ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT

AND

SPECIAL STUDIES REPORT

2010

Los Angeles County
Department of Public Health

Public Health
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Acute Communicable Disease Control Program

Annual Morbidity Report

2010

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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 on-line reporting. Electronic laboratory reporting has been in place since 2002 and has expanded to more than twenty clinical and reference laboratories that report an estimated 60 percent of all mandated laboratory reports.

ACDC Mission

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

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

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

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

Los Angeles County: A Description of Our Community

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

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

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

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

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

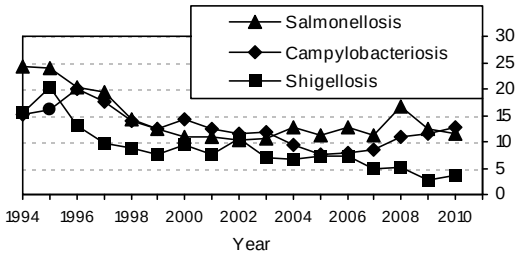
- provide epidemiologic consultation and support, as well as assist with special projects, data maintenance, epidemiologic analysis, data presentation, and geographic information system (GIS)
- plan and evaluate cross-cutting ACDC activities with strategic planning and consequential epidemiology concept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

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

Foodborne Diseases

Diseases spread by food and food sources make up much many of the investigations and activities conducted by ACDC and CHS. Overall, foodborne diseases 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 returned to the level of most of the past eight years while the campylobacteriosis rate continued to increase over the past four years. Incidence of Shiga-toxin producing *E. coli* (STEC) serotypes has changed in the past two years. Serotype O157:H7 has been decreasing while other serotypes are being reported more often. This is due to the introduction of EIA stool tests for Shiga toxins which many laboratories are now using; both positive EIA tests and cultures are reportable to Public Health. LAC enteric disease findings are similar to national trends depicting sustained decreases with occasional upsurges among many foodborne illnesses, particularly those of the

Figure 1
Foodborne Disease
Incidence Rates (cases per 100,000)
by Year
LAC and US, 1994–2010



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, a highly publicized restaurant grading system in operation in LAC since 1998 may have also advanced food safety through education for food handlers and the public regarding best practices to reduce foodborne disease.

In 2010, the LAC salmonellosis crude rate dropped to 11.6 per 100,000 (Figure 1), similar to the average annual rate for the years 2003-2007 (12.2 per 100,000). Nationally, the incidence of salmonellosis cases has also been decreasing, but at a slower rate than it has for LAC in the previous 10 years.[2] Although many food items and both potable and recreational water sources have been implicated in the transmission of *Salmonella*, salmonellosis is most commonly associated with eggs, poultry, and fresh produce. Occasionally, an infected food worker is the source of salmonellosis outbreaks. Another prominent source is reptiles, either by direct contact or through surfaces or other people exposed to reptiles. In 2010, 6% of reported LAC salmonellosis cases had contact with turtles, lizards or snakes—an improvement of about 3 percentage points that may be due to the ACDC-led Reptile-Associated Salmonellosis Working Group efforts to work with internal DPH partners and external community stakeholders for community-based 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 17 disease outbreaks in 2010 that were determined to be foodborne, in which at least 240 persons were ill and 18 were hospitalized. Five outbreaks were caused by *Salmonella*, eight by norovirus, one by bacterial toxin, 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—thousands of preventable infections occur yearly. The majority of people affected by these illnesses improves without treatment and suffers no complications; however, some infections may become invasive, especially among children, the elderly and those with certain chronic medical conditions (e.g., immunocompromised), leading to hospitalization and death. In LAC, foodborne diseases were a contributing factor for at least eight deaths in 2010. Accordingly, further efforts are needed to improve food quality and to educate 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 2010; the last known such outbreak occurred in 1988 which was a swimming pool-associated cryptosporidiosis outbreak. In 2005, a drinking water dispenser, probably contaminated by the maintenance worker, transmitted Giardia to 41 members of a gym. In 2007, hepatitis A was transmitted to eight patrons of a neighborhood bar by a contaminated ice machine. Waterborne parasitic disease reports continue to decline for the past ten years, staying below or consistent with state incidence rates. From 2006 to 2010, surveillance data reflects a growing proportion of reported amebiasis and giardiasis cases among immigrants in LAC.

Invasive Bacterial Diseases

In February 2008 severe community acquired *Staphylococcus aureus* infection was made a reportable disease by California State mandate. Twenty-eight cases that resulted in ICU admission or death were reported in

[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.

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

2010. However, since only four hospitals reported 43% of the cases, substantial under-reporting was likely. From interviews with patients or their family members (in the case of death), it was found that diabetes and pre-existing liver disease were significant risk factors for acquiring such infections. Counter to the popular reports in the press focusing on school aged children with "superbug" infections due to methicillin-resistant *Staphylococcus aureus (*MRSA), those at highest risk for illness were aged <1 year or >43 years old.

Risk factors for invasive group A streptococcal disease (IGAS) were similar to those for community acquired *Staphylococcus aureus,* including diabetes and intravenous drug use. From 2006-2009, the rate of IGAS steadily decreased, yet in 2010 the rate increased to one of the highest levels since 2002. One cluster of IGAS infections (N=3) was identified in an assisted living 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. ACDC investigated a case of acute hepatitis C that was acquired during a procedure at a pain clinic. See the 2009 Special Studies Reports for an overview of these investigations and the 2010 Special Studies Report for a summary of the investigation and public health response. ACDC continues to diligently follow up all potential cases of nosocomial hepatitis B and C.

Influenza

In April of 2009 a new strain of human influenza was first identified in both the US and Mexico. By June, the new strain, pandemic H1N1 (pH1N1), had spread across the globe and the WHO declared a pandemic. The influenza surveillance team, augmented by staff from inside and outside ACDC, worked hard to and describe the epidemiology of pH1N1 in LAC. See the 2009 Special Studies Report on hospitalizations due to pH1N1. The 2010-2011 influenza season was characterized by the presence of three co-circulating viruses: influenza B, influenza A H3N2, and influenza A pH1N1. There were significantly fewer deaths reported due to influenza than during the pandemic season (2009-2010). While there were almost equal numbers of cases of influenza A and B reported to DPH's laboratory surveillance system, most deaths were due to influenza A. See Influenza Watch for a summary of the 2010-2011 influenza season in Los Angeles County.

Vaccine Preventable Diseases

National and international vaccine preventable disease (VPD) outbreaks have been increasing in frequency in recent years, and 2010 marked - the resurgence of pertussis in LAC as part of a state-wide epidemic of this disease.

A total of 972 pertussis cases were documented in LAC during 2010, a number that exceeded the last major pertussis resurgence in 2005 when 439 cases were identified. Although the mean age of pertussis cases has been shifting upwards, young infants continue to experience the most significant morbidity and death from this disease. Four infants died from pertussis in LAC in 2010.

Vaccine Preventable Diseases

- *2010 marked a peak in the resurgence of VPD incidence internationally pertussis in LAC.*
- *Because of 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.*

Increased mumps and measles incidence was noted worldwide. Mumps outbreaks were noted in multiple countries, particularly in a religious group in Europe that quickly led to an on-going large scale outbreak on the East Coast of the US. More than half of the 20 LAC mumps cases were linked to the mumps outbreak on the East Coast. All eight measles cases had links to foreign travel or residence in a country other than the US.

Because of 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.

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

Vaccine coverage levels in LAC remain high (over 80% in children) for disease-specific vaccine antigens. These high levels generally are preventing outbreaks and curbing VPD morbidity in the general community. There have even been improvements in Tdap coverage for Californian adolescents 13-17 years of age where the rate increased from 53.1% in 2009 to 71.2% in 2010. However, coverage levels remain low for the human papilloma virus vaccine with only 32% of California females 13-17 years of age having received the recommended three doses of the vaccine.

Although high childhood immunization coverage levels have helped LAC keep its VPD morbidity levels low compared to other regions, a multi-pronged effort incorporating innovative and tailored community-based strategies must be continued in order to prevent and control outbreaks, educate, dispel myths, and increase vaccination coverage levels, especially among hard-to-reach populations including international travelers and parents who are opting out of vaccinations for their children..

Healthcare Associated Infections and Outbreaks

Healthcare associated infections (HAI) have generated a great deal of attention in the US in recent years, especially the issue of public reporting and transparency. California passed legislation that mandates healthcare facility reporting of selected conditions and practices, and establishes a statewide HAI advisory committee to monitor implementation of these laws to reduce and prevent HAI. The ACDC Hospital Outreach Unit (HOU) participates in the state advisory committee and works with the California Department of Public Health (CDPH) and other public health organizations to make recommendations related to the prevention and control of HAIs, including compliance with HAI regulations and public reporting of HAI associated process and outcome measures. In December 2010, CDPH issued the first public report of healthcare associated bloodstream infections in California hospitals for the period of January 2009 through March 2010. The data in the report was collected manually by hospitals and submitted directly to CDPH. In April 2010, California hospitals were mandated to begin reporting healthcare associated bloodstream infections using the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) as a method of standardizing the data.

In 2009, through the American Recovery and Reinvestment Act, Congress allocated $40 million to states to increase their capacity and supplement existing programs for prevention of HAI. CDPH received federal grant funds for rapid expansion of CDPH HAI prevention efforts, including surveillance and reporting. Using this money, CDPH augmented its HAI program to include eight expert infection preventionists (IP). These IP started in early 2010, with two assigned to LAC. In collaboration, the HOU have conducted over 100 onsite visits to hospitals, held joint information sessions with hospital IP, hosted monthly conference calls with the hospitals, and fielded numerous phone consultations.

Multidrug-resistant organisms are emerging diseases that have become of increasing public health concern and are frequently HAIs. In June 2010, LAC made carbapenem-resistant *Klebsiella pneumoniae* (CRKP) a laboratory reportable disease under HOU surveillance. (See ACDC Special Reports)

In 2009, the California Occupational Safety and Health Standards Board passed the Aerosol Transmissible Diseases Standard. Parts of the standard went into effect in September 2010. This includes the requirement of employers to provide powered air purifying respirators (PAPR) to employees who perform high hazard procedures on airborne infectious diseases cases. It also requires employers to make available recommended vaccinations to all employees who have occupational exposures. Vaccines include influenza, measles,

mumps, rubella, tetanus, diphtheria, and acellular pertussis (Tdap) and varicella-zoster. This latter requirement of varicella vaccination became very appropriate after a varicella outbreak investigation was conducted at a hospital (see ACDC Special Reports).

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

Sub-acute Healthcare Facilities

In 2010, the total number of reported outbreaks in sub-acute healthcare facilities decreased by 40% compared to 2009 with 169 and 104 outbreak reports in respective years. Outbreaks of scabies were the most frequently reported outbreaks of 2010 (30, 27%) followed by gastroenteritis (25, 23%), with 16 of these due to laboratory-confirmed norovirus. Only six respiratory outbreaks were reported in 2010 compared to nineteen in 2009. Only one of six respiratory outbreaks was confirmed due to influenza virus, specifically type A-H3N2. This outbreak involved six staff and 19 patients. Although 74 percent of patients were appropriately vaccinated against influenza, only half of the staff were vaccinated, highlighting the importance of influenza vaccination in healthcare workers to reduce patient morbidity.

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 automated disease surveillance in 2010 were consolidating gains and building toward future accomplishments as well as the continued integration of early detection system activities into routine public health operations. Emergency department syndromic surveillance 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.

Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complemented traditional disease surveillance activities and is one of the tools used for influenza surveillance. In 2010, the near real-time syndromic surveillance data were used to monitor pertussis as well as heat related illness during the summer months and respiratory effects of poor air quality due to wildfires. Current hospital participation represents approximately 65% of all emergency department visits in the county and recruitment of additional hospitals is ongoing. Volume data from the ReddiNet® system for emergency department visits during influenza season strongly correlated with virologic test results. Nurse call line, coroner data, veterinary, 911 calls, and over-the-counter medications data also complement our early event detection systems.

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

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

ELR (Electronic Laboratory Reporting): Automated electronic reporting of communicable diseases from laboratories to DPH has been shown to yield more complete and rapid reporting of disease. Results are sent as soon as they are available rather than days later. LAC began using ELR in 2002, and since early 2006 has pursued efforts to recruit and implement many additional public and private laboratories, with feeds from 21 laboratories in 2010.

Bioterrorism, Emergency Preparedness and Response Activities

The ACDC Bioterrorism Preparedness and Response team actively participates and collaborates 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 Intelligence Regional 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 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 assumes the role of Weapons of Mass Destruction (WMD) Medical Intelligence Analyst This added value and 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.

Joint efforts continued in 2010 among numerous DPH Programs, LAC Department of Health Services, LAC Emergency Medical Services (EMS), and external response agencies and partners in the testing and exercising of plans for response to a Biohazard Detection System (BDS) signal at the United States Postal Service Processing and Distribution Centers in LAC. In 2010, LAC DPH participated in one BDS full-scale exercise which provided the opportunity to exercise, test and evaluate the readiness and preparedness of elements such as, notification, deployment of public health staff to assume ICS roles and functions, delivery of medication from the cache, laboratory testing of sample air filtration cartridge, and a functional point of dispensing (POD) at the USPS facility.

The Response Unit provides ongoing subject matter expertise (SME) consultation related to biological incidents to other public health programs, first responder agencies, hospitals and the community as needed. This unit worked closely with the public health lab bioterrorism response unit in 2010 to develop procedures to improve reporting mechanisms of clinical specimens tested for Category A agents. The response team is included in the development of training and planning efforts for upcoming response exercise, During 201010, the Response Team continued to respond as indicated to the field or hospital for the assessment, investigation and evaluation of suspected biological incidents in collaboration with the technical advisory group (TAG) or emergency preparedness and response program.

Planning and Evaluation

In 2010, the ACDC Planning and Evaluation Unit continued to convene and facilitate the interdisciplinary RAS Workgroup to collaborate with stakeholders such as LAC DPH Veterinary Public Health Program, Community Health Services, LAC Childcare Planning Committee to increase awareness of reptile-associated salmonellosis (RAS) among the target populations based on the surveillance data evidence; and to engage with the early childhood education providers and network to encourage policy change on classroom reptile

pets. The Unit and the Workgroup facilitated strategic planning and implementation of a community-based intervention by utilizing evidence-based intervention methods—*fotonovela*, training-of-trainers, and readers' theater (see 2010 ACDC Special Studies Report). The intervention planning and implementation were guided by a quality/performance improvement process which includes the Plan-Do-Study-Act (PDSA) model. In addition to RAS, other communicable/infectious disease resources were provided to the community stakeholders via various venues to maintain relationships and build capacity for ongoing sustainable communicable disease prevention and health promotion efforts.

During the 2009-2010 season, H1N1 influenza surveillance and response activities led ACDC and LAC DPH CHS to actively engage with various community sectors including the schools. In the interest of improving for similar future outbreaks and engagement with schools, the Unit conducted an evaluation of the efficiency and effectiveness of outbreak response processes between the LAC DPH and the school district nurses. The evaluation was designed in two phases—document abstraction and telephone interviews with the school nurses. The results and recommendations for improvement were shared with other ACDC units and LAC DPH Community Health Services.

The Unit conducted an assessment of disease reporting from community healthcare providers. The goal was to identify and assess key barriers and factors of underreporting reportable diseases. An online survey of local healthcare providers was conducted from January to June 2010. The results were shared with the survey participants and their agencies. The findings from this survey highlight important areas for ACDC to consider in increasing and encouraging disease reporting practices. (see 2010 ACDC Special Studies Report).

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*[3]—which is crucial in enhancing capacity to respond to communicable disease outbreaks, emerging infectious diseases and to prepare for natural and man-made disasters. Building capacity and community resiliency, for example with the networks of early childhood education provider, schools, healthcare professionals, will increase effectiveness and efficiency of public health response, intervention, and mitigation efforts.

[3] 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
2010 ANNUAL MORBIDITY REPORT

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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
PUBLICATIONS AND PRESENTATIONS
2010

Publications

Croker C, Reporter R, Mascola L. Use of statewide hospital discharge data to evaluate the economic burden of neurocysticercosis in Los Angeles County (1991-2008). *Am J Trop Med Hyg*. 2010 Jul;83(1):106-10.

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OVERVIEW

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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
ANNUAL MORBIDITY REPORT
OVERVIEW
2010

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
2010

Table A. Los Angeles County* population by year, 2005–2010

Year	Population	% change
2005	9,580,462	
2006	9,644,738	0.7%
2007	9,689,462	0.5%
2008	9,728,653	0.4%
2009	9,767,825	0.4%
2010	9,811,210	0.4%

* Does not include cities of Pasadena and Long Beach.

Table B. Los Angeles County* population by age group, 2010

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.

Table C. Los Angeles County* population by sex, 2010

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.

Table D. Los Angeles County* population by race, 2010

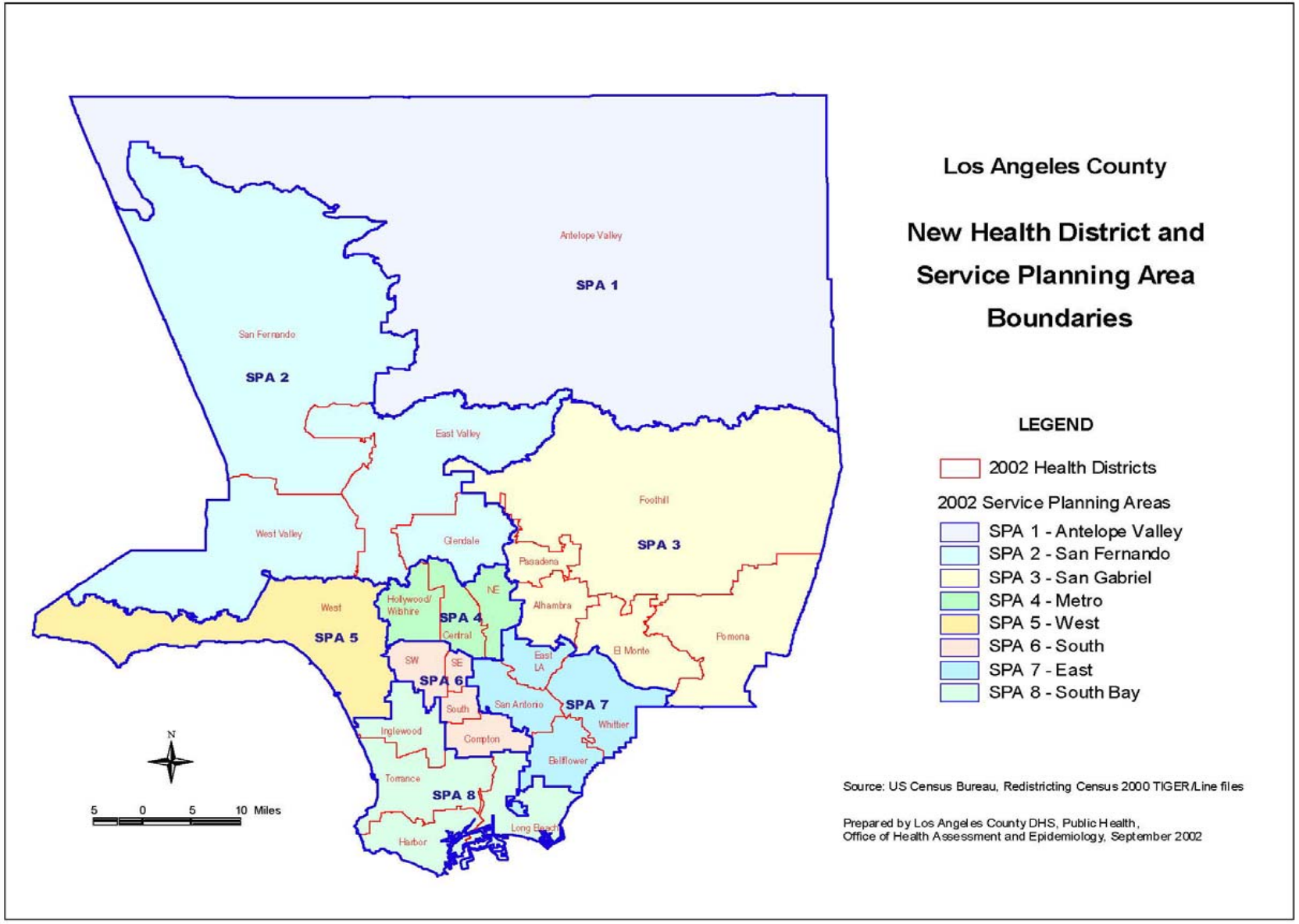
Race	Population	%
Asian	1,333,490	13.6%
Black	852,875	8.7%
Latino	4,732,396	48.2%
White	2,866,642	29.2%
Other**	25,807	0.3%
Total	**9,811,210**	**100.0%**

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

Table E. Los Angeles County*
population by health district and SPA, 2010

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.


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

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

Table F. List of Acronyms

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

LOS ANGELES COUNTY HEALTH DISTRICTS

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

TABLES OF NOTIFIABLE DISEASES

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Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2005-2010

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2005	2006	2007	2008	2009	2010		
Amebiasis	114	94	122	115	107	119	110	129
Botulism	8	2	1	5	1	1	3	9
Brucellosis	8	5	3	3	4	7	5	8
Campylobacteriosis[b]	725	775	825	1072	1135	1239	906	1230
Cholera	0	0	0	0	0	0	0	0
Coccidioidomycosis	214	196	145	228	171	235	191	249
Cryptosporidiosis[b]	45	48	50	41	51	61	47	54
Cysticercosis	15	11	7	6	9	3	10	16
Dengue	10	2	3	0	2	1	3	10
E. *coli* O157:H7	13	12	12	16	18	12	14	19
E. *coli* Other Stec	-	6	13	11	20	45	-	-
Encephalitis	72	46	65	89	51	51	65	95
Foodborne Outbreaks	32	37	21	18	16	17	25	41
Giardiasis	313	376	441	355	354	308	368	450
Haemophilus Influenzae Type B	3	5	1	0	2	0	2	6
Hansen's Disease (Leprosy)	2	2	5	1	3	2	3	5
Hepatitis A	480	364	78	80	66	51	214	555
Hepatitis B	57	62	55	66	41	54	56	73
Hepatitis C	3	4	3	5	8	4	5	8
Hepatitis Unspecified	4	7	10	4	19	5	9	20
Kawasaki Syndrome	56	75	52	55	70	65	62	80
Legionellosis[b]	31	24	40	59	66	108	44	76
Listeriosis, Nonperinatal	25	25	21	20	15	14	21	28
Listeriosis, Perinatal	3	12	6	2	5	4	6	12
Lyme Disease	7	16	8	9	4	5	9	17
Malaria	45	33	26	30	24	25	32	46
Measles[b]	0	1	0	1	1	8	1	2
Meningitis, Viral	527	373	395	597	399	570	458	631
Meningococcal Infections	37	46	24	30	21	26	32	49
Mumps[b]	10	10	5	7	7	20	8	12
Pertussis[b]	439	150	69	80	156	972	179	443
Pneumococcal Disease, Invasive	590	533	624	662	786	576	639	805
Psittacosis	0	1	0	0	1	0	0	1
Q-fever	0	1	2	2	0	1	1	3
Relapsing Fever	0	2	0	0	0	0	0	2
Rheumatic Fever, Acute	0	0	0	1	1	1	0	1
Rubella	1	0	0	1	0	0	0	1
Salmonellosis	1085	1217	1081	1638	1194	1142	1243	1645
Shigellosis	710	524	463	498	259	355	491	773
Staphylococcus Aureus Infection	-	-	-	25	27	28	-	-
Streptococcus, Group A Invasive	179	197	173	156	129	191	167	212
Strongyloidiasis	0	0	0	0	0	0	0	0
Tetanus	0	4	0	2	0	0	1	4
Trichinosis	0	1	0	0	0	0	0	1
Tularemia	0	0	0	0	0	0	0	0
Typhoid Fever, Case	12	17	17	14	17	15	15	19
Typhoid Fever, Carrier	4	3	1	4	1	4	3	5
Typhus Fever[b]	9	10	17	18	9	31	13	20
Vibrio	14	18	13	18	26	13	18	27
West Nile Virus	43	16	43	170	25	4	59	170

[a]The normal distribution assumption may not apply to some rare diseases.
[b]2010 data over 95% upper limit.

