varicella disease in previously vaccinated children. Of 9% of reported varicella cases between 2003 through 2011 (n=253), PCR-based laboratory testing was completed in 65% of previously vaccinated cases of which >90% of those were between 1-14 years of

age. Most PCR-positive cases presented with vaccine modified varicella which characteristically presents with a macular papular rash and < 50 lesions [19].

Overall 77% of PCR- tested cases with <50 lesions were PCR-positive confirming the clinical suspicion of the medical provider. While most of the varicella cases with PCR testing were PCR-positive and supported the clinical diagnosis, a smaller proportion was either PCR-negative or had inadequately collected specimens. Cases that presented with <50 lesions and had macular/papular rash were more likely to be PCR-negative compared with cases that had ≥50 lesions and vesicular lesions, most likely because less VZV DNA was present and could not be detected in the laboratory testing. A PCR-negative result produces questions about the accuracy of the clinical diagnosis of varicella and the timing of specimen collection.

Timely and adequate specimen collection is challenging for confirmation of varicella cases because of delays in reporting, delays in seeking medical attention, cases not seeking medical attention and inexperience with proper specimen collection. The sensitivity and specificity of PCR testing is optimized if specimens are collected early in the course of rash [17]. In our study, specimens collected >5 days after symptom onset were generally PCR-negative, making it difficult to ascertain whether they were true varicella cases. Earlier testing of varicella lesions may not be feasible in real world situations as specimen collection depends on when HCP follow-up is sought. Additionally, specimens that were inadequately collected were not useful since varicella could not be laboratory confirmed. Training is needed to inform HCP's on adequate specimen collection from two or more different lesions for a better chance of VZV DNA detection.

In addition to documenting that varicella infection occurs after one varicella vaccine, we also confirmed that varicella can occur in persons with two documented doses [20][21]. Of five cases with two documented varicella vaccine doses, four cases were in the 5-9 year and one was in the 10 to 14 year age-group. From 2007 to 2011, our surveillance program investigated 88 (10%) two-dose BT varicella cases of 869 verified cases. Laboratory testing was completed on 15 (17%) of two-dose BT cases of which five cases were PCR-positive with wild type VZV.

There are several limitations to our study. The most severe limitation was that only 9% of all verified varicella cases had PCR based testing compared with cases clinically diagnosed and not PCR-tested cases. Most cases were reported by schools and represented school age children so the results may not be generalizable to older varicella cases. Most varicella cases had HCP follow-up for PCR testing, so the results may be less representative of milder varicella cases that did not seek HCP follow-up. Biweekly surveillance usually resulted in cases being reported after initial symptom onset and by the time project follow-up of report, the rash had resolved. In cases where rash was still present, this resulted in specimen collection being attempted in a less optimal period after five days unless specimen was obtained by HCP within five days of symptoms onset. Since additional testing for other viral etiologies was not conducted for PCR-negative specimens, we could not determine the causes of these cases. Additionally, varicella diagnostic test such as serology or other PCR-based tests of other specimen types such as saliva or buccal mucosa were not completed.

PCR-based laboratory testing for VZV is primarily available at state public health laboratories and CDC, with limited availability at commercial laboratories. For our study, all laboratory testing was conducted at the CDC National VZV Laboratory which is highly specialized and dedicated to accurate VZV DNA PCR-testing. However, the turn-around time for laboratory results was five or more days and thus not optimal for helping HCPs with the clinical management of the case. Therefore, it is important to make PCR testing available to commercial laboratories to increase its use and utility. Although, a greater proportion of PCR tested cases were positive within five days of collection time, our findings suggest that it is

possible for varicella cases to be laboratory confirmed when specimens are collected ten days after rash onset. HCPs should consider specimen collection for VZV for unresolved rash whenever varicella disease is suspected, in settings where a varicella outbreak is considered, and in hospitalized cases of varicella as it may still be possible to detect the VZV DNA. With the documentation that varicella disease is still possible in persons with two documented vaccine doses, additional surveillance will be required to determine how effectiveness of the second dose in preventing varicella.

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A CASE OF *VIBRIO CINCINNATIENSIS* SEPTICEMIA

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ABSTRACT

A Los Angeles County woman was hospitalized in January 2011 with septic shock and altered mental status. *Vibrio* was identified in blood cultures and eventually confirmed as *Vibrio cincinnatiensis* by the California Department of Public Health Microbial Diseases Laboratory (CA-MDL). Because *Vibrio* infections (vibrioses) are reportable conditions in California, Los Angeles County Department of Public Health Acute Communicable Disease Control Program (ACDC) opened an investigation of this case. Previously, only one other case of *V. cincinnatiensis* human infection had been described in the literature: a man diagnosed with vibrio meningitis caused by this rare organism. The purpose of this report is to add to the scant body of literature describing this pathogen.

CASE HISTORY

On January 5, 2011, a 50-year-old Latina woman with altered mental status was admitted to a Long Beach hospital. She was found on a commuter train, having failed to exit at the final stop. When Emergency Medical Services (EMS) arrived on the scene, she was on the sidewalk, confused and unable to respond to the medics' questions. She had no signs of visible trauma. Physical examination found elephantiasis of the lower extremities, with erythema, blue-black discoloration, and lichenification of the skin. Her blood pressure was 76/32, pulse 102 beats per minute, and temperature 92.2ºF. Gross appearance was described as "disheveled, foul-smelling, and altered (mental status)." The patient was capable of opening her eyes on command, but was nonverbal.

The patient was sedated, intubated and admitted to the intensive care unit (ICU). She was given pressors and intravenous hydration to correct her hypotension. She was also given broad-spectrum antibiotics (piperacillin/tazobactam and vancomycin) to treat sepsis. Her legs were elevated to reduce edema.

Blood chemistry was normal at admission except for elevated BUN and creatinine. Liver function tests were elevated, but toxicology found minimal amounts of alcohol in her bloodstream. Toxicology was positive for THC (marijuana). Cultures were taken from multiple sites on the patient's body. Wound cultures from her legs yielded β-hemolytic *Streptococcus*, MRSA, VREF and multiple Gram-negative organisms. Urine cultures yielded *Pseudomonas* and heavy growth of yeast. Blood cultures yielded *Vibrio* species resembling *V. parahæmolyticus*.

In addition to septicemia, cellulitis, and urinary tract infection, the patient was found to have insulin-dependent diabetes with acute renal failure. Doripenem was added to the previous antibiotics to treat her leg wounds and necrotic cellulitis (*Vibrio* species are susceptible to these antibiotics). Amphotericin B was used to treat the patient's funguria.

The patient was extubated on January 11, 2011 and transferred out of the ICU. She underwent cranial CT and MRI; no evidence of stroke or cardiovascular accident was found. Her altered mental status improved, but her condition was found to be compounded by previously undiagnosed schizophrenia, for which treatment was initiated. Nonetheless, a psychiatric evaluation on March 4, 2011 determined that the patient was not capable of making informed independent medical decisions. On March 17, 2011, the patient was transferred to a nursing home. She recovered from the cellulitis and elephantiasis, and the schizophrenia was controlled with drug therapy. She was discharged from the nursing home to her home six months after initial admission.

CASE INTERVIEW

Because the patient was hospitalized with a rare presentation of vibriosis, ACDC interviewed her in person to obtain food and environmental exposure history. During the interview, the patient mostly spoke Spanish, but insisted she could understand English adequately. She denied having any exposure to seawater or brackish water. She denied eating any seafood in the week prior to her onset of illness. The patient stated that she mostly eats pre-packaged foods at home, but occasionally buys food from street vendors. She was unemployed, living in a house with two other people, and then mentioned that she had an ongoing dispute with her neighbors, whom she accused of trying to harm her. The patient exhibited increasing paranoid and anxious behavior over the course of the interview. On the day she was picked up by EMS, the patient stated she had taken the commuter train to a local store. She had no recollection of being helped by paramedics or her arrival at the hospital.

LABORATORY

The hospital laboratory identified probable *Vibrio parahæmolyticus* in the original blood specimen on January 18, 2011. The isolate was sent to the Los Angeles County Public Health Laboratory (LAC-PHL) for confirmation. LAC-PHL could not positively identify the isolate, so it was forwarded to CA-MDL. On March 25, 2011, the CA-MDL confirmed the identity of the organism as *Vibrio cincinnatiensis*.

LITERATURE REVIEW

Only one case of vibriosis due to *Vibrio cincinnatiensis* had been reported in the English literature prior to our findings. The report was published in the Journal of Clinical Microbiology in 1986. That case occurred in a 70-year-old white male who presented to the University of Cincinnati Hospital with fever and altered mental status. A novel species of *Vibrio* was isolated from the patient's cerebrospinal fluid; it was named for the university where it was isolated. The man was treated with moxalactam and recovered with no complications.

DISCUSSION

The case described in this report bears some similarities to the first case report. Both cases presented with altered mental status and absence of diarrhea. Neither case had reported a previous history of seafood consumption or exposure to seawater or brackish water. Neither case had recent history of foreign travel. It was not possible to discern the sources of the patients' infections in either of these cases.

The current case was afflicted with multiple co-morbid conditions that are known to predispose people to vibriosis. At the time she was admitted to the hospital she had elevated liver enzymes, renal failure and anemia. She also has diabetes, history of previous cholecystectomy and cardiomyopathy. While these conditions were not present in the other previously documented case, they were possible contributing factors to this patient's *V. cincinnatiensis* infection.

One significant difference between this case and its predecessor was the omission of a cerebrospinal fluid culture. The CT and MRI did not detect any signs of intracranial vascular accident. A lumbar puncture could have been done to confirm or rule out infectious encephalitis.

CONCLUSIONS

This is the third known report of a confirmed case vibriosis due to *V. cincinnatiensis*. The patient was septicemic, but it is not known whether she also had vibriosis meningitis. It was difficult to discern the true presentation of disease due to a multitude of severe comorbidities. It was also impossible to properly interview the case for exposure history as she had altered mental status with paranoid delusions. Despite the complications surrounding the investigation of this case, it is important to document this case because of its obscurity in the medical literature.

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ARTIFICIAL KIDNEYS, O-RINGS AND *STENOTROPHOMONAS MALTOPHILIA*: AN OUTBREAK IN A DIALYSIS CENTER, LOS ANGELES COUNTY, 2011

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BACKGROUND

Hemodialysis is a life-saving procedure that utilizes an artificial kidney, or dialyzer, to remove waste from the blood. It is most often a treatment for end-stage renal disease (ESRD). Reuse of dialyzers is a common practice, and is thought to result in economic and waste savings. As of 2005, roughly 40% of dialysis centers reuse dialyzers in some capacity.[1] Use of reused dialyzers has been associated with an increase in hospitalization rates when compared to use of single-use dialyzers in free-standing dialysis centers using peracetic acid for reprocessing.[2] Of the 16 outbreaks investigated by CDC of bacteremia or pyrogenic reactions in hemodialysis patients between 1980 and 1999, eight were related to dialyzer reuse, and half of those resulted from errors in dialyzer disinfection.[3]

On August 2, 2011, an infectious disease (ID) physician at Hospital Y, contacted Los Angeles County (LAC) Department of Public Health (DPH), Acute Communicable Disease Control Program (ACDC) to report four patients diagnosed with *Stenotrophomonas maltophilia* and one patient diagnosed with *Achromobacter anthropi* bacteremia among hemodialysis patients who receive services from Dialysis Center A. One of the patients with *S. maltophilia* also had *Candida parapsilosis* in the blood. Four patients were admitted to Hospital Y between July 1, 2011 and July 27, 2011 and one case was evaluated as an outpatient in May 2011. The ID physician notified the medical director at Dialysis Center A, of the cluster on July 29, 2011. On August 3, 2011, the facility voluntarily suspended the reuse program and all patients were switched to single-use dialyzers. A joint site investigation with LAC DPH Health Facilities Inspection Division (HF) was conducted on August 10, 2011, and a second site investigation was done on November 29, 2011. ACDC consulted with the California Department of Public Health (CDPH) and the Centers for Disease Control and Prevention (CDC) during the investigation.

This report describes an outbreak investigation of *S. maltophilia* infections among patients who underwent hemodialysis in Dialysis Center A, the measures taken to enhance patient safety, and collaborations between the DPH and Dialysis Center A to understand the importance of proper cleaning and disinfection of dialyzers to prevent healthcare associated infections.

METHODS

Dialysis Center Characterization

Information on patients, staff, and practices at Dialysis Center A were ascertained from the facility's Director of Clinical Services.

Case Definition

A case was defined as a patient undergoing hemodialysis using a Hemoflow™ Fresenius Polysulfone® F8 multiple use low-flux dialyzer (Fresenius F8) from May 1 to July 31, 2011, who was *S. maltophilia* blood culture positive with isolates indistinguishable by pulsed-field gel electrophoresis (PFGE).

Case Characterization and Finding

ACDC staff conducted a comprehensive review of case medical and microbiologic records. The facility's hospitalization and adverse event logs were evaluated for additional cases.

ACDC also initiated a summary report that was submitted to the CDC's epidemic information exchange (Epi-X) nationwide network on August 17, 2011 for additional case finding. The report notified public health professionals of the cluster and sought to identify other cases and clusters nationwide.

Molecular Epidemiology

Blood culture reports were reviewed for the five patients initially reported. PFGE DNA fingerprinting was conducted by the LAC Public Health Lab (PHL) on all patient blood culture isolates (n=3), patient 4 blood culture, and dialyzer isolates from patient 2 and patient 3 (dialyzer isolates were not available for patient 1). Dialyzer isolates were collected after reprocessing. PFGE DNA fingerprinting produces individual DNA fingerprint patterns using the restriction enzymes *Xba*I. Individual band differences were interpreted using the Tenover criteria: if PFGE resolves at least ten distinct fragments, PFGE patterns are considered indistinguishable if there are zero fragment differences between the fingerprint patterns, closely related if there are two to three fragment differences, possibly related if there are four to six fragment differences, and different if there are over seven fragment differences.[4] Isolates possessing indistinguishable DNA fingerprint patterns are more likely to have originated from a common source.

Antibiotic Susceptibility

The antibiotic susceptibility pattern was reviewed for all case patient and patient blood isolates.

Dialyzer Reuse and Reprocessing History

The dialyzer reuse history was analyzed and included the last reuse date, the number of times the dialyzer was reprocessed, and the number of times the dialyzer was reused. We reviewed the dialyzer failure log which describes the reprocessing history for each case to determine the length of time between termination of treatment and initiation of sterilization.

Background Surveillance

The background rate of bacteremia among hemodialysis patients in Dialysis Center A was calculated for the time period of January 1, 2009 to December 31, 2010.

Epidemiologic Analysis

Dialysis post-treatment flow sheets for the three months prior to positive blood culture were reviewed for all case patients and patients. The flow sheets were evaluated for date and time of treatment, staff assigned during the session, station assigned, and dialysis machine used. We calculated the monthly rate of bacteremia among dialysis patients from January 1, 2009 to December 31, 2010. Dialysis machine logs and staffing records were analyzed for any association.

Control Measures

Actions taken by Dialysis Center A following the identification of the outbreak were recorded and summarized by ACDC.

CDC Water Testing

On August 11, 2011, the PHL submitted six water samples and three dialysate samples to CDC for endotoxin testing.

Site Investigation

On August 10, 2011, a joint unannounced site investigation with LAC HF was conducted. Entrance and exit conferences were held in addition to a walk-through of the facility. Participants included representatives from administration, infection control, nursing, and the medical director. Reprocessing and infection control policies and procedures, and the hospitalization and adverse events logs were examined by ACDC staff. The medical records of the five bacteremia cases were also reviewed. Cleaning and disinfection of the dialysis machine was observed as well as staff interaction with patients.

ACDC conducted a second unannounced site investigation to observe dialyzer reprocessing on November 29, 2011. Entrance and exit conferences were held in addition to a unit walk through. During the entrance conference we discussed changes that were implemented since the first visit. The complete reprocessing procedure was observed, from removal of the dialyzer from the dialysis machine to dialyzer cleaning, disinfection and storage.

Reprocessing Quality Assurance Audits

ACDC requested the reprocessing quality assurance audits for 2010 and 2011.

ACDC Environmental Cultures

On August 10, 2011, ACDC collected 26 environmental cultures from treatment area Pod 5 and the dialyzer reprocessing room.

Facility Environmental Cultures

The facility cultured all dialysis machines and dialysate solutions (n=28), 28 machine water endotoxin levels, eight water sites and two reprocessing machines on August 3, 2011, which were analyzed by the Dialysis Center A laboratory.

RESULTS

Dialysis Center Characterization

Dialysis Center A sees, on average, 45 to 65 patients per day, and has 109 patients monthly. Typically, patients receive dialysis treatment 3 days per week, for 3 to 4 hours. The center is open 6 days per week, from 5:00 am to 6:00 pm. The treatment floor has 25 beds, divided into six treatment areas, or PODs. There are two nursing stations and one reprocessing room in the facility. There are 28 dialysis machines in the center, and 83 preprocessed dialyzers in stock. The staff includes two Registered Nurses daily, one License Vocational Nurse every other day, and one reprocessing technician daily. Five to six patient care technicians are present daily.