Table H. Annual Incidence Rates of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2005-2010

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2005	2006	2007	2008	2009	2010
Amebiasis	1.19	0.97	1.26	1.18	1.10	1.21
Botulism	0.08	0.02	0.01	0.05	0.01	0.01
Brucellosis	0.08	0.05	0.03	0.03	0.04	0.07
Campylobacteriosis	7.57	8.04	8.51	11.02	11.62	12.63
Cholera	-	-	-	-	-	-
Coccidioidomycosis	2.23	2.03	1.50	2.34	1.75	2.40
Cryptosporidiosis	0.47	0.50	0.52	0.42	0.52	0.62
Cysticercosis	0.16	0.11	0.07	0.06	0.09	0.03
Dengue	0.10	0.02	0.03	-	0.02	0.01
E. *coli* O157:H7	0.14	0.12	0.12	0.16	0.18	0.12
E. *coli* Other Stec	-	0.06	0.13	0.11	0.21	0.46
Encephalitis	0.75	0.48	0.67	0.91	0.52	0.52
Giardiasis	3.27	3.90	4.55	3.65	3.62	3.14
Haemophilus Influenzae Type B	0.03	0.05	0.01	-	0.02	-
Hansen's Disease (Leprosy)	0.02	0.02	0.05	0.01	0.03	0.02
Hepatitis A	5.01	3.77	0.80	0.82	0.68	0.52
Hepatitis B	0.59	0.64	0.57	0.68	0.42	0.55
Hepatitis C	0.03	0.04	0.02	0.05	0.08	0.04
Hepatitis Unspecified	0.04	0.07	0.10	0.04	0.19	0.05
Kawasaki Syndrome	0.58	0.78	0.54	0.57	0.72	0.66
Legionellosis	0.32	0.25	0.41	0.61	0.68	1.10
Listeriosis, Nonperinatal	0.26	0.26	0.22	0.21	0.15	0.14
Listeriosis, Perinatal[a]	2.14	8.47	4.23	1.45	4.60	3.23
Lyme Disease	0.07	0.17	0.08	0.09	0.04	0.05
Malaria	0.47	0.34	0.27	0.31	0.25	0.25
Measles	-	0.01	-	0.01	0.01	0.08
Meningitis, Viral	5.50	3.87	4.08	6.14	4.08	5.81
Meningococcal Infections	0.39	0.48	0.25	0.31	0.21	0.27
Mumps	0.10	0.10	0.05	0.07	0.07	0.20
Pertussis	4.58	1.56	0.71	0.82	1.60	9.91
Pneumococcal Disease, Invasive	6.16	5.53	6.44	6.80	8.05	5.87
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	11.34	12.62	11.16	16.84	12.22	11.64
Shigellosis	7.41	5.43	4.78	5.12	2.65	3.62
Staphylococcus Aureus Infection	-	-	-	0.26	0.28	0.29
Streptococcus, Group A Invasive	1.87	2.04	1.79	1.60	1.32	1.95
Strongyloidiasis	-	-	-	-	-	-
Tetanus	-	0.04	-	0.02	-	-
Trichinosis	-	0.01	-	-	-	-
Tularemia	-	-	-	-	-	-
Typhoid Fever, Case	0.13	0.18	0.18	0.14	0.17	0.15
Typhoid Fever, Carrier	0.04	0.03	0.01	0.04	0.01	0.04
Typhus Fever	0.09	0.10	0.18	0.19	0.09	0.32
Vibrio	0.15	0.19	0.13	0.19	0.27	0.13
West Nile Virus	0.45	0.17	0.44	1.75	0.26	0.04

[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, 2006-2010

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	8.6	7.8	8.4	7.6	8.6	8.2	7.8	9.2	8.2	10.0	8.2	9.0	111.4
Botulism	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	1.2	0.0	2.0
Brucellosis	0.4	0.4	0.2	1.2	0.2	0.0	0.2	0.2	0.2	0.0	0.2	0.4	4.4
Campylobacteriosis	65.0	46.0	47.2	60.6	70.6	87.2	95.8	82.8	75.2	58.4	53.2	45.4	1009.2
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	16.0	15.0	15.8	11.8	12.4	14.2	15.4	16.8	17.8	14.6	21.4	20.2	195.0
Cryptosporidiosis	3.4	3.6	3.0	4.2	3.2	3.8	4.2	6.6	5.6	3.4	2.6	2.8	50.2
Cysticercosis	0.4	0.4	1.2	1.0	0.8	0.6	1.2	0.2	0.0	0.6	0.0	0.2	7.2
Dengue	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.2	0.6	0.0	0.0	1.6
E. *coli* O157:H7	0.6	0.4	0.2	0.4	1.6	1.8	2.6	2.0	2.4	1.4	0.2	0.4	14.0
E. *coli* Other Stec[a]	0.6	0.0	1.2	0.8	1.6	2.2	2.2	3.0	1.8	1.8	1.0	0.0	16.2
Encephalitis	3.4	2.4	5.6	3.6	2.8	4.2	5.0	8.0	9.2	4.2	4.2	2.4	60.4
Giardiasis	26.4	22.8	26.4	28.2	27.2	27.6	32.4	36.0	36.8	30.6	25.4	26.4	366.8
Haemophilus Influenzae Type B	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.6	1.6
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	22.0	20.0	12.2	10.4	12.2	8.6	5.8	8.8	12.2	5.2	5.8	4.4	127.8
Hepatitis B	4.2	6.0	3.8	4.6	5.2	6.2	4.0	4.6	4.4	4.4	5.0	3.0	55.6
Hepatitis C	0.0	0.0	0.6	0.2	0.4	0.4	0.4	0.8	0.4	0.8	0.4	0.2	4.6
Hepatitis Unspecified	0.6	0.2	0.2	0.0	0.2	0.4	0.4	0.2	0.0	0.0	0.0	0.4	9.0
Kawasaki Syndrome	5.6	7.6	5.2	8.2	5.8	3.8	4.4	3.0	3.2	5.4	5.8	5.4	63.4
Legionellosis	5.8	4.6	4.6	4.0	3.8	5.4	4.2	4.6	3.0	4.6	5.2	9.6	59.4
Listeriosis, Nonperinatal	0.2	1.8	1.0	1.2	1.2	2.8	2.0	2.8	3.0	1.6	0.6	0.6	19.0
Listeriosis, Perinatal	0.2	0.4	0.0	0.0	0.6	0.4	1.0	1.2	0.8	0.6	0.4	0.0	5.8
Lyme Disease	0.2	0.4	0.0	0.2	0.4	2.4	3.6	0.6	0.2	0.4	0.0	0.0	8.4
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	0.2	0.0	0.8	0.0	0.6	0.2	0.2	0.0	0.0	0.0	0.2	0.0	2.2
Meningitis, Viral	27.8	18.4	19.6	25.4	27.4	34.6	57.8	65.0	55.8	48.2	35.2	25.0	466.8
Meningococcal Infections	4.8	5.6	3.0	2.6	2.0	2.0	1.6	1.8	1.4	1.4	2.0	1.2	29.4
Mumps	0.6	1.0	0.8	1.8	1.2	0.6	0.8	1.2	0.2	0.2	0.4	1.0	9.8
Pertussis	11.4	9.6	8.2	12.4	19.8	24.4	43.8	43.2	36.4	29.8	24.6	21.8	285.4
Pneumococcal Disease, Invasive	84.2	88.8	74.0	55.4	44.8	35.8	23.6	20.6	23.8	38.8	54.6	91.6	636.0
Psittacosis	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Q-fever	0.4	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.2	0.0	0.0	0.0	1.2
Relapsing Fever	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4
Rheumatic Fever, Acute	0.0	0.2	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	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Salmonellosis	59.4	56.4	54.6	72.2	98.8	104.6	144.8	148.2	111.4	206.2	87.6	74.4	1254.2
Shigellosis	23.6	16.2	14.2	18.8	32.4	29.0	59.6	68.4	56.0	42.6	29.4	20.6	419.8
Staphylococcus Aureus Infection	-	-	-	-	-	-	-	-	-	-	-	-	-
Streptococcus, Group A Invasive	18.4	15.2	16.6	18.0	18.6	14.2	11.4	10.4	8.2	9.2	14.0	14.6	168.8
Strongyloidiasis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	0.2	0.2	0.0	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.0	1.2
Trichinosis	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Tularemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Typhoid Fever, Case	1.6	2.0	0.2	1.6	1.4	2.0	1.0	1.2	1.8	1.2	1.4	0.6	16.0
Typhoid Fever, Carrier	0.2	0.4	0.0	0.2	0.8	0.0	0.2	0.0	0.0	0.2	0.2	0.4	2.6
Typhus Fever	1.6	0.6	0.4	0.2	0.4	0.8	2.2	2.8	2.2	1.6	2.4	1.8	17.0
Vibrio	0.2	0.4	1.4	0.6	1.0	1.2	4.8	3.2	1.8	1.8	0.6	0.0	17.6
West Nile Virus	0.0	0.0	0.0	0.0	0.2	1.0	7.8	17.6	19.0	4.2	0.6	0.0	51.2

[a] Not applicable.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2010

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	0	5	8	38	25	25	11	7	119
Botulism	0	0	0	0	1	0	0	0	1
Brucellosis	0	0	1	3	0	1	0	2	7
Campylobacteriosis	24	150	175	318	157	136	96	165	1239
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	1	0	5	43	38	55	42	51	235
Cryptosporidiosis	0	2	5	15	14	13	5	7	61
Cysticercosis	0	0	0	0	0	2	1	0	3
Dengue	0	0	0	0	0	0	1	0	1
E. *coli* O157:H7	0	3	2	5	0	1	0	1	12
E. *coli* Other Stec	4	23	2	8	1	6	1	0	45
Encephalitis	1	4	21	11	1	4	6	3	51
Giardiasis	5	41	37	81	46	36	37	24	308
Haemophilus Influenzae Type B	0	0	0	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	1	0	0	1	2
Hepatitis A	0	2	3	27	6	3	3	7	51
Hepatitis B	0	0	0	18	13	11	7	5	54
Hepatitis C	0	0	0	1	2	1	0	0	4
Hepatitis Unspecified	0	0	0	1	3	1	0	0	5
Kawasaki Syndrome	6	49	10	0	0	0	0	0	65
Legionellosis	0	0	0	3	9	25	27	44	108
Listeriosis, Nonperinatal	0	0	1	2	2	2	2	5	14
Listeriosis, Perinatal[b]	0	0	0	3	1	0	0	0	4
Lyme Disease	0	0	1	2	1	0	1	0	5
Malaria	0	1	1	12	4	4	3	0	25
Measles	1	1	2	2	2	0	0	0	8
Meningitis, Viral	89	33	138	164	56	39	17	33	570
Meningococcal Infections	2	2	1	8	4	5	1	3	26
Mumps	0	1	8	8	0	2	1	0	20
Pertussis	273	158	304	122	40	28	24	23	972
Pneumococcal Disease, Invasive	12	47	21	39	46	84	108	218	576
Psittacosis	0	0	0	0	0	0	0	0	0
Q-fever	0	0	0	0	0	1	0	0	1
Relapsing Fever	0	0	0	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	0	1	0	0	0	1
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	56	186	174	262	131	87	100	146	1142
Shigellosis	1	79	68	75	63	36	17	15	355
Staphylococcus Aureus Infection	1	0	3	6	3	7	3	5	28
Streptococcus, Group A Invasive	4	6	6	33	21	34	29	58	191
Strongyloidiasis	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	0	0	0	0	0
Trichinosis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid Fever, Case	0	3	4	5	1	1	1	0	15
Typhoid Fever, Carrier	0	0	0	0	2	0	2	0	4
Typhus Fever	0	0	3	4	7	5	10	2	31
Vibrio	0	0	2	5	0	3	2	1	13
West Nile Virus	0	0	0	1	0	1	0	2	4

[a] Totals include cases with unknown age.

[b] Mother's age.

Table K. Incidence Rates of Selected Notifiable Diseases by Age Group
Los Angeles County, 2010

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	-	0.9	0.6	1.3	1.7	1.8	1.1	0.7
Botulism	-	-	-	-	0.1	-	-	-
Brucellosis	-	-	0.1	0.1	-	0.1	-	0.2
Campylobacteriosis	17.2	25.8	13.2	10.8	10.9	10.1	10.0	15.6
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	0.7	-	0.4	1.5	2.6	4.1	4.4	4.8
Cryptosporidiosis	-	0.3	0.4	0.5	1.0	1.0	0.5	0.7
Cysticercosis	-	-	-	-	-	0.1	0.1	-
Dengue	-	-	-	-	-	-	0.1	-
E. *coli* O157:H7	-	0.5	0.2	0.2	-	0.1	-	0.1
E. *coli* Other Stec	2.9	4.0	0.2	0.3	0.1	0.4	0.1	-
Encephalitis	0.7	0.7	1.6	0.4	0.1	0.3	0.6	0.3
Giardiasis	3.6	7.1	2.8	2.7	3.2	2.7	3.8	2.3
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-	0.1	-	-	0.1
Hepatitis A	-	0.3	0.2	0.9	0.4	0.2	0.3	0.7
Hepatitis B	-	-	-	0.6	0.9	0.8	0.7	0.5
Hepatitis C	-	-	-	-	0.1	0.1	-	-
Hepatitis Unspecified	-	-	-	-	0.2	0.1	-	-
Kawasaki Syndrome	4.3	8.4	0.8	-	-	-	-	-
Legionellosis	-	-	-	0.1	0.6	1.8	2.8	4.2
Listeriosis, Nonperinatal	-	-	0.1	0.1	0.1	0.1	0.2	0.5
Listeriosis, Perinatal[a]	-	-	-	3.0	4.1	-	-	-
Lyme Disease	-	-	0.1	0.1	0.1	-	0.1	-
Malaria	-	0.2	0.1	0.4	0.3	0.3	0.3	-
Measles	0.7	0.2	0.2	0.1	0.1	-	-	-
Meningitis, Viral	63.8	5.7	10.4	5.6	3.9	2.9	1.8	3.1
Meningococcal Infections	1.4	0.3	0.1	0.3	0.3	0.4	0.1	0.3
Mumps	-	0.2	0.6	0.3	-	0.1	0.1	-
Pertussis	195.6	27.2	22.9	4.1	2.8	2.1	2.5	2.2
Pneumococcal Disease, Invasive	8.6	8.1	1.6	1.3	3.2	6.2	11.2	20.6
Psittacosis	-	-	-	-	-	-	-	-
Q-fever	-	-	-	-	-	0.1	-	-
Relapsing Fever	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-	0.1	-	-	-
Rubella	-	-	-	-	-	-	-	-
Salmonellosis	40.1	32.0	13.1	8.9	9.1	6.4	10.4	13.8
Shigellosis	0.7	13.6	5.1	2.5	4.4	2.7	1.8	1.4
Staphylococcus Aureus Infection	0.7	-	0.2	0.2	0.2	0.5	0.3	0.5
Streptococcus, Group A Invasive	2.9	1.0	0.5	1.1	1.5	2.5	3.0	5.5
Strongyloidiasis	-	-	-	-	-	-	-	-
Tetanus	-	-	-	-	-	-	-	-
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	-	0.5	0.3	0.2	0.1	0.1	0.1	-
Typhoid Fever, Carrier	-	-	-	-	0.1	-	0.2	-
Typhus Fever	-	-	0.2	0.1	0.5	0.4	1.0	0.2
Vibrio	-	-	0.2	0.2	-	0.2	0.2	0.1
West Nile Virus	-	-	-	-	-	0.1	-	0.2

[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, 2010

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	5	9	48	47	1	9
Botulism	0	0	1	0	0	0
Brucellosis	0	0	4	0	0	3
Campylobacteriosis	35	13	182	118	13	878
Cholera	0	0	0	0	0	0
Coccidioidomycosis	26	43	71	76	3	16
Cryptosporidiosis	2	11	13	22	0	13
Cysticercosis	0	0	3	0	0	0
Dengue	0	0	0	0	0	1
E. *coli* O157:H7	3	1	2	6	0	0
E. *coli* Other Stec	1	2	31	10	0	1
Encephalitis	6	3	27	7	1	7
Giardiasis	23	28	90	137	8	22
Haemophilus Influenzae Type B	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	1	1	0	0
Hepatitis A	12	3	22	14	0	0
Hepatitis B	11	14	14	14	1	0
Hepatitis C	0	0	1	3	0	0
Hepatitis Unspecified	0	0	0	0	0	5
Kawasaki Syndrome	22	8	29	5	1	0
Legionellosis	15	25	25	41	2	0
Listeriosis, Nonperinatal	1	1	7	5	0	0
Listeriosis, Perinatal[b]	1	0	2	1	0	0
Lyme Disease	0	0	1	4	0	0
Malaria	8	10	1	2	0	4
Measles	0	2	4	2	0	0
Meningitis, Viral	36	64	259	112	13	86
Meningococcal Infections	1	7	11	7	0	0
Mumps	0	1	3	16	0	0
Pertussis	32	50	655	216	2	17
Pneumococcal Disease, Invasive	46	82	208	206	8	26
Psittacosis	0	0	0	0	0	0
Q-fever	0	0	1	0	0	0
Relapsing Fever	0	0	0	0	0	0
Rheumatic Fever, Acute	1	0	0	0	0	0
Rubella	0	0	0	0	0	0
Salmonellosis	115	50	570	387	3	17
Shigellosis	15	31	203	94	0	12
Staphylococcus Aureus Infection	4	4	7	13	0	0
Streptococcus, Group A Invasive	16	25	52	53	3	42
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	11	0	3	1	0	0
Typhoid Fever, Carrier	2	0	2	0	0	0
Typhus Fever	2	2	10	14	0	3
Vibrio	1	0	4	4	0	4
West Nile Virus	0	0	1	3	0	0

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

Table M. Incidence Rates of Selected Notifiable Diseases by Race/Ethnicity
Los Angeles County, 2010

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.4	1.1	1.0	1.6
Botulism	-	-	-	-
Brucellosis	-	-	0.1	-
Campylobacteriosis	2.6	1.5	3.8	4.1
Cholera	-	-	-	-
Coccidioidomycosis	1.9	5.0	1.5	2.7
Cryptosporidiosis	0.1	1.3	0.3	0.8
Cysticercosis	-	-	0.1	-
Dengue	-	-	-	-
E. *coli* O157:H7	0.2	0.1	-	0.2
E. *coli* Other Stec	0.1	0.2	0.7	0.3
Encephalitis	0.4	0.4	0.6	0.2
Giardiasis	1.7	3.3	1.9	4.8
Haemophilus Influenzae Type B	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-
Hepatitis A	0.9	0.4	0.5	0.5
Hepatitis B	0.8	1.6	0.3	0.5
Hepatitis C	-	-	-	0.1
Hepatitis Unspecified	-	-	-	-
Kawasaki Syndrome	1.6	0.9	0.6	0.2
Legionellosis	1.1	2.9	0.5	1.4
Listeriosis, Nonperinatal	0.1	0.1	0.1	0.2
Listeriosis, Perinatal[a]	6.9	-	2.6	4.6
Lyme Disease	-	-	-	0.1
Malaria	0.6	1.2	-	0.1
Measles	-	0.2	0.1	0.1
Meningitis, Viral	2.7	7.5	5.5	3.9
Meningococcal Infections	0.1	0.8	0.2	0.2
Mumps	-	0.1	0.1	0.6
Pertussis	2.4	5.9	13.8	7.5
Pneumococcal Disease, Invasive	3.4	9.6	4.4	7.2
Psittacosis	-	-	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	0.1	-	-	-
Rubella	-	-	-	-
Salmonellosis	8.6	5.9	12.0	13.5
Shigellosis	1.1	3.6	4.3	3.3
Staphylococcus Aureus Infection	0.3	0.5	0.1	0.5
Streptococcus, Group A Invasive	1.2	2.9	1.1	1.8
Strongyloidiasis	-	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.8	-	0.1	-
Typhoid Fever, Carrier	0.1	-	-	-
Typhus Fever	0.1	0.2	0.2	0.5
Vibrio	0.1	-	0.1	0.1
West Nile Virus	-	-	-	0.1

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

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

Table N. Number of Cases and Annual Incidence Rate of Selected Notifiable Diseases by Sex
Los Angeles County, 2010

	Male		Female	
Disease	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	78	1.6	41	0.8
Botulism	1	0.0	0	-
Brucellosis	2	0.0	5	0.1
Campylobacteriosis	662	13.6	554	11.2
Cholera	0	-	0	-
Coccidioidomycosis	154	3.2	81	1.6
Cryptosporidiosis	43	0.9	17	0.3
Cysticercosis	2	0.0	1	0.0
Dengue	1	0.0	0	-
E. *coli* O157:H7	6	0.1	6	0.1
E. *coli* Other Stec	23	0.5	22	0.4
Encephalitis	27	0.6	23	0.5
Giardiasis	197	4.0	110	2.2
Haemophilus Influenzae Type B	0	-	0	-
Hansen's Disease (Leprosy)	2	0.0	0	-
Hepatitis A	28	0.6	23	0.5
Hepatitis B	38	0.8	16	0.3
Hepatitis C	2	0.0	2	0.0
Hepatitis Unspecified	5	0.1	0	-
Kawasaki Syndrome	36	0.7	29	0.6
Legionellosis	77	1.6	31	0.6
Listeriosis, Nonperinatal	6	0.1	8	0.2
Listeriosis, Perinatal[a]	0	-	4	6.6
Lyme Disease	3	0.1	2	0.0
Malaria	12	0.2	13	0.3
Measles	7	0.1	1	0.0
Meningitis, Viral	314	6.4	254	5.1
Meningococcal Infections	18	0.4	8	0.2
Mumps	14	0.3	6	0.1
Pertussis	462	9.5	510	10.3
Pneumococcal Disease, Invasive	343	7.0	233	4.7
Psittacosis	0	-	0	-
Q-fever	0	-	1	0.0
Relapsing Fever	0	-	0	-
Rheumatic Fever, Acute	1	0.0	0	-
Rubella	0	-	0	-
Salmonellosis	515	10.6	627	12.7
Shigellosis	199	4.1	154	3.1
Staphylococcus Aureus Infection	20	0.4	8	0.2
Streptococcus, Group A Invasive	116	2.4	75	1.5
Strongyloidiasis	0	-	0	-
Tetanus	0	-	0	-
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	6	0.1	9	0.2
Typhoid Fever, Carrier	0	-	4	0.1
Typhus Fever	15	0.3	16	0.3
Vibrio	7	0.1	6	0.1
West Nile Virus	2	0.0	2	0.0

[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 O-1. Selected Notifiable Diseases
SPA 1. Antelope Valley Area
Los Angeles County, 2010

Disease	Frequency Antelope	Rate (Cases per 100,000)[b] Antelope
Amebiasis	3	0.8
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	39	10.5
Cholera	0	-
Coccidioidomycosis	87	23.3
Cryptosporidiosis	3	0.8
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	0	-
E. *coli* Other Stec	1	0.3
Encephalitis	2	0.5
Giardiasis	11	2.9
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	3	0.8
Hepatitis B	2	0.5
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Kawasaki Syndrome	5	1.3
Legionellosis	2	0.5
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	2	0.5
Measles	0	-
Meningitis, Viral	45	12.1
Meningococcal Infections	1	0.3
Mumps	0	-
Pertussis	19	5.1
Pneumococcal Disease, Invasive	13	3.5
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	36	9.6
Shigellosis	3	0.8
Staphylococcus Aureus Infection	1	0.3
Streptococcus, Group A Invasive	2	0.5
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	0	-

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.
[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-2. Selected Notifiable Diseases
SPA 2. San Fernando Area
Los Angeles County, 2010

Disease	Frequency					Rate (Cases per 100,000)[b]				
	EV	GL	SF	WV	TOTAL	EV	GL	SF	WV	TOTAL
Amebiasis	17	21	3	11	52	3.6	5.9	0.6	1.2	2.3
Botulism	0	1	0	0	1	-	0.3	-	-	0.0
Brucellosis	0	0	0	1	1	-	-	-	0.1	0.0
Campylobacteriosis	81	58	87	120	346	17.3	16.3	18.0	13.2	15.6
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	7	2	24	21	54	1.5	0.6	5.0	2.3	2.4
Cryptosporidiosis	1	0	12	3	16	0.2	-	2.5	0.3	0.7
Cysticercosis	0	0	0	2	2	-	-	-	0.2	0.1
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	1	0	4	5	-	0.3	-	0.4	0.2
E. *coli* Other Stec	2	3	2	7	14	0.4	0.8	0.4	0.8	0.6
Encephalitis	3	2	1	4	10	0.6	0.6	0.2	0.4	0.5
Giardiasis	16	37	17	42	112	3.4	10.4	3.5	4.6	5.1
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	4	1	3	10	18	0.9	0.3	0.6	1.1	0.8
Hepatitis B	0	1	0	4	5	-	0.3	-	0.4	0.2
Hepatitis C	1	0	0	2	3	0.2	-	-	0.2	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	2	4	2	4	12	0.4	1.1	0.4	0.4	0.5
Legionellosis	11	2	4	5	22	2.3	0.6	0.8	0.6	1.0
Listeriosis, Nonperinatal	0	2	0	3	5	-	0.6	-	0.3	0.2
Listeriosis, Perinatal[a]	0	1	1	0	2	-	1.4	0.1	-	0.4
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	1	1	1	3	-	0.3	0.2	0.1	0.1
Measles	0	2	1	1	4	-	0.6	0.2	0.1	0.2
Meningitis, Viral	8	12	28	38	86	1.7	3.4	5.8	4.2	3.9
Meningococcal Infections	1	1	0	1	3	0.2	0.3	-	0.1	0.1
Mumps	0	0	0	4	4	-	-	-	0.4	0.2
Pertussis	52	30	57	70	209	11.1	8.4	11.8	7.7	9.4
Pneumococcal Disease, Invasive	34	18	29	49	130	7.3	5.0	6.0	5.4	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	1	0	0	1	-	0.3	-	-	0.0
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	60	43	72	128	303	12.8	12.1	14.9	14.1	13.7
Shigellosis	21	5	13	22	61	4.5	1.4	2.7	2.4	2.8
Staphylococcus Aureus Infection	2	0	2	2	6	0.4	-	0.4	0.2	0.3
Streptococcus, Group A Invasive	6	6	8	14	34	1.3	1.7	1.7	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	1	2	2	1	6	0.2	0.6	0.4	0.1	0.3
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	3	2	0	0	5	0.6	0.6	-	-	0.2
Vibrio	0	0	0	1	1	-	-	-	0.1	0.0
West Nile Virus	0	0	0	0	0	-	-	-	-	-

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

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

Table O-3. Selected Notifiable Diseases
SPA 3. San Gabriel Area
Los Angeles County, 2010

Disease	Frequency					Rate (Cases per 100,000)[b]				
	AH	EM	FH	PO	TOTAL	AH	EM	FH	PO	TOTAL
Amebiasis	1	4	1	1	7	0.3	0.8	0.3	0.2	0.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	1	1	0	0	2	0.3	0.2	-	-	0.1
Campylobacteriosis	35	38	30	63	166	9.6	7.9	9.5	11.0	9.6
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	3	6	3	5	17	0.8	1.3	0.9	0.9	1.0
Cryptosporidiosis	0	2	0	7	9	-	0.4	-	1.2	0.5
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
E. *coli* Other Stec	2	1	2	2	7	0.5	0.2	0.6	0.3	0.4
Encephalitis	2	2	2	1	7	0.5	0.4	0.6	0.2	0.4
Giardiasis	7	3	10	7	27	1.9	0.6	3.2	1.2	1.6
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	1	1	-	-	-	0.2	0.1
Hepatitis A	0	1	0	2	3	-	0.2	-	0.3	0.2
Hepatitis B	2	3	2	3	10	0.5	0.6	0.6	0.5	0.6
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	1	1	0	2	-	0.2	0.3	-	0.1
Kawasaki Syndrome	4	4	3	5	16	1.1	0.8	0.9	0.9	0.9
Legionellosis	5	2	3	3	13	1.4	0.4	0.9	0.5	0.7
Listeriosis, Nonperinatal	0	0	0	1	1	-	-	-	0.2	0.1
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	2	2	4	-	-	0.6	0.3	0.2
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	16	23	16	43	98	4.4	4.8	5.1	7.5	5.6
Meningococcal Infections	1	2	0	0	3	0.3	0.4	-	-	0.2
Mumps	0	1	0	0	1	-	0.2	-	-	0.1
Pertussis	21	46	29	51	147	5.8	9.6	9.2	8.9	8.5
Pneumococcal Disease, Invasive	19	23	15	23	80	5.2	4.8	4.7	4.0	4.6
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	47	57	51	66	221	12.9	11.9	16.1	11.5	12.7
Shigellosis	1	10	11	11	33	0.3	2.1	3.5	1.9	1.9
Staphylococcus Aureus Infection	2	0	0	4	6	0.5	-	-	0.7	0.3
Streptococcus, Group A Invasive	9	7	6	8	30	2.5	1.5	1.9	1.4	1.7
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	0	0	2	0.5	-	-	-	0.1
Typhoid Fever, Carrier	1	0	0	0	1	0.3	-	-	-	0.1
Typhus Fever	2	1	6	0	9	0.5	0.2	1.9	-	0.5
Vibrio	0	0	0	0	0	-	-	-	-	-
West Nile Virus	0	0	0	2	2	-	-	-	0.3	0.1

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.
[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-4. Selected Notifiable Diseases
SPA 4, Metro Area
Los Angeles County, 2010

Disease	Frequency				Rate (Cases per 100,000)[b]			
	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	2	10	7	19	0.5	1.9	2.0	1.5
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	52	63	43	158	14.1	11.7	12.2	12.6
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	5	7	8	20	1.4	1.3	2.3	1.6
Cryptosporidiosis	2	7	1	10	0.5	1.3	0.3	0.8
Cysticercosis	0	1	0	1	-	0.2	-	0.1
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	0	0	0	-	-	-	-
E. *coli* Other Stec	2	4	0	6	0.5	0.7	-	0.5
Encephalitis	3	1	0	4	0.8	0.2	-	0.3
Giardiasis	16	24	9	49	4.3	4.5	2.6	3.9
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	1	1	-	-	0.3	0.1
Hepatitis A	0	7	2	9	-	1.3	0.6	0.7
Hepatitis B	3	4	1	8	0.8	0.7	0.3	0.6
Hepatitis C	0	0	0	0	-	-	-	-
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Kawasaki Syndrome	3	4	2	9	0.8	0.7	0.6	0.7
Legionellosis	7	6	2	15	1.9	1.1	0.6	1.2
Listeriosis, Nonperinatal	1	0	3	4	0.3	-	0.9	0.3
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	0	1	1	2	-	0.2	0.3	0.2
Malaria	0	2	0	2	-	0.4	-	0.2
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	10	5	14	29	2.7	0.9	4.0	2.3
Meningococcal Infections	1	0	1	2	0.3	-	0.3	0.2
Mumps	0	7	0	7	-	1.3	-	0.6
Pertussis	59	61	42	162	16.0	11.4	11.9	12.9
Pneumococcal Disease, Invasive	20	32	18	70	5.4	6.0	5.1	5.6
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	59	60	37	156	16.0	11.2	10.5	12.4
Shigellosis	22	55	14	91	6.0	10.2	4.0	7.2
Staphylococcus Aureus Infection	2	1	1	4	0.5	0.2	0.3	0.3
Streptococcus, Group A Invasive	18	13	7	38	4.9	2.4	2.0	3.0
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	2	0	2	-	0.4	-	0.2
Typhoid Fever, Carrier	0	1	1	2	-	0.2	0.3	0.2
Typhus Fever	0	1	4	5	-	0.2	1.1	0.4
Vibrio	1	0	1	2	0.3	-	0.3	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 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 at all.

Table O-5. Selected Notifiable Diseases
SPA 5. West Area
Los Angeles County, 2010

Disease	Frequency	Rate (Cases per 100,000)[b]
	West	West
Amebiasis	7	1.1
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	130	19.7
Cholera	0	-
Coccidioidomycosis	7	1.1
Cryptosporidiosis	5	0.8
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	3	0.5
E. *coli* Other Stec	3	0.5
Encephalitis	2	0.3
Giardiasis	31	4.7
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	6	0.9
Hepatitis B	4	0.6
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Kawasaki Syndrome	1	0.2
Legionellosis	12	1.8
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	2	0.3
Malaria	5	0.8
Measles	1	0.2
Meningitis, Viral	13	2.0
Meningococcal Infections	2	0.3
Mumps	2	0.3
Pertussis	57	8.6
Pneumococcal Disease, Invasive	44	6.7
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	86	13.0
Shigellosis	30	4.5
Staphylococcus Aureus Infection	2	0.3
Streptococcus, Group A Invasive	12	1.8
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	1	0.2
Typhoid Fever, Carrier	0	-
Typhus Fever	6	0.9
Vibrio	4	0.6
West Nile Virus	0	-

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

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

Table O-6. Selected Notifiable Diseases
SPA 6. South Area
Los Angeles County, 2010

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**CN**	**SO**	**SE**	**SW**	**TOTAL**	**CN**	**SO**	**SE**	**SW**	**TOTAL**
Amebiasis	2	1	3	6	12	0.7	0.5	1.6	1.5	1.1
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	1	1	0	0	2	0.3	0.5	-	-	0.2
Campylobacteriosis	31	26	22	43	122	10.6	13.3	12.0	10.8	11.4
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	9	3	2	5	19	3.1	1.5	1.1	1.3	1.8
Cryptosporidiosis	5	2	1	2	10	1.7	1.0	0.5	0.5	0.9
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
E. *coli* Other Stec	2	2	0	0	4	0.7	1.0	-	-	0.4
Encephalitis	4	2	1	6	13	1.4	1.0	0.5	1.5	1.2
Giardiasis	5	5	3	8	21	1.7	2.6	1.6	2.0	2.0
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	2	0	0	2	4	0.7	-	-	0.5	0.4
Hepatitis B	3	0	2	3	8	1.0	-	1.1	0.8	0.7
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	1	0	1	3	5	0.3	-	0.5	0.8	0.5
Legionellosis	1	4	1	6	12	0.3	2.0	0.5	1.5	1.1
Listeriosis, Nonperinatal	0	0	0	1	1	-	-	-	0.3	0.1
Listeriosis, Perinatal[a]	0	0	1	0	1	-	-	2.4	-	0.4
Lyme Disease	0	0	0	1	1	-	-	-	0.3	0.1
Malaria	1	0	0	4	5	0.3	-	-	1.0	0.5
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	40	14	10	12	76	13.7	7.2	5.4	3.0	7.1
Meningococcal Infections	1	1	0	4	6	0.3	0.5	-	1.0	0.6
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	39	18	39	62	158	13.4	9.2	21.2	15.5	14.8
Pneumococcal Disease, Invasive	21	12	12	34	79	7.2	6.1	6.5	8.5	7.4
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	25	11	23	27	86	8.6	5.6	12.5	6.8	8.0
Shigellosis	18	13	13	14	58	6.2	6.7	7.1	3.5	5.4
Staphylococcus Aureus Infection	1	0	0	1	2	0.3	-	-	0.3	0.2
Streptococcus, Group A Invasive	10	5	4	10	29	3.4	2.6	2.2	2.5	2.7
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	0	1	2	0.3	-	-	0.3	0.2
Typhoid Fever, Carrier	0	0	0	1	1	-	-	-	0.3	0.1
Typhus Fever	2	0	0	2	4	0.7	-	-	0.5	0.4
Vibrio	0	2	0	0	2	-	1.0	-	-	0.2
West Nile Virus	0	0	0	0	0	-	-	-	-	-

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.
[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-7. Selected Notifiable Diseases
SPA 7. East Area
Los Angeles County, 2010

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**BF**	**EL**	**SA**	**WH**	**TOTAL**	**BF**	**EL**	**SA**	**WH**	**TOTAL**
Amebiasis	1	2	6	0	9	0.3	0.9	1.3	-	0.7
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	0	1	-	-	0.2	-	0.1
Campylobacteriosis	40	22	47	36	145	10.8	10.2	10.4	10.7	10.5
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	6	1	6	1	14	1.6	0.5	1.3	0.3	1.0
Cryptosporidiosis	0	0	0	1	1	-	-	-	0.3	0.1
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	1	0	0	1	2	0.3	-	-	0.3	0.1
E. *coli* Other Stec	1	2	3	0	6	0.3	0.9	0.7	-	0.4
Encephalitis	1	1	1	2	5	0.3	0.5	0.2	0.6	0.4
Giardiasis	8	5	7	11	31	2.2	2.3	1.5	3.3	2.3
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	2	1	3	0	6	0.5	0.5	0.7	-	0.4
Hepatitis B	1	1	2	3	7	0.3	0.5	0.4	0.9	0.5
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	2	2	5	1	10	0.5	0.9	1.1	0.3	0.7
Legionellosis	1	1	4	7	13	0.3	0.5	0.9	2.1	0.9
Listeriosis, Nonperinatal	1	0	0	0	1	0.3	-	-	-	0.1
Listeriosis, Perinatal[a]	1	0	0	0	1	1.2	-	-	-	0.3
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	1	0	1	-	-	0.2	-	0.1
Measles	0	0	0	3	3	-	-	-	0.9	0.2
Meningitis, Viral	28	4	32	28	92	7.5	1.8	7.1	8.3	6.7
Meningococcal Infections	0	0	1	2	3	-	-	0.2	0.6	0.2
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	25	22	43	39	129	6.7	10.2	9.5	11.5	9.4
Pneumococcal Disease, Invasive	20	8	18	23	69	5.4	3.7	4.0	6.8	5.0
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	1	1	-	-	-	0.3	0.1
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	31	18	49	42	140	8.4	8.3	10.8	12.4	10.2
Shigellosis	10	6	28	10	54	2.7	2.8	6.2	3.0	3.9
Staphylococcus Aureus Infection	1	1	0	2	4	0.3	0.5	-	0.6	0.3
Streptococcus, Group A Invasive	4	1	3	4	12	1.1	0.5	0.7	1.2	0.9
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	0	0	1	0.3	-	-	-	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	0	0	0	0	0	-	-	-	-	-
Vibrio	1	0	0	0	1	0.3	-	-	-	0.1
West Nile Virus	0	0	0	2	2	-	-	-	0.6	0.1

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.
[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especially hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

Table O-8. Selected Notifiable Diseases
SPA 8. South Bay Area
Los Angeles County, 2010

Disease	Frequency				Rate (Cases per 100,000)[b]			
	HB	IW	TO	TOTAL	HB	IW	TO	TOTAL
Amebiasis	1	4	5	10	0.5	0.9	1.1	0.9
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	1	0	1	-	0.2	-	0.1
Campylobacteriosis	32	41	54	127	14.9	9.4	11.4	11.3
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	3	8	5	16	1.4	1.8	1.1	1.4
Cryptosporidiosis	0	4	0	4	-	0.9	-	0.4
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	1	1	-	-	0.2	0.1
E. *coli* O157:H7	0	1	1	2	-	0.2	0.2	0.2
E. *coli* Other Stec	1	2	1	4	0.5	0.5	0.2	0.4
Encephalitis	0	2	2	4	-	0.5	0.4	0.4
Giardiasis	7	8	11	26	3.3	1.8	2.3	2.3
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	0	1	0	1	-	0.2	-	0.1
Hepatitis B	1	5	4	10	0.5	1.1	0.8	0.9
Hepatitis C	0	0	1	1	-	-	0.2	0.1
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Kawasaki Syndrome	0	4	3	7	-	0.9	0.6	0.6
Legionellosis	2	8	6	16	0.9	1.8	1.3	1.4
Listeriosis, Nonperinatal	1	0	1	2	0.5	-	0.2	0.2
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	0	0	0	0	-	-	-	-
Malaria	0	1	2	3	-	0.2	0.4	0.3
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	19	46	56	121	8.8	10.6	11.9	10.8
Meningococcal Infections	1	3	2	6	0.5	0.7	0.4	0.5
Mumps	4	2	0	6	1.9	0.5	-	0.5
Pertussis	13	28	49	90	6.0	6.4	10.4	8.0
Pneumococcal Disease, Invasive	14	34	29	77	6.5	7.8	6.1	6.9
Psittacosis	0	0	0	0	-	-	-	-
Q-fever	0	0	0	0	-	-	-	-
Relapsing Fever	0	0	0	0	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	-	-	-	-
Rubella	0	0	0	0	-	-	-	-
Salmonellosis	28	36	50	114	13.0	8.3	10.6	10.2
Shigellosis	5	13	7	25	2.3	3.0	1.5	2.2
Staphylococcus Aureus Infection	0	1	1	2	-	0.2	0.2	0.2
Streptococcus, Group A Invasive	3	2	8	13	1.4	0.5	1.7	1.2
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	0	0	0	-	-	-	-
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	0	0	2	2	-	-	0.4	0.2
Vibrio	0	1	2	3	-	0.2	0.4	0.3
West Nile Virus	0	0	0	0	-	-	-	-

[a]Rates for perinatal listeriosis were calculated as cases per 100,000 women aged 15 to 44 years.
[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is especiallly hazardous and are not reported here, except with a dash ("-"). Conclusions drawn from unreliable rates should be made with caution, if they are to be made at all.

DISEASE SUMMARIES

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AMEBIASIS

CRUDE DATA	
Number of Cases	119
Annual Incidence[a]	
LA County	1.2
California[b]	1.1
United States[c]	N/A
Age at Diagnosis	
Mean	38
Median	37
Range	3-83

[a]Cases per 100,000 population.
[b]Calculated from Monthly Summary Report Selected Reportable Diseases. California Department of Public Health, December 2010.
[c]Not nationally reportable.

DESCRIPTION

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

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

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

2010 TRENDS AND HIGHLIGHTS

- The incidence rate of amebiasis did not change significantly in 2010, increasing slightly from 1.1 per 100,000 residents in 2009 to 1.2 in 2010.
- The largest proportion of cases was the 15 to 34 year age group, which is consistent with 2009 (Figure 2).
- Hispanic cases accounted for a slightly greater proportion of cases this year (48, 40%), with a smaller gap between the proportion of white and Hispanic cases. For the previous five years whites have had a slightly greater proportion of cases than Hispanics.
- Service Planning Area (SPA) 2 continued to have the highest incidence rate of all the SPAs in 2010, with 2.3 cases per 100,000 residents (Figure 4). SPA 4 had the second highest proportion of cases (16%) and incidence rate of amebiasis (1.5 per 100,000).
- The number of cases reported in 2010 peaked in March, differing from the previous five-year average in which cases peaked in August (Figure 5).
- The male to female ratio in 2010 was 2:1, as was the incidence rate ratio. Incidence rates were 1.6 per 100,000 for males and 0.8 per 100,000 for females.
- Risk factor information was available for 97% of the cases reported in 2010. The most frequently reported risk factor was immigration to the US (28, 25%); immigrants from Mexico (12, 43%) and India (12, 43%) were the most frequently reported countries of origin. Travel to another country (20, 17%), particularly to Mexico (10, 50%) was also commonly reported in 2010. This differs from previous years in which travel destination was more variable.

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=94)			2007 (N=122)			2008 (N=115)			2009 (N=107)			2010 (N=119)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0	0	0	0.0
1-4	0	0.0	0.0	6	4.9	1.0	1	0.9	0.2	1	0.9	0.2	5	4.2	0.9
5-14	5	5.3	0.3	11	9.0	0.8	8	7.0	0.6	6	5.6	0.4	8	6.7	0.6
15-34	28	29.8	1.0	30	24.6	1.1	37	32.2	1.3	33	30.8	1.2	38	31.9	1.3
35-44	26	27.7	1.7	30	24.6	2.0	26	22.6	1.7	23	21.5	1.5	25	21	1.7
45-54	18	19.1	1.4	22	18.0	1.7	22	19.1	1.6	22	20.5	1.6	25	21	1.8
55-64	9	9.6	1.0	13	10.7	1.5	12	10.4	1.3	14	13.1	1.5	11	9.2	1.1
65+	8	8.5	0.8	9	7.4	0.9	9	7.8	0.9	8	7.5	0.8	7	5.9	0.7
Unknown	0	0.0		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	5	4.2	0.4
Black	2	2.1	0.2	10	8.2	1.2	3	2.6	0.4	0	0.0	0.0	9	7.6	1.1
Hispanic	32	34.0	0.7	44	36.1	1.0	36	31.3	0.8	37	34.6	0.8	48	40.3	1.0
White	39	41.5	1.4	50	41.0	1.7	56	48.7	1.9	43	40.2	1.5	47	39.5	1.6
Other	2	2.1	7.0	8	6.6	38.4	4	3.5	16.2	1	0.9		1	0.8	
Unknown	9	9.6		2	1.6		9	7.8		24	22.5		9	7.6	
SPA															
1	2	2.1	0.6	6	4.9	1.7	1	0.9	0.3	2	1.9	0.5	3	2.5	0.8
2	39	41.5	1.8	51	41.8	2.4	52	45.2	2.4	49	45.8	2.2	52	42	2.3
3	6	6.4	0.3	14	11.5	0.8	14	12.2	0.8	9	8.4	0.5	7	5.9	0.4
4	17	18.1	1.3	16	13.1	1.3	17	14.8	1.3	18	16.8	1.4	19	16	1.5
5	12	12.8	1.9	9	7.4	1.4	6	5.2	0.9	8	7.5	1.2	7	5.9	1.1
6	4	4.3	0.4	8	6.6	0.8	11	9.6	1.0	4	3.7	0.4	12	10.1	1.1
7	7	7.4	0.5	11	9.0	0.8	7	6.1	0.5	12	11.2	0.9	9	7.6	0.7
8	7	7.4	0.6	6	4.9	0.5	7	6.1	0.6	3	2.8	0.3	10	8.4	0.9
Unknown	0	0.0		1	0.8		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 Amebiasis
CA and LAC, 2000-2010**

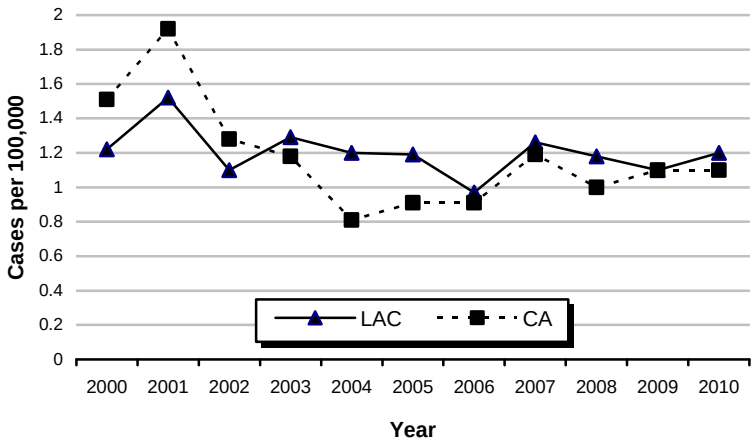


**Figure 2. Incidence Rates of Amebiasis by Age Group
LAC, 2010**

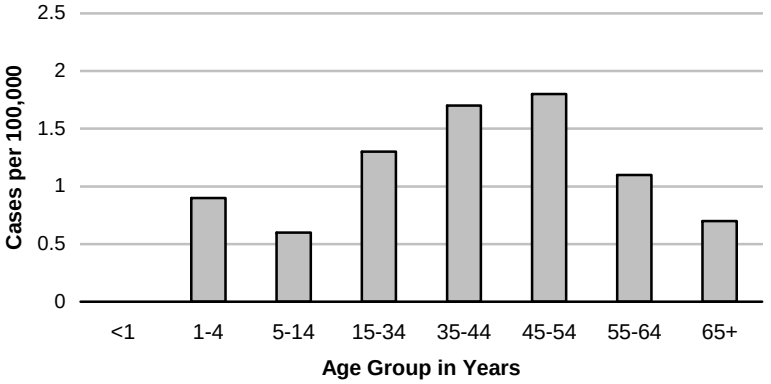


**Figure 3. Percent Cases of Amebiasis by Race/Ethnicity
LAC, 2010**

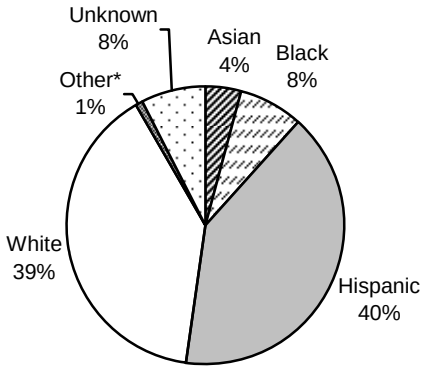
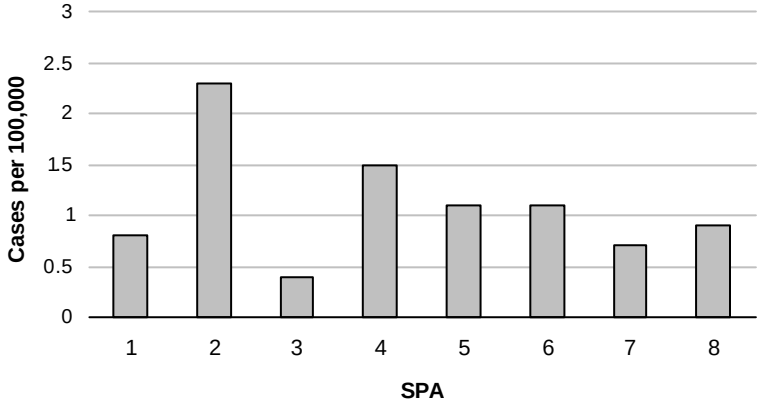