Case Definition

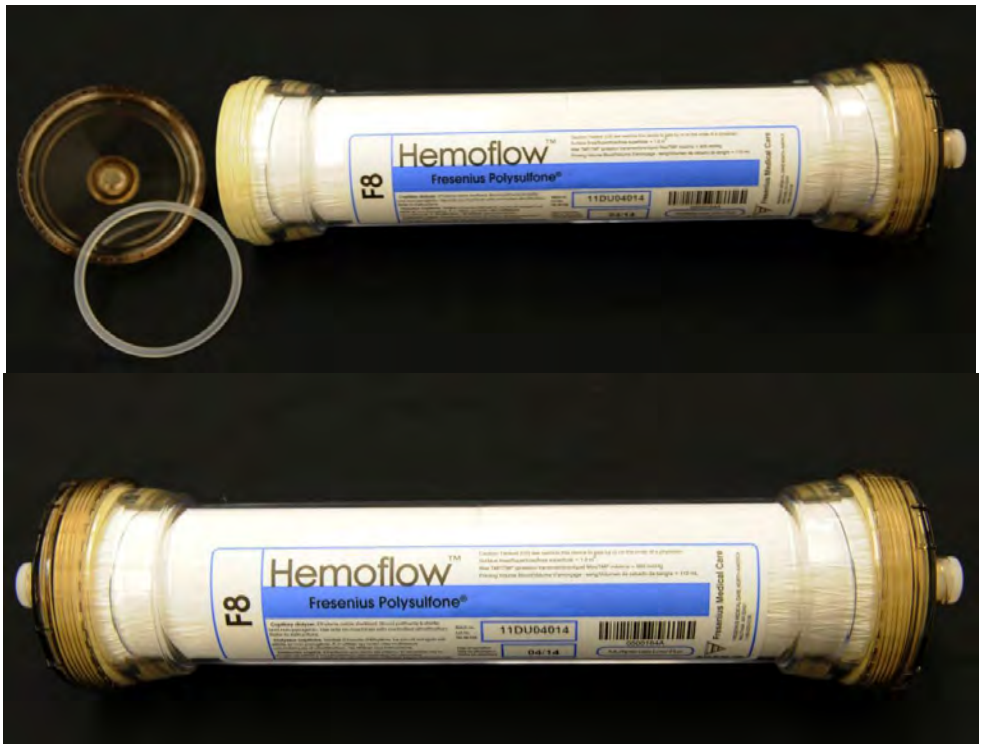
Three patients met the case definition. Two patients who were initially reported did not meet the case definition. Patient 4 was *S. maltophilia* culture positive but did not match by PFGE and patient 5 was culture positive for *A. anthropi*, not *S. maltophilia*.

Case Characterization

All case patients were male, diagnosed with ESRD, had an arterio-venous (AV) fistula for dialysis access and received hemodialysis services ≥ 6 years. All were dialyzed using a Fresenius F8 reprocessed dialyzer with an O-ring header (end) cap. The cases were the only patients using the Fresenius F8 reprocessed dialyzer in the facility. Ages ranged from 31 years to 65 years with a mean of 45 years. In addition, all case patients were assigned to the same treatment area, Pod 5, during the time period reviewed. Of note, case patient 2, was previously diagnosed with *S. maltophilia* bacteremia in 2009; this case patient was considered chronically infected/colonized with *S. maltophilia*.

The two bacteremic patients who were not cases, patients 4 and 5, were both male, ages 58 and 67 years. Both had a catheter dialysis access. One patient used a Gambro Revaclear dialyzer; the other used a Polyflux 21R dialyzer until July 18, 2011, then switched to a single-use dialyzer on August 5, 2011. Patient 4 was treated in POD 5, and patient 5 was treated in POD 2.

Figure 1. Fresenius F8 dialyzer, intact and with header and O-ring removed.



Case Finding

In addition to the five patients initially reported, nine other patients became symptomatic with fever and/or chills during or after dialysis from January 1, 2011 through August 10, 2011. Blood cultures were drawn per policy; all were assessed and subsequently hospitalized. Blood culture results indicate that seven cultures were negative and two cultures were positive, both in April 2011 (positive *Enterococcus faecalis* and positive group A *Streptococcus*).

No responses to the Epi-X report were registered.

Molecular Epidemiology

All case patients were blood culture positive for *S. maltophilia*. Blood cultures from case patient 2 were also positive for *C. parapsilosis*. Patient 4 was culture positive for *S. maltophilia* and *Klebsiella oxytoca* and patient 5 was culture positive for *A. anthropi*. Dialyzers for all cases were cultured by the Dialysis Center A laboratory. The dialyzers for case patient 2 and case patient 3 were culture positive for both *S. maltophilia* and *C. parapsilosis*. The dialyzer for case patient 1 was culture negative. Test results indicated that the three case blood isolates and dialyzer isolates from case patient 2 and case patient 3 had indistinguishable pulse-field gel electrophoresis (PFGE) fingerprint patterns with zero band differences and were designated Type A, indicating origin from a common source.

DNA fingerprinting was also performed by the CDC Mycotic Diseases Branch on the *C. parapsilosis* positive blood and dialyzer isolates for case patients 2 and 3 and a *C. parapsilosis* positive environmental isolate from the reprocessing room blood rinse reverse ultra filtration (RUF) faucet. The results indicated that the blood and dialyzer isolates for case patient 2 and the positive environmental isolate had the same DNA pattern. The dialyzer isolate for case patient 3 did not match the dialyzer isolate from case patient 2 or the environmental isolate and was unrelated to the other isolates.

Antibiotic Susceptibility Pattern

All case blood isolates were susceptible to trimethoprim/sulfamethoxazole and levofloxacin and had different susceptibility patterns for other antibiotics. The susceptibility pattern for patient 4, who was *S. maltophilia* culture positive, had a different susceptibility pattern and was resistant to trimethoprim/sulfamethoxazole but susceptible to levofloxacin.

Dialyzer Reuse History Analysis

All dialyzer reuse was in compliance with Dialysis Center A policy. As per Dialysis Center A policy, the maximum number of reuse for dialyzers is set by the facility.

Dialyzer Reprocessing History

As noted previously, all case patients used the same multi-use dialyzer with removable O-ring header. Reprocessing logs for the most recent multi-use dialyzer were available for case patient 2 and case patient 3; case patient 1 did not have a log available as this patient was starting a new dialyzer at the time we recommended they discontinue use of reusable dialyzers. Reprocessing logs for case patient 2 and case patient 3 revealed a mean time to reprocessing of 72 minutes (range: 24 to 135 minutes) and 33 minutes (range: 26 to 54 minutes) respectively.

Background Surveillance for *S. maltophilia*

The monthly rate of bacteremia among dialysis patients from January 1, 2009 to December 31, 2010 ranged from 0 to 2.4 events per 1000 procedures, with a mean rate of 0.07 events per 1000 procedures.

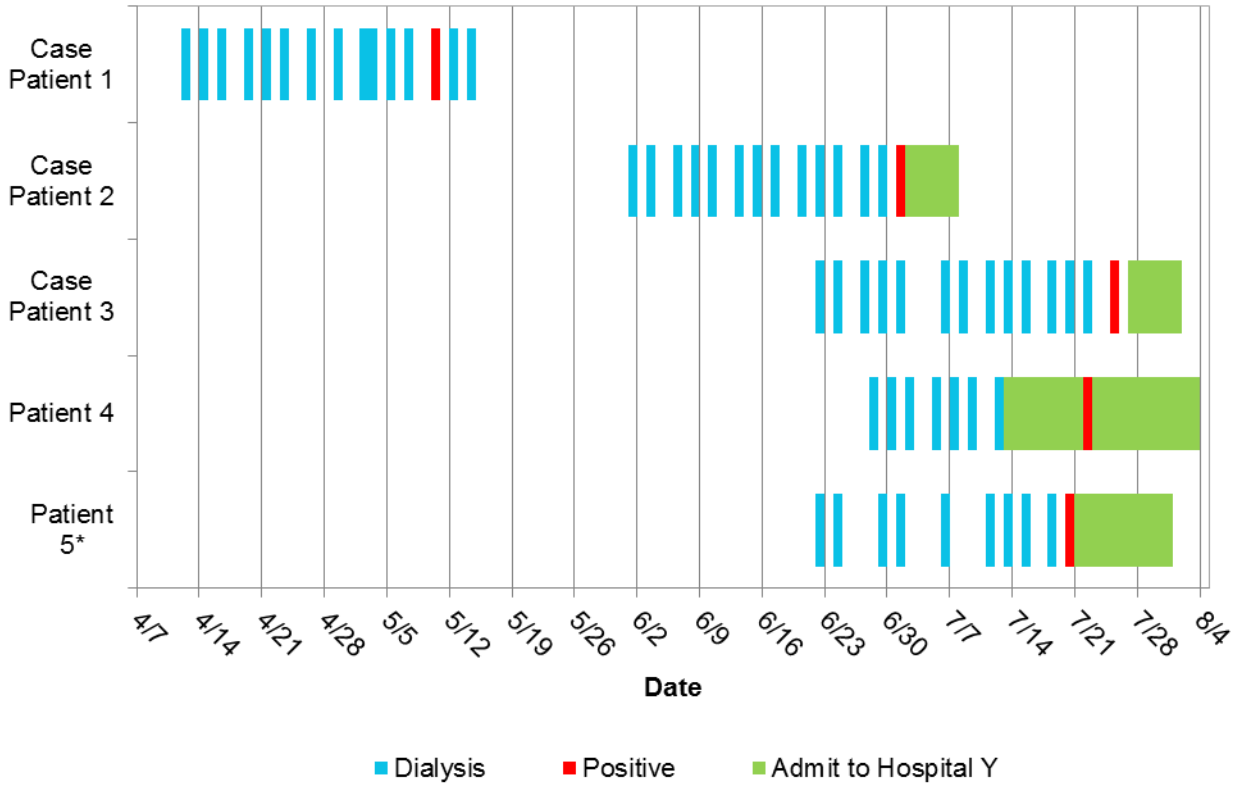
Epidemiologic Analysis

Evaluation of patient dialysis schedules showed that both case patient 2 and case patient 3 received dialysis treatment on the same daily schedule (Monday, Wednesday and Friday), in the same treatment area (Pod 5) but not at the same time/shift or station. Case patient 1 was consistently scheduled on opposing days, but in the same treatment area. Of note, both case patient 2 and case patient 3 received dialysis treatment on July 1, 2011. Case patient 2 was dialyzed on the first shift, experienced fever, chills and hypotension at the end of treatment, was admitted to the hospital with a diagnosis of fever of

unknown origin and was positive for *S. maltophilia*. Case patient 2 was dialyzed the same day on the second shift, using the same machine as case patient 3, which was also consistently used by the case patient 1, who was positive for *S. maltophilia* in May 2011.

Analysis of the dialysis machines used by the three case patients during the outbreak period revealed that dialysis machines were not consistently located in the same station as described by facility staff during the initial site investigation.

Figure 2. Epidemiologic curve, including case patients and patients.



*Positive for Achromobacter anthropi; others positive for Stenotrophomonas maltophilia

Control Measures

On August 3, 2011, the facility voluntarily suspended the reuse program and all patients were dialyzed with single-use dialyzers. All dialysis machines and dialysate solutions (n=28) were cultured by the facility per policy the same day. Physicians were notified of cluster. Daily management meetings were held to review policies to ensure staff compliance and safe practices. Enhanced staff education was also conducted, including retraining of reprocessing staff on dialyzer header cleaning. A letter was posted in the facility notifying patients of cluster of infection.

CDC Water Sampling

All water and dialysate samples were determined to be within acceptable limits for endotoxin.

Site Investigations

During the first site investigation on August 10, 2011, several lapses in staff infection control practices were noted, including issues with hand hygiene and safe injection practices, and improper environmental cleaning technique. The facility informed ACDC that dialyzers can be refrigerated for up to 36 hours before being reprocessed.

The second site visit on November 29, 2011 found that the facility was no longer using the Fresenius F8 O-ring header multi-use dialyzer. Multi-use dialyzers with no O-rings and/or single-use dialyzers were being used. All cultures will be sent to the dialysis center main laboratory Monday through Friday and to the Hospital A laboratory on Saturday. Culture results will be entered manually in a log book to identify clusters of disease and ensure timely follow-up. During the walk-through, the treatment room floors were clean and the unit was less cluttered. The reprocessing procedure was observed and documented: first, the patient care technician unhooked and capped the used multi-use dialyzer on the treatment floor, walked it to the reprocessing room, bagged the dialyzer and labeled the bag with the date and time, and placed it in the refrigerator with the other used dialyzers. Dialyzers can be stored in the refrigerator up to 36 hours before being reprocessed. Then dialyzer is then manually cleaned to remove excess blood, refilled with a high-level disinfectant, tested for adequate disinfectant application, inspected, labeled, and stored. The procedure was in compliance with facility policy but had one lapse in step: the dialyzer was not bagged prior to transport to the reprocessing room. Cleaning of a multi-use dialyzer with an O-ring was not observed because those dialyzers were no longer in use at the time of the site visit.

ACDC provided recommendations which included detailed instructions on cleaning, disinfection, and documentation.

Reprocessing Quality Assurance Audits

There was no documentation of the reprocessing quality assurance audits available, which is not compliant with state mandates.

ACDC Environmental Cultures

Four reverse osmosis (RO) water samples were *Burkholderia cepacia* (*B. cepacia*) positive. The prime bucket from one machine in Pod 5 also tested positive for *B. cepacia*. Microbiologic analysis of the blood rinse RUF faucet in the dialyzer reprocessing room was positive for *C. parapsilosis*. A specimen from the RUF faucet to dialysate in the dialyzer reprocessing room revealed *Ralstonia pickettii*. Of the remaining cultures, 16 were negative and four were not tested because they were not epidemiologically linked.

Table 1. ACDC environmental cultures results.

Location	Source	Sample Type	Date of Collection	Results
Station 12, machine 26	Water	50 ml bottle	8/10/11	*B. cepacia*
Station 11, machine 25	Water	50 ml bottle	8/10/11	*B. cepacia*
Station 12	Prime bucket	Swab	8/10/11	*B. cepacia*
Station 13	Water	50 ml bottle	8/10/11	*B. cepacia*
Dialyzer reprocessing room	RUF to dialysate	Swab	8/10/11	*R. pickettii*
Dialyzer reprocessing room	Blood rinse	Swab	8/10/11	*C. parapsilosis*

Facility Environmental Cultures

All cultures were negative. Dialysate and water endotoxin levels were within acceptable levels (total viable microbial count lower than 200 colony forming units (CFU)/mL).

DISCUSSION

This report describes an investigation of a cluster of bacteremic and fungemic patients in a dialysis center infected with *S. maltophilia* and other pathogens. Analysis of the DNA strain testing for *S. maltophilia* results indicate that a common source likely served as the mode of transmission between patients. Blood culture isolates from the three case patients and dialyzer isolates from case patient 1 and case patient 2 shared an indistinguishable PFGE pattern denoting a common source. Additionally, blood and dialyzer isolates from case patient 2 were genetically related to the environmental isolate from the reprocessing room faucet for *C. parapsilosis*.

S. maltophilia is a gram-negative bacillus characterized by its ability to colonize nosocomial water sources and aqueous environments. Greater risk of infection is associated with immunocompromised health status, long hospital stays, and medical treatment with indwelling devices.[5] A recent increase in the number of *S. maltophilia* infections can be ascribed to the resistance of the organism to common microbials and newer antibiotics.[6] *S. maltophilia* bacteremia has an attributable mortality rate of 27%, indicating its severity, especially in a nosocomial setting.[7]

We hypothesize that transmission of *S. maltophilia* most likely occurred due to cross contamination and improper cleaning and disinfection of dialyzer header in the reprocessing room. The results of the environmental samples support that the contaminated environment in the reprocessing room was a possible source of infection. As suggested by facility staff during the site investigation and as supported by the literature, reused dialyzers and the reprocessing process have been implicated in a number of bacteremia clusters in dialysis centers.[8] In California specifically, a study of dialysis centers found a strong association between *S. maltophilia* bloodstream infections and clusters and both reprocessing dialyzers and refrigerating dialyzers before reprocessing.[9] O-ring contamination of the reprocessed dialyzer may occur when disinfectant cannot reach portions of the O-ring that are compressed against the

header or fiber bundle of the dialyzer. Fresenius F8 dialyzers utilize an O-ring that needs to be cleaned using a complex twelve step process, unlike other multi-use dialyzers without O-rings. Further, past outbreaks and mock dialyzer trials have demonstrated that during dialysis, organisms from the O-rings are able to enter the bloodstream.8 *S. maltophilia* is known for its ability to adhere to plastic materials such as the walls of the dialyzer.[10] Other routes of transmission are possible.

The ability of *C. parapsilosis* to adhere to and form biofilm on implanted devices is acknowledged as a potential pathway for infection.[11] Because the patient blood cultures and dialyzers were genetically related to the environmental sample, it is hypothesized that a lapse in infection control during the reprocessing process may have contributed to this infection. Outbreaks in acute care settings of *C. parapsilosis* have been documented and present a serious concern, especially in immunocompromised patients.[12]

The multiple infection control lapses that were identified during the initial site visit denotes an overall lack of understanding of basic infection control principles and indicates a considerable issue with staff compliance with facility infection control, handwashing, and medication policies.

Given the reprocessing policy in which dialyzers may be refrigerated for up to 36 hours, *S. maltophilia* and *C. parapsilosis* and other cold-tolerant organisms may be allowed to grow and accumulate biofilm. Though dialyzer logs that were available for review did not demonstrate long periods of refrigeration, refrigeration should be minimized and reprocessing should occur as soon as possible after dialysis. Use of multi-use dialyzers with O-rings is strongly discouraged.