**Figure 4. Incidence Rates of Amebiasis by SPA
LAC, 2010**



* 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, 2010

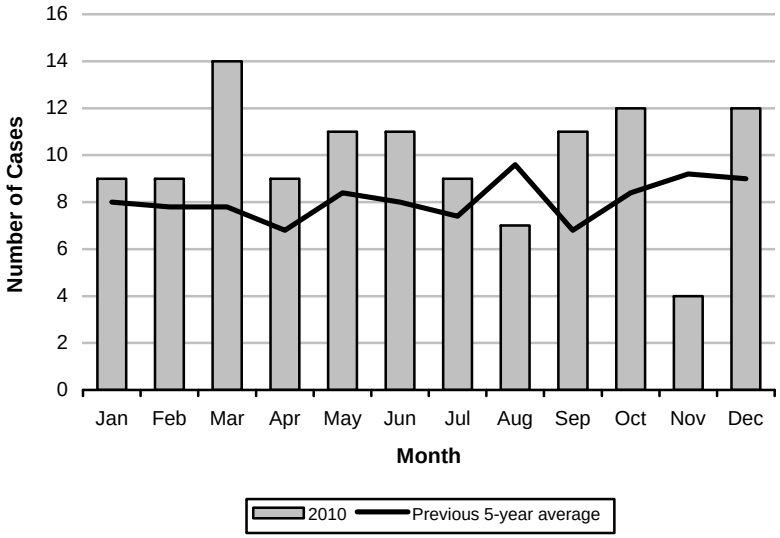
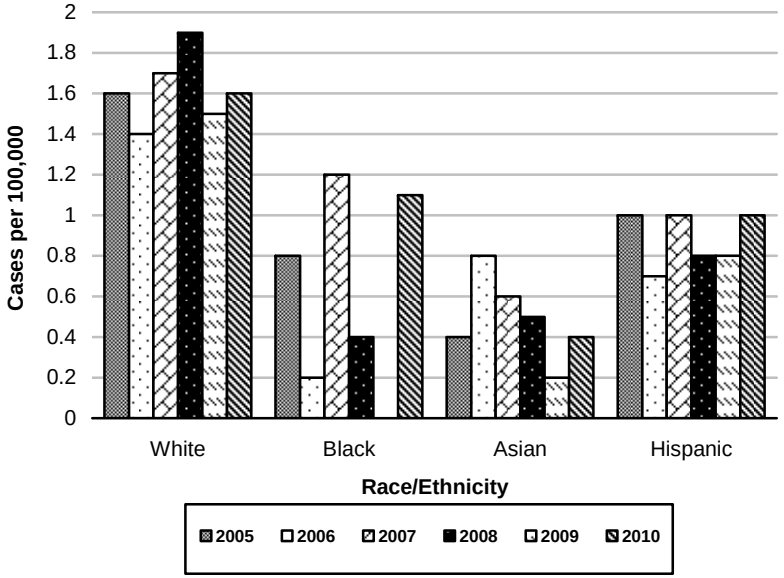
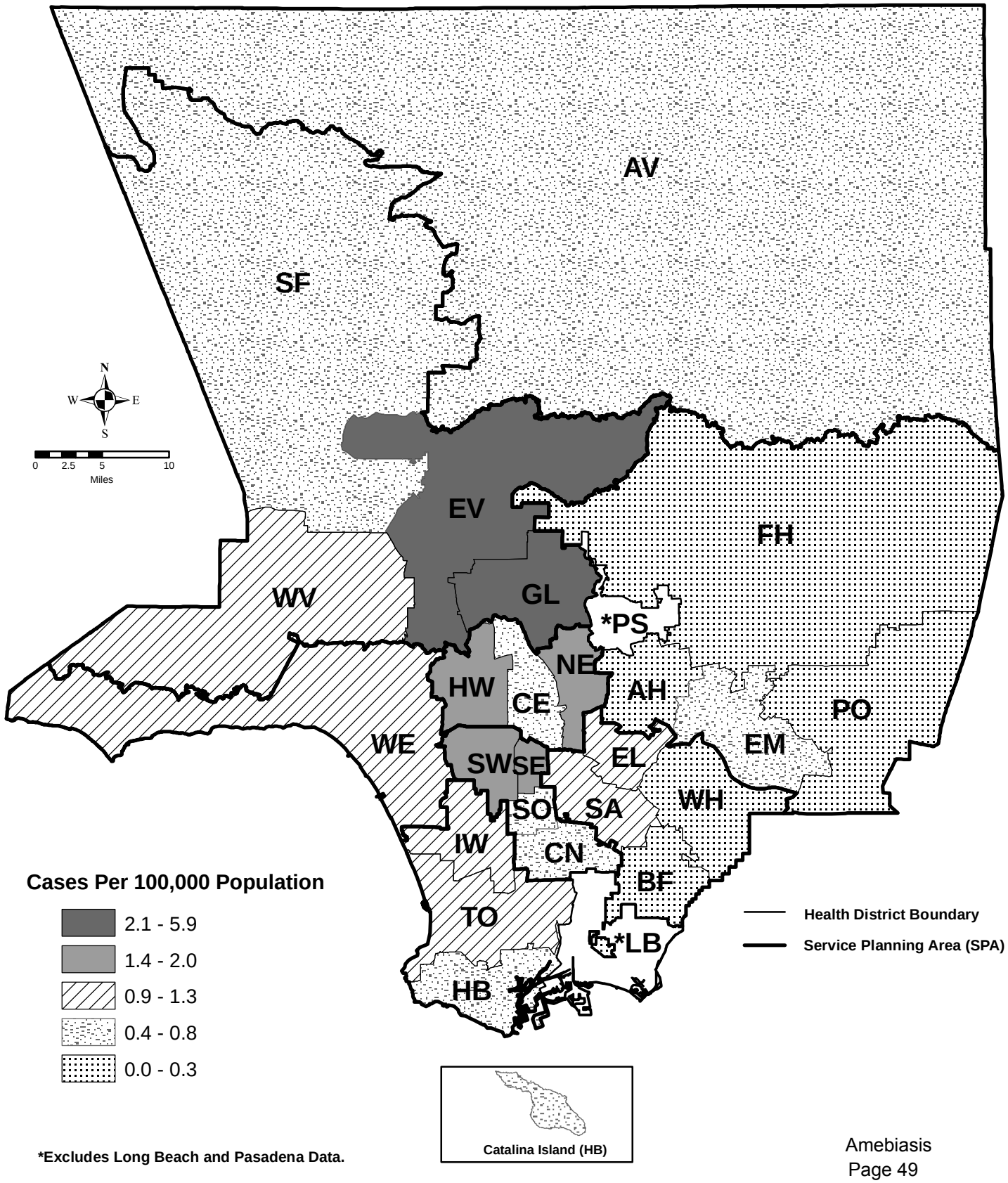


Figure 6. Amebiasis Incidence by Race/Ethnicity
LAC, 2006-2010



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1239
Annual Incidence[a]	
LA County	12.6
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	33.4
Median	31
Range	0-92

[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.

2010 TRENDS AND HIGHLIGHTS

- There was a 9.1% increase in the incidence of campylobacteriosis from the previous year and a 60% increase in cases since 2006 (Figure 1).
- The highest rates continued to be among children aged 1 to 4 years (25.8 per 100,000) followed by infants aged <1 year (17.2 per 100,000) (Figure 2).
- Service Planning Area (SPA) 5 had the highest rate (19.7 per 100,000) which is consistent with previous years (Figure 3).
- No outbreaks of campylobacteriosis were reported in 2010.
- In 2010, routine interviews of campylobacter were discontinued, 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, 2006-2010

	2006 (N=775)			2007 (N=827)			2008 (N=1072)			2009 (N=1135)			2010 (N=1239)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	21	2.7	14.5	25	3.0	16.9	42	3.9	30.1	30	2.6	21.9	24	1.9	17.2
1-4	91	11.7	15.7	108	13.1	18.7	137	12.8	24.2	138	12.1	24.6	150	12.1	25.8
5-14	97	12.5	6.6	109	13.2	7.6	152	14.2	10.8	146	12.8	10.7	175	14.1	13.2
15-34	207	26.7	7.4	237	28.7	8.4	285	26.6	9.9	316	27.8	11.2	318	25.6	10.8
35-44	105	13.5	7.0	78	9.4	5.2	129	12.0	8.5	119	10.4	8.0	157	12.6	10.9
45-54	81	10.5	6.2	100	12.1	7.6	127	11.8	9.4	137	12.0	10.0	136	10.9	10.1
55-64	68	8.8	7.8	69	8.3	7.8	90	8.4	9.9	100	8.8	10.5	96	7.7	10.0
65+	105	13.5	10.7	101	12.2	10.0	110	10.3	10.8	143	12.6	13.5	165	13.3	15.6
Unknown	0	0.0		0	0.0		0	0.0		6	0.5	0	0	0	0
Race/Ethnicity															
Asian	92	11.9	7.2	86	10.4	6.7	100	9.3	7.7	42	3.7	3.2	35	2.8	2.6
Black	34	4.4	4.0	39	4.7	4.6	31	2.9	3.6	15	1.32	1.8	13	1.0	1.5
Hispanic	336	43.4	7.3	364	44.0	7.9	542	50.6	11.6	156	13.7	3.3	182	14.6	3.8
White	302	39.0	10.5	314	38.0	10.8	373	34.8	12.8	81	7.1	2.8	118	9.5	4.1
Other	4	0.5	14.0	3	0.4	14.4	0	0.0	0.0	9	0.7	0	13	1.0	0
Unknown	7	0.9		21	2.5		26	2.4		832	73.0	0	878	70.8	0
SPA															
1	25	3.2	7.2	22	2.7	6.1	27	2.5	7.4	32	2.8	8.7	39	3.1	10.5
2	217	28.0	10.1	209	25.3	9.7	271	25.3	12.4	292	25.7	13.2	346	2.7	15.6
3	92	11.9	5.3	122	14.8	7.1	154	14.4	8.9	157	13.8	9.1	166	13.3	9.6
4	98	12.6	7.8	68	8.2	5.4	99	9.2	7.8	158	13.9	12.7	158	1.2	12.6
5	119	15.4	18.7	115	13.9	17.9	155	14.5	24.0	151	13.3	23.2	130	10.4	19.7
6	63	8.1	6.0	68	8.2	6.5	122	11.4	11.6	114	10.0	10.8	122	9.8	11.4
7	94	12.1	6.8	108	13.1	7.8	127	11.8	9.2	104	8.8	9.1	145	11.7	10.5
8	65	8.4	5.8	95	11.5	8.5	117	10.9	10.4	114	10.0	10.8	127	10.2	11.3
Unknown	2	0.3		20	2.4		0	0.0		13	1.1	0	0	0	0

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

**Figure 1. Reported Campylobacteriosis Rates by Year
LAC, 2001-2010**

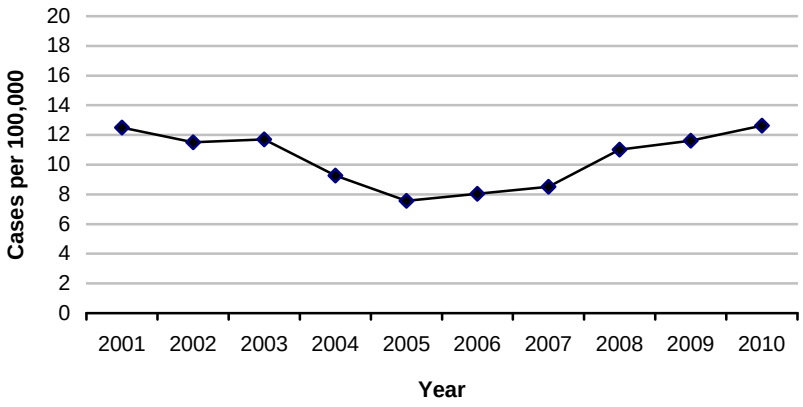


**Figure 2. Reported Campylobacteriosis Rates by Age Group
LAC, 2010 (N=1239)**

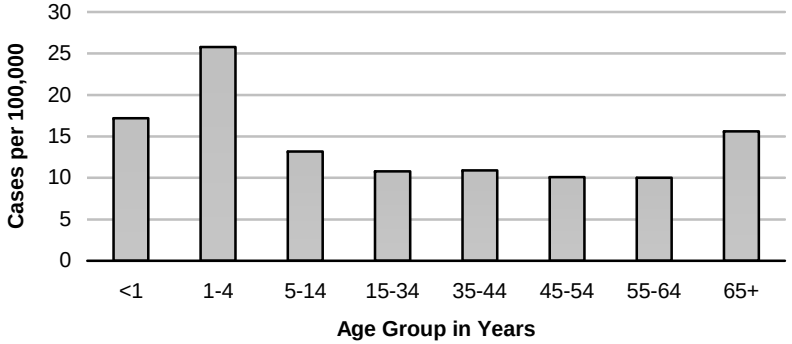
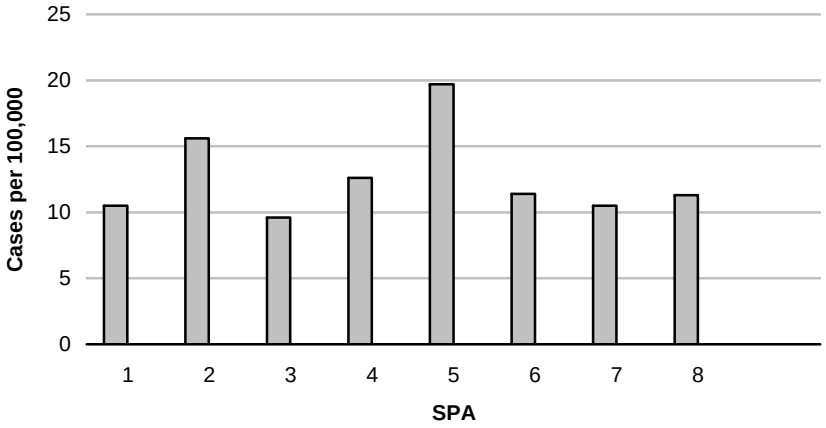
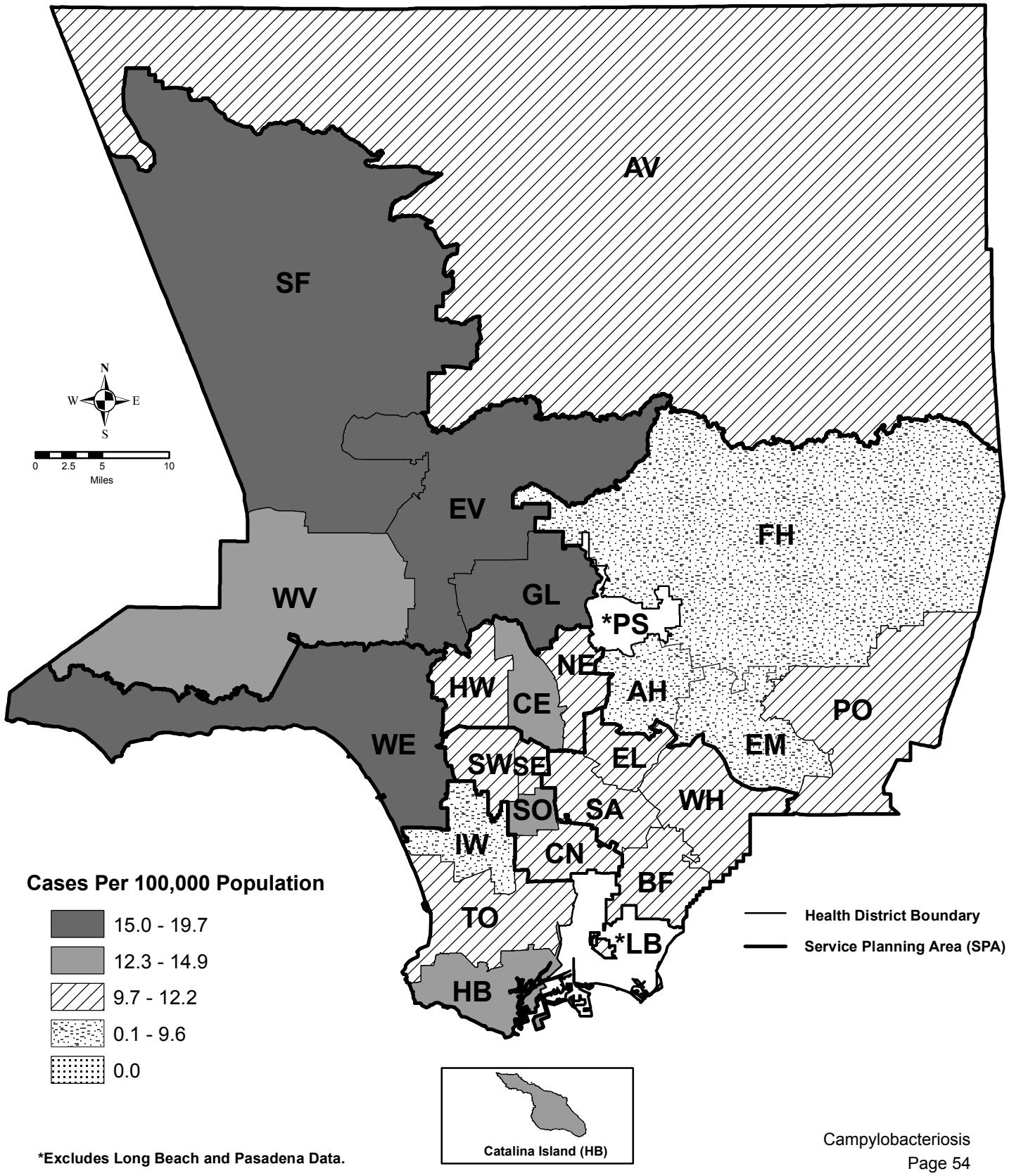


**Figure 3. Reported Campylobacteriosis Rates by SPA
LAC, 2010 (N=1239)**



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	235
Annual Incidence[a]	
LA County	2.4
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	50
Median	50
Range	0-92

[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.

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, and the lack of highly effective antifungal treatment validate the need for prevention efforts.

2010 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 adults; the greatest number of reported cases was in ages 45-65+ years. The highest incidence rate was in the 65+ age groups, 4.8 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 65% of cases; females 35%, but in SPA 1, the percentages were similar with males 52% and females 48% (Figure 3).
- Whites had the highest percentage of cases with 32.3% (n=76) as compared to other racial groups. However, the incidence rate for blacks 5.0 cases per 100,000 (n=43) 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 32.6 (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, 23.3 per 100,000 (n=87), which has increased from the previous year (Figure 5).
- Coccidioidomycosis cases began to increase in the summer of 2010, compared to the 5 year average (Figure 6). The rise in cases occurred almost exclusively in SPA 1 and 2 with the rest of the county showing little increase. (Figure 7)
- The case fatality rate was 3% among 171 cases for which this could be tracked, a 13% decrease from 2009. There were 14 cases of disseminated coccidioidomycosis in LAC.

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=196)			2007 (N=145)			2008 (N=228)			2009 (N=171)			2010 (N=235)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.5	0.7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.4	0.7
1-4	1	0.5	0.2	1	0.7	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	3	1.5	0.2	4	2.8	0.3	6	2.6	0.4	3	1.8	0.2	5	2.1	0.4
15-34	51	26.0	1.8	27	18.6	1.0	41	18.0	1.5	30	17.5	1.1	43	18.3	1.5
35-44	30	15.3	2.0	30	20.7	2.0	33	14.5	2.2	38	22.2	2.6	38	16.2	2.6
45-54	42	21.4	3.2	37	25.5	2.8	58	25.4	4.3	30	17.5	2.2	55	23.4	4.1
55-64	32	16.3	3.7	26	17.9	2.9	38	16.7	4.1	33	19.3	3.5	42	17.9	4.4
65+	36	18.4	3.7	20	13.8	2.0	52	22.8	5.0	37	21.6	3.5	51	21.7	4.8
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	15	7.7	1.2	10	6.9	0.8	27	11.8	2.1	11	6.4	0.8	26	11.1	1.9
Black	27	13.8	3.2	22	15.2	2.6	37	16.2	4.3	27	15.8	3.2	43	18.3	5.0
Hispanic	68	34.7	1.5	52	35.9	1.1	86	37.7	1.8	67	39.2	1.4	71	30.2	1.5
White	75	38.3	2.6	56	38.6	1.9	62	27.2	2.1	56	32.7	1.9	76	32.3	2.7
Other	3	1.5	10.5	1	0.7	4.8	1	0.4	4.1	2	1.2		3	1.3	
Unknown	8	4.1		4	2.8		15	6.6		8	4.7		16	6.8	
SPA															
1	67	34.2	19.3	51	35.2	14.2	52	22.8	14.2	45	26.3	12.2	87	37.0	23.3
2	57	29.1	2.7	47	32.4	2.2	62	27.2	2.8	52	30.4	2.3	54	23.0	2.4
3	11	5.6	0.6	9	6.2	0.5	21	9.2	1.2	16	9.4	0.9	17	7.2	1.0
4	14	7.1	1.1	8	5.5	0.6	20	8.8	1.6	13	7.6	1.0	20	8.5	1.6
5	9	4.6	1.4	1	0.7	0.2	9	3.9	1.4	11	6.4	1.7	7	3.0	1.1
6	16	8.2	1.5	0	0.0	0.0	24	10.5	2.3	15	8.8	1.4	19	8.1	1.8
7	9	4.6	0.7	12	8.3	0.9	21	9.2	1.5	9	5.3	0.7	14	6.0	1.0
8	12	6.1	1.1	8	5.5	0.7	13	5.7	1.2	9	5.3	0.8	16	6.8	1.4
Unknown	1	0.5		9	6.2		6	2.6							

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

**Figure 1. Incidence Rates of Coccidioidomycosis
US, CA and LAC, 1999-2010**

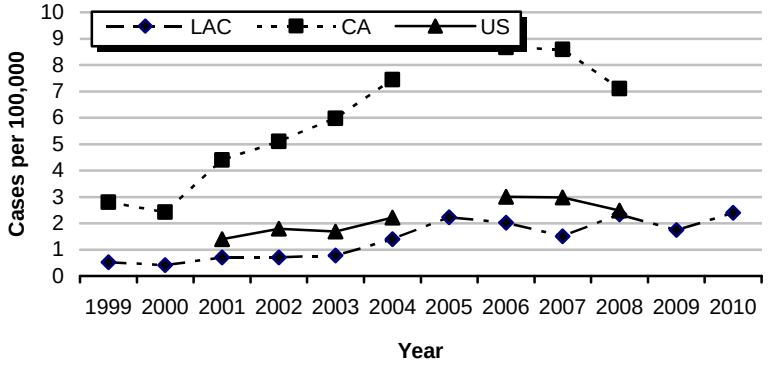


**Figure 2. Incidence Rates of Coccidioidomycosis by Age Group
LAC, 2010 (N=235)**

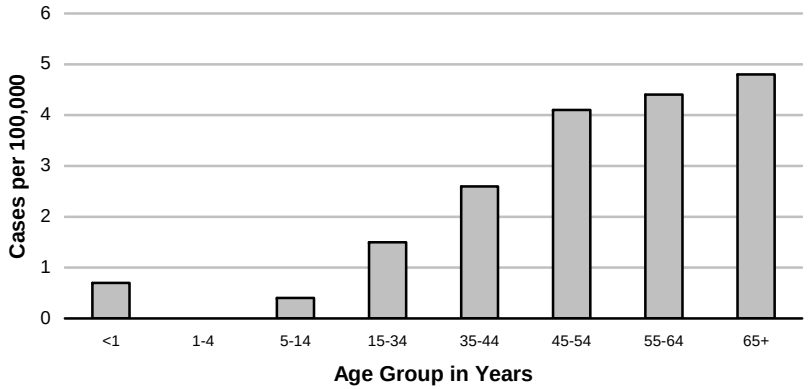


**Figure 3. Percent of Reported Coccidioidomycosis Cases that are Male by SPA
LAC, 2010**

**Figure 4. Coccidioidomycosis Incidence Rates by Race/Ethnicity
LAC, 2006-2010**

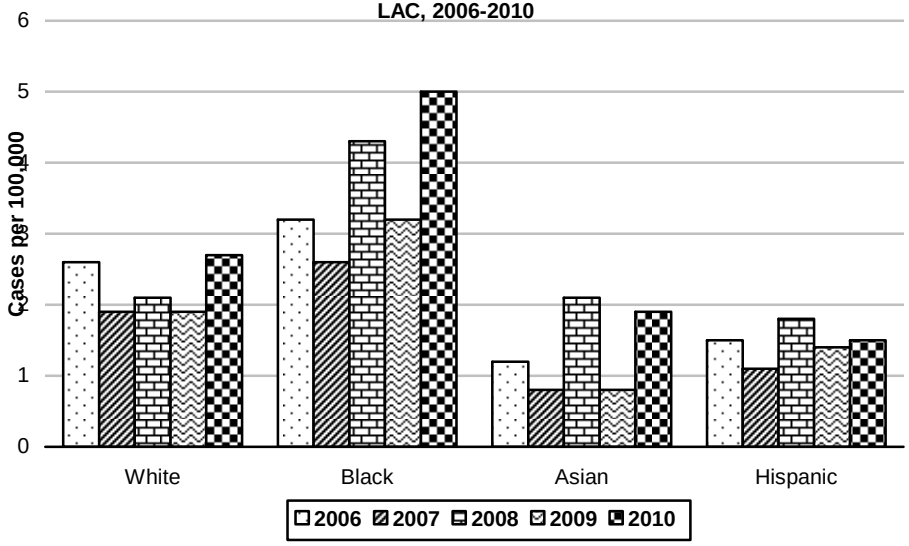


Figure 5. Incidence Rates of Coccidioidomycosis by SPA LAC, 2009-2010

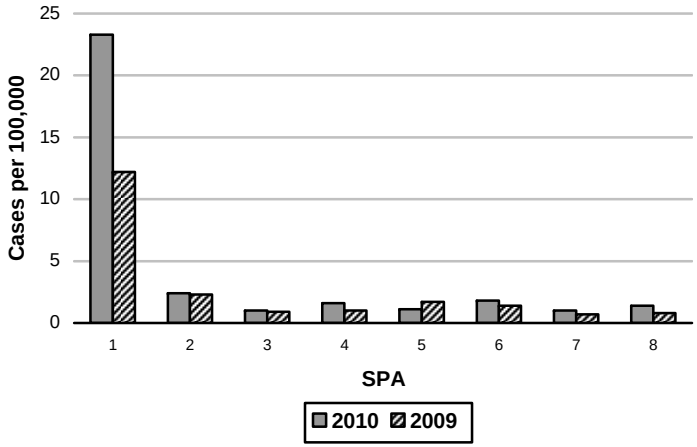


Figure 6. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2010 (N=235)

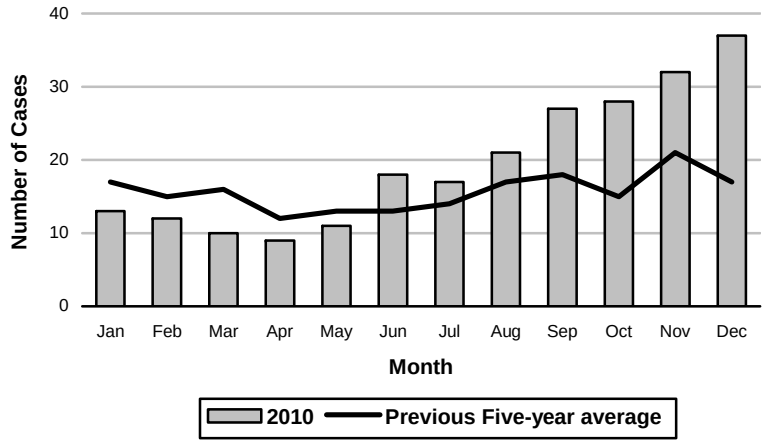
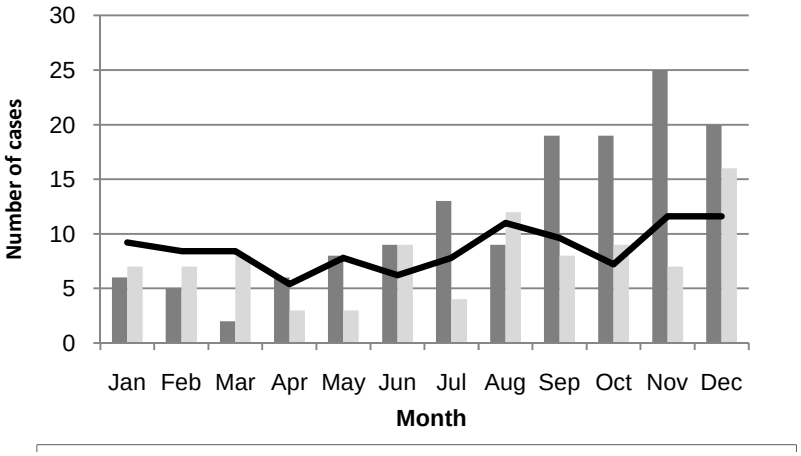
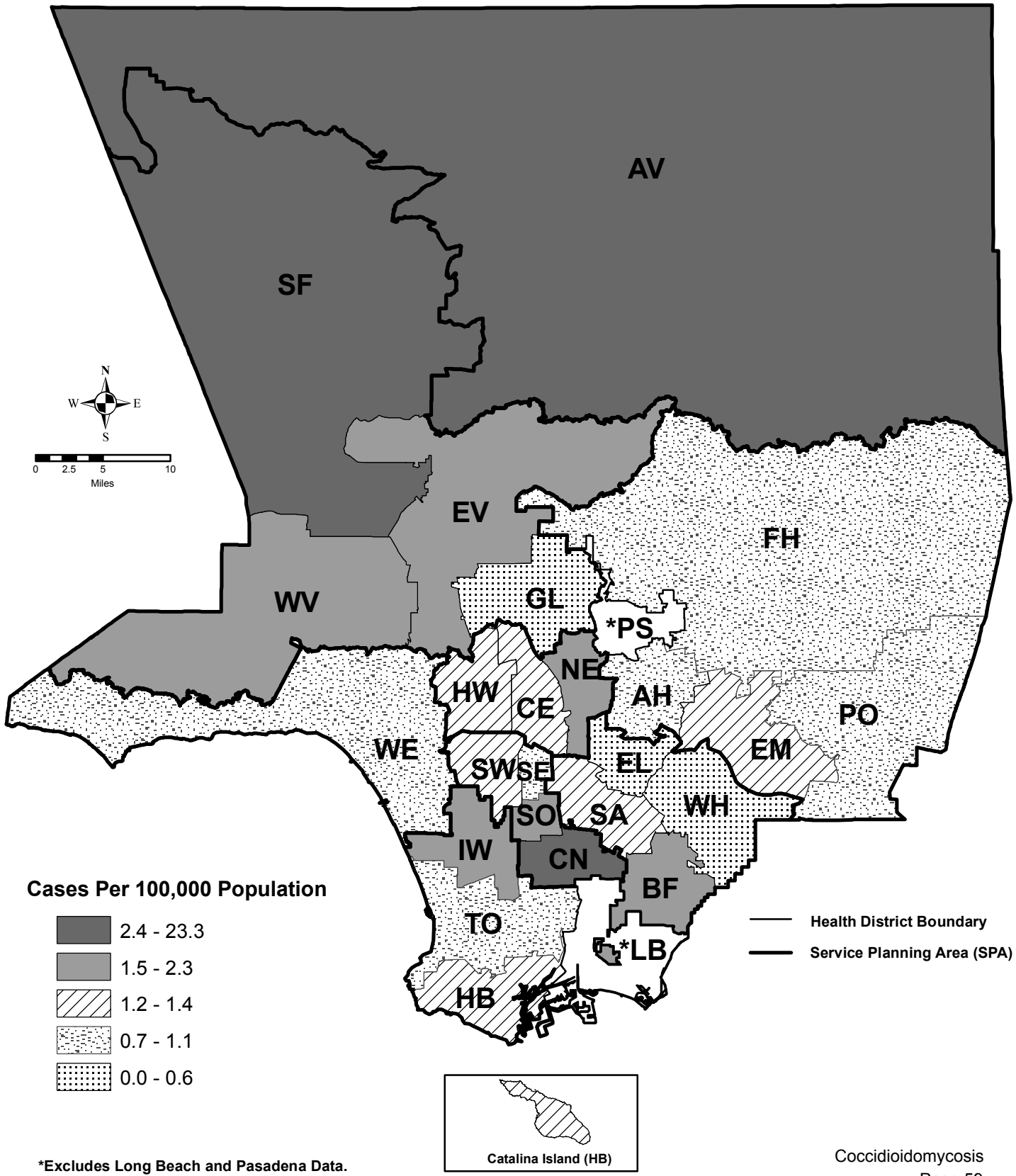


Figure 7. Reported Coccidioidomycosis Cases by SPA and Month of Onset, LAC 2010 (N=234)



Map 3. Coccidioidomycosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases[a]	61
Annual Incidence	
LA County	0.62
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	37
Median	41
Range	1-83 years

[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.

DESCRIPTION

Cryptosporidiosis is fecal-orally transmitted when cysts of several species of the parasite *Cryptosporidium* 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.

2010 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases in Los Angeles County (LAC) increased slightly from 0.52 in 2009 to 0.62 in 2010 (Figure 1).
- The age group with the highest incidence of cryptosporidiosis in LAC was the 35 to 44 and 45-54 year old age group, which both had an incidence rate of 1.0 per 100,000 (Figure 2). The 35 to 44 age group has consistently had the highest incidence rate in previous reporting periods. The 15 to 34 year age group had the largest proportion of cases reported. This is similar to the previous year.
- Whites (22, 37%) accounted for the largest proportion of cases in 2010. A large percentage (21%) of cases had unknown race/ethnicity data (Figure 3). Blacks had the highest incidence rate of all the race/ethnicity groups, with 1.3 cases per 100,000.
- Service Planning Area (SPA) 2 (16, 26%) reported the largest proportion of cases. SPA 6 had the highest incidence rate, with 0.9 cases per 100,000; this differs from previous reporting periods where SPA 4 and 5 have had the highest incidence rates (Figure 4).
- In 2010, the number of cases reported peaked in August. This is consistent with previous years in which cases peaked in late summer (Figure 5).
- The male to female case ratio for 2010 was 2:1, consistent with previous years. Males have repeatedly comprised the larger proportion of cases.
- Complete risk factor data were available for 96% of cases. The most frequently reported risk factor was contact with animals (25, 49%) the majority of which were dogs at home. Other risk factors were HIV positive status (15, 30%), especially among MSM (13, 22%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=48)			2007 (N=50)			2008 (N=41)			2009 (N=51)			2010 (N=61)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0	0	0	0.0
1-4	1	2.1	0.2	2	4.0	0.3	2	4.9	0.4	4	7.8	0.7	2	3.3	0.3
5-14	4	8.3	0.3	4	8.0	0.3	7	17.1	0.5	4	7.8	0.3	5	8.2	0.4
15-34	7	14.6	0.3	15	30.0	0.5	10	24.4	0.3	16	31.4	0.6	15	24.6	0.5
35-44	22	45.8	1.5	13	26.0	0.9	15	36.6	1.0	13	25.5	0.9	14	23	1.0
45-54	5	10.4	0.4	10	20.0	0.8	4	9.8	0.3	4	7.8	0.3	13	21.3	1.0
55-64	6	12.5	0.7	1	2.0	0.1	1	2.4	0.1	6	11.8	0.6	5	8.2	0.5
65+	3	6.3	0.3	5	10.0	0.5	2	4.9	0.2	4	7.8	0.4	7	11.5	0.7
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race/Ethnicity															
Asian	0	0.0	0.0	1	2.0	0.1	1	2.4	0.1	1	2.0	0.1	2	3.3	0.1
Black	8	16.7	0.9	7	14.0	0.8	5	12.2	0.6	8	15.7	0.9	11	18.0	1.3
Hispanic	20	41.7	0.4	8	16.0	0.2	10	24.4	0.2	10	9.6	0.2	13	21.3	0.3
White	16	33.3	0.6	29	58.0	1.0	12	29.3	0.4	16	31.4	0.5	22	36.1	0.8
Other	2	4.2	7.0	2	4.0	9.6	2	4.9	8.1	1	2.0		0	0.0	0.0
Unknown	2	4.2		3	6.0		11	26.8		15	29.4		13	21.3	
SPA															
1	4	8.3	1.2	3	6.0	0.8	2	4.9	0.5	5	9.8	1.4	3	4.9	0.8
2	13	27.1	0.6	19	38.0	0.9	14	34.1	0.6	12	23.5	0.5	16	26.2	0.7
3	3	6.3	0.2	3	6.0	0.2	0	0.0	0.0	5	9.8	0.3	9	14.8	0.5
4	13	27.1	1.0	7	14.0	0.6	12	29.3	0.9	11	21.6	0.9	10	16.4	0.8
5	2	4.2	0.3	7	14.0	1.1	5	12.2	0.8	4	7.8	0.6	5	8.2	0.8
6	3	6.3	0.3	1	2.0	0.1	1	2.4	0.1	5	9.8	0.5	10	16.4	0.9
7	8	16.7	0.6	3	6.0	0.2	3	7.3	0.2	3	5.9	0.2	1	1.6	0.1
8	1	2.1	0.1	7	14.0	0.6	4	9.8	0.4	4	7.8	0.4	4	6.6	0.4
Unknown	1	2.1		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 Cryptosporidiosis US, CA and LAC, 2000-2010

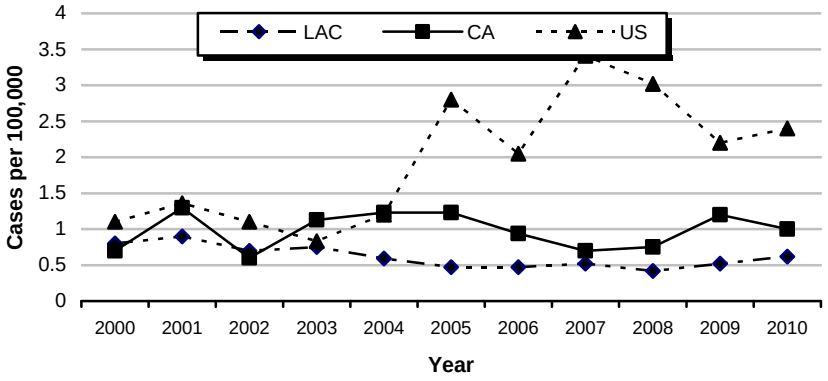


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2010

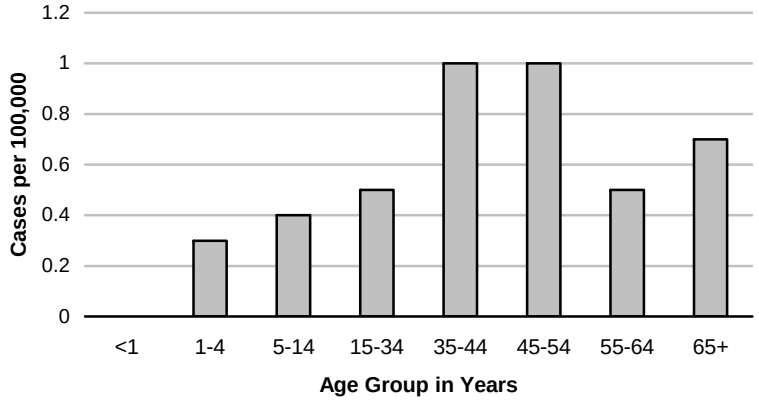
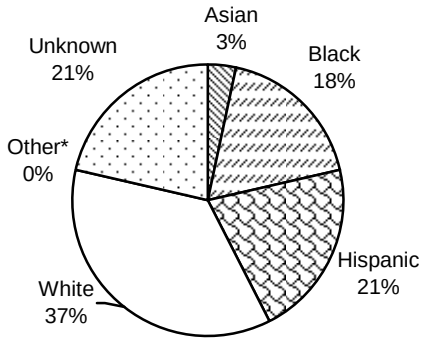


Figure 3. Percent Cases of Cryptosporidiosis by Race/Ethnicity LAC, 2010



* 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, 2010

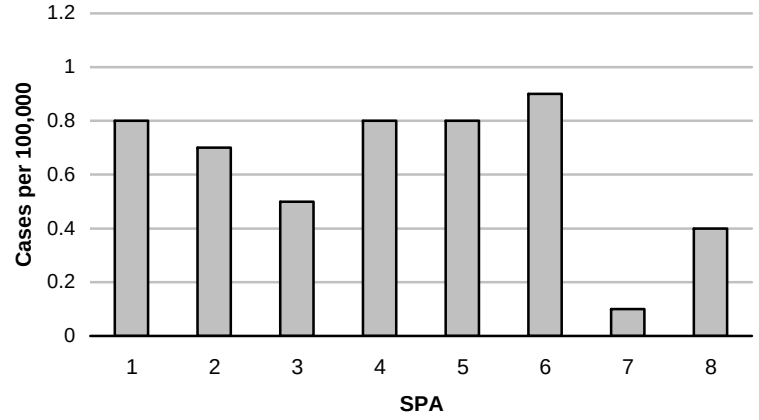


Figure 5. Reported Cryptosporidiosis Cases by Month of Onset LAC, 2010

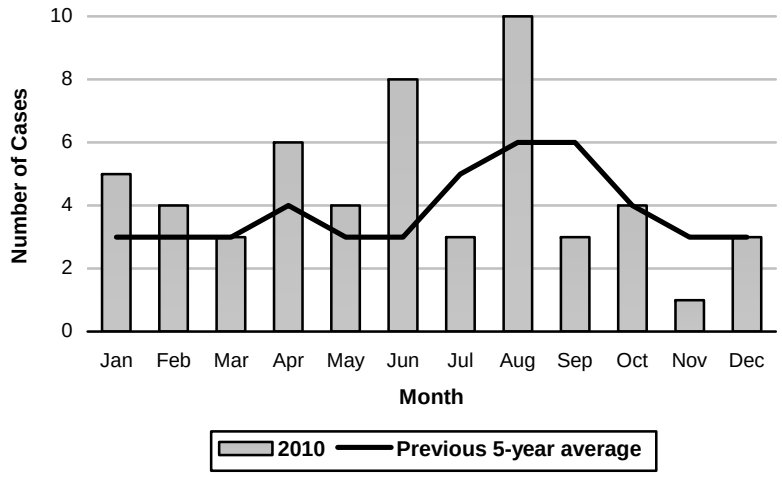
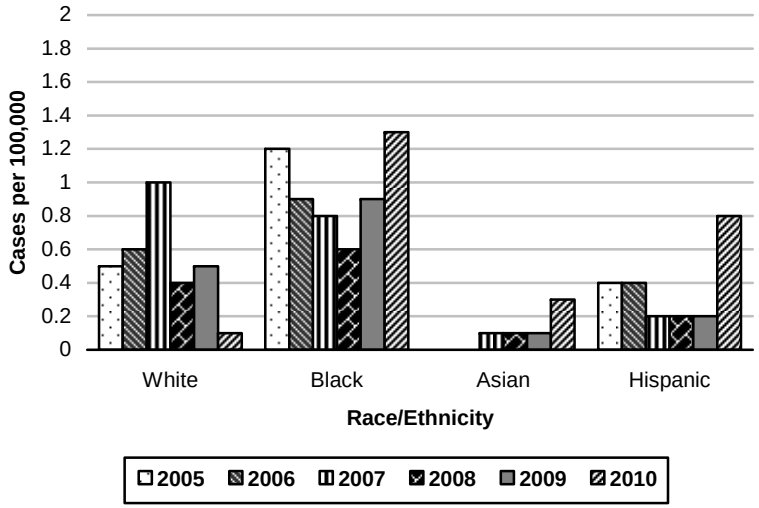
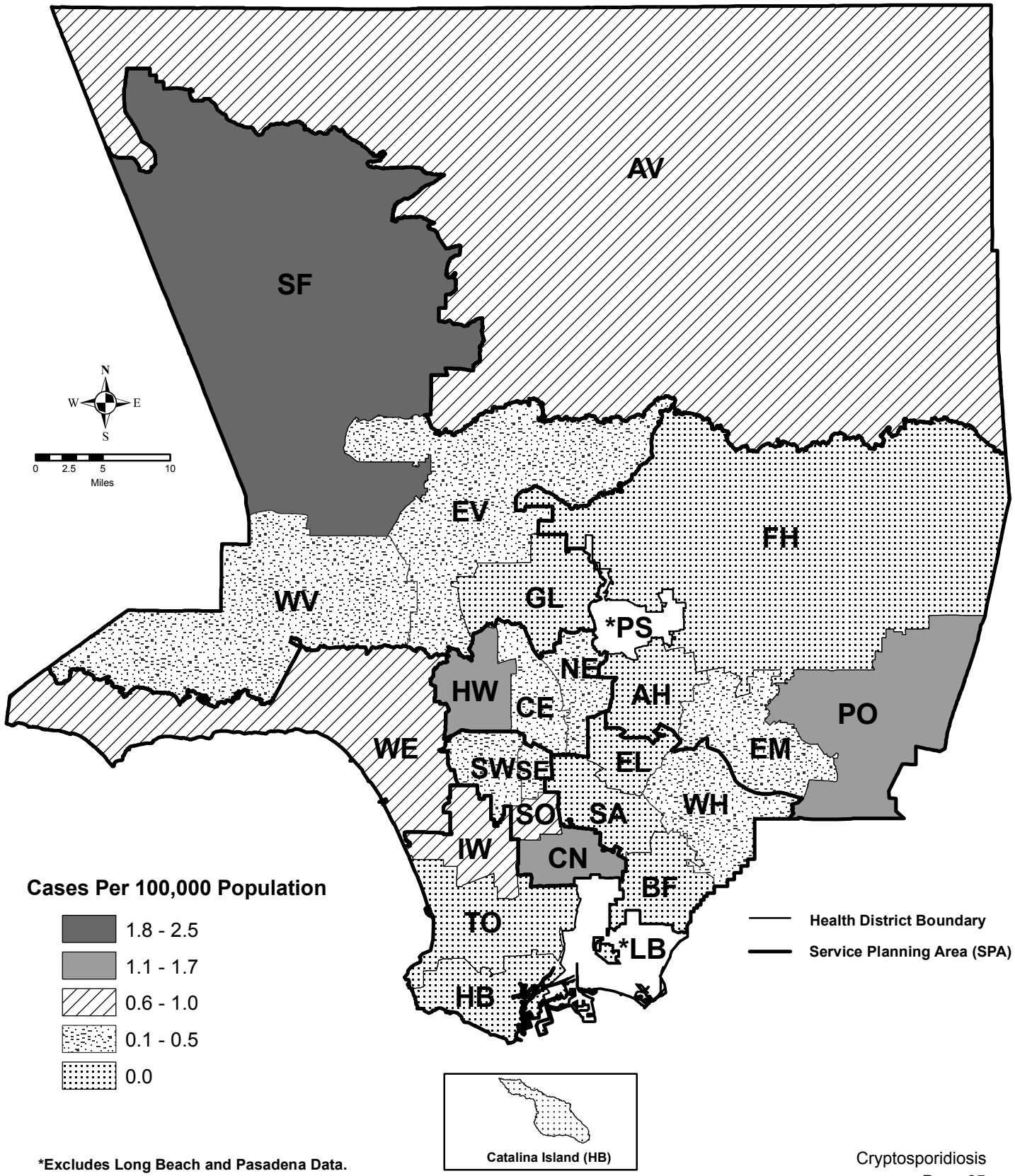


Figure 6. Cryptosporidiosis Incidence by Race/Ethnicity LAC, 2005-2010



Map 4. Cryptosporidiosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

ENCEPHALITIS

CRUDE DATA	
Number of Cases	51
Annual Incidence[a]	
LA County	0.52
California	N/A
United States	N/A
Age at Diagnosis	
Mean	24 years
Median	14 years
Range	1 -82 years

[a]Cases per 100,000 population.

DESCRIPTION

Encephalitis, an inflammation of parts of the brain, spinal cord and meninges, causes headache, stiff neck, fever and altered mental status. It can result from infection with a number of different agents including viral, parasitic, fungal, rickettsial, and bacterial pathogens as well as chemical agents. Public health surveillance is limited to cases with suspected or confirmed viral etiology, which includes primary and post-infectious encephalitis but excludes individuals with underlying human immunodeficiency virus (HIV) infection. Of special concern 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. Arboviral encephalitides have a global distribution. The five main viral agents of encephalitis in the United States are West Nile virus (WNV), eastern equine encephalitis (EEE) virus, western equine encephalitis (WEE) virus, St. Louis encephalitis (SLE) virus and La Crosse (LAC) virus, all of which are transmitted by mosquitoes and thus can be prevented by personal protection and mosquito control (see West Nile virus chapter).

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

2010 TRENDS AND HIGHLIGHTS

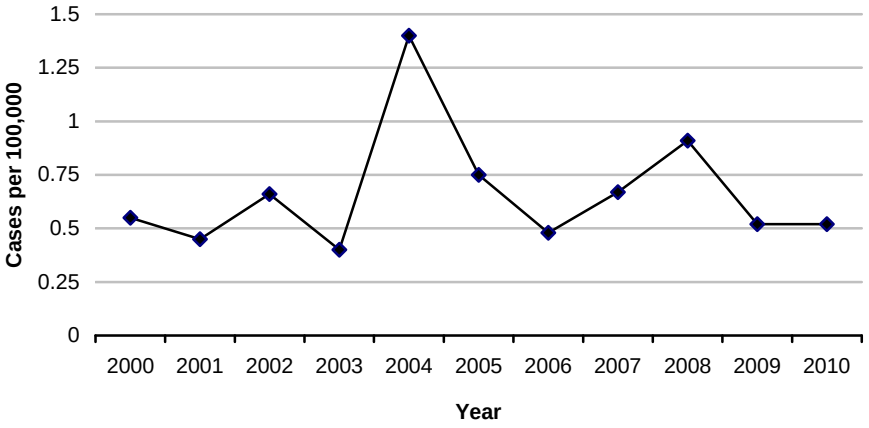
- Encephalitis case reports originate from the California Encephalitis Project (http://ceip.us/encephalitis.htm) and acute care medical facilities through local confidential morbidity reporting system.
- Fifty-one cases of encephalitis of probable viral etiology were reported in 2010, identical to the number of encephalitis cases reported in 2009 (Table). The decline in encephalitis cases since 2008 is most likely related to a decrease in all WNV-associated infections seen in both 2009 and 2010 compared to previous peak seasons in 2004 and 2008 (Figure 4). Forty-eight cases of WNV-associated encephalitis were reported in 2004 and 2008, both peak WNV infection seasons; WNV infection was first detected in LAC in 2003. WNV- associated encephalitis has decreased significantly since 2008 with 6 and 1 cases documented in 2008 and 2009, respectively.
- Twenty- eight (55%) encephalitis cases were reported to LAC from the California Encephalitis Project. Despite a thorough work-up, twenty-seven (96%) cases had no definitive infectious disease etiology identified. One case had presumed underlying etiology of parainfluenza-1 virus infection.
- The greatest incidence of encephalitis was in the 5-14 year old group (1.6 cases per 100,000) followed by those in the 1-4 and <1 year old group (0.7 cases per 100,000 population).