In summary, ACDC investigated an outbreak of bloodstream infections in a dialysis center and concluded the source to be related to the reprocessing of multi-use dialyzers with O-rings. Final recommendations included adherence to hand hygiene, medication, and infection control policies as outlined in facility, CDC, and Centers for Medicare & Medicaid Services guidelines. Additionally, a system of physician notification of positive cultures to facility staff should be maintained and refrigeration should be minimized and instead, reprocess dialyzers as soon as possible. Fresenius F8 dialyzers are no longer used by the center. The facility continues to reuse dialyzers.

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RESPIRATORY OUTBREAK OF UNKNOWN ETIOLOGY ASSOCIATED WITH EVENT AT VENUE A, FEBRUARY 2011

Patricia Marquez, MPH, Caitlin Reed, MD, MPH, Dawn Terashita, MD, MPH

BACKGROUND

On February 11, 2011, the Los Angeles County Department of Public Health (LAC DPH) was notified of a possible outbreak of legionellosis among attendees of a recent conference in LAC. LAC DPH was notified of the possible outbreak by the California Department of Public Health (CDPH) who was notified by CDC based on inquiries from a media outlet in New York City. Through blogs and social media posts, the reporter became aware of a cluster of persons with respiratory illness among attendees of a conference held February 1st–3rd. The conference was held at Hotel A, where the majority of attendees stayed; there were parties at various locations on each night of the conference, concluding with a large gathering at Venue A on February 3, 2011.

The conference had 715 registered attendees who came from 30 countries, most of whom returned to their homes on February 4, 2011. Conference attendees who fell ill began discussing their respiratory illness on Facebook and other social media sites in the week following the conference. Several reported that they had been diagnosed with legionellosis. At the time of DPH notification, the Wikipedia entry for legionellosis had already been updated to include a detailed description of the outbreak associated with Venue A.

METHODS

Epidemiologic Methods

Case Definitions

From the outset of the investigation, legionellosis was considered a possible etiology for the cluster of illnesses. Initial reports from attendees suggested that most had an influenza-like illness compatible with Pontiac fever. We used case definitions based on prior CDC *Legionella* investigations. A Pontiac fever case was defined as a conference attendee with onset of illness on or after February 1, 2011, and within 10 days of last exposure to Hotel A and/or Venue A, with fever (measured or subjective), and at least one of the following symptoms: headache, cough, shortness of breath, myalgias, vomiting or diarrhea. A Legionnaires disease case was defined as a person with respiratory illness, radiographically-confirmed pneumonia, and laboratory evidence of *Legionella* infection on or after February 1st in a person exposed to the conference at Hotel A and/or party at Venue A.

Case Finding

We conducted an online survey of conference attendees who attended the party at Venue A. A list of all registered conference attendees was obtained from the organizers of the event, including names and email addresses. An online survey was emailed to all attendees, who were asked to complete the survey whether they became ill or not. Questions included attendance at other conference events, hotels attendee stayed in during the conference, as well as prior illness. DPH also contacted the event coordinator who hired hostesses for the event for a list of all hostesses who worked that evening. Incomplete contact information was available for the hostesses; of an estimated 150–180 hostess attending the Venue A event, only 99 email addresses were provided to invite them to participate in the survey. A separate online survey was emailed to hostesses, who were also asked to complete the survey whether they became ill or not. Questions in this survey included specific questions regarding locations at the party they spent the most time, as well as if they participated in other Venue A events prior to the February 3rd party. In addition to event hostesses, DPH interviewed 41 of the 67 Venue A employees who worked on February 3rd.

Exposure Assessment

Details of the conference schedule and activities were obtained from the conference schedule and from interviews with the conference organizers. All conference sites were inspected by LAC DPH and CDC for water features and aerosol-generating devices that could lead to increased growth and transmission of *Legionella*. The environmental assessment was completed using the Environmental Assessment Form from CDC (1).

The conference opened on February 1st. Sessions and activities were held from 7:00 am to 6:00 pm daily at Hotel A. Breakfast was served at Hotel A in a ballroom. Lunch was served outdoor at Hotel A next to a decorative fountain. Each evening the conference ended with a party. On February 1st, the party was next to the pool of Hotel A and consisted only of conference attendees. In addition to the decorative fountain mentioned above, potential aerosol-generating water features included a hot tub and three cooling towers on top of the building. Two smaller additional parties were held on February 1st by other sponsors, one directly across the street from Hotel A at Hotel B and one at a private residence nearby. The February 2nd party was held at the outdoor bar of Hotel C, and consisted only of conference attendees. No aerosol-generating water features were identified at Hotel C.

The event at Venue A was held on February 3rd from 8:00 pm to 1:00 am. Conference attendees were shuttled by bus from Hotel A to Venue A. In addition to conference attendees, an estimated 150 to180 hostesses from Southern California were invited to attend, for approximately 700 guests on site. Hostesses did not attend any other conference functions or events. Shuttle buses circled the main driveway of Venue A and unloaded passengers near the entrance to the back lawn and pool area of the property. To enter the main party tent, guests had to pass by the pool and waterfall. In the tent, there was a band, dance floor, food, bar and hazer ("fog machine"). The pool extended into a cave-like structure containing interconnected hot tubs. No guests or facility staff used the pool or hot tubs, A few hostesses were paid to swim in the pool during the party, but none used the hot tubs. Behind the tent was the animal area with peacocks, tropical birds, and monkeys. Most animals were in cages; a few tropical birds were out and accessible to guests. Guests were not allowed inside the main building (the private residence of the owner) at Venue A during the party. Restrooms were located in a pool house, and port-a-potties were available on the driveway.

Environmental Sampling for Legionella and Laboratory Methods

Environmental samples for *Legionella* were collected from Hotel A and Venue A according to previously published standard procedures (2). Bulk water samples and biofilm swabs were collected from all areas identified on environmental assessment that could lead to *Legionella* transmission. Water samples were collected in one-liter sterile bottles with 0.5 ml of 0.1N sodium thiosulfate added to neutralize chlorine. Biofilms were sampled with a polyester swab and then placed in 3 to 5 ml of water taken from the same source (to prevent drying during transport) with one to two drops of sodium thiosulfate solution. Water temperature, pH, and free chlorine concentrations were measured at the time of sample collection. The free chlorine levels were assessed using N,N-diethyl-P-phenylenediamine.

Because of initial concern that the hazer machines used in the main tent might have been a water aerosol-producing source, both machines were collected by LAC Environmental Health from the lighting and effects company hired by party planners. The machines were taken to the LAC Public Health Laboratory (PHL) for environmental sampling. The owner was interviewed and stated that the machines were refurbished machines, recently purchased, and used only once previously for a holiday party in another county. The operator used "Haze Juice," a commercially available pre-packaged mineral oil solution, to produce a mist effect. No water had been used in the machines; according to the manufacturer's directions, the device was not intended to handle water. Although mineral oil is not known to support the growth of *Legionella*, ten swabs were collected from each hazer machine on February 19th at the LAC PHL Both hazer machines were disassembled in order to collect swabs from all parts of the machine.

Samples were collected from both locations on February 11th and 15th by LAC DPH and on February 22nd and 23rd by CDC. Samples collected by LAC DPH were transported to LAC PHL. Samples collected by CDC were shipped overnight to CDC.

Clinical Laboratory Methods

All cases among attendees, hostesses and staff who reported respiratory illness were invited to submit clinical specimens for testing. In total, 122 individuals in LAC were contacted via phone and email to inquire if they were still symptomatic and willing to submit specimens for testing. Those willing to submit specimens were directed to their primary care physician or their local public health clinic for collection. Specimens requested included nasopharyngeal swabs, sputum if still symptomatic with productive cough, as well as urine and blood specimens for *Legionella* urine antigen and acute serological testing respectively. Several specimens were collected and tested by private physicians. Other specimens collected from LAC cases were submitted to the LAC PHL for testing and out-of-county or out-of-state cases submitted specimens through CDC.

RESULTS

Among 715 registered conference attendees, 465 (65%) began the survey and 441 completed it. Of these, 235 (53%) self-reported illness by responding 'yes' to the survey question: "Did you become ill during or after the conference?" For hostesses, of the 99 emails available, 81 started the survey and 47 (58%) completed it. Of those, 40 (85%) self-reported illness by responding 'yes' to the survey question "Did you experience any illness after the date(s) you worked at (Venue A)?" Because of the unknown denominator of hostesses, our inability to contact many of them, and their poor response rate to the survey, hostess responses were not used in the exposure assessment or calculations of relative risk of illness by exposure.

Analysis of self-reported illness among attendees showed a range of symptom onset from February 1st to 15th, with peak onset on February 5th, two days after the event at Venue A (Figure 1). Among 235 persons who reported experiencing illness, the predominant symptoms reported were fever (56%), fatigue (67%), myalgias (52%), and productive cough (58%) (Figure 2). Of the respondents who indicated illness after the event, 52 (22%) sought medical care through visits to primary care physicians or urgent care centers. None were hospitalized. Many were given clinical diagnoses of acute respiratory illness and a few were sent home with prescribed antibiotics. None were given a laboratory confirmed diagnosis.

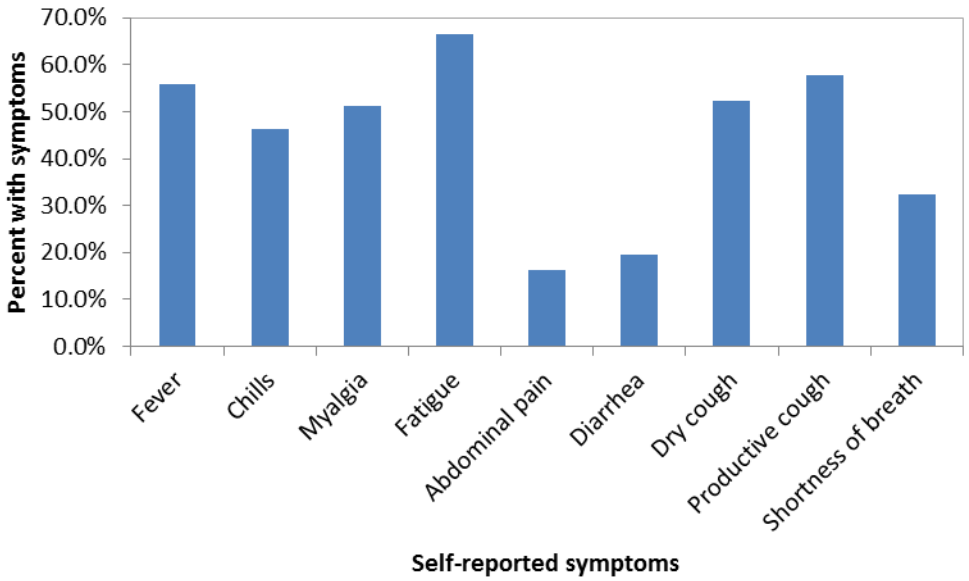

Figure 1. Self-reported Symptoms Among Ill Conference Attendees (N=235)

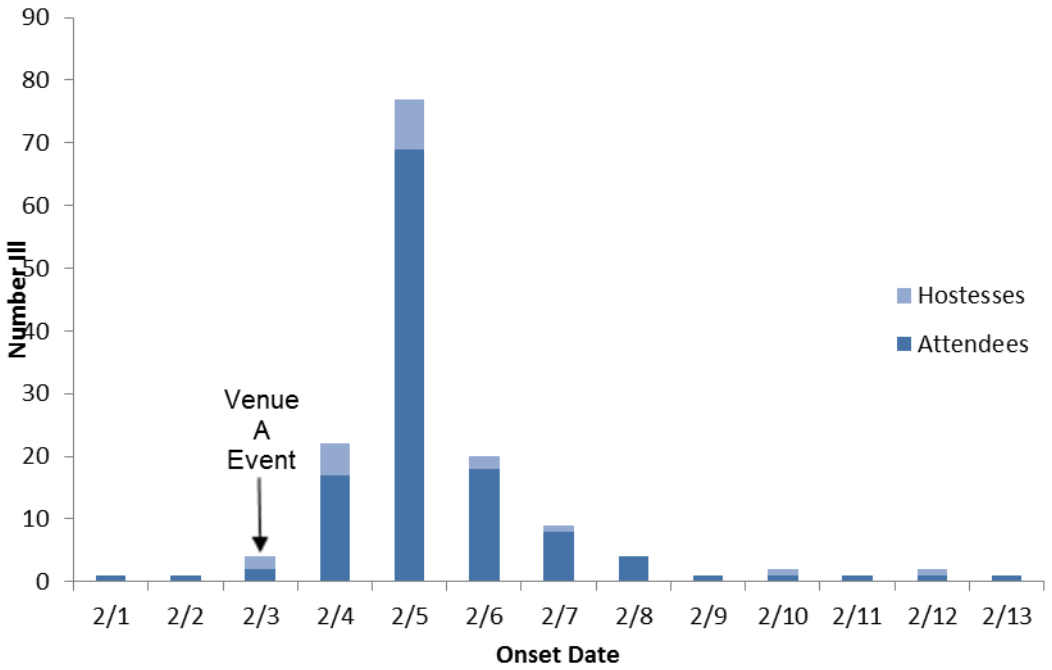

Figure 2. Epidemic curve of respiratory illness among conference attendees and hostesses (N=145).

Risk of Illness by Exposure

Among the 432 conference attendees who responded to the survey, 235 self-reported illness and of these, 123 met the case definition (fever and at least one other symptom). Among the persons who did not meet the case definition, 30 had a missing date of illness onset, 25 did not report whether or not they attended the Venue A event, and 80 had symptoms that did not meet the case definition (for example, respiratory symptoms without fever). In an additional analysis, 110 of the conference attendees met the CDC influenza case definition of fever and cough or sore throat.

We surveyed 47 hostesses, of whom 22 (46%) met the case definition for febrile illness. Hostess duties varied from lounging in the pool to posing for photos with guests. We also interviewed 41 of the 67 employees of Venue A who worked on February 3rd. Of these, only three reported illness meeting the case definition with onset in the week after working at the Venue A event; two of the three had direct contact with party guests bartending and passing drinks, and the third worked as a cleaner. Finally, the Venue A staff stated that they hold major events approximately two to three times a month, with 500–1,500 guests, and they had not been informed of any other cluster of respiratory illness associated with these events prior to the outbreak under investigation.

We evaluated exposures to several conference events, including staying at Hotel A, attending evening parties at Hotels A, B, and C on February 1st and 2nd, and attending the event at Venue A on February 3rd. The only statistically significant association with illness was attending the Venue A event, 3.8 RR (2.0–7.5 95% CI).

Clinical Specimen Results

Of 148 total cases among conference attendees, hostesses, and staff, 45 provided at least one clinical specimen (urine, serum, sputum, or nasopharyngeal swab) for testing. Persons submitting specimens exhibited symptoms of myalgia (69%) and shortness of breath (51%) in slightly higher proportions compared to the total cohort of cases. Persons submitting specimens did not differ by proportion reporting all other symptoms, compared with cases who did not submit specimens. Dates of onset peaked on Feb

5th for both those who submitted specimens and those who did not, and reported duration of illness was greater than five days in both groups. Clinical specimens for *Legionella* testing were collected from February 14th to March 1st, 2011. No case-patients tested positive for *L. pneumophila* by any testing method.

Four (17.4%) of 23 persons tested by nasopharyngeal PCR for influenza tested positive for influenza A, one of whom also tested positive for influenza A by multiple respiratory pathogen PCR. Of the four persons who tested positive, three had illness onset on February 7, 2011, two days after the peak of the epidemic curve. The fourth person who was positive for influenza had onset on February 10, 2011. All four patients had NP swabs collected seven days after the onset of symptoms Among the four persons testing positive for influenza A, three were confirmed as 2009 H1N1 influenza A. The other person tested positive for influenza A, not H1N1, but because a personal physician ordered the tests no further documentation of testing methodology or results were available to the outbreak investigation team. Of note, no patients tested positive by PCR for other respiratory pathogens including RSV, parainfluenza, human metapneumovirus, rhinovirus, and adenovirus.

Upon medical record review of 13 persons who had chest radiographs performed, no persons were diagnosed with radiographically confirmed pneumonia, and thus no persons met the case definition for LD.

Environmental Sampling Results

Multiple samples were collected on two separate visits from Hotel A and Venue A by LAC DPH. Of the 24 samples collected from Venue A and two samples from Hotel A, only two samples from Venue A were positive for *L. pneumophila* – one from a hot tub water sample and another from diatomaceous earth pool filter water. In the sample collected from the hot tub, seven isolates of *L. pneumophila* were identified. In summary, Monoclonal antibody and Sequence-Based Typing analyses identified three different types of *L. pneumophila* in these hot tub isolates, serogroup 3 sequence type 6, serogroup 1 sequence type 1, and serogroup 1 sequence type 154. Another isolate, *L. pneumophila* serogroup 6, was found in the diatomaceous earth filter from the pool. None of the samples from Venue A, Hotel A or the hazer that were collected by and tested at the CDC laboratory were positive for *L. pneumophila.*

DISCUSSION

We found that among attendees of the conference, a large outbreak of respiratory illness occurred with the peak of the epidemic curve occurring on February 5, 2011. One hundred and twenty three individuals met the case definition. Predominant symptoms reported include fever, chills, myalgias, and cough; although not directly asked, 7% of ill persons reported sore throat. Hostesses from the local area who only attended the party at Venue A reported similar influenza-like symptoms. However, only 3 Venue A staff of 41 interviewed reported illness. The attack rate among conference attendees was 29% (123 who met the case definition for respiratory illness among 432 survey respondents). Among conference attendees, attendance at the Venue A party on February 3rd was associated with a 3.8 times increased risk of respiratory illness. No other exposure to the other hotels and conference venues was significantly associated with illness.