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=46)			2007 (N=65)			2008 (N=89)			2009 (N=51)			2010 (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	2	4.3	1.4	3	4.6	2.0	4	4.5	2.9	0	0	-	1	2.0	0.7
1-4	8	17.4	1.4	6	9.2	1.0	8	9.0	1.4	4	7.8	0.7	4	7.8	0.7
5-14	8	17.4	0.5	13	20.0	0.9	14	15.7	1.0	17	33.4	1.2	21	41.2	1.6
15-34	15	32.6	0.5	15	23.1	0.5	4	4.5	0.1	10	19.6	0.4	11	21.6	0.4
35-44	3	6.5	0.2	2	3.1	0.1	1	1.1	0.1	2	3.9	0.1	1	2.0	0.1
45-54	4	8.7	0.3	6	9.2	0.5	11	12.4	0.8	7	13.7	0.5	4	7.8	0.3
55-64	1	2.2	0.1	7	10.8	0.8	14	15.7	1.5	2	3.9	0.2	6	11.8	0.6
65+	5	10.9	0.5	10	15.4	1.0	33	37.1	3.2	8	15.7	0.8	3	5.9	0.3
Unknown	0	0.0		3	4.6		0	0.0		1	2.0	0	0	0.0	
Race / Ethnicity															
Asian	4	8.7	0.3	7	10.8	0.5	3	3.4	0.2	5	9.8	0.4	6	11.8	0.4
Black	8	17.4	0.9	5	7.7	0.6	5	5.6	0.6	2	3.9	0.2	3	5.9	0.4
Hispanic	20	43.5	0.4	31	47.7	0.7	40	44.9	0.9	22	43.2	0.5	27	52.9	0.6
White	12	26.1	0.4	19	29.2	0.7	38	42.7	1.3	9	17.6	0.3	7	13.7	0.2
Other	1	2.2	3.5	0	0.0	0.0	1	1.1	4.1	1	2.0	-	1	2.0	-
Unknown	1	2.2		3	4.6		2	2.2		12	23.5	-	7	13.7	-
SPA															
1	5	10.9	1.4	3	4.6	0.8	3	3.4	0.8	3	5.9	0.8	2	3.9	0.5
2	8	17.4	0.4	20	30.8	0.9	9	10.1	0.4	11	21.7	0.5	10	19.6	0.5
3	12	26.1	0.7	7	10.8	0.4	25	28.1	1.4	10	19.6	0.6	7	13.7	0.4
4	3	6.5	0.2	5	7.7	0.4	10	11.2	0.8	7	13.7	0.6	4	7.8	0.3
5	1	2.2	0.2	1	1.5	0.2	0	0.0	0.0	0	0.0	-	2	3.9	0.3-
6	1	2.2	0.1	6	9.2	0.6	3	3.4	0.3	7	13.7	0.7	13	25.5	1.2
7	8	17.4	0.6	6	9.2	0.4	16	18.0	1.2	9	17.6	0.7	5	9.8	0.4
8	8	17.4	0.7	13	20.0	1.2	9	10.1	0.8	2	3.9	0.2	4	7.8	0.4
Unknown	0	0.0		4	6.2		14	15.7		2	3.9		4	7.8	

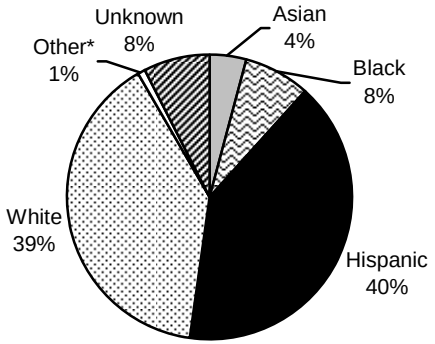
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis
LAC, 2000-2010 (N=51)



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity
LAC, 2010 (N=51)



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

Figure 3. Incidence Rates of Encephalitis by SPA
LAC, 2010 (N=51)

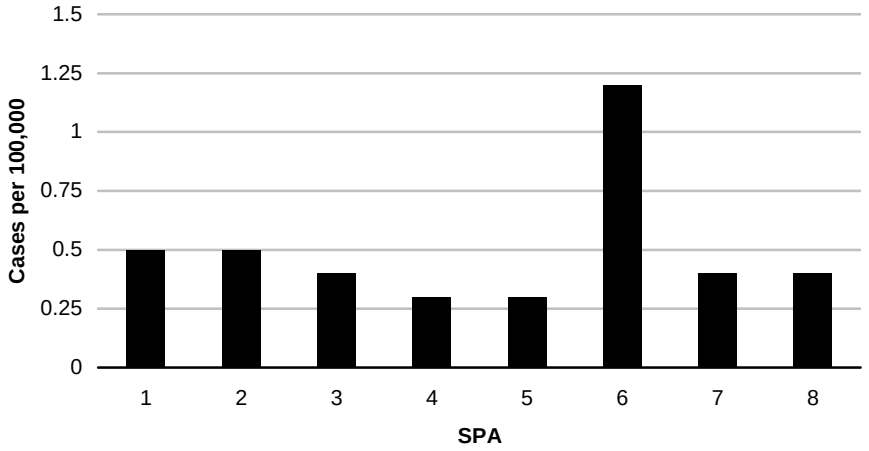


Figure 4. Reported Encephalitis Cases by Month of Onset
LAC, 2010 (N=51)

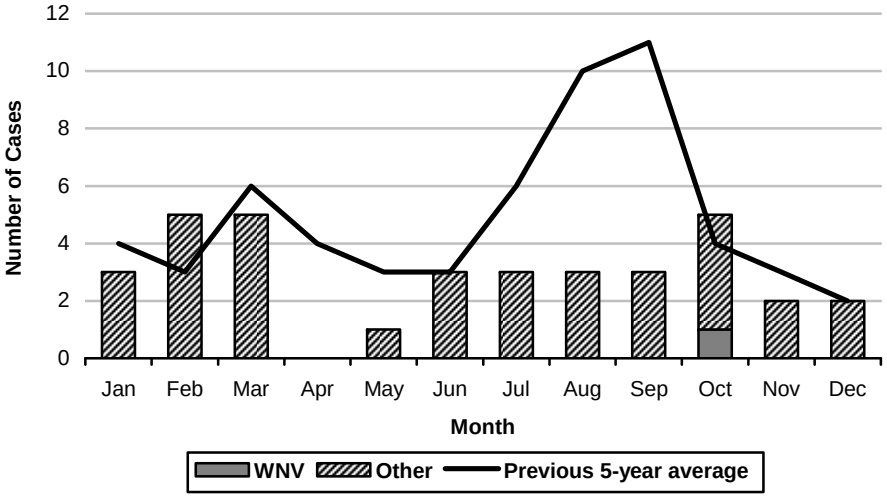
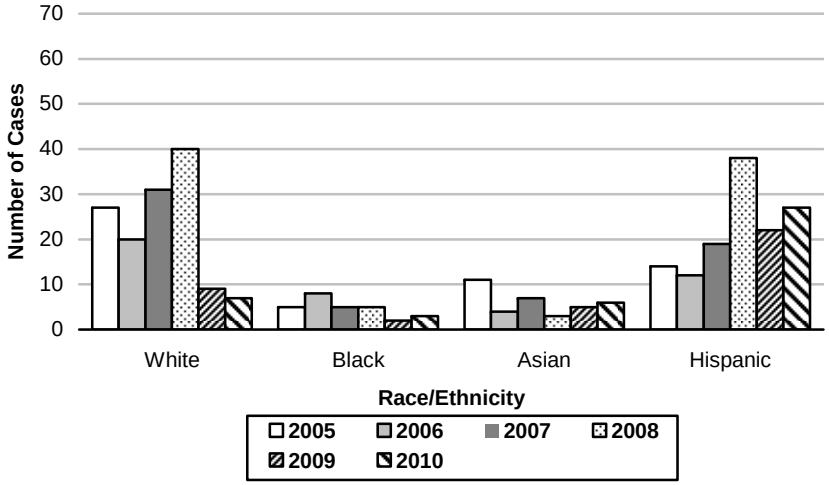
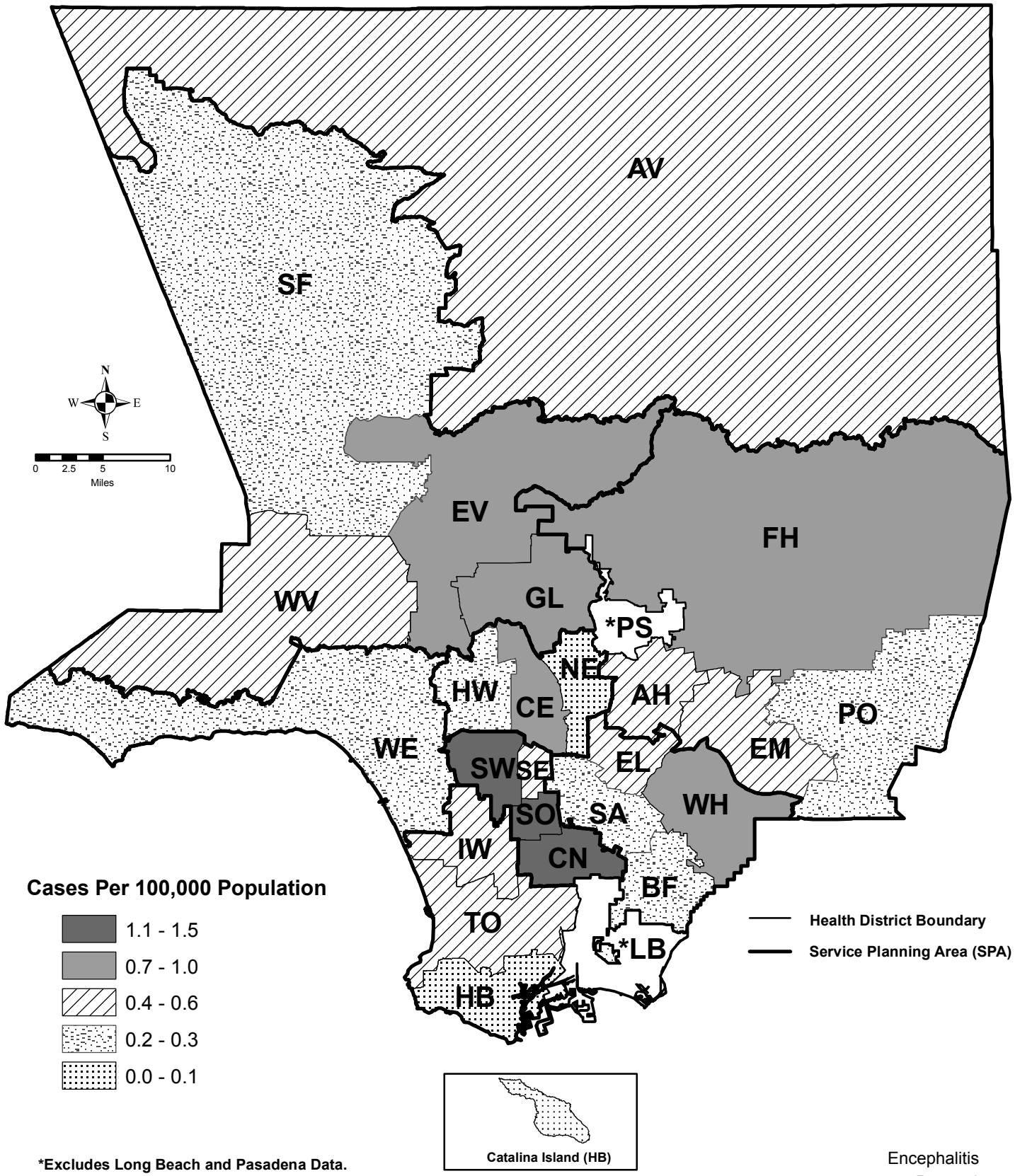


**Figure 5. Reported Encephalitis Cases by Race/Ethnicity
LAC, 2005-2010**



Map 5. Encephalitis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	12	45	57
Annual Incidence[a]			
LA County	0.12[b]	0.46	0.58[d]
California[c]	--	--	0.80[d]
United States[c]	--	--	0.15[d]
Age at Diagnosis			
Mean	21.3	13.5	
Median	15	3	
Range	1-69	0-62	

[a] Cases per 100,000 population.
[b] Rates calculated based on less than 19 cases or events are considered unreliable.
[c] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.
[d] 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 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 infection.

2010 TRENDS AND HIGHLIGHTS

- There was a 33.3% (n=12) decrease in the frequency of confirmed *E. coli* O157:H7 cases in 2010 (Figure1).
- For reasons that are unclear, cases of *E. coli* "other serotypes" had a younger mean age than O157: H7 cases (13.5 vs. 21.3 years). One possibility is that cases with other serotypes are largely Hispanic compared to the O157:H7 cases, 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 125% (n=45) compared to 2009. 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]

- Two HUS cases were reported; neither had a confirmed etiologic agent.
- No outbreaks of STEC were identified.
- For serotype O157:H7, the highest number of cases reported was among persons aged 15-34 years (n=5) (Figure 2); it continues to be mainly observed among whites (n=6) (Figures 3, 6). Four SPAs reported no cases of disease (Table 2, Figure 4).
- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=23) (Figure 2); and was predominantly observed in the Hispanic population (n=31) (Figures 3, 7). The reasons for these differences are unknown. SPA 1 did not report any cases.

[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, 2006-2010

	2006 (N=12)			2007 (N=12)			2008 (N=16)			2009 (N=18)			20010 (N=12)		
	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	6.3	0.7	0	0	0	0	0	0
1-4	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7	5	27.7	0.9	3	25.0	0.5
5-14	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2	3	16.6	0.2	2	16.6	0.2
15-34	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1	5	27.7	0.2	5	41.6	0.2
35-44	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	2	11.1	0.1	0	0	0
45-54	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1	0	0	0	1	8.3	0.1
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	0	0	0
65+	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2	2	11.1	0.2	1	8.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0	0	0	0	0
Race/Ethnicity															
Asian	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0	1	5.5	0.1	3	25.0	0.2
Black	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6	0	0	0	1	8.3	0.1
Hispanic	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1	4	22.2	0.1	2	16.6	--
White	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2	13	72.2	0.4	6	50.0	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
Unknown	1	8.3		0	0.0		0	0.0		0	0	0	0	0	0
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.5	0.3	0	0	0
2	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2	5	27.7	0.2	5	41.6	0.2
3	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1	1	5.5	0.1	0	0	0
4	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2	0	0	0	0	0	0
5	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9	3	16.6	0.5	3	25.0	0.5
6	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0	0	0	0	0	0	0
7	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0	4	22.2	03	2	16.1	0.1
8	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1	4	22.2	0.4	2	16.1	0.1
Unknown	0	0.0		0	0.0		0	0.0							

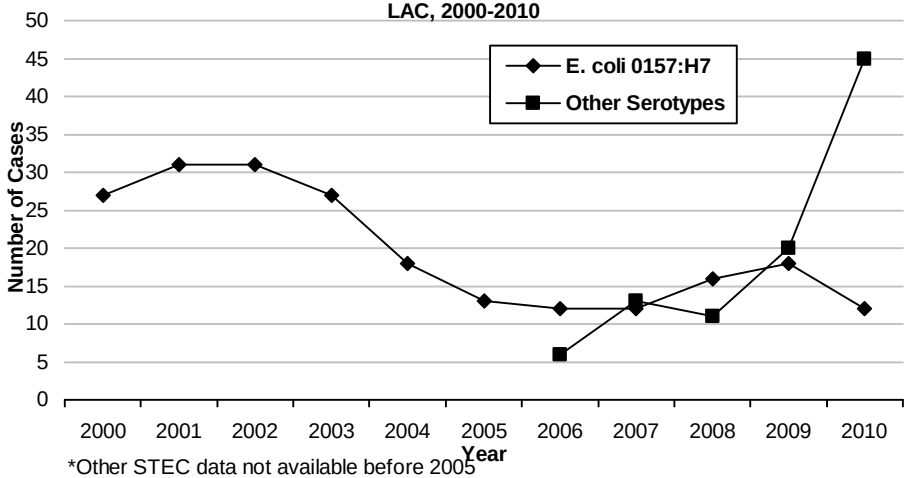
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2006-2010

	2006 (N=6)05 (N=0)			2007 (N=13)2006 (N=6)			2008 (N=12)			2009 (N=20)			2010 (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	4	8.8	2.9
1-4	1	14.2	0.2	8	60.0	1.4	1	14.2	0.2	9	42.8	1.6	23	51.1	4.0
5-14	0	0	0	1	6.6	0.1	1	7.1	0.1	2	9.5	0.1	2	4.4	0.2
15-34	1	28.6	0	2	13.3	0.1	7	50.0	0.2	4	23.8	0.1	8	17.8	0.3
35-44	1	14.2	0.1	0	0	0	0	7.1	0	1	4.7	0.1	1	2.2	0.1
45-54	1	14.2	0.1	2	20	0.2	1	7.1	0.1	1	4.7	0.1	6	13.3	0.4
55-64	1	14.2	0.1	0	0	0	0	0	0	1	4.7	0.1	1	2.2	0.1
65+	1	14.2	0.1	0	0	0	2	14.2	0.2	2	9.5	0.2	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	1	6.6	0.1	2	21.4	0.2	2	9.5	0.2	1	2.2	0.1
Black	0	0	0	0	0	0	1	7.1	0.1	0	0	0	2	4.4	0.2
Hispanic	3	42.9	0.1	6	53.3	0.1	5	42.8	0.1	6	28.5	0.1	31	68.8	0.7
White	3	57.1	0.1	6	40.0	0.2	4	28.5	0.1	12	61.9	0.4	10	22.2	0.3
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	2.2	--
SPA															
1	0	14.2	0	0	0	0	1	14.2	0.3	0	0	0	1	2.2	0.3
2	0	0	0	2	13.3	0.1	3	14.2	0.1	4	19.0	0.2	14	31.1	0.6
3	2	28.6	0.1	1	6.6	0.1	1	14.2	0.1	3	14.2	0.2	7	15.5	0.4
4	1	14.2	0.1	1	13.3	0.1	2	21.4	0.2	3	19.0	0.2	6	40.0	0.5
5	0	0	0	2	13.3	0.3	4	28.5	0.6	6	28.5	0.9	3	6.6	0.5
6	0	0	0	0	6.6	0	0	0	0	0	0	0	4	8.8	0.4
7	1	14.2	0.1	1	13.3	0.1	1	7.1	0.1	2	9.5	0.1	6	13.1	0.4
8	2	28.6	0.2	6	33.3	0.5	0	0	0	2	9.5	0.2	4	8.8	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, 2000-2010



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and Age Group
LAC, 2010

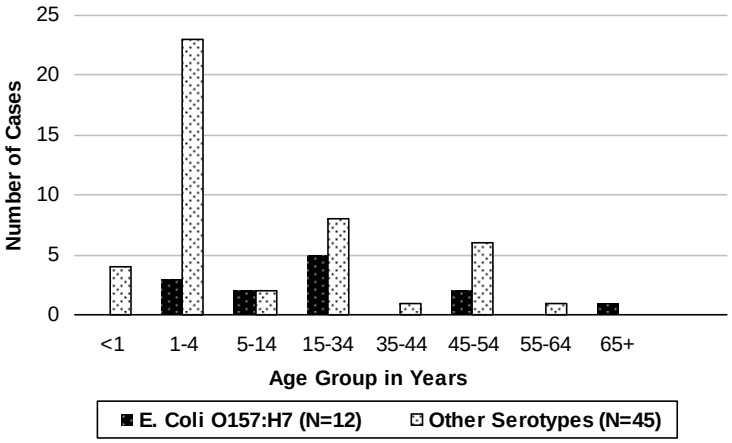


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*, by Race/Ethnicity, LAC, 2010

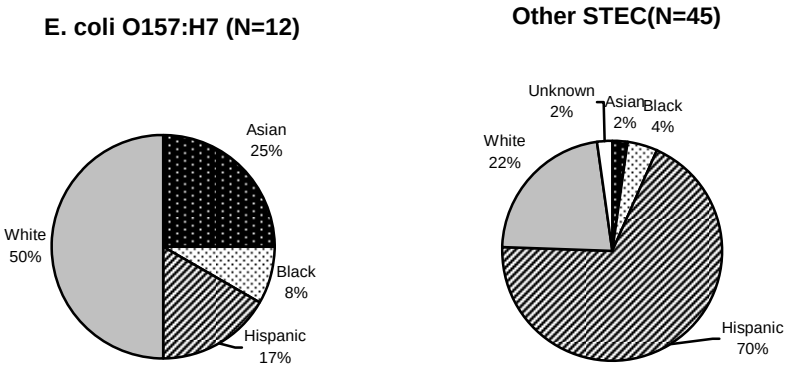


Figure 4. Reported Cases of Shiga Toxin-producing *E. coli* by Serotype and SPA
LAC, 2010

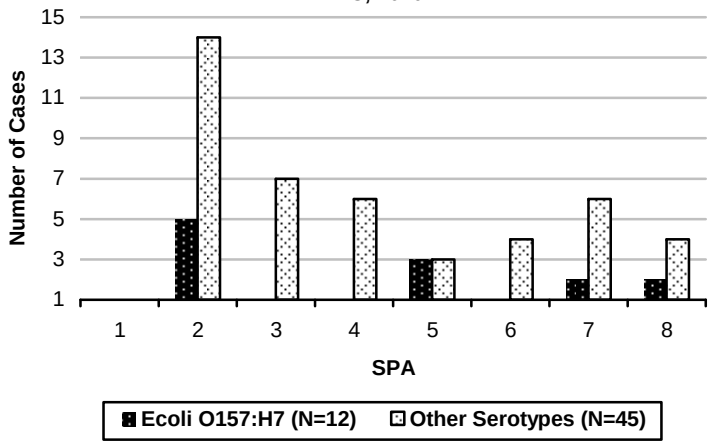


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2010

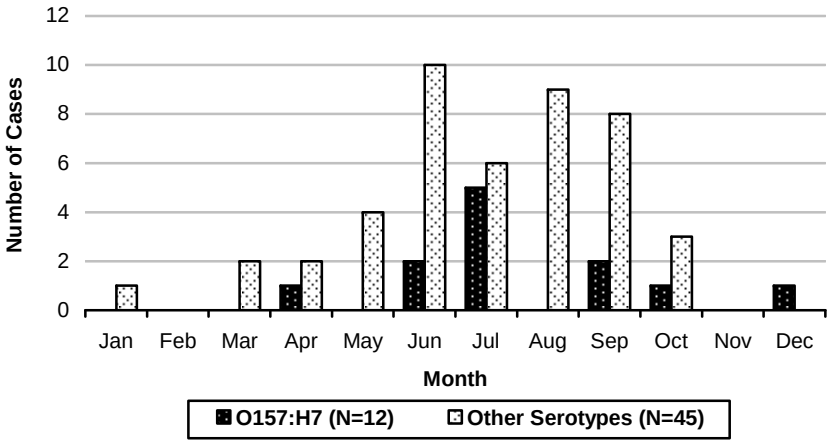


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2006-2010

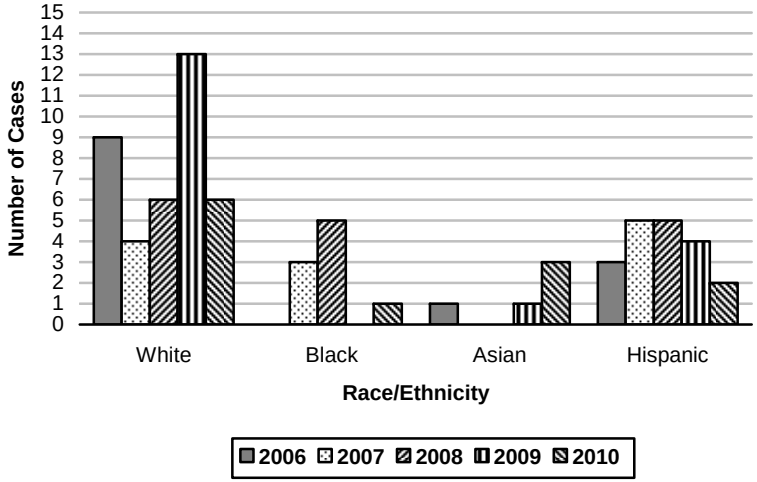
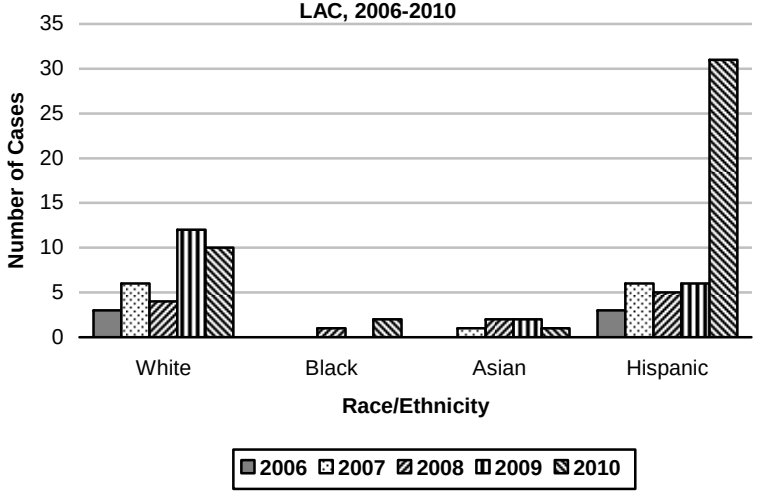


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2006-2010



GIARDIASIS

CRUDE DATA	
Number of Cases	308
Annual Incidence[a]	
LA County	3.14
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	32
Median	30
Range	<1-89

[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.

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 7-10 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.

2010 TRENDS AND HIGHLIGHTS

- Giardiasis incidence in Los Angeles County (LAC) did not change significantly in 2010 (3.1 per 100,000) compared to 2009 (3.6 per 100,000) (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 (Figure 2).
- Whites continue to have highest race/ethnicity specific incidence rates and proportion of cases compared to other races (Figure 3).
- Within LAC, Service Planning Area (SPA) 5 reported the highest incidence rate of giardiasis with 4.7 cases per 100,000; the second highest incidence rate was reported from SPA 4 (3.9 per 100,000) (Figure 4). This is a consistent with the previous reporting period in which SPA 5 had the highest incidence rate.
- The number of cases reported in 2010 peaked early in the summer months. This is consistent with the previous five-year average where cases tended to peak only in the summer months (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 2010 was contact with animals (105, 35%), predominantly dogs. Travel to another country was also frequently reported (72, 24%), with travel to Mexico as the most frequently reported country (15, 21%). Immigration to the US (65, 21%); approximately half of immigrant cases were from Iran. 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, 2006-2010

	2006 (N=376)			2007 (N=441)			2008 (N=355)			2009 (N=354)			2010 (N=308)		
	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	3	0.7	2.0	4	1.1	2.9	1	0.3	0.7	5	0.2	3.6
1-4	47	12.5	8.1	61	13.8	10.6	45	12.7	7.9	46	13.0	8.2	41	13.3	7.1
5-14	66	17.6	4.5	66	15.0	4.6	41	11.5	2.9	40	11.3	2.9	37	12.0	2.8
15-34	105	27.9	3.8	126	28.6	4.5	96	27.0	3.3	85	24.0	3.0	81	26.3	2.7
35-44	66	17.6	4.4	76	17.2	5.1	63	17.7	4.2	67	19.0	4.5	46	14.9	3.2
45-54	47	12.5	3.6	62	14.1	4.7	62	17.5	4.6	43	12.1	3.1	36	11.7	2.7
55-64	29	7.7	3.3	30	6.8	3.4	27	7.6	3.0	41	11.6	4.3	37	12.0	3.8
65+	15	4.0	1.5	17	3.9	1.7	17	4.8	1.7	30	8.5	2.8	24	7.8	2.3
Unknown	1	0.3			0.0			0.0		1	0.3		0	0	
Race/Ethnicity															
Asian	36	9.6	2.8	33	7.5	2.6	21	5.9	1.6	13	3.7	1.0	23	7.5	1.7
Black	26	6.9	3.1	24	5.4	2.8	16	4.5	1.9	25	7.1	2.9	28	9.1	3.3
Hispanic	137	36.4	3.0	133	30.2	2.9	106	29.9	2.3	102	28.8	2.2	90	29.2	1.9
White	149	39.6	5.2	195	44.2	6.7	167	47.0	5.7	129	36.4	4.4	137	44.5	4.8
Other	7	1.9	24.5	13	2.9	62.4	5	1.4	20.3	4	1.1		8	27.3	
Unknown	21	5.6		43	9.8		40	11.3		81	22.9		22	7.1	
SPA															
1	11	2.9	3.2	4	0.9	1.1	8	2.3	2.2	5	1.4	1.4	11	3.6	2.9
2	124	33.0	5.8	170	38.5	7.9	161	45.4	7.4	138	39.0	6.2	10	3.2	0.5
3	46	12.2	2.7	45	10.2	2.6	34	9.6	2.0	27	7.6	1.6	27	8.8	1.6
4	57	15.2	4.5	63	14.3	5.0	36	10.1	2.8	46	13.0	3.7	49	15.9	3.9
5	44	11.7	6.9	57	12.9	8.9	37	10.4	5.7	43	12.1	6.6	31	10.0	4.7
6	34	9.0	3.3	26	5.9	2.5	27	7.6	2.6	29	8.2	2.8	21	6.8	2.0
7	30	8.0	2.2	42	9.5	3.0	25	7.0	1.8	26	7.3	1.9	31	10.1	2.3
8	27	7.2	2.4	32	7.3	2.9	26	7.3	2.3	36	10.2	3.2	26	8.4	2.3
Unknown	3	0.8		2	0.5		1	0.3		0	0.0		0	0.0	

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

**Figure 1. Incidence Rates of Giardiasis
LAC, CA and US, 2000-2010**

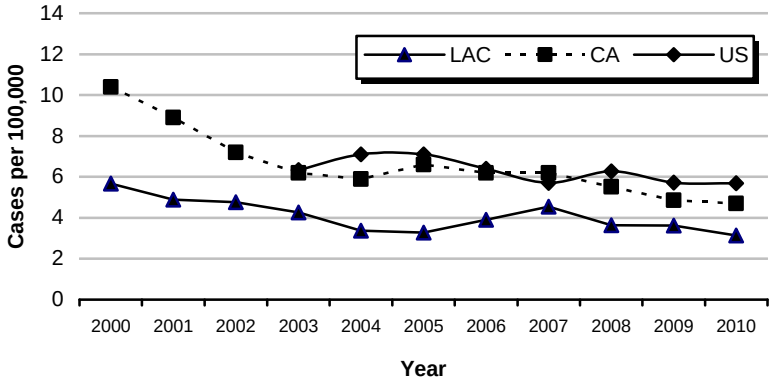


**Figure 2. Incidence Rates of Giardiasis by Age Group
LAC, 2010**

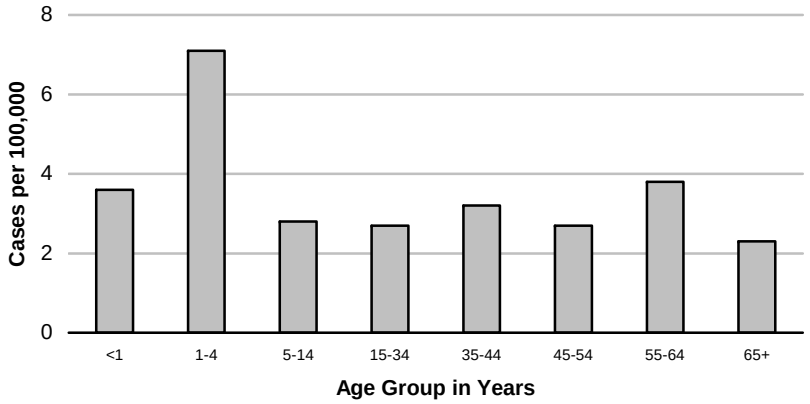


**Figure 3. Percent Cases of Giardiasis by Race/Ethnicity
LAC, 2010**

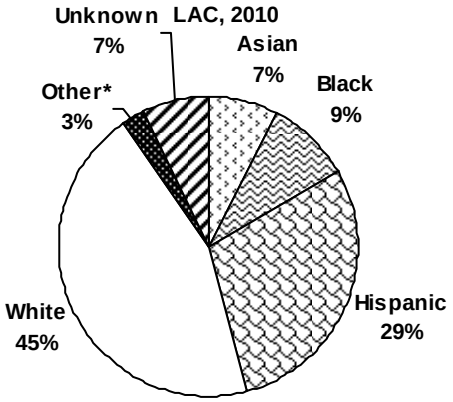
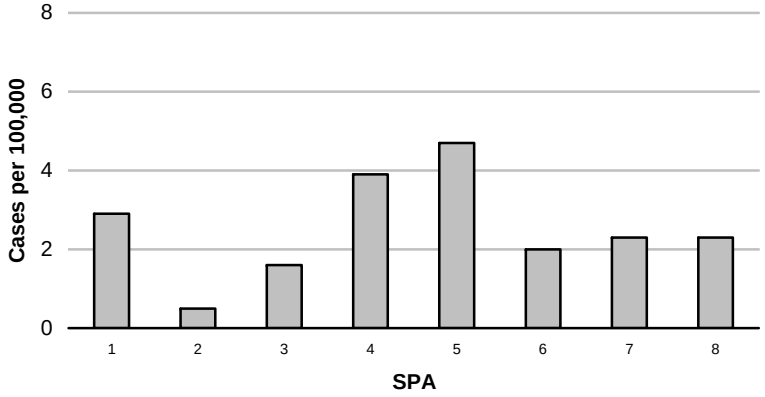


**Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2010**



* 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, 2010

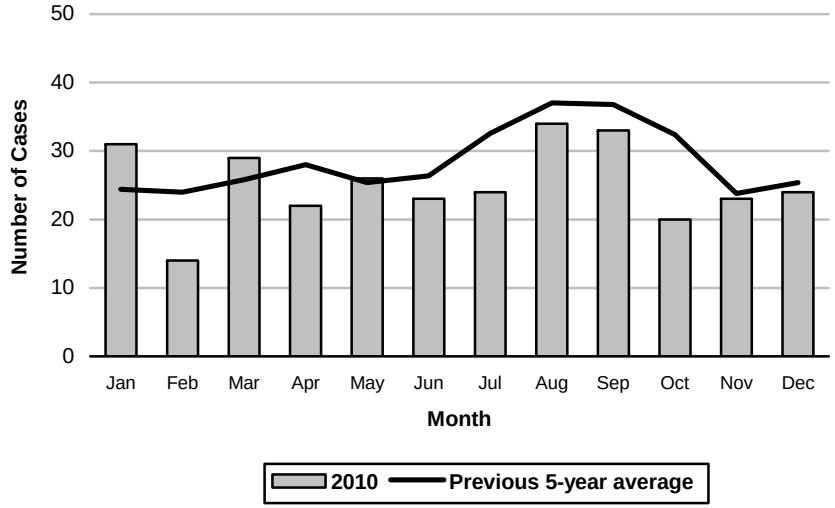
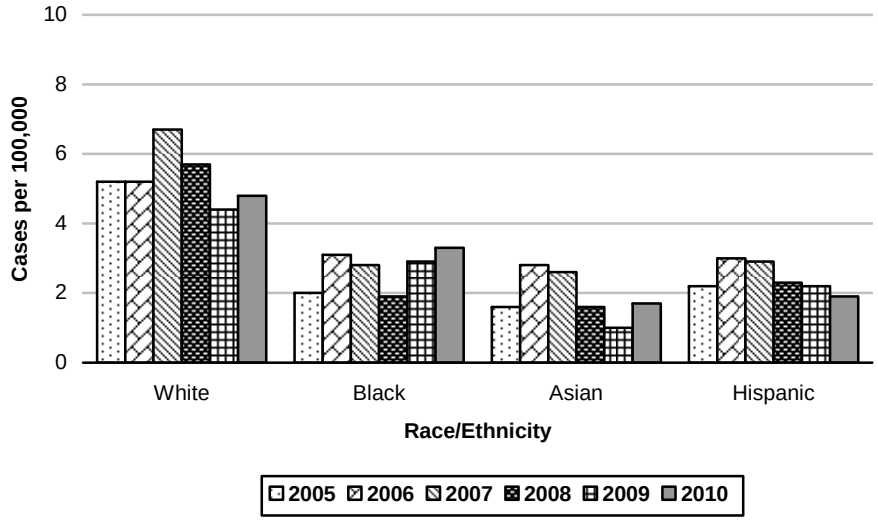
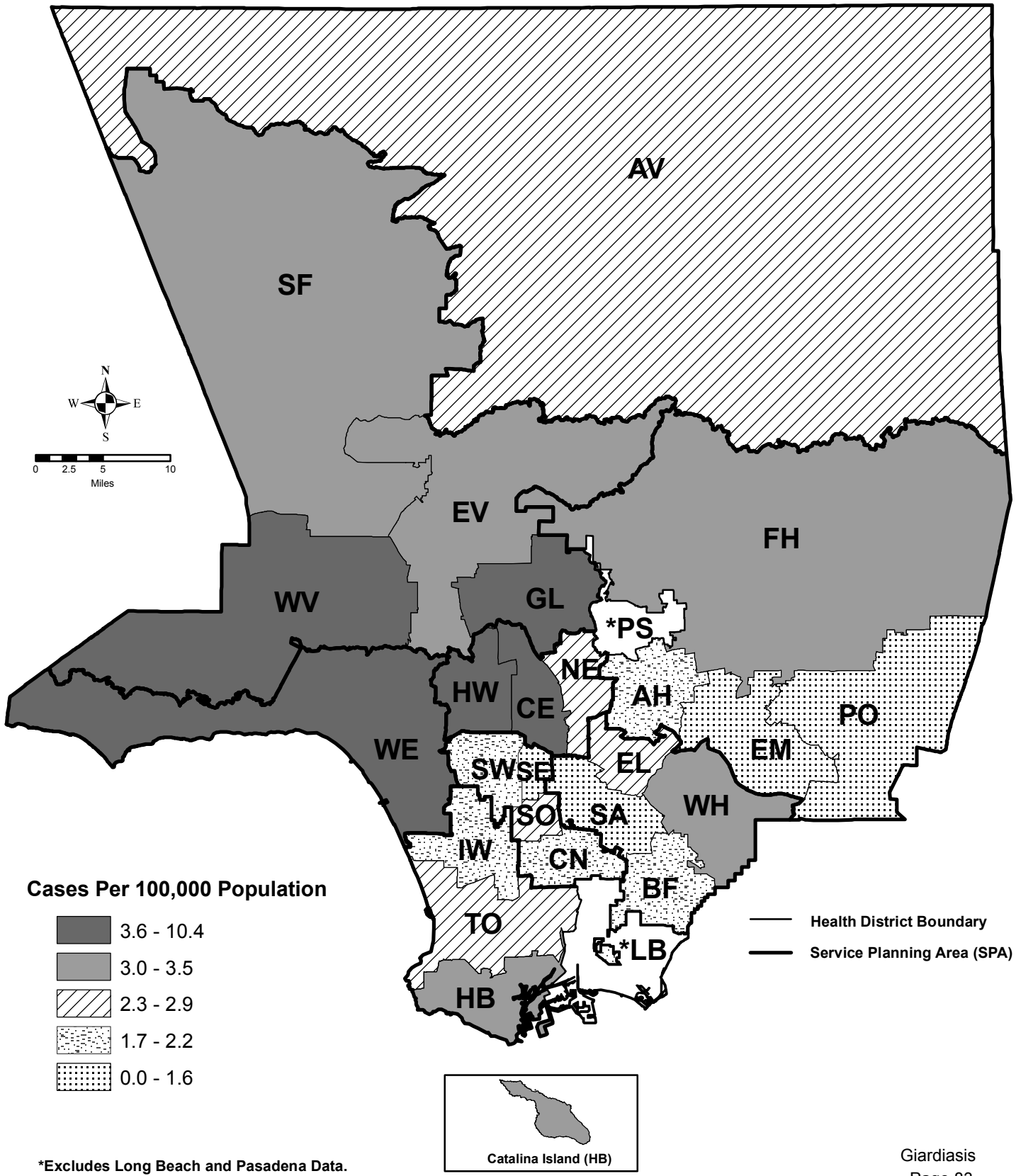


Figure 6. Giardiasis Incidence by Race/Ethnicity
LAC, 2005-2010



Map 6. Giardiasis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	70
Annual Incidence[a]	
LA County	0.71
California[b]	0.09
United States[c]	--
Age at Diagnosis	
Mean	48.4 years
Median	54.0 years
Range	Birth – 91 years

[a]Cases per 100,000 population.
[b]The incidence rates for California only include cases age <15 years
[c]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website
http://www.cdc.gov/mmwr/mmwr_nd/index.html.

DESCRIPTION

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

Immunization Recommendations:

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

2010 TRENDS AND HIGHLIGHTS

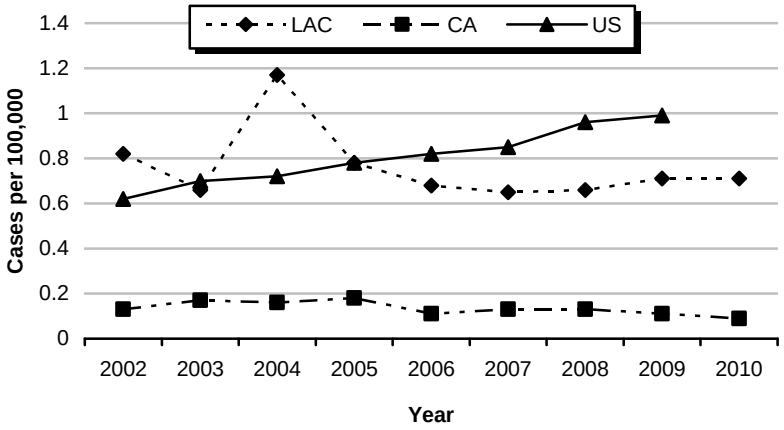
- No serotype B cases were identified so none of the cases were vaccine-preventable (Figures 6, 7, 8).
- As in previous years, the highest incidence rates occurred in the <1 and 65+ age groups (Figure 2).
- None of the cases were linked. Unlike previous years, SPA 1 and SPA reported the highest incidence rates (Figure 4).
- Similar to previous years, the highest incidence rates occurred in the first half of the year, with a peak in March – May (Figure 5). It is unknown why this occurred.
- Similar to previous years, the majority of reported cases were among non-B (n=43) and unknown serotypes (n=27) (Figures 6, 7, 8). Of the 70 cases, 77% (n=54) were ≥15 years of age and were not investigated further. Data on race/ethnicity and location is 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, 2006-2010

	2006 (N=66)			2007 (N=63)			2008 (N=64)			2009 (N=69)			2010 (N=70)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	6.1	2.8	8	12.7	5.4	6	9.4	4.3	7	10.1	5.1	9	12.8	6.4
1-4	1	1.5	0.2	1	1.6	0.2	2	3.1	0.4	4	5.8	0.7	3	4.3	0.5
5-14	2	3.0	0.1	3	4.8	0.2	3	4.7	0.2	0	0.0	0.0	4	5.7	0.3
15-34	7	10.6	0.3	7	11.1	0.2	4	6.3	0.1	7	10.1	0.2	4	5.7	0.1
35-44	5	7.6	0.3	4	6.3	0.3	5	7.8	0.3	2	2.9	0.1	6	8.6	0.4
45-54	6	9.1	0.5	7	11.1	0.5	11	17.2	0.8	8	11.6	0.6	9	12.9	0.7
55-64	6	9.1	0.7	5	7.9	0.6	2	3.1	0.2	11	15.9	1.2	9	12.9	0.9
65+	35	53.0	3.6	28	44.4	2.8	31	48.4	3.0	30	43.5	2.8	26	37.1	2.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				
Race/Ethnicity															
Asian	3	4.5	0.2	1	1.6	0.1	3	4.7	0.2	3	4.4	0.2	0	0.0	0.0
Black	10	15.2	1.2	8	12.7	0.9	2	3.1	0.2	6	8.7	0.7	2	2.9	0.2
Hispanic	17	25.8	0.4	10	15.9	0.2	13	20.3	0.3	8	11.6	0.2	15	21.4	0.3
White	9	13.6	0.3	13	20.6	0.4	9	14.1	0.3	10	14.5	0.3	20	28.6	0.7
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	27	40.9		31	49.2		37	57.8		42	60.8		33	47.1	
SPA															
1	2	3.0	0.6	2	3.2	0.6	0	0.0	0.0	2	2.9	0.5	4	5.7	1.1
2	11	16.7	0.5	13	20.6	0.6	7	10.9	0.3	16	23.2	0.7	26	37.1	1.2
3	7	10.6	0.4	3	4.8	0.2	10	15.6	0.6	7	10.1	0.4	4	5.7	0.2
4	6	9.1	0.5	8	12.7	0.6	8	12.5	0.6	5	7.3	0.4	7	10.0	0.6
5	11	16.7	1.7	8	12.7	1.2	4	6.3	0.6	2	2.9	0.3	2	2.9	0.3
6	10	15.2	1.0	12	19.0	1.1	10	15.6	0.9	8	11.6	0.8	4	5.7	0.4
7	10	15.2	0.7	8	12.7	0.6	10	15.6	0.7	11	15.9	0.8	6	8.6	0.4
8	6	9.1	0.5	6	9.5	0.5	9	14.1	0.8	7	10.2	0.6	7	10.0	0.6
Unknown	3	4.5		3	4.8		6	9.4		11	15.9		10	14.3	

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

Figure 1. Incidence Rates of *H. influenzae* Invasive Disease US, CA and LAC, 2001-2010*



*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, 2010 (N=70)

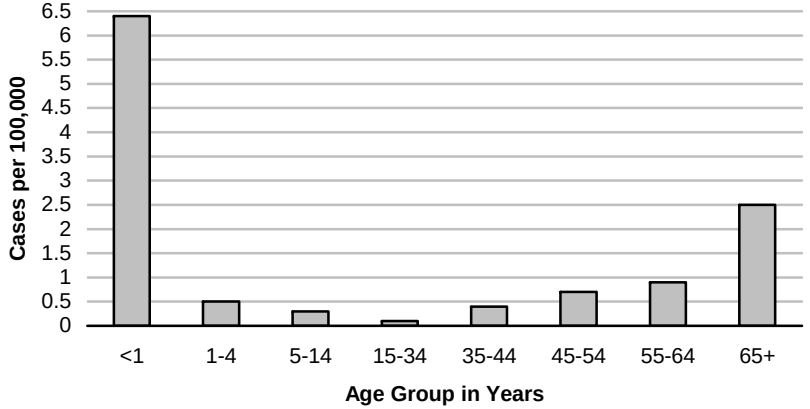


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2010 (N=70)

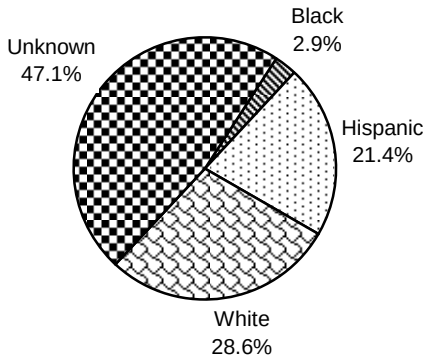


Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2010 (N=70)

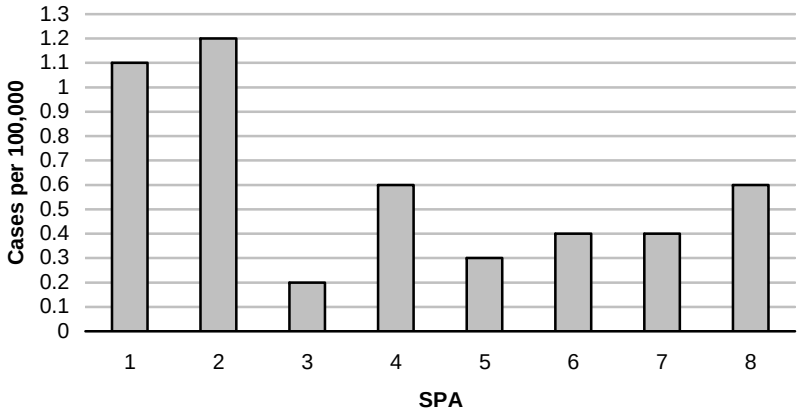


Figure 5. Reported *H. influenzae* Invasive Disease Cases by Month of Onset, LAC, 2010 (N=70)

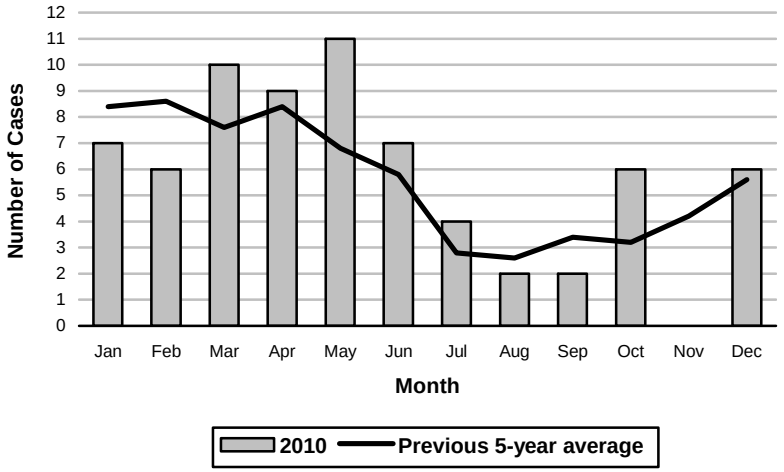


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 2001-2010

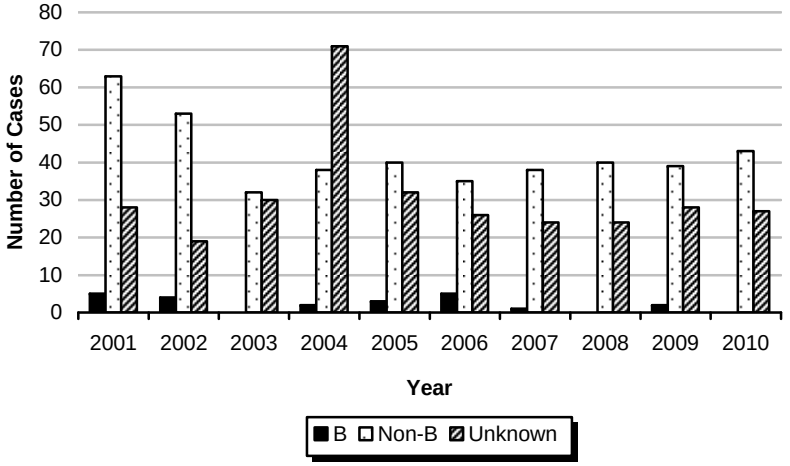
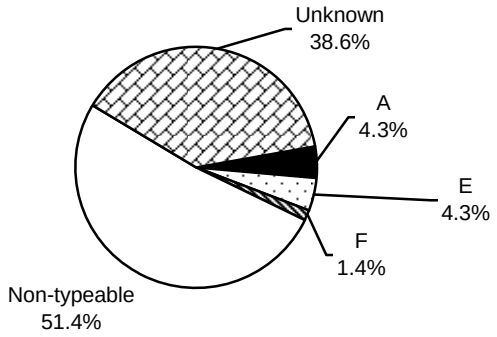


Figure 7. Reported *H. influenzae* Invasive Disease Cases by Serotype, 2010 (N=70) vs. Previous 5-Year Average

	B		Non-B		Unknown	
	2010	Previous 5-Year Average	2010	Previous 5-Year Average	2010	Previous 5-Year Average
Total Cases	0	2.2	43	38.4	27	26.8
Age at Onset (years)						
Mean	--	44.7	38.5	48.5	64.1	65.7
Median	--	40.9	45.0	55.0	64.0	69.7
Range	–--	<1 – 73	<1 – 91	<1 – 99	27 - 90	<1 – 99
Case Fatality	--	0.0%	0.0	5.2%	3.7[1]	9.7%

[1] One death was reported. The case was ≥15 years of age so no further investigation was conducted.