Although the epidemic curve appears consistent with a point-source outbreak, which could be compatible with an environmental exposure such as *Legionella* presenting as Pontiac Fever, it is important to note that the conference attendees departed on February 4th, thus immediately limiting the possibility of ongoing transmission of a communicable infectious agent within this closed group. Due to the media circulating around the purportedly confirmed *Legionella* outbreak, all initial surveys assessed typical exposures for *Legionella*. In addition, initial reports also implicated a hazer (fog machine) that was in use in the main tent; many of the exposure questions assessed how much time was spent near this hazer. We did not survey conference attendees for secondary illness, or ill contacts prior to the conference. It was not until we contacted ill attendees for specimen submission that we assessed influenza vaccination status and secondary illness. In communities with extensive close contact, and low prevalence of immunity to influenza, such as schools and universities, similar explosive epidemic curves have been

described in the setting of influenza outbreaks. For example, a 2009 H1N1 influenza outbreak in a high school in New York City showed an epidemic curve with a high peak and rapid decline (3). Although this definition has been used for Pontiac Fever, there is considerable overlap with other respiratory illnesses, including influenza, due to non-specific symptoms

A bulk water specimen collected on February 15, 2011 from a hot tub at Venue A tested positive for multiple *Legionella* serotypes. Another specimen collected from the pool diatomaceous earth filter on February 22, 2011 tested positive for *Legionella pneumophila* serogroup 6. Of these, only serogroup 1 is a typical human pathogen, although the monoclonal antibody (MAb) type identified was not the most pathogenic of the serogroup. None of the other samples collected by LAC DPH or CDC from Venue A grew *Legionella*. As CDC guidelines have a zero tolerance for *Legionella* in water systems, we felt it prudent to recommend remediation to reduce any future risk of *Legionella* transmission after *Legionella* was isolated from the hot tub. Though Venue A is a private residence, it also functions as a commercial establishment with many large events that potentially expose hundreds of people. In light of the isolation of *Legionella* from an aerosol-generating water feature, we recommended remediation of the pool system and filters to prevent any future risk to public health. *Legionella* remediation recommendations based on national guidelines were provided to the facility managers.

Overall 45 case-patients provided at least one clinical specimen (urine, serum, sputum, or nasopharyngeal swab) for testing. None of the submitted specimens tested positive for *Legionella* by multiple methods including *Legionella* urine antigen, sputum for *Legionella* DFA, sputum for *Legionella* culture, and *Legionella* serology. Previous outbreaks have shown that Pontiac Fever is difficult to diagnose. In one study, only 8 % of those tested for urine antigen were positive, and serology has been shown to have an even weaker sensitivity (4). In addition, the large lag time between onset of symptoms and collection of specimens could contribute to the lack of positivity. Among the case-patients, four persons tested positive for influenza A by PCR on nasopharyngeal swabs, three of which were found to be 2009 H1N1. It is notable that the four persons who tested positive for influenza A had slightly later onset of illness and shorter time from symptom onset to specimen collection (seven days) than the other case-patients (median 12 days, range 8-17 days). Because influenza shedding can occur up to 5–10 days after onset of symptoms it is possible that other persons who had influenza no longer had detectable virus in nasopharyngeal secretions by the time specimens were collected (5). Given the positive clinical specimens, pandemic H1N1 influenza A is the most likely etiology of this outbreak.

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MEASLES OUTBREAK ASSOCIATED WITH AN ARRIVING REFUGEE LOS ANGELES COUNTY, CALIFORNIA AUGUST-SEPTEMBER 2011

Michelle T. Parra, PhD, Laurene Mascola, MD, David Dassey, MD, et al.

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INVESTIGATION OF INVASIVE MENINGOCOCCAL DISEASE OUTBREAK AMONG THE HOMELESS COMMUNITY IN LOS ANGELES COUNTY

Mopelola Adeyemo, MPH, Van Ngo, MPH, and Rachel Civen, MD, MPH

INTRODUCTION

Meningococcal disease is a life- threatening infection of the cerebrospinal fluid or the bloodstream caused by the bacteria *Neisseria meningitidis*. It is transmitted via direct or droplet contact with nose or throat secretion of persons colonized with the bacteria. There are 13 serogroups, however, serogroups A, B, C, Y, and W-135 are the most common, of which, all but B are preventable by vaccination.[1] Serogroup C meningococcal infections account for the greatest proportion of outbreaks in the United States (US). Invasive meningococcal disease (IMD) most commonly presents with symptoms that include sudden onset of fever, headache, pectechial rash, altered mental status, lethargy, and unstable vital signs. Advanced sepsis can cause disseminated intravascular coagulation leading to thrombocytopenia and embolic phenomenon, resulting in severe neurologic and/or orthopedic complications.[2] IMD remains a rare communicable disease which has shown declining incidence in Los Angeles County (LAC) and nationwide.[3] The annual incidence of meningococcal infection in the US ranges from 0.5 to 1.1 per 100,000 population.[4] In LAC from 2006-2010 the annual incidence rate of meningococcal infection was 0.30 per 100,000 population.[3]

On March 13th, 2011 the LAC Department of Public Health Acute Communicable Disease Control Program (ACDC) received a report of MD in a 61 year old black female who was a resident of homeless shelter A in downtown Los Angeles. On March 24th 2011, a second case of IMD was reported in a 43 year old African American male who also resided at shelter A. On March 25th an investigation was initiated and both the California Department of Public Health (CDPH) and the Centers for Disease Control (CDC) were informed of the situation. From March 1 through July 31, 2011, a total of 20 MD cases were confirmed and investigated, compared to an annual average of 12 cases over 2006-2010 for the same period. This report describes the investigation of an outbreak of four cases and a separate cluster-related cases during this hyper-endemic period from March 1 to July 31, 2011.

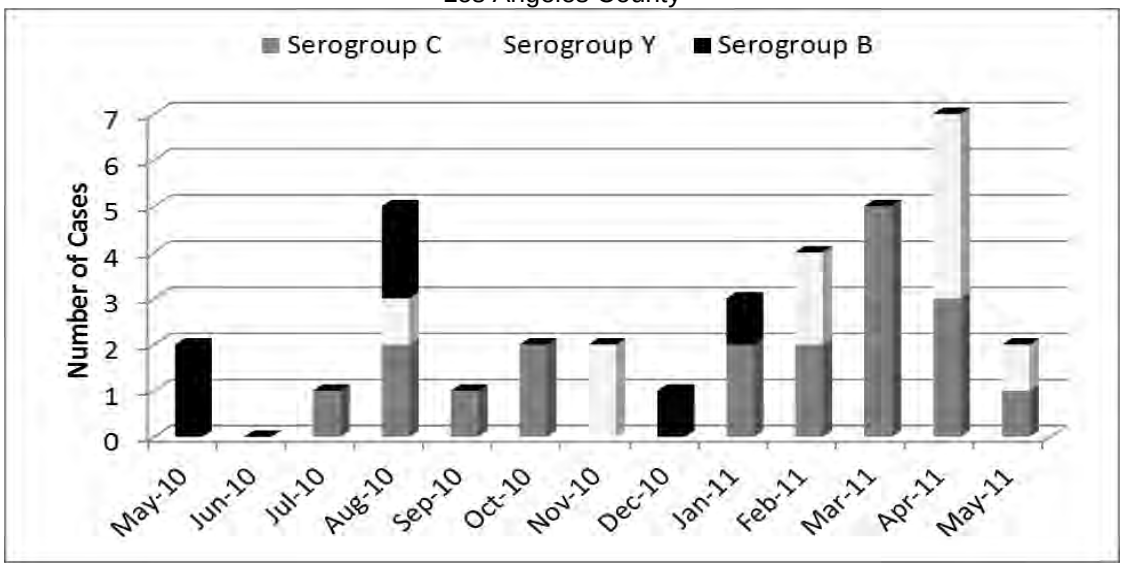
METHODS

Following the report of three serogroup C cases within the first three weeks of March 2011 (Figure 1), two of which were epidemiologically linked, a supplemental questionnaire was developed to identify common risk factors among all reported MD cases. This questionnaire obtained case history information about housing, homelessness, drug use, public transportation use, and other behavioral risk factors. Additionally, the standard CDPH MD case report form was used to collect case demographics, laboratory results, and contact information. For each new MD suspect case reported, ACDC staff and Community Health Services Public Health Nurses (PHN) performed a joint interview with the case or next of kin (if case unavailable) in the hospital setting.

Case Definitions

A confirmed case of IMD was defined as a resident of LAC with positive culture for *Neisseria meningitidis* from a normally sterile site occurring between March 1st and July 31st, 2011. IMD cases were clinically diagnosed as meningitis and/or sepsis due to *Neisseria meningitidis*. A cluster-related case was defined as any confirmed MD case with an epidemiologic link and >80% pulse field gel electrophoresis (PFGE) similarity to another case. An MD outbreak was defined as three or more confirmed cases of MD in ≤ 3 months with an epidemiologic link and whose isolates shared >80% PFGE similarity to the outbreak strain.[4] An investigation period of March 1st through July 31st was selected in which all confirmed MDs were investigated for risk factors and PFGE analysis was performed.

Figure 1. Meningococcal disease cases by week of onset and serogroup, March – July 2011, Los Angeles County



Case Finding and Ascertainment

CDPH was notified to determine if neighboring public health jurisdictions were experiencing a similar increase in MD. An advisory was sent by Community Health Services (CHS) to all LAC homeless shelters and the LAC Sheriff's Department Medical Unit, advising them to be alert to signs of meningitis in residents and to report suspected cases to ACDC. A similar advisory was released to infection preventionists of all acute care facilities and all DPH service planning area (SPA) health officers to notify them of the cluster and the actions taken. Following the report of the third MD case, a second advisory was sent to all emergency departments, hospital infection preventionists, and laboratory directors in LAC instructing them to be on heightened alert for patients with meningitis and to report all suspected meningitis cases to ACDC. The notice also stressed the importance of collecting patient risk factor information and providing prophylaxis to close contacts. Following the 6th case of MD, a report was posted on Epi-X, the CDC's emergency communication network, in order to inform public health officials nationally of the cluster. Following the 7th case, a health advisory was released to the public and posted on the department web site in order to provide information regarding the signs and symptoms of meningitis, mechanism of transmission, and preventative measures.

A retrospective chart review of all reports of viral, aseptic, and/or bacterial meningitis to LAC DPH in the three months prior to the outbreak period (December 1st, 2010 to March 1st 2011) was conducted to identify epidemiologic links among previously investigated MD cases and to identify additional cases. We re-interviewed the earlier MD cases reported from January 1 through March 13th with the supplemental questionnaire for factors not available in the standard investigation process to obtain comprehensive risk factors for all cases beginning January 1, 2011. Specimens and isolates from all individuals with a clinical presentation suggestive of IMD were actively sought and forwarded to LAC Public Health Laboratory (PHL). Similar prospective surveillance was conducted throughout the investigation period for all reported meningitis cases.

Laboratory testing

The PHL performed serogrouping by bacterial slide agglutination for serogroups A, B, C, W135, and Y. The PHL also performed PFGE genotyping on all case isolates using the Nhe-I restriction enzyme; PFGE was replicated by the CDC in Atlanta, Georgia. Additionally, the CDPH Microbial Diseases Laboratory performed genotyping by multiple-locus variable number tandem repeat analysis (MLVA).

Prevention of secondary cases

Antibiotic prophylaxis was offered by PHNs to individuals who were found to be close contacts to each case. Healthcare facility infection control staff oversaw prophylaxis of their hospital workers and ensured first responders (e.g., paramedics, firefighters) were notified of MD exposure and potential need for prophylaxis.

RESULTS

In total 20 cases of IMD were identified with onset from March 1st through July 31st, 2011. We reviewed records of eight MD cases that were previously identified in the three months prior to March 1, 2011. We re-interviewed all the eight cases with the supplemental questionnaire. No additional MD cases were found from retrospective review of aseptic/viral and bacterial meningitis cases passively reported during the three months prior to the onset of the first outbreak case. Among the investigated cases, PFGE and risk factors identified two distinct clusters and one outbreak. Compared to the previous five-year average incidence rate of 0.10 cases per 100,000 between March and July, the IMD incidence rate doubled to 0.20 cases per 100,000 populations for the same time period in 2011. By July 2011, the annualized cumulative incidence rate was 0.28 cases per 100,000, which approached the previous five-year annual average of 0.30 cases per 100,000.

Epidemiological Characteristics

During the investigation period, three cases died due to complications of MD, for a case fatality rate of 15% (Table 1). A majority of the cases were black (n=9, 45%) or Hispanic (n=8, 40%). This differs from the previous five years (2006-2010) in which Hispanics and whites consistently made up the greatest proportion of meningococcal cases. The mean age of the 20 cases was 41 years old and ranged from ten to 80 years old. There was a 3:2 ratio of male to female cases. Five of the 20 cases (25%) smoked marijuana, four of which were in the 18-25 age group. Forty percent of cases (n=8) were cigarette smokers. Seven (35%) of the cases used public transportation. A majority of cases resided in either the San Fernando-SPA 2 (n=6, 30%) or South Bay-SPA 8 (n=5, 25%) (Figure 2). Six MD cases were determined to have associations with homeless persons or shelters.

Table 1. Invasive Meningococcal Disease Cases, Los Angeles County, March – July 2011

	All cases (%)	Outbreak cases (%)	Non-outbreak cases (%)
N	20	4	16
Age	41 ± 20	46 ± 11	40 ± 22
Sex (M:F)	3:2	3:1	9:7
Deaths	3 (15)	1 (25)	2 (13)
Serogroup	13 C/6Y/ 1 W-135	4 C	9 C/6 Y/ 1 W-135
MLVA patterns	4 serogroup C/ 6 serogroup Y	1 serogroup C	4 serogroup C/ 6 serogroup Y
PFGE patterns	4 serogroup C/ 5 serogroup Y	1 serogroup C	3 serogroup C/ 5 serogroup Y
Race			
Blacks	9 (45)	3 (75)	6 (38)
Hispanics	8(40)	1 (25)	7 (44)
Whites	3 (15)	0	3 (19)
Resided in Shelter/Homeless	4 (20)	3 (75)	1 (6)
Share marijuana	5 (25)	0	5 (31)
Smoke cigarettes	8 (40)	1 (25)	7 (44)
Public Transportation	7 (35)	1 (25)	6 (38)
SPA			
San Fernando (SPA 2)	6(30)	0	6 (38)
Metro (SPA 4)	3 (15)	2 (50)	1 (6)
West (SPA 6)	4 (20)	0	4 (25)
East (SPA 7)	2 (10)	1 (25)	1 (6)
South Bay (SPA 8)	5 (25)	1 (25)	4 (25)

MD Outbreak - Epidemiological Characteristics

Four of the six individuals reported to have association with homeless persons and/or shelters met the outbreak case definition (Table 2). The first two reported outbreak cases (cases #1 and #2) resided in the same homeless shelter A in downtown Los Angeles. The 3rd case spent time in shelter B in West Los Angeles prior to symptom onset. The final outbreak case was a bus driver whose route passed in front of shelter A. No other epidemiological ties were discovered among the outbreak cases.

The four outbreak-related cases consisted of three blacks and one Hispanic. The identified residences of the four outbreak cases included two in central Los Angeles, one in the South Bay, and one in the East Los Angeles Area. Outbreak case ages ranged from 37-61 years old. Three of the four MD cases had underlying chronic medical illnesses, including two with hepatitis C infection and one case with diabetes. The case with underlying diabetes died of sepsis secondary to IMD.

Table 2. Epidemiologic characteristics of outbreak and cluster cases in Los Angeles County (LAC), March 2011-July 2011

Case #*	Date of onset	Age	Sex	Race	SPA	Homeless	Public transit	Tobacco use	Exposure to children	Jail	Underlying Chronic Disease
Outbreak cases											
1	03/8/2011	61	F	African American	Metro (SPA 4)	Y†	N	Y	N	N	Y- HCV
2	03/23/2011	43	M	African American	Metro (SPA 4)	Y	U	U	N	N	Y- HCV
4	03/25/2011	37	M	African American	South Bay (SPA 8)	Y	N	N	N	Y	N
5	03/29/2011	42	M	Hispanic	East (SPA 7)	N	Y	Y	N	N	Y- Diabetes
Cluster #1											
3	03/24/2011	21	F	Hispanic	San Fernando (SPA 2)	N	N	N	N	Y	N
13	04/30/2011	20	F	Hispanic	San Fernando (SPA 2)	N	Y	N	N	N	N
Cluster #2											
6	04/01/2011	44	F	African American	South Bay (SPA 8)	N	N	N	Y	N	N
11	04/21/2011	37	M	African American	West (SPA 6)	N	Y	Y	Y	N	N

* Cases are numbered according to onset date; †Y=yes, N=no, U= Unknown

MD Clusters - Epidemiologic characteristics

Two MD clusters that did not meet the definition of outbreak were identified as having greater than 80% matching by PFGE. Cluster #1 was identified between two Hispanic females in the 20-25 year old age group (cases #3 and #13). They also shared a geographic link; both live within five miles of each other in the San Fernando area, SPA 2. PFGE patterns of the two case isolates had a match of >80%.

The second cluster was identified between two black cases whose isolates had an indistinguishable PFGE pattern and who shared a geographical link. Case #6 was an elementary school teacher at a school within five miles of the residence of case #11 who did volunteer work with children. Additional commonalities were not identified.

Laboratory Results

Serogrouping was completed on all 20 isolates and included 13 (65%) serogroup C, 6 (30%) serogroup Y, and 1 (5%) serogroup W135. By comparison, during the same time period in 2010, a total of 14 cases were seen including 5 (35%) serogroup C, 3 (21%) serogroup Y, 4 (29%) serogroup B, and 2 (10%) serogroup W-135.

Among the serogroup C cases, one outbreak and two clusters were identified. Of the 13 serogroup C cases, four MLVA and four PFGE patterns were identified. All four outbreak cases had indistinguishable PFGE and MLVA patterns. Cluster #1 consisted of two cases who shared the same PFGE and MLVA pattern. Cluster #2 consisted of two additional cases whose isolates shared the same MLVA pattern and a >80% PFGE match.

Of the six serogroup Y cases, six distinct MLVA and PFGE patterns were identified.

DISCUSSION

Cluster cases

From March 1- July 31, 2011, reported IMD incidence and cases doubled in comparison to the previous five-year average from the same time period. A supplemental case report form enabled collection of additional risk factors for MD and PFGE analysis and identified one outbreak and two clusters. In general, MD cases were distributed throughout the county, making it difficult to identify a specific population at risk. Among the 20 cases described, the most predominant risk factors were black race (9, 45%), cigarette smoking (8, 40%), and use of public transportation (7, 30%) (Table 1). Over the previous five-years blacks made up an average of 16% of the meningococcal cases in LAC; however this number has gradually increased since 2006.[3] Thus the high proportion of blacks in the cluster may be attributed to this overall trend. Cigarette smoking was the second most prevalent risk factor. Several studies have reported that tobacco smoking increases risk of bacterial infections, such as MD.[5] Though the exact mechanism is unknown, this may explain the high proportion of cigarette smokers among the cluster. Also, several studies have reported exposure to congregated and crowded environments, such as homeless shelters and public buses to be a risk factor for acquiring respiratory infections, such as bacterial meningitis, due to the potential for droplet transmission between close contacts.[6] Furthermore close contact with persons of low socioeconomic status who have higher rates of MD and are more likely to use public transportation, may also have compounded the risk of MD.[7,8] The tendency for overcrowding and exposure to persons of low socioeconomic status on public transportation may explain the large proportion of public transportation users with MD among the investigated cases.

Outbreak cases

Within LAC, there are an estimated 51,340 homeless individuals on any given day[9] . Sixty-three percent of these individuals are unsheltered. This number has risen by 7% in the past 2 years, which may be partly attributed to the current economic state of California. Because of some behaviors associated with homelessness, these individuals are at greater risk for diseases such as hepatitis and infections such as meningitis.[10] Three of four outbreak-related cases resided in a shelter, making these cases at compounded risk of infection due to their congregate living situation.[8,11] The fourth outbreak-related case, a public bus driver whose route passed by a homeless shelter, may have been at a higher risk for meningococcal infection due to occupational exposure to the homeless population and the potentially crowded environment.

Several immunocomprimising chronic diseases have been implicated in increasing susceptibility to MD. Among the outbreak-related cases two had hepatitis C infection and one had diabetes mellitus. Advanced hepatitis C infection can lead to decreased hepatic synthetic capacity and complement deficiency leading to immunosuppression. As a result, the outbreak-related cases with hepatitis C were likely at increased risk for MD.[12,13,14] In regards to diabetes, several studies have shown a level of immunodeficiency in these patients due to polymorphonuclear leukocyte defects[15,16]. As a result, the diabetic outbreak case was likely at increased risk for bacterial infections such as MD.

Prevention Activities

The limited number of outbreak cases and three-week duration of the outbreak suggest that preventative measures such as health alerts to local shelters and early prophylaxis dissemination to homeless shelter staff and close contacts may have been successful in controlling the outbreak. Time between the onset of case #2 and #4 was 6 days. Since 7 to 10 days are required following vaccination to develop protective levels of anti-meningococcal antibodies, a vaccination campaign targeting homeless populations following case #2 would not have been effective in preventing infection in any of the subsequent outbreak-related cases.

The decision to not initiate a vaccination campaign was made after discussions with the CDC and CDPH. Issues that were considered in this decision were inability to define a target group, potential panic that may ensue among the public, marginalization of an already downtrodden social group, availability of vaccine, vaccine efficacy, and cost. The final decision was based on the inability to define a clear target group due to the lack of substantial epidemiologic links with supporting molecular epidemiologic matches among non-outbreak cases.

SUMMARY

During our investigation period of March 2011 to July 2011 we identified one outbreak of serogroup C meningococcal infection among individuals with links to the homeless; this outbreak was limited to four individuals over three weeks. The rapid response of LAC Department of Public Health in disseminating health alerts and education and providing prophylaxis treatment to close contacts likely played a part in controlling the spread of the outbreak.

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"THE SCOMBROID, IT BURNS!" SCOMBROID FISH POISONING OUTBREAK

Susie Tangpraphaphorn, MPH

The Acute Communicable Disease Control Program (ACDC) at Los Angeles County (LAC) Department of Public Health (DPH) received a foodborne illness complaint regarding a fine-dining restaurant in Los Angeles. The complaint stated that a customer ate a tuna burger for lunch at the restaurant and fell ill with rashes, facial flushing and swelling within minutes, followed by gastrointestinal distress. The symptoms and alleged food source are commonly associated with scombroid fish poisoning. Scombroid fish poisoning is an intoxication caused by an overabundance of histamine in food, usually scombroid-type fish like tuna. The histamine accumulates when bacteria in the food proliferate and decompose the amino acid histidine into histamine. Because the food was produced and served in a commercial establishment, and because scombroid fish poisoning is a reportable condition, ACDC initiated an investigation.

METHODS

ACDC reviewed the foodborne illness report and interviewed the person who filed the complaint to get additional information about his illness. ACDC contacted LAC DPH Environmental Health Services (EHS) Food & Milk Program (F&M) to notify them of a probable scombroid fish poisoning case, stating the name and location of the restaurant, as well as the food implicated in the complaint.

F&M inspected the restaurant that served the tuna, requested information regarding number of tuna sandwiches served, additional complaints about the tuna, and invoices for the restaurant's tuna supplier(s).

ACDC created a standardized questionnaire to interview suspected additional cases. Then ACDC called people whose names and telephone numbers were on a list of complaints collected by the restaurant and given to F&M. ACDC used a cohort study design to analyze data collected in the questionnaires. MS® Excel was used to process the data.

F&M traced the origin of the tuna from the restaurant back to its original suppliers. F&M requested copies of purchase and sales invoices to determine whether the purveyors were following appropriate procedures.

RESULTS

ACDC spoke to the original complainant and asked him to verify his symptoms. He stated that 45 minutes after eating an ahi tuna burger, he had onset of facial flushing, itching and upper-body rashes which were followed by diarrhea. He searched his symptoms online and decided it was probably scombroid fish poisoning, so he self-medicated with Benadryl® and did not seek medical attention. He also stated that he had lunch with a friend. She did not order any items made with tuna, and she did not become sick.

F&M sent an inspector to the restaurant on the same day of the complaint. The restaurant demonstrated its process for making tuna burgers: the cook minces tuna trimmings in a mechanical grinder, then shapes the tuna into flat, circular patties, which are seared rare and served on a bun with greens and aioli. F&M noticed the grinder had traces of food debris on the cutting surfaces. However the grinder was being cleaned at the time of inspection, therefore it was difficult to ascertain how long the food debris had been on the cutting blades. The refrigerator that housed the tuna was operating at an appropriate temperature. There was no tuna leftover from that day's lunch service; the manager had removed and discarded the tuna following initial complaints of foodborne illness. The restaurant manager provided invoices and receipts for the seafood they had served that day. The restaurant manager also compiled a list of people who had filed complaints pertaining to the ahi tuna burger; the list was given to F&M and forwarded to ACDC.

There were seven people on the list, including the person who filed the initial foodborne illness complaint; ACDC interviewed each person listed. All seven people had eaten the ahi tuna burger for lunch on November 10, 2011. The burger is only served at lunch. None of the people interviewed reported eating any other ahi tuna items that were on the menu. Five people fit the case definition, while two described symptoms not compatible with scombroid fish poisoning (Table 1). Four cases were male, one was female. Ages ranged from 32 to 68 years, with an average of 47 years (Table 2). Symptom onsets ranged from 30 to 75 minutes after eating. Durations of symptoms lasted from 3 to 4 hours. One person sought medical care who was hospitalized overnight at a local hospital. Three people self-medicated with over-the-counter antihistamines.

Table 1. Reported Symptoms (N=5)

Symptom	n	Percent
Body Rashes / Itching	4	80%
Facial Flushing / Redness	5	100%
Oral Swelling	1	20%
Oral/Peri-Oral Burning Sensation	2	40%
Shortness of Breath	2	40%
Tachycardia	2	40%
Headache	2	40%
Dizziness	2	40%
Nausea	1	20%
Vomiting	0	0%
Abdominal Cramps	2	40%
Diarrhea	2	40%
Fever	0	0%
Duration=3.6 hours (range 3 to 4 hours) Incubation= 47 mins (range 30 to 75 mins)		

Table 2. Case Demographics (N=5)

	n	Percent
Male	4	80%
Female	1	20%
Age Group		
1-4	0	0%
5-19	0	0%
20-49	2	40%
50+	1	20%
Unknown	2	40%
Mean age	47	range = (32 to 68 yrs)

F&M used the purchase invoices and receipts provided by the restaurant to trace back the origins of the ahi tuna. F&M contacted Seafood Broker “O” who supplied fish to the restaurant. The invoices from Broker “O” showed an address and phone number based in Orange County. The owner of Broker “O” stated they purchased the ahi tuna trimmings from Seafood Processor “U” but that all related invoices were not available and could be provided by the next business day. F&M inspected Processor “U”. Processor “U” was unable to provide F&M with any invoices or evidence of sales to Broker “O.” Processor “U” denied selling ahi trimmings, stating that the trimming were byproducts to be discarded. However, the manager at Processor “U” mentioned that workers are permitted to take home leftover fish portions not sold to market.

Seafood Broker “O” was again contacted for related invoices. Seafood Broker “O” explained that they were still working on gathering the invoices. Upon inquiry regarding their location of any processing and storage facilities, Broker “O” replied they did not process food, but had a storage facility in Los Angeles. It was then discovered that “O” was operating without a current public health license and was working within the facility of another seafood processor “C” in Los Angeles. The California Food and Drug Branch was notified about the situation. It was not until five days later that Broker “O” admitted they had no purchase invoices for the ahi tuna trimmings which they had sold to the restaurant. They stated they bought ahi trimmings from a worker at Processor “U”.

F&M filed a criminal complaint against Broker “O”. Broker “O” plead guilty to one count of failing to provide food from an approved source. EHS recovered $3000 in investigative costs. Broker “O” paid a fine to the court and was placed on probation for a year to ensure it does not violate health laws again. In the meantime, EHS was able to assist Broker “O” in obtaining the proper permits to conduct business lawfully.

CONCLUSIONS

This was an outbreak of five clinical cases of scombroid fish poisoning that affected diners who ate tuna burgers at a restaurant in LAC. The investigation found that the broker supplying the restaurant’s tuna was operating fraudulently without a public health license and without proper documentation to detail their purchases and sales transactions. Environmental Health Services did not find any faults with the restaurant’s operations since the restaurant had purchased the tuna in good faith had received the product one day prior to serving and all refrigeration units were functional and at temperature. The restaurant severed business ties with the seafood broker and removed tuna items from their menu.

The scombroid fish poisoning cases all recovered from their symptoms within a matter of hours. Only one case, a 68 year old man with a history of hyperlipidemia and hypertension, required medical attention; therefore, he was the only case diagnosed with scombroid fish poisoning by a physician.

Seafood Processor “U” amended its company policy of allowing workers to take unsold product for personal use. Seafood Processor “C,” which was brought in for an administrative office hearing, is no longer sharing their facility with another business. EHS followed through with legal actions against Broker “O” for operating unlawfully and for being unable to show that the ahi trimmings came from an approved source. As a result, Broker “O” has obtained the appropriate permits and found an approved facility for their business. Broker “O” now obtains seafood from approved licensed seafood purveyors.

LIMITATIONS

A significant limitation in this investigation was the lack of food samples available for testing. Because scombroid fish poisoning is a clinical diagnosis, testing the food for the presence of excess histamine is necessary to confirm a link between illness and food. Secondly, ACDC did not interview dining partners who did not eat tuna, and did not conduct a case-control study which could have demonstrated a statistically association of illness with consuming the ahi tuna burger.

IMPLEMENTING THE CIFOR *GUIDELINES FOR FOODBORNE DISEASE OUTBREAK RESPONSE*: SOUTHERN CALIFORNIA REGIONAL WORKSHOP

Y. Silvia Shin, RN, MSN/MPH, Elaine Waldman, Alan Wu, MPH

BACKGROUND

To aid government agencies responsible for preventing and managing foodborne disease, Council to Improve Foodborne Outbreak and Response (CIFOR) and Centers for Disease Control Prevention (CDC) developed the *Guidelines for Foodborne Disease Outbreak Response* and CIFOR Toolkit. The *Guideline* was issued by the Council of State and Territorial Epidemiologists (CSTE) in 2009. Acute Communicable Disease Control Program (ACDC) at Los Angeles County Department of Public Health received a grant funding from CSTE to provide a training workshop to local public health departments using the *Guidelines* and Toolkit with the aim of integrating recommendations from the guidelines into the activities of their departments. The target audiences for this project were multidisciplinary state, county and city-based teams involved in outbreak response, including epidemiologists, public health laboratorians, environmental health specialists, and public health nurses.

OBJECTIVES

Objectives of the workshop included the following:

1. To bring together a multidisciplinary team to work together for a highly interactive day of learning and sharing.
2. To conduct a plenary session to introduce the workshop, provide an overview of the agenda, and to present case studies on topics such as multijurisdictional outbreaks, “doing more with less”, and an example of a challenging outbreak with a successful response.
3. To familiarize workshop participants with the Guidelines for Foodborne Disease Outbreak Response including a participant prerequisite to have a base familiarity with the Guidelines and to bring local or existing algorithms and procedures to the workshop.
4. To familiarize workshop participants with the Guidelines Toolkit and its components.
5. To conduct small discussions about current protocols, what needs to be included in future protocols, and challenges and successes.
6. To brainstorm shared problems and barriers as well as to identify potential solutions.
7. To complete at least two to three Focus Areas of the Toolkit, pre-selected through an assessment conducted before the workshop takes place.
8. To identify improvements for foodborne disease outbreak response.
9. To identify and prioritize recommendations from the Guidelines that address needed improvements.
10. To create an action plan to implement the selected recommendations including a lead point person and timeframe.
11. To evaluate the team’s experience with the Toolkit and submit an evaluation form to CSTE.
12. To create a summary report for CSTE.

METHODS

ACDC formed a workshop Planning Committee. The Planning Committee consisted of multidisciplinary staff from ACDC Food Safety Unit, Planning & Evaluation Unit, Health Education Unit, and Training Unit; LAC DPH Community Health Services, Environmental Health Program, Public Health Laboratory, Organizational Development & Training Program; California Department of Public Health (CDPH) Division of Communicable Disease Control; and Solano County Health Officer.

A project plan was developed to include tasks with timeline and responsible team member(s) in order to guide the workshop planning. The Planning Committee held bi-weekly meetings to determine the format of the workshop and agenda, to distribute workload, to review planning progress and to determine next steps in order to accomplish the workshop objectives.

The Planning Committee sought bids from area hotels and meeting venues per Los Angeles County policies and selected the workshop venue in Pomona, California for May 18, 2011.

In order to develop a relevant, effective workshop, the Planning Committee decided to conduct a pre-workshop assessment. The goal of the assessment was to prioritize topics and Focus Areas to incorporate in the workshop agenda based on the prospective workshop participants' perspectives. The assessment was modeled after the CIFOR *Guidelines* Toolkit Document E-Selecting Focus Area Worksheet. An online survey was developed and launched via SurveyMonkey™. The survey link was emailed to prospective workshop participants as well as to those who may not be able to attend the workshop but may be interested in contributing to identifying improvement needs and priorities.

Invitations to the workshop were sent out via electronic mail to local public health jurisdictions in Southern California—counties of Los Angeles, Santa Barbara, Riverside, Orange, Imperial, San Diego, Ventura, and San Bernardino; cities of Pasadena, Long Beach, and Vernon; and state of California Department of Public Health. Target audience members were health officers/program directors, epidemiologists, public health laboratorians, environmental health specialists, and public health nurses. The workshop online registration was set up on SurveyMonkey™.

The workshop agenda was formulated through a collaborative effort of the Planning Committee. The workshop agenda items consisted of the following:

- Welcome: to greet participants, introduce the workshop, provide an overview of the agenda, and convey the importance of the workshop to support "doing more with less" in the current economic climate.
- Plenary Presentation: to familiarize workshop participants with the CIFOR *Guidelines* and the Toolkit.
- Case Study Presentation and Tabletop Exercise: to promote discussions about current foodborne outbreak response protocols; identify needs for future protocols; discuss challenges and successes; and identify current practices in various aspects of foodborne disease outbreak response.
- Peer Exchange: to bring together individuals in the same public health discipline to provide networking opportunity; brainstorm shared problems and barriers as well as to identify potential solutions.
- Action Planning: to identify improvement needs for foodborne disease outbreak response; identify and prioritize recommendations from the *Guidelines* that address needed improvements; create an action plan to implement the selected recommendations including a lead point person and timeframe for at least two to three Focus Area of the Toolkit.