Figure 8. Percent Cases of *H. influenzae* Invasive Disease by Serotype LAC, 2010 (N=70)



HEPATITIS A

CRUDE DATA	
Number of Cases	51
Annual Incidence[a]	
LA County	0.52
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	37
Median	30
Range	2-94 years

[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.

DESCRIPTION

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

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

2010 TRENDS AND HIGHLIGHTS

- The 2010 incidence rate of acute hepatitis A in Los Angeles County (LAC) was lower than the previous year (0.52 per 100,000 versus 0.68 per 100,000) (Figure 1).
- The rate was highest in those between the ages of 15-34 (0.9 per 100,000), followed by the 65+ age group (0.7 per 100,000) and the 35-44 age group (0.4 per 100,000) (Figure 2).
- The highest rate was seen in Asians (0.9 per 100,000) followed by Hispanics (0.5 per 100,000), whites (0.5 per 100,000), and blacks (0.4 per 100,000) (Figure 3).
- Four Service Planning Areas (SPA) had rates greater than the overall county mean rate of 0.52 per 100,000)—SPA 5 (0.9 per 100,000), SPA 1 (0.8 per 100,000), SPA 2 (0.8 per 100,000) and SPA 4 (0.7 per 100,000) (Figure 4).
- Historically, there is an increase of hepatitis A cases in summer and autumn, and in 2010 this pattern was noted with an increase in cases in the summer and fall (Figure 5).
- Risk factors were identified in 60% (n=29) of the 48 confirmed cases interviewed (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=20, 69%) was the most common risk factor reported, followed by eating raw shellfish (n=10, 35%), having a household member who traveled outside of the US in 3 months prior to onset of illness (n=9, 31%), being part of a common source outbreak (n=5, 17%), and contact with anyone with hepatitis A infection (n=5, 17%) (Figure 6).
- Thirty-nine percent (n=20) of acute hepatitis A cases were hospitalized.
- One common source outbreak involving 6 cases was investigated in 2010. No definitive source of infection was identified.

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=364)			2007 (N=78)			2008 (N=80)			2009 (N=66)			2010 (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
1-4	5	1.4	0.9	1	1.3	0.2	0	0.0	0.0	0	0	0	2	3.9	0.3
5-14	20	5.5	1.4	6	7.7	0.4	7	8.8	0.5	1	1.5	0.1	3	5.9	0.2
15-34	114	31.3	4.1	32	41.0	1.1	34	42.5	1.2	34	51.5	1.2	27	52.9	0.9
35-44	83	22.8	5.5	16	20.5	1.1	14	17.5	0.9	10	15.1	0.7	6	11.8	0.4
45-54	73	20.1	5.6	13	16.7	1.0	9	11.3	0.7	6	9.1	0.4	3	5.9	0.2
55-64	33	9.1	3.8	5	6.4	0.6	7	8.8	0.8	5	7.6	0.5	3	5.9	0.3
65+	36	9.9	3.7	5	6.4	0.5	9	11.3	0.9	10	15.1	0.9	7	13.7	0.7
Unknown	0	0.0		0	0.0		0	0.0		0	0	0	0	0	0
Race/Ethnicity															
Asian	25	6.9	2.0	15	19.2	1.2	14	17.5	1.1	18	27.3	1.4	12	23.5	0.9
Black	64	17.6	7.6	5	6.4	0.6	6	7.5	0.7	2	3.0	0.2	3	5.9	0.4
Hispanic	124	34.1	2.7	33	42.3	0.7	36	45.0	0.8	21	31.8	0.4	22	43.1	0.5
White	125	34.3	4.3	24	30.8	0.8	23	28.8	0.8	24	36.4	0.8	14	27.4	0.5
Other	1	0.3	3.5	0	0.0	0.0	1	1.3	4.1	0	0	0	0	0	0
Unknown	25	6.9		1	1.3		0	0.0	0	1	1.5		0	0	0
SPA															
1	3	0.8	0.9	5	6.4	1.4	3	3.8	0.8	2	3.0	0.5	3	5.9	0.8
2	58	15.9	2.7	16	20.5	0.7	17	21.3	0.8	22	33.3	1.0	18	35.3	0.8
3	57	15.7	3.3	17	21.8	1.0	17	21.3	1.0	8	12.1	0.5	3	5.9	0.2
4	79	21.7	6.3	9	11.5	0.7	7	8.8	0.5	6	9.1	0.5	9	17.6	0.7
5	24	6.6	3.8	5	6.4	0.8	10	12.5	1.5	8	12.1	1.2	6	11.8	0.9
6	37	10.2	3.6	8	10.3	0.8	2	2.5	0.2	8	12.1	0.8	4	7.8	0.4
7	33	9.1	2.4	12	15.4	0.9	15	18.8	1.1	6	9.1	0.4	6	11.8	0.4
8	45	12.4	4.0	5	6.4	0.4	7	8.8	0.6	6	9.1	0.5	1	2.0	0.1
Unknown	28	7.7		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, 2000-2010

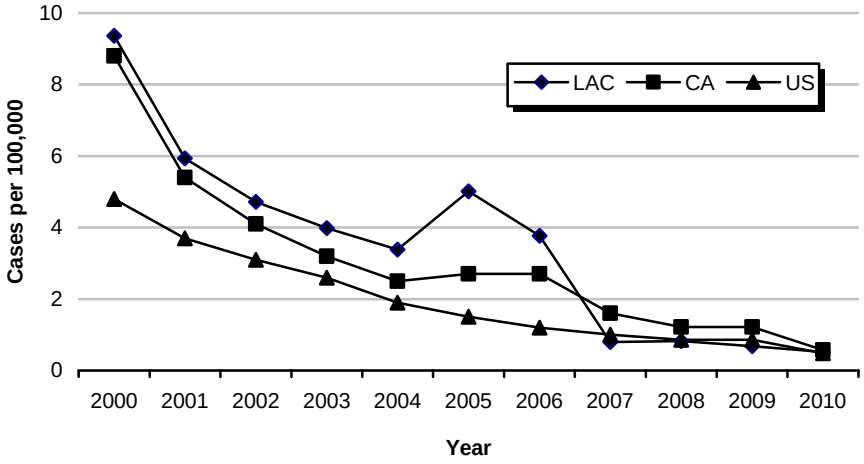


Figure 2. Incidence Rates* of Hepatitis A by Age Group
LAC, 2010 (N=51)

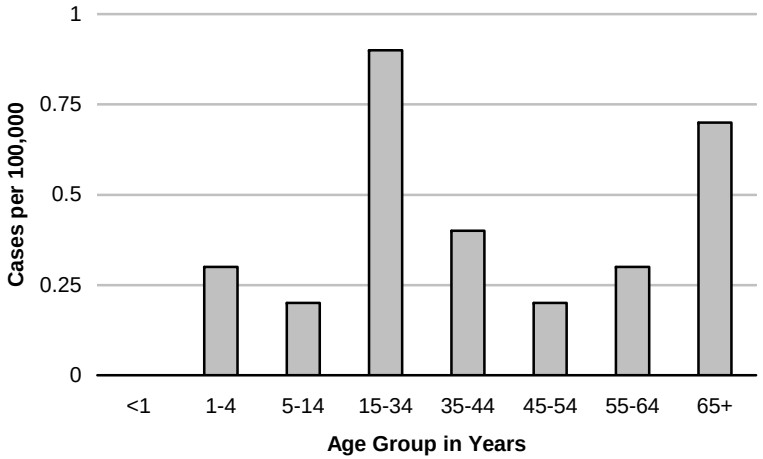


Figure 3. Hepatitis A Incidence Rates* by Race/Ethnicity
LAC, 2006-2010

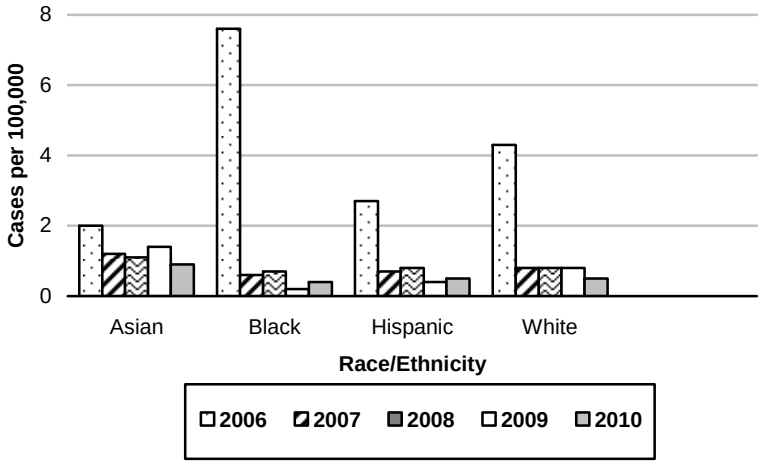
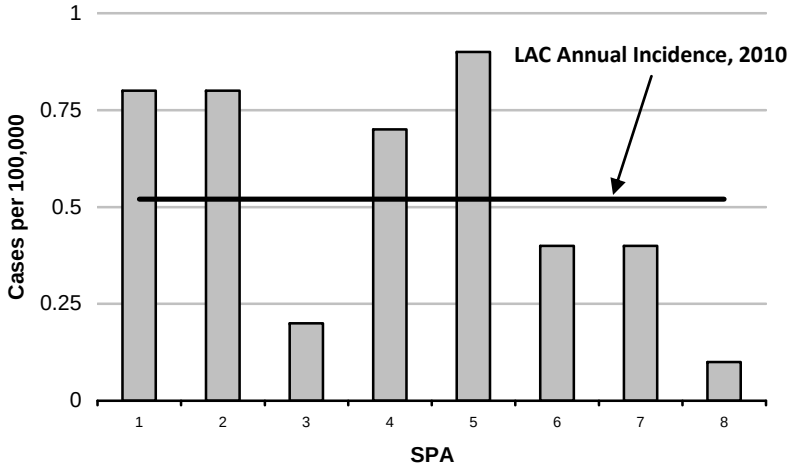


Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 20010 (N=51)



* Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Hepatitis A Cases by Month of Onset
LAC, 2010 (N=51)

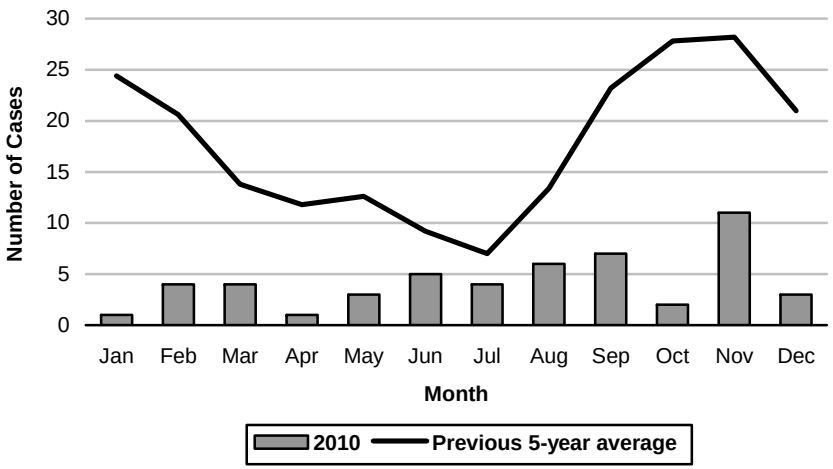
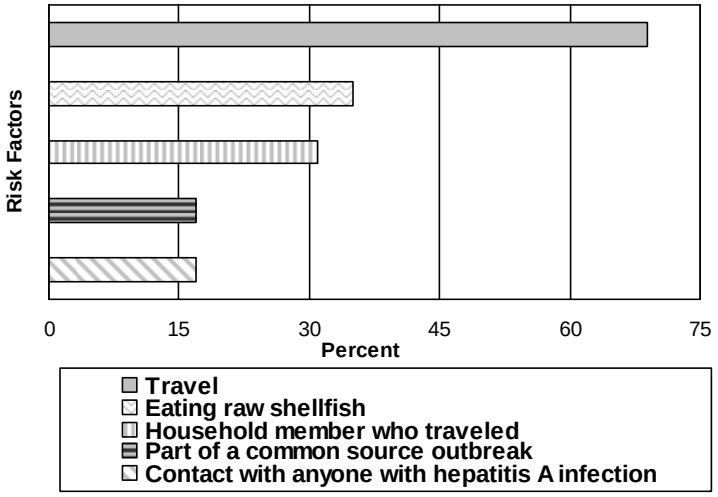
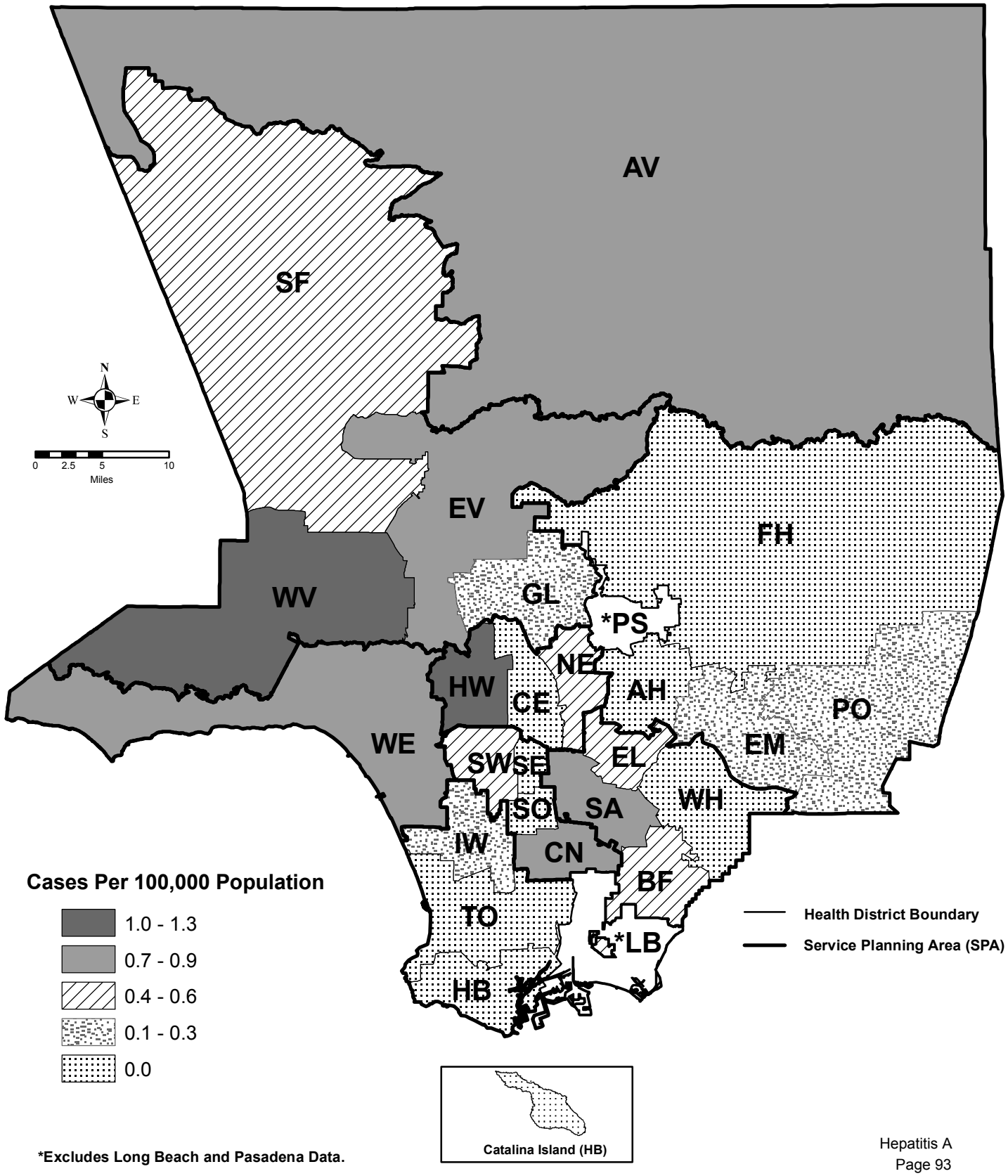


Figure 6. Hepatitis A Reported Risk Factors*
LAC, 2010 (n=29)



*Includes cases with multiple risk factors

Map 7. Hepatitis A
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	54
Annual Incidence[a]	
LA County	0.55
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	43
Median	41
Range	21-83 years

[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.

DESCRIPTION

Hepatitis B is a DNA-virus transmitted through percutaneous or mucous membrane exposure, 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 infrequently in the United States (US) but should be considered in persons without traditional risk factors. Symptoms, which occur in less than half of those acutely infected, may be very mild and flu-like: anorexia, nausea, fatigue, abdominal pain, muscle or joint aches, jaundice and mild fever. Approximately 2-10% of adults infected with HBV are unable to clear the virus within six months and become chronic carriers. Death from cirrhosis or liver cancer is estimated to occur in 15–25% of those with chronic infection. Overall, hepatitis B is more prevalent and infectious than HIV. Hepatitis B infection is vaccine preventable.

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).

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

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

2010 TRENDS AND HIGHLIGHTS

- The 2010 incidence rate increased from the previous year (0.55 per 100,000 versus 0.42 per 100,000) (Figure 1).
- The rate was highest in those between the ages of 35-44 years (0.9 per 100,000), followed by the 45-54 year age group (0.8 per 100,000) (Figure 2).
- The male-to-female ratio was 1:0.42.
- The 2010 incidence rate was highest in blacks (1.6 per 100,000) followed by Asians (0.8 per 100,000), whites (0.5 per 100,000) and Hispanics (0.3 per 100,000) (Figure 3).
- SPA 8 had the highest incidence rate (0.9 per 100,000) while SPA 2 had the lowest incident rate (0.2 per 100,000). (Figure 4),
- Risk factors were identified in 70% (n=35) of the 50 confirmed cases interviewed (including some cases with multiple risk factors). The most common risk factors were having multiple sexual partners (n=17, 49%), MSM behavior (n=11, 31%), having contact with a confirmed or suspected case of hepatitis B (n=4, 11%), recent dental work (n=4, 11%), having a diagnostic medical procedure or surgery (n=4, 11%), receiving a tattoo at home (n=4, 11%), using non-injection street drugs (n=4, 11%), being incarcerated (n=4, 11%), receiving fingersticks (n=3, 9%), and IV/IM injections (n=3, 9%), (Figure 5).

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=62)			2007 (N=55)			2008 (N=66)			2009 (N=41)			2010 (N=54)		
	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	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
15-34	20	32.3	0.7	9	16.4	0.3	18	27.3	0.6	12	29.3	0.4	18	33.3	0.6
35-44	21	33.9	1.4	21	38.2	1.4	14	21.2	0.9	7	17.1	0.5	13	24.1	0.9
45-54	15	24.2	1.2	12	21.8	0.9	13	19.7	1.0	16	39.0	1.2	11	20.4	0.8
55-64	3	4.8	0.3	3	5.5	0.3	14	21.2	1.5	4	9.7	0.4	7	13.0	0.7
65+	3	4.8	0.3	9	16.4	0.9	7	10.6	0.7	2	4.9	0.2	5	9.2	0.5
Unknown	0	0.0		1	1.8		0	0.0		0	0		0	0	
Race/Ethnicity															
Asian	10	16.1	0.8	7	12.7	0.5	7	10.6	0.5	5	12.2	0.4	11	20.4	0.8
Black	4	6.5	0.5	11	20.0	1.3	15	22.7	1.8	11	26.8	1.3	14	25.9	1.6
Hispanic	26	41.9	0.6	16	29.1	0.3	16	24.2	0.3	12	29.3	0.3	14	25.9	0.3
White	21	33.9	0.7	19	34.5	0.7	22	33.3	0.8	11	26.8	0.4	14	25.9	0.5
Other	0	0.0	0.0	2	3.6	9.6	1	1.5	4.1	0	0	0	1	1.8	
Unknown	1	1.6		0	0.0		5	7.6		2	4.9		0	0	
SPA															
1	2	3.2	0.6	1	1.8	0.3	2	3.0	0.5	0	0	0	2	3.7	0.5
2	15	24.2	0.7	13	23.6	0.6	9	13.6	0.4	4	9.8	0.2	5	9.3	0.2
3	6	9.7	0.3	4	7.3	0.2	6	9.1	0.3	6	14.6	0.3	10	18.5	0.6
4	16	25.8	1.3	14	25.5	1.1	7	10.6	0.5	13	31.7	1.0	8	14.8	0.6
5	3	4.8	0.5	5	9.1	0.8	9	13.6	1.4	1	2.4	0.2	4	7.4	0.6
6	6	9.7	0.6	9	16.4	0.9	22	33.3	2.1	10	24.4	1.0	8	14.8	0.7
7	6	9.7	0.4	4	7.3	0.3	6	9.1	0.4	2	4.9	0.1	7	13.0	0.5
8	6	9.7	0.5	5	9.1	0.4	4	6.1	0.4	4	9.8	0.4	10	18.5	0.9
Unknown	2	3.2		0	0.0		1	1.5		1	2.4		0	0	0

*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, 2001-2010**

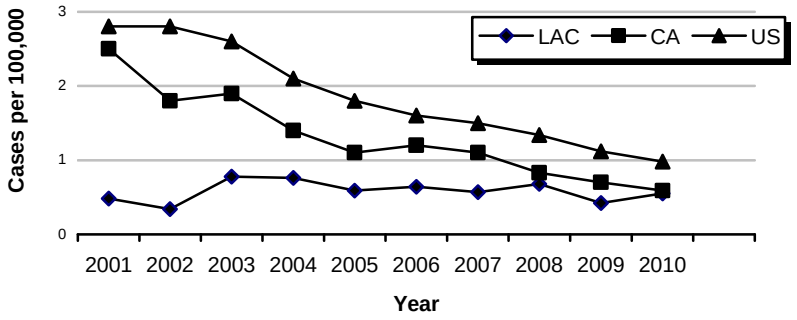
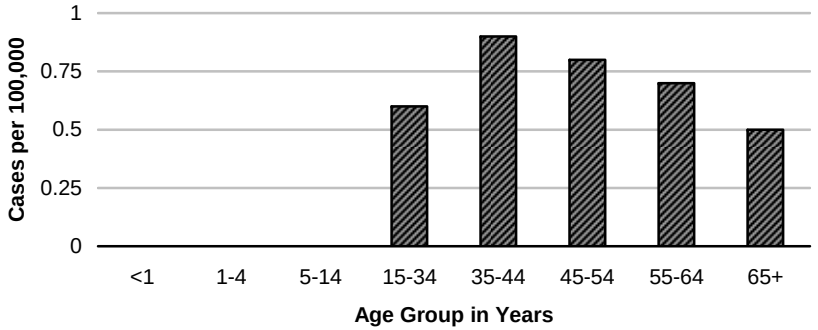


**Figure 2. Incidence Rates* of Acute Hepatitis B by Age Group
LAC, 2010 (N=54)**



* Rates bases on fewer than 19 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence Rates* by Race/Ethnicity
LAC, 2006-2010 (N=54)**

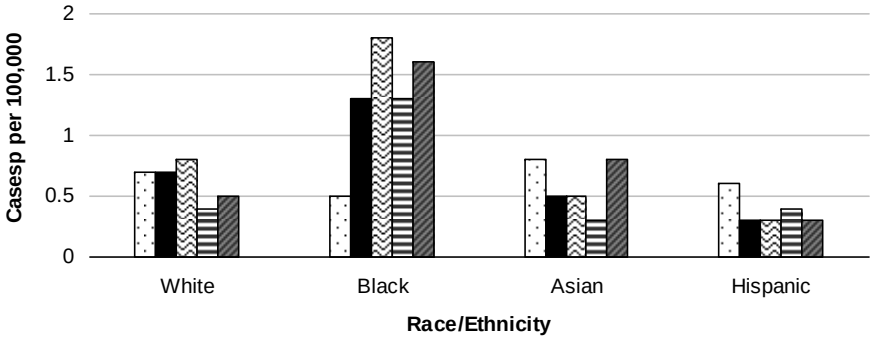