- Plenary Discussion: to share and evaluate the team's experience with the case study activities, peer exchange session, and action planning.

RESULTS

There were 26 Los Angeles County and CDPH staff members who served on the Planning Committee, 18 (70%) of whom attended the May 18th workshop. The Planning Committee convened for seven biweekly meetings, along with a post-workshop debriefing meeting on May 24th. These meetings involved a range of 13 to 22 participants, with an average of 17 attending in person or via teleconference. Agendas and minutes for each planning meeting were prepared and distributed to committee members to document workshop planning discussions and decisions.

The pre-workshop assessment survey was completed by 48 individuals. The assessment results showed that Focus Area 1-Relationships with Relevant Agencies and Organizations, Focus Area 2-Necessary Resources, Focus Area 3-Communications were greater gaps and needs for improvement.

The workshop was attended by 57 individuals from the following counties: Los Angeles, Santa Barbara, Riverside, Orange, Imperial, and San Diego; from the cities of Pasadena, Long Beach, and Vernon; and State of California Department of Public Health. Participants represented various public health disciplines including public health policy (i.e., health officers), epidemiology, public health laboratory, and environmental health.

The welcome session was conducted by Dr. Laurene Mascola, Chief of Acute Communicable Disease Control Program (ACDC) of Los Angeles County. She highlighted the importance of gathering to discuss current practices of foodborne outbreak response and identifying efficiencies during times of economic hardship, i.e., "do more with less". As a plenary session speaker, Dr. Bela Matyas, Solano County Health Office introduced the CIFOR *Guidelines*. He discussed CIFOR *Guidelines* history, purpose and intent, target audiences, and contents. He also presented the CIFOR Toolkit's purpose, target audiences, approach, components including the Focus Areas, and the worksheets. Finally, the plenary session also included the pre-workshop assessment results.

The case study presentation was conducted by Dr. Roshan Reporter, Food Safety Unit Head at ACDC of Los Angeles County and Dr. Akiko Kimura, medical epidemiologist in the Infectious Disease Branch of California Department of Public Health. The case study presented a foodborne outbreak scenario that addressed both local and multi-jurisdiction/national level responses. The first break-out session, tabletop exercises, was facilitated by Noel Barakat, Director at Organizational Development and Training of Los Angeles County Department Public Health. The exercises were incorporated into the case study presentation which consisted of several questions for each exercise session. Questions were related to all Focus Areas with emphasis on Focus Areas 1, 2, 3, 5, and 8. After each jurisdictional group discussed the exercise questions they were encouraged to share their answers with rest of the participants.

The second break-out session was a Peer Exchange session where each disciplinary group from across jurisdictions convened in separate rooms. There were four disciplinary groups—program directors (e.g., health officers, infectious disease program directors), epidemiologists, public health laboratorians, and environmental health specialists. Each group had a facilitator and a recorder, who documented session proceedings on flipchart paper. Facilitators were provided with a set of guide questions to motivate interactive discussions on common issues, challenges as well as successes unique in their disciplinary setting. They were also encouraged to discuss potential solutions. Facilitators presented highlights of their group discussion with all of the participants after the Peer Exchange session.

The last break-out session was Action Planning in which each jurisdictional group was asked to draft an action plan with a lead point person and timeframe utilizing the CIFOR *Guidelines* and the Toolkit. All groups were encouraged to incorporate what they have learned throughout the day from the break-out sessions.

As the last item of the workshop, representatives from each group shared what they planned to implement for improvement and what they learned from the day's experience. Dr. David Dassey, Deputy Director of ACDC, shared concluding remarks with the theme of "we're all in this together… today is just the beginning." All participants were asked to complete an evaluation form and were given a certificate of completion.

Following the workshop, each participant received an email with all jurisdictions' action plans, a summary of the evaluation, roster of participant contact information, and photos of their jurisdiction's participants in action at the workshop.

EVALUATION

Out of 60 registered workshop attendees, 57 attended the workshop from 11 jurisdictions—18 epidemiologists, 18 environmental health specialists, eight public health laboratorians, 11 health officers/program directors, and two workshop coordinators.

Each participant was asked to complete an evaluation form at the end of the workshop. A total of 36 (63%) participants completed an evaluation form. Out of the 36 participants, 24 (67%) strongly agreed and 12 (33%) agreed that the Plenary Presentation was relevant. The vast majority of the participants stated either "strongly agree" (n=20, 56%) or "agree" (n=13, 36%) that the Case Study Presentation/Tabletop Exercise was effective. All participants who completed the evaluation form strongly agreed or agreed that the Peer Exchange session was useful. The Action Planning session was rated as helpful by all participants who completed the evaluation. Participants appreciated the opportunity to network with colleagues in neighboring health jurisdictions and to address common concerns regarding foodborne outbreaks. Post-workshop feedback included:

- "It gave us a great road map to improve our job."
- "It was a very worthwhile day; it was great to get together, clarify, and put on paper our goals, dates, and responsible people, to solidify our plan."
- "We need another workshop to practice the steps of a multi-jurisdictional outbreak."

Overall, all participants stated that they "strongly agree" or "agree" that the workshop met their expectations.

DISCUSSION

As local and state public health departments are responsible for preventing and managing foodborne diseases, it is crucial for these departments to have competent workforce and resources in order to effectively and efficiently respond to disease outbreaks. The CIFOR *Guidelines for Foodborne Disease Outbreak Response* and CIFOR Toolkit was designed to provide a foundation for epidemiologists, laboratorians, environmental health specialists, and others involved in food safety programs. The *Guidelines* can influence standardization of foodborne disease investigation as well as other communicable disease investigations. Moreover, continuous utilization of the *Guidelines* and diligent

follow-through of the action planning will be essential in contributing to foodborne disease prevention and management.

EVALUATING THE LOS ANGELES COUNTY PUBLIC HEALTH URGENT DISEASE REPORTING SYSTEM

Amber Zelenay, MPH

Strengthening the ability of Local Public Health Agencies (LPHAs) to detect and respond to bioterrorism as well as natural disease outbreaks has become a national priority. In response to this priority, Centers for Disease Control and Prevention (CDC) issued guidance that clarified LPHA responsibilities for receiving and responding to urgent disease case reports and outbreaks [1]. This guidance detailed four primary recommendations: 1) a single, well-publicized telephone number to receive urgent case reports; 2) a phone triage system to process urgent case reports; 3) being capable of receiving urgent case reports 24 hours a day, 7 days a week and 4) a trained public health (PH) professional to respond within 30 minutes of receiving the report. Lacking from this guidance was the provision of tools or methods that LPHAs could use to evaluate and test their disease reporting system to identify areas that were working well and areas that needed improvement.

RAND Corporation developed a set of methods that could be used by LPHAs to evaluate their ability to respond to urgent case reports and assess their compliance with CDC recommendations. A pilot study using these methods was conducted by RAND in 2004 using several LPHAs across the country as test subjects. The study methods and results were published in 2005 [2]. Accompanying the report was a technical manual that LPHAs could use to perform similar evaluations of their own disease reporting systems. Using this manual as a guide, evaluations of the Los Angeles County (LAC) Disease Reporting System have been performed in 2006 [3], 2008, and 2010 [4]. In August 2011 another test of the system was performed using the same methods.

BACKGROUND

Los Angeles County maintains a disease reporting system capable of receiving reports 24 hours a day, 7 days a week via an 888 toll-free disease reporting hotline. In addition to the hotline, urgent disease reports can also be called in directly to Acute Communicable Disease Control Program (ACDC).

Calls received through the hotline during normal business hours—Monday-Friday, 8am-5pm—go directly to the LAC Department of Public Health Morbidity Unit. If a caller is requesting information or assistance related to infectious disease the call is transferred to ACDC. Calls are then triaged by ACDC clerical staff based on whether the caller is a healthcare provider and the exact nature of the call.

All calls received after-hours—Monday-Friday, 5pm-8am, weekends, and holidays—are forwarded directly to the County Operator [CO] (serves as the answering service for *all* county departments). Healthcare providers with questions related to infectious disease are transferred to the Public Health physician on call (aka Administrator On Duty [AOD]). Public callers, however, are provided with requested information, but not typically transferred to the AOD.

METHODS

The RAND technical manual provides a template for evaluating the competency of disease reporting systems. The manual was used to test how quickly a connection can be made between a caller and the action officer[1] (AO). A test of the system was planned for June 2010. Selected ACDC staff persons with jobs unrelated to the immediate receipt and processing of urgent disease situations were used to perform test calls. For callers without previous experience with the project, a brief training session was given. Callers signed up to perform several test calls during the test month.

The call process consisted of three phases: 1) initiating a call, 2) reaching an AO and 3) debriefing. A call was initiated when a test caller phoned the disease reporting system, used a lead-in (a short message

[1] For purposes of this test, an Action Officer (AO) is defined as a Public Health professional responsible for responding to public health emergencies at the time of the test call.

designed to move the call to an AO) and asked to speak to an AO. The caller would either be transferred directly to the AO (a warm transfer) or be asked to leave a message for the AO (callback). Once the caller reached an AO and confirmed that the person was responsible for handling urgent disease case reports, the AO was "debriefed"—informed that the call was only a test and that no further action was required.

Test callers received a script to follow for each call initiation that had them pose as a healthcare worker trying to get information regarding a potential case or cluster of infectious disease. This disguise prevented the person receiving the call from knowing immediately that the call was a test. During the call, each caller would complete a worksheet to keep track of specific call details such as the exact time the call was initiated, how long the caller was on hold, if the caller reached an AO, whether they had a warm transfer or a call back and how long the entire call took from start to finish. Callers were also encouraged to make notes on anything else of interest that happened during the call.

Information collected during the test calls was used to measure several outcomes—if contact with an AO was made within 30 minutes of call initiation (where contact was treated as a yes/no variable); the time from call initiation to contact with an AO; and the percent of calls with warm transfers as opposed to callbacks.

The test of the urgent disease reporting system was announced to physician staff, but the exact schedule of test calls was kept undisclosed. Dates and times of test calls were varied throughout the month.

RESULTS

During the month of August 2011, a total of ten test calls were made to the disease reporting system. Contact with an AO was made within 30 minutes for nine calls (Table 1). Response times for successful calls ranged from 3 to 12 minutes with a mean of 5.8 minutes from initiating the phone call to reaching an AO. All nine calls were warm transfers.

Table 1. Successful Call Line List

Call #	Type of Call	Time of Call	Out-come	Time on hold			Total Time to reach AO
				County Operator	Morbidity Unit	ACDC/IP	
1	Business Hrs	Morning	WT	----	10 sec	15 sec	5 min
2	Business Hrs	Afternoon	WT	----	20 sec	3 min	6 min
3	Business Hrs	Afternoon	WT	----	8 sec	3 min	5 min
4	Business Hrs	Morning	WT	----	5 sec	1 min	6 min
5	After Hrs	Afternoon	WT	6 min	----	----	12 min
6	Business Hrs	Afternoon	WT	----	20 sec	45 sec	6 min
7	After Hrs	Evening	WT	2 min	----	----	6 min
8	Business Hrs	Afternoon	WT	----	15 sec	30 sec	3 min
9	After Hrs	Evening	WT	1 min	----	----	4 min

WT=Warm Transfer

Successful Calls:

Two calls stood out for being handled smoothly and professionally from start to finish. Both calls were conducted after-hours. Each CO was professional, took the appropriate information from the caller, informed the caller when the AO was connected and then left the line. The AO was able to be contacted very quickly and they were pleasant and helpful on the phone.

While all of the successful calls reached an AO in a short amount of time, issues with customer service were noted, examples of which could be found in the CO office, Morbidity Unit and ACDC.

Unsuccessful calls:

One call was not able to connect with an AO within the 30 minutes recommended by CDC (Table 2). This call was placed shortly before the time the CO switched calls back to the ACDC main office. The CO informed the caller that their call might not be returned until the main office opened, but that she would let ACDC know that there was a physician waiting for a return call. While the CO handled the call appropriately, a callback was not received for almost an hour after the initial call was made.

Table 2. Unsuccessful Call Line List

Call #	Type of Call	Time of Call	Out-come	Time on hold			Total Time to reach AO
				County Operator	Morbidity Unit	ACDC/IP	
1	After Hrs	Morning	CB	10 sec	----	----	53 min

CB=Callback

Suggested Improvements:

1. Regularly review call-transfer procedures with ACDC front office and professional staff. External healthcare professionals calling about an urgent potential infectious disease case, whether they suspect a specific disease or not, should be connected to the AOD or an appropriate back-up. As a last option, a message should be taken and a return call made as soon as possible.

2. Infectious disease calls that may regularly be handled by an alternate program (e.g., Immunization Program) should still be forwarded to an appropriate internal AOD if the external healthcare professional insists on speaking with someone immediately.

3. Remind Morbidity Unit staff that when external healthcare professionals call looking for a physician consult, they should immediately be transferred to ACDC, not to the Morbidity Unit supervisor.

DISCUSSION

All test calls except for one reached an AO within 12 minutes; well under the 30 minute standard recommended by the CDC. The telephone hardware systems functioned appropriately, but the need for improvements with the human element of the system were noted.

The evaluation of the LAC disease reporting system was successful in that the vast majority of test calls reached an AO very quickly, although customer service problems were identified that need to be addressed. The latest test shows that the current system is functional. The county maintains a system to receive reports 24 hours a day, 7 days a week and a toll-free hotline specific for receiving urgent disease case reports. The findings of this report have been shared with ACDC administration and areas of improvement have been discussed with appropriate staff affected by this response protocol.

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RESPONSE TO THE 9/11 TENTH YEAR ANNIVERSARY AND RICIN BIOTERRORISM THREAT REPORTS

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BACKGROUND

The tenth anniversary of the 9/11 attacks followed the death in May 2011 of Al-Qaeda leader Osama bin Laden. The confluence of these events led to heightened concern for acts of terrorism. In August 2011, the New York Times wrote a news article on a ricin terror threat which was subsequently also distributed via ProMed-Mail as an international ricin terror alert (1,2) expressing concerns of American counter-terrorism officials that Al Qaeda was producing ricin toxin for attacks in the United States. Ricin is a poison found naturally in castor beans. If castor beans are chewed and swallowed, the released ricin can cause injury. Ricin can be made from the waste material left over from processing castor beans. It can be in the form of a powder, a mist, or a pellet, or it can be dissolved in water or weak acid. The Centers for Disease Control and Prevention (CDC) has classified ricin toxin as a Category B threat agent. Category B agents are the second highest priority agents because they can be disseminated with moderate ease, they cause moderate morbidity and low mortality, and they require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance. We describe our efforts to prepare for the 9/11 tenth year anniversary.

METHODS

In order to prepare the Los Angeles County Department of Public Health and its partners, the following objectives were planned by the Acute Communicable Disease Control Program (ACDC): a) notification of hospitals and emergency room physicians of the need to remain vigilant for signs of illness due to possible bioterrorist events, b) notification of key internal and external partners regarding need for increased vigilance, c) calibration of syndromic surveillance and non-traditional surveillance systems (e.g., coroner database, poison control center database) look for specific illness patterns associated with ricin poisoning. Based on enhanced surveillance, if ricin is ingested, initial symptoms typically occur in less than six to 12 hours. These initial symptoms are most likely to affect the gastrointestinal system and include nausea, vomiting and abdominal pain. The symptoms of ricin poisoning are then likely to rapidly progress (generally over 12-24 hours) to include problems such as severe dehydration, and kidney and liver problems. This rapid progression of symptoms and illness is noticeably different than what typically occurs with most (but not all) commonly encountered infectious foodborne illnesses, which generally resolve within a day or two. If ricin is inhaled, initial symptoms may occur as early as 4-6 hours after exposure, but serious symptoms could also occur as late as 24 hours after exposure. The initial symptoms are likely to affect the respiratory system and can include difficulty breathing, shortness of breath, chest tightness, and cough. The symptoms of ricin poisoning are then likely to rapidly progress (generally over 12-24 hours) to include problems such as worsening respiratory symptoms, pulmonary edema (fluid within the lungs), and eventually, respiratory failure. This rapid progression of symptoms and illness is noticeably different than what typically occurs with most common colds and cough-type illnesses. (3), d) ensuring protocols and procedures related to bioterrorism agent testing are readily available to pertinent partners both internal and external, and e) maintaining heightened awareness with the Joint Regional Intelligence Center (JRIC) through our public health nurse detailed at this regional fusion center that facilitates the exchange of information both classified and unclassified among Federal agencies (e.g., FBI, Department of Health Services) and local agencies (law enforcement, fire, sheriff, public health).

RESULTS

We accomplished our objectives by performing the following:

a) A health alert containing epidemiologic clues to a potential terrorist incident was distributed to local area hospital including Emergency Department Directors, Infectious Disease Chiefs, Infection Control Directors) and Emergency Medical Services reminding them to remain vigilant

considering the 9/11 anniversary. Healthcare Providers were also reminded to report any suspected cases of terrorism (biological, chemical/toxin, or nuclear/radiological) immediately to public health as concerns regarding infection control, management of those exposed, diagnostic testing, and specimen collection/packaging need to be addressed. A weblink to our Terrorism Agent Information and Treatment Guidelines for Clinicians and Hospitals was also provided in the health alert (http://www.bt.cdc.gov/agent/ricin/qa.asp).

b) Via the Department of Public Health's Technical Advisory Group (TAG), key partners including our Public Health Laboratory, Toxics Epidemiology, Environmental Health, Veterinary Public Health, and Radiation Management were reminded to remain vigilant in identifying isolated or unusual cases of illnesses or illness clusters.

c) An expanded bioterrorism profile was initiated for our syndromic surveillance systems which included key signs and symptoms of ricin via exposure through ingestion or inhalation.

d) The Poison Control Center database was reviewed specifically for toxins and ricin.

e) ACDC Food Safety Team was notified to look for unusual outbreaks or clusters of illnesses.

f) ACDC Coroner Liaison was notified to remain vigilant in their daily corner database review to look for unusual death related to signs and symptoms of ricin exposure.

g) The Los Angeles County Coroner was also notified and made aware of our efforts to remain vigilant in the detection of unusual deaths and protocols were shared.

h) Continued to maintain connection at the JRIC via ACDC medical intel-analyst and TAG for review of relevant intel.

DISCUSSION

Since 9/11 and the anthrax attacks in October 2001, we must remain vigilant in the detection of another bioterrorist attack. In efforts to help ensure that the department and its partners do not become complacent in performing duties to detect potential bioterrorist events, we emphasized the importance of surveillance and monitoring to our partners during the tenth anniversary year of 9/11.

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USING SYNDROMIC SURVEILLANCE TO ASSIST IN AN INVASIVE MENINGOCOCCAL DISEASE OUTBREAK

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BACKGROUND

Neisseria meningitidis is a gram negative diplococcic responsible for causing meningococcal disease, which may include meningitis, inflammation of the protective membranes covering the brain and spinal cord, and meningococcemia, a form of sepsis [1]. Beginning on March 13, 2011, the Acute Communicable Disease Control Program (ACDC) experienced an unusual increase in reported cases with culture positive *Neisseria meningitidis* in Los Angeles County (LAC). By April 30, 2011 there were 13 confirmed cases with invasive meningococcal disease (IMD), including two fatalities; a total of 20 cases were identified between March 13, 2011 and July 31, 2012. Early in the investigation there were few epidemiological links between the 20 cases: three cases were homeless, two of which resided at the same Skid Row shelter in downtown LA, and thus syndromic surveillance was used to assist in the investigation.

ACDC queried its syndromic surveillance databases to help gauge the scope of the outbreak and detect potentially missed cases. A focus was placed on homelessness as a risk factor because increased rates of IMD are often among persons with a common organizational affiliation or who live in the same community[2].

OBJECTIVE

The purpose of this report is to describe the complementary usage of electronic emergency department (ED) data, coroner death data, and 911 dispatch call center data for case ascertainment in an invasive meningococcal disease outbreak.

METHODS

We queried electronic ED chief complaints (CC) from January 1, 2011 to April 10, 2011 from eight EDs within an 11-mile radius of Skid Row, Los Angeles (LA). A SaTScan™ cluster analysis was performed to locate clusters near Skid Row. All visits were reviewed if the CC included key words based on common IMD symptoms; all ED visits of confirmed IMD cases were also reviewed.

Coroner deaths from the same time period were reviewed for location of death and homeless status. Key words for the query were consistent with symptoms of meningitis. Deaths were excluded if the report included the words “suicide”, “accident”, or “homicide”.

Real-time LA City emergency dispatch (911) calls were also reviewed if the calls originated from the same homeless shelter in which the two confirmed cases resided. All statistical analyses were conducted with SAS® version 9.2.1 (Cary, N.C.).

RESULTS

A total of 238 ED visits met the IMD syndrome definition; however, there was no substantial increase compared to the previous nine months (Figure 1). After review, there were no ED visits with mention of homelessness or shelter residence within the same zip code catchment area.

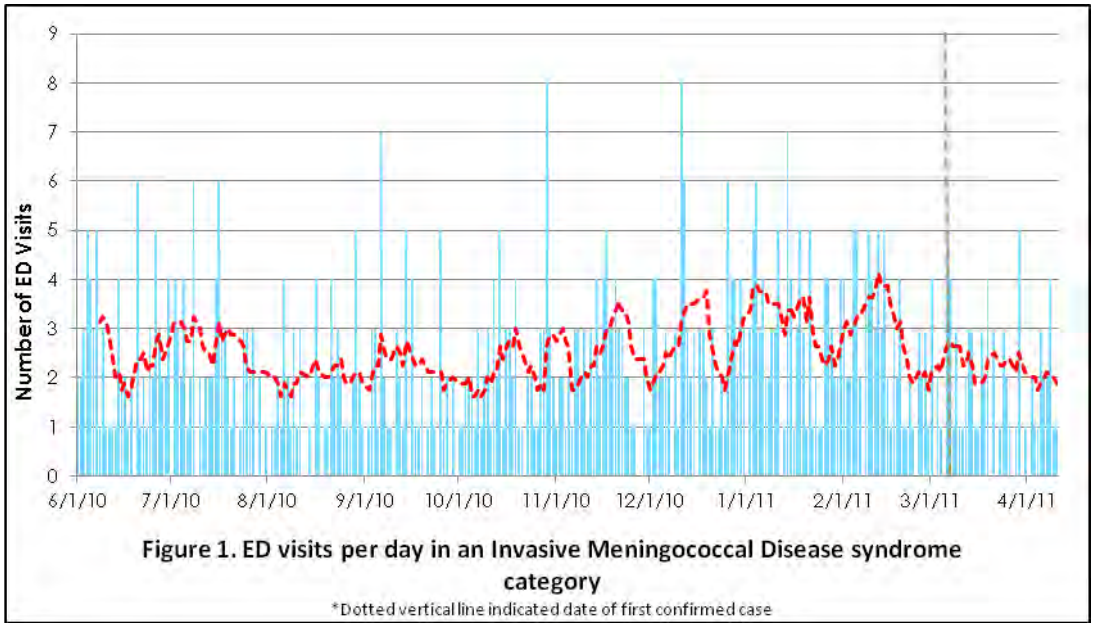

Figure 1. ED visits per day in an Invasive Meningococcal Disease syndrome category

*Dotted vertical line indicated date of first confirmed case

There was no overall increase in the total number of homeless coroner deaths (Figure 2). Two of 45 unrelated deaths (4.4%) took place in shelters—one death in January from "cardiomyopathy" that occurred at the homeless shelter of interest, and another non-specific shelter death in March from "strep pneumonia."

Forty-one 911 ambulance calls were made from the homeless shelter associated with the two confirmed IMD cases. While there was no overall increase in call volume (Figure 3), one call matched a confirmed case fatality.

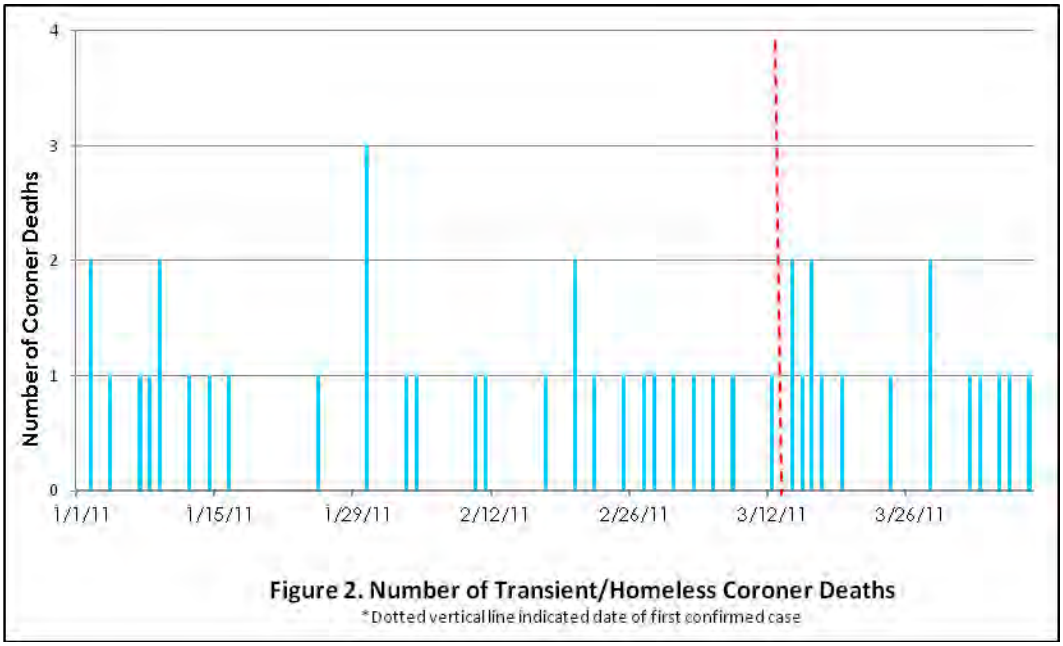

Figure 2. Number of Transient/Homeless Coroner Deaths

*Dotted vertical line indicated date of first confirmed case

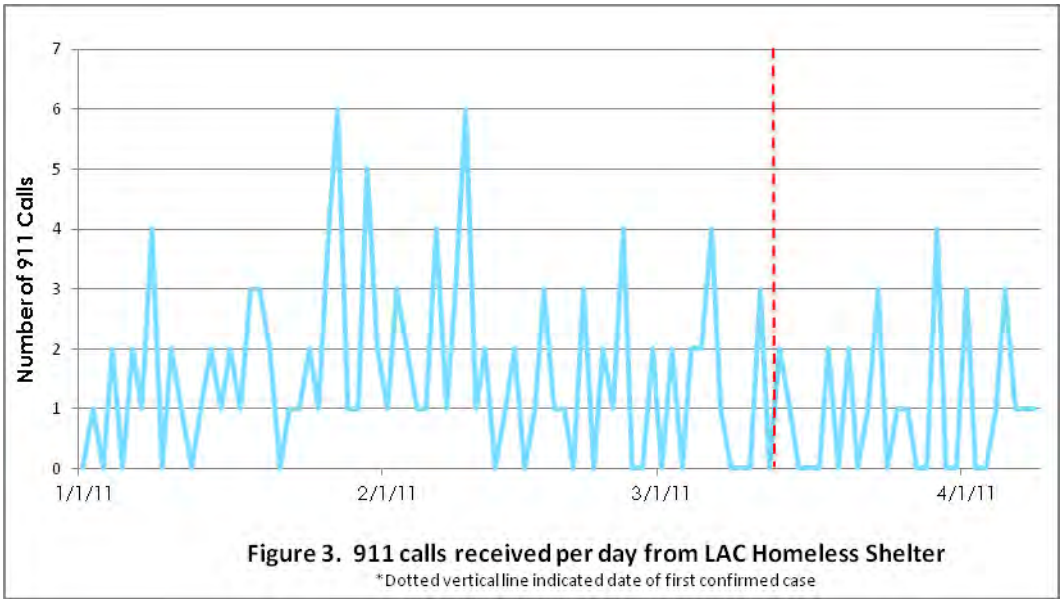

Figure 3. 911 calls received per day from LAC Homeless Shelter
*Dotted vertical line indicated date of first confirmed case

DISCUSSION

An IMD outbreak and two individual clusters were detected in LAC early in 2011. To aid in case ascertainment as well as help establish tighter epidemiological links, three databases within the county's syndromic surveillance system were queried. Both coroner and 911 call databases were more effective than ED data in terms of content, containing free-text fields facilitating focused queries on the key epidemiological links of homelessness and shelter residence. Coroner data are, however, limited in that there is a two-day reporting lag. Also, while many homeless deaths were found, few had precisely reported death locations which limits investigations. It is recommended that LAC coroner data switch to an automated feed, with multiple feeds per day, to facilitate investigative efforts and eliminate the time delay; automation would also allow for data analysis on weekends, when necessary.

Many 911 calls were reported from the shelter of interest. While medical information was vague, additional details enabled ACDC to match one call to a confirmed case. Follow-up for diagnosis information is possible when ED transportation information is present. When available, precise caller locations make 911 calls particularly useful for investigations with a strong emphasis on location such as point source outbreaks. In the future, electronic medical service records will be useful in quickly obtaining necessary data elements for analysis, as well as for attaining more detailed event descriptions that were not known or available at the time of dispatch.

Syndromic surveillance is an important complement to traditional surveillance, providing baselines for health conditions that are otherwise very difficult to obtain. Complementary databases such as coroner deaths and 911 calls may be useful in outbreak investigations that occur in unusual settings or among unique populations.

While no additional cases were found, the absence of an increase provides validation that a large, countywide IMD outbreak had not occurred.

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THE UTILITY OF AN EXTERNAL MEDICAL RESOURCE TO PROVIDE SCHOOL-BASED VACCINATION CLINICS

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BACKGROUND

When pandemic influenza H1N1 (pH1N1) first emerged in March 2009, it took about seven months for the medical and scientific communities to isolate the virus then develop and test a corresponding vaccine to be used as an effective protective response. In the US, by late-October 2009 the federal government began distributing pH1N1 vaccine to Public Health departments across the nation to then manage and oversee the local distribution to their residents; however, the strategy for disseminating the vaccine to the appropriate communities was left to the discretion of each jurisdiction. Because pH1N1 predominantly affects younger populations,[1] many jurisdictions chose to enact school-based vaccination clinics.[2] The Los Angeles County Department of Public Health (LACDPH), instead, chose to primarily implement community-based points of dispensing (PODs) and distribute vaccine to primary care physicians and major medical groups. As such, LACDPH's ability to enact school-based vaccine clinics was identified in retrospective assessments as an area for improvement.

Any outreach to schools in Los Angeles County (LAC) is very challenging because LAC's school system is exceptionally large and complex. In addition to countless private, parochial and home-school entities, LAC is also home to over 80 public school districts, including the Los Angeles Unified School District (LAUSD) which is the second largest in the nation; LAUSD alone serves nearly 700,000 students. Implementing campus vaccine clinics to such a vast entity as LAC's schools would require a large cadre of trained medical staff; but during a pandemic, LACDPH's staff would be hampered by the need to attend to other medical emergencies. Plus, a pandemic would likely deplete *all* staff throughout the area due to their own illnesses and the need to care for sick family members. As such, it is very likely that if LACDPH should choose to implement school-based vaccine clinics during a future medical emergency, like a another pandemic, LACDPH would require employing an outside medical agency to either assist with or take the primary role in enacting those clinics. The purpose of this project was to assess the utility of employing an outside (non-LACDPH) medical agency to implement school-based vaccine clinics in a variety of public school settings across LAC. This project would serve to identify the advantages of this strategy, as well as its gaps and challenges—and then to determine potential solutions to those disadvantages.

Shift in type of vaccine to assist with pertussis booster vaccination compliance (Assembly Bill 354):

Because the impetus for this project was LACDPH's pH1N1 response, and because funding was provided through federal pandemic planning, the initial proposal for this project was to assess the implementation of influenza vaccine via school-based clinics. However, the funding for this project was significantly delayed and unable to commence until late-February 2011, at the end of influenza season. At this point in time, the need for influenza vaccination, as well as the motivation to receive this vaccination, was extremely low. Also at this time, the California Department of Public Health sponsored a statewide vaccination mandate (Assembly Bill 354) in response to the pertussis epidemic that was currently affecting California residents.[3,4] This new ordinance required all students entering 7th through 12th grades to provide documentation of receipt of a pertussis booster vaccination, via the tetanus/diphtheria/pertussis

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(Tdap), vaccine by July 1, 2011. Students without either documentation verifying recipe of Tdap vaccination, or a vaccination exemption waiver, would be barred from admission to school. This new law created a large cohort of students that required vaccination. In addition, because public schools had the potential of losing funding if student attendance suffered as a result of this new law, school administrators would likely be especially motivated to receive services that could assist with compliance to the AB 354 mandate. Because the core objective of this project was to assess the *process* of providing vaccine, not the *type* of vaccine, it was decided to change the vaccine administered via this project from influenza to Tdap.

METHODS

Multiple steps were enacted to implement this project. The first task was to solicit potential participating school districts, which was done with the assistance of the Los Angeles County Office of Education (LACOE), the umbrella organization that unites the over 80 public school districts across LAC. LACOE serves as a conduit for providing information and resources to LAC's public schools. This agency also provides updates in health issues and healthcare-related policy including holding quarterly meetings for key district health administrators. An announcement describing LACDPH's plans to test the utility of an outside agency to implement school-based vaccine clinics was made during their spring 2011 meeting.

Attendees at the meeting were informed that if they wanted their district to participate, they would receive a Tdap vaccination clinic. At no charge to the school, the medical agency implementing the clinic would provide the medical staff to administer the vaccine, as well as the vaccine and all necessary ancillary medical supplies. However, participating school districts would need to handle the majority of the other responsibilities to ensure the success of the project such as: disseminating consent forms and vaccine information sheets to the students, collecting and verifying the information on the consent forms, and arranging for the transportation of students to and from the clinic if held during school hours (see Table 1. Division of School-Based Clinic Roles and Responsibilities). Attendees that wished to have their school district considered for participation in the project completed a short questionnaire to provide their contact information, a description of their school district (i.e., the number of schools, approximate number of students, issues of special need, etc.). A total of 33 separate school districts completed the form requesting to be considered for participation in the project. However, because of continued delays initiating the project, the vaccination clinics could not be held until June 2011. At this point many school districts could no longer participate because they would be attending to end of the school year activities. Ultimately, ten separate school districts including LAUSD participated in the project. In addition, nine smaller clinics were held specifically for LACOE special needs students. Prior to implementing the vaccination clinics, meetings were held with school representatives at each separate school district to plan for their clinic. The breakdown of responsibilities were discussed (Table 1) and the necessary forms were reviewed. Also during these meetings, potential sites for the clinics were considered.

Table 1. Summary of Distribution of Responsibilities for School-Based Vaccination Clinics Held by an External Medical Agency

To ensure the success of the school-based vaccination clinics, all participating agencies must complete several tasks and assume a range of responsibilities as follows:

Los Angeles County Department of Public Health (LACDPH) Duties

- Arrange and provide the funding to employ the external medical agency that will provide the vaccine clinics.
- Provide and duplicate all necessary forms including: sample cover letter, consent forms (from the external medical agency), vaccine information sheet (from the CDC), and California Immunization Registry (CAIR) information sheet and declination statement.

School Duties

- Establish necessary administrative approval (i.e., approval with principals, site supervisors, board members, etc.).
- Arrange and conduct clinic promotion as necessary (including posters, flyers, and letters and/or phone calls to parents, etc.).
- At least two days prior to the clinic, collect signed consent forms and reviewed the forms for: 1) completeness, 2) contraindications, 3) whether the student has already met the vaccine requirement, and 4) to obtain an estimate of how many doses will be needed for the clinic.
- Prior to the clinic, make a copy of all of the returned consent forms. The set of original consent forms will be given to medical

agency providing the clinic, the copy will be provided to the student as a record of their vaccination. If the school would like another set of copies for their records, they can make a second copy; however, medical agency will provide the school with a participant log of students receiving vaccination after the event. The log will contain: 1) the student names, 2) their birthdates, and 3) mother's first name. This log can be used for entry into a vaccine registry like CAIR.

- Designate an appropriate room and provide for all necessary furniture (tables, chairs, trash cans).
- If the clinic is held during class hours, arrange for the transport of the students to and from the clinic. It is important to stagger the participation of students to avoid overcrowding.
- Following the clinic, enter all necessary data from the vaccine clinic into CAIR or other vaccine database. The school does not have to use CAIR to participate, but a vaccine summary database can help to demonstrate compliance with the law for future years.
- Following the clinic, complete the post-event satisfaction survey provided by LACDPH.

External Medical Agency Duties

- Connect with the school district representatives to: 1) review and confirm the division of responsibilities, 2) determine a location on the school site to hold the clinic and confirm that this selection is adequate, 3) review and confirm that the school can provide all necessary furniture as needed (i.e., the number of tables, chairs, trash cans, etc.).
- Provide consent forms in English and Spanish.
- Provide vaccine and all necessary ancillary clinic supplies.
- Provide all necessary staff to conduct the clinic.
- Following the clinic, provide the school a copy of the participant log.
- Handle all vaccine clinic complaints and ensure responsibility for any adverse events.

RESULTS

From June to July 2011, this project conducted a total of 13 clinics for ten separate school districts; three districts held a second clinic in the summer because of surplus vaccine (Table 2). In addition, nine smaller clinics were held specifically for LACOE special needs students. Total 4,160 doses of Tdap vaccine were provided, an average of 297 doses per site (median 265 doses; range 118 to 562 doses).

Table 2. Summary of Tdap Clinics: Dates and Vaccination Totals

	Clinic Dates	Vaccination Totals
1	June 8	397
2	June 8	562
3	June 9	156
4	June 14	423
5	June 15	269
6	June 17	261
7	June[1]	167
8	July 6	244
9	July 12	425
10	July 14	289
11	July 15	118
12	July 19[2]	250
13	July 19[2]	227
14	July 28[2]	372
TOTAL		4,160

[1] A total of nine separate and smaller clinics were held for LACOE special needs classes throughout June.
[2] Because of surplus vaccine, second summer clinics were held for three districts.

DISCUSSION

Overall, the vaccine clinics were extremely successful: the participating school nurses and administrators were very appreciative of LACDPH's outreach which provided vaccinations to thousands of students and greatly assisted the schools' compliance to the AB 354 mandate. The representatives from the

participating schools rated the clinics very highly, had no complaints, and felt the events ran very well with no issues or problems. However, even though the schools were grateful to receive the clinics, the clinics could not have been accomplished without the tremendous effort of the school nurses who were responsible for much of the preparation required for these events—particularly the promotion and registration of students. Uniformly, the most challenging aspects they reported were clinic promotion as well as motivating students to participate. All of the sites complained that there was a lack of understanding of the law requiring Tdap vaccination, and that it would have substantially helped their efforts if there was corresponding media support getting the word out (public service announcements, news reports, etc.). As a consequence, the school nurses became very creative instituting a range of materials to announce and promote the events and also invested a tremendous amount of time sending out letters, making phone calls and urging students to get vaccinated. Nonetheless, all of the sites had a lower turn-out for their clinics than planned; none exhausted the amount of vaccine LACDPH had allocated for their site, which is why this project was able to hold an additional three summer clinics.

Among the 13 clinics, the site that achieved the greatest student turn-out, 562 students vaccinated in one day, instituted several unique and innovative methods to achieve their successful participation. First and foremost, in retrospect, administrative support proved vital to the success the clinics. The locations that had better student turn-out were the locations where the school principal championed the project: assisted with promotion, campus awareness and school announcements—and this was certainly the case for the location that had the project's largest turn-out. At this location, the school principal made getting all of his students vaccinated his top priority. Instead going by AB 354 deadline of July 1 (which would mean his students could wait until school resumed in September to get vaccinated), he wanted his students to meet the mandate before they left school in June. He went out of his way to make this goal known to his students, parents and staff and instituted creative incentives. For instance, a few days following the LACDPH sponsored vaccination clinic, he arranged for a "DJ Party" where students that had submitted proof of vaccination could leave class for lunch 30 minutes early to enjoy a DJ dance. The students were highly motivated by this event, and the teachers were also motivated to have all of their students involved so they too could enjoy 30 extra minutes away from class. Other creative methods that the schools employed included: withholding fall registration packets until students showed proof of registration, having student leaders promote the event in classrooms, and posting signs throughout the campus and also at off-site locations that were common places where parents would likely see them (like a nearby market and laundromat).

Overall, this project demonstrated that using an external medical agency to implement school-based vaccination clinics can be a viable strategy during a pandemic or other public health crisis. However, even though the clinics were successful (ran well without issue or complaint) they still required considerable effort from LACDPH and school staff. Because of budget cuts, schools do not have the resources and funding available to develop the corresponding materials (registration forms, vaccination information sheets, etc.) essential for a vaccination clinic. The development and duplication of these items must still be provided for the schools. In addition, the schools requested that more simple (easy-to-read, lower literacy) forms be used in the future. This project required using the consent forms developed by the external medical resource because they assumed the liability for the events. Future vaccination events would likely have better participation if they used more simplified forms that improved parent and student understanding and motivation for the clinics. Similarly, LAC is very culturally and ethnically diverse; many districts require translation of forms into languages beyond just Spanish. A few sites could not participate because we were unable to provide Chinese or Vietnamese translation. Again, this is a factor that should be accounted for during future clinics.

Conducting vaccination clinics at school sites is a method that Public Health would be wise to employ more often in the future. In particular, providing influenza vaccine at school-sites could yield substantial community and school benefits. The epidemiology of influenza shows that vaccinating children is the single best method of reducing the impact of this disease in our communities. Children, especially young children, have the highest age-specific rate of influenza infection; they are less likely to practice infection control habits (washing hands, covering sneezes and coughs); they tend to play and socialize in close proximity to one another; and when sick with flu, they tend to shed the virus longer than adults. Not surprisingly then, preschool and school-age children are known to be the major disseminators of influenza

and but also respond best immunologically to influenza vaccine. Targeting influenza vaccination to this critical group has shown to provide exponential benefits to the entire population. Schools can also benefit from offering influenza vaccination since this can reduce illness and improve attendance. The convenience of providing vaccination at school sites would likely increase willingness to receive vaccination and further strengthen Public Health's partnership with our valued community partners.

TESTING BIOLOGICAL TEAM RESPONSE DURING A FULL-SCALE MULTI-AGENCY BIOTERRORISM EXERCISE ON BOARD A CARGO SHIP

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BACKGROUND

In June 2011, the Los Angeles County (LAC) Department of Public Health (DPH) participated in a full-scale multi-agency bioterrorism response exercise. The exercise was sponsored by the California National Guard 9th Civil Support Team and took place on board a military cargo vessel docked at a LAC Port. A core group was involved in the discussion and planning of the scenario leading to the event to simulate a response of a potential bioterrorism threat in LAC. The exercise scenario implicated a release of weaponized smallpox virus. Smallpox has been declared eradicated by the World Health Organization since 1980 and the immunity of the population to the virus has declined. A potential release and exposure to the smallpox virus would certainly create a public health emergency response. The scenario of the exercise implicated terrorists taking over a cargo civilian ship in the Middle East, posing as crew members, accidently releasing the virus on the ship during their travels across the ocean, and infecting themselves and crew members. The agencies that participated in the exercise included public health, law enforcement, port authorities, coroner, fire departments, and HazMat agencies. These agencies worked together to assess and mitigate the theat.

The exercise offered the opportunity for the LAC DPH biological response team to conduct the following: test their operational capabilities to respond to a biological agent release with affected ill victims; collect clinical samples while in personal protective equipment (PPE) and respirators; and coordinate response with other responding agencies onsite. Participation in this type of exercise provided staff an opportunity to practice their response skills in a heightened threat environment and prepare the workforce to respond to potential public health related emergency incidents. In addition, participation in this type of bioterrorism exercise definitely incorporated elements of the ten essential public health services and aligned with the strategic planning goals set forth by LAC DPH.

METHODS

In preparation, Acute Communicable Disease Control Program (ACDC) Training and Response Unit provided an online competency-based training on suspected smallpox case investigation, specimen collection procedure, and process for donning and doffing of PPE. The training reviewed transmission of smallpox, the diagnostic criteria, infection control precautions and practices, and the role of the team member in the initial evaluation of a suspected smallpox case. Successful completion of the course was measured by a minimum passing score of 80% on the post-course 20-question multiple choice exam.

To supplement the online course, the bio-response team members completed a practicum session to review and perform a return demonstration of various methods of specimen sample collection for suspected smallpox, packaging of specimens, and completion of laboratory requisition forms for laboratory analysis. A demonstration of the appropriate techniques for donning and doffing of PPE and the use of a new type of Powered Air Purifying Respirators (PAPR) were offered. This training provided the opportunity for the members to perform return demonstration, test the equipment, and familiarize themselves with the components and assembly process of the PAPR.

RESULTS

On the day of the exercise, DPH staff were pre-staged and met in a designated area near the exercise incident. The team was briefed and informed of the situation (a potential act of bioterrorism) and given instructions for response. The bio-response team waited for clearance to enter the vessel once law enforcement and the fire department deemed the vessel safe and clear for entry. The initial notification to DPH described the scenario as a ship arriving from Yemen with many people, both passengers and crew

members, seriously ill with fever, generalized lesions on bodies, and an unknown number of deceased individuals upon arrival to the LAC port.

Once cleared safe for entry, a DPH specialized response team deployed on board the ship first along with the Fire HazMat unit to conduct an initial health threat assessment, perform field sampling testing and determine the extent of the situation from a public health standpoint. Members of the ACDC training and response unit briefed a second bio-response team of the health risk situation on board, reviewed the necessary steps for donning PPE, use of the partner system for safety measures, procedures for collection of clinical specimens of victims, and packaging of specimens for delivery to the public health laboratory.

The bio-response team prepared and gathered their necessary equipment at the staging area for entry on board the vessel once deemed safe to enter. Equipment consisted of supplies such as particulate resistant coveralls, chemical resistant gloves and boot covers, duck tape for sealing seams on coveralls, PAPR, specimen collection laboratory supplies, and radio. Use of the partner-system concept was crucial to ensure proper fitting and positioning of their partner's PPE/PAPR and early recognition of potential emergencies on board the ship.

The team members donned their PPE with the assistance of their partner and consultation from an environmental hygienist on site as needed. They were deployed to respond on-board the vessel, along with some of the DPH specialized team members and external partners such as law enforcement, coroner, and fire HazMat agencies. The goal was to rapidly assess, interview and collect samples of skin lesions on affected victims (both ill and deceased) on board the ship. In a real incident, the specimens would be transported under chain of custody for immediate analysis by the DPH Laboratory Response Network.

The ten bio-response team members consisted primarily of public health nurses and one public health investigator. They worked extremely well together considering all members came together from different programs within DPH and the majority of them were participating in their first bioterrorism response exercise. They quickly established methods for communication with their assigned partner while wearing a PAPR. The scenario and turn of events during the exercise changed unexpectedly throughout the drill, however, the team was flexible and able to adjust to the situations as they presented without problems. The most challenging task for the team was responding in an unfamiliar environment such as a cargo ship, while climbing steep and narrow ladders between decks, assessing victims on the floor in tight quarters while in PPE and kneeling or bending over for prolonged periods, establishing clean and dirty work boundaries and maintaining aseptic technique during the specimen collection process.

Upon successful mission of assessing victims and completing tasks on board the vessel, the bio-response team departed the ship and was directed to a decontamination area and instructed by Fire HazMat on methods to appropriately decontaminate and remove their PPE.

EVALUATION

Five DPH members were assigned to evaluate and closely observe the bio-response team member's actions during the entire response process. Evaluators were instructed to rate the quality of the following areas: overall exercise, PPE donning and doffing process, specimen collection process, team work, and communication between team members. Table 1 summarizes the ratings of assessment areas ranging: poor, fair, good, very good and excellent.

Table 1: Evaluator's Rating Table (n=5)

Evaluator's Ratings	N/A	Poor	Fair	Good	Very Good	Excellent
Overall exercise (team response)	1				1	3
PPE donning and doffing process				1		4
Specimen collection process	1			1	1	2
Team work					1	4
Communication between team members				1		4

The bio-response team members were given an opportunity to provide feedback on their participation after the exercise. Table 2 illustrates the bio-response team responses related to their participation.

Table 2: Bio-response Team Evaluation (n=12)

	Yes	No	N/A
1. The orientation given onsite prepared me to effectively complete my duties.	12		
2. My Job Action Resource Guide (JARG) was helpful in preparing me for my role at the exercise.	11		1
3. Equipment and materials were available for me to do my job effectively.	11	1	
4. My team partner and I were able to communicate and work together well without problems during the exercise.	10	2	
5. The PAPR used during the exercise was comfortable to wear for a prolonged period.	9	3	
6. I feel better prepared to respond to a suspected smallpox case investigation call after this exercise.	10	2	
7. After today's exercise, I could benefit from more smallpox collection exercises and refresher trainings.	12		

Overall, six bio-response team members rated their overall exercise experience as "excellent," four rated their experience as "good," one rated it as "fair," and one did not respond.

DISCUSSION AND LESSONS LEARNED

Recommendations from team members for improvement for future exercise included:

- developing a cheat sheet for collection kits,
- including a small flashlight in kits,
- better organization of supplies prior to specimen collection,
- more practice in drills of this nature,
- improve communications with agencies such as Fire HazMat, and
- improving radio communication.

Recommendations from the team also included continuous on-going skills competency and refresher training sessions. Increasing opportunities to practice responding to biological incidents through multi-agency full-scale exercises is crucial and necessary to ensure a well-prepared and confident workforce capable of responding to potential public health emergency incidents. The ability to measure performance and identify areas of improvement after each exercise is important to ensuring a well-prepared health department (Gebbie, Valas, Merrill and Morse, 2006). According to Gebbie (2006), public health agencies must be able to measure performance and identify areas for improvement. This can be done through ongoing training and emergency response exercising, and through the use of response exercises that include plans for evaluation.

CONCLUSION

Each year, LAC DPH participates in table-top exercises, full-scale exercises and functional exercises. The 2008 National Profile of Local Health Departments reported that 86% of local health departments participated in a tabletop exercise, 72% participated in a functional exercise, and 49% in a full-scale exercise (Biddinger, Savoia, Massin-Short, Preston & Stoto, 2010). Preparedness exercises are effective in familiarizing personnel with emergency plans, allowing different agencies to practice working together, and identifying gaps and shortcomings in emergency planning (Biddinger et al., 2010). Participation in this full-time bioterrorism exercise reinforced the departments need to continue participating in exercises such as these. The Harvard School of Public Health Center for Public Health Preparedness evaluated 38 public health emergency preparedness exercises employing realistic scenarios, and reported usefulness of the exercises in clarifying public health workers' role and responsibilities, facilitating knowledge transfer among these individuals and organizations, and identifying specific public health systems-level challenges (Biddinger et al., 2010).

Participating in full-scale multi-agency bioterrorism exercises provides a realistic simulation of the highly stressful and threatened environment that a possible bioterrorism threat causes. Coordination and communication with multiple external agencies can be challenging in the field, as experienced during this exercise. Despite the challenges, it's extremely important for LAC DPH to continue participation in full-scale bioterrorism exercises and continue testing their skills capabilities, and improve workforce competence and confidence in their response to potential public health emergency events and incidents.

REFERENCES

Biddinger, P.D., Savoia, E., Massin-Short, S.B., Preston, J. & Stoto, M.A. (2010). Public Health Emergency Preparedness Exercises: Lessons Learned. 2010 Supplement 5, volume 125. Public Health Reports. Boston, MA. Association of Schools of Public Health.

Gebbie, K.M., Valas, J., Merril, J. & Morse, S. (May-June 2006). Role of exercises and drills in the evaluation of public health in emergency response. Prehospital and Disaster Medicine. New York, NY. Center for Health Policy, Columbia University School of Nursing and National Center for Disaster Preparedness. http://pdm.medicine.wisc.edu

RESOURCES

National Association of County and City Health Officials at http://www.naccho.org/

National Center for Disaster Preparedness at http://www.ncdp.mailman.columbia.edu/

Harvard School of Public Health Center for Public Health Preparedness at
http://www.hsph.harvard.edu/hperlc/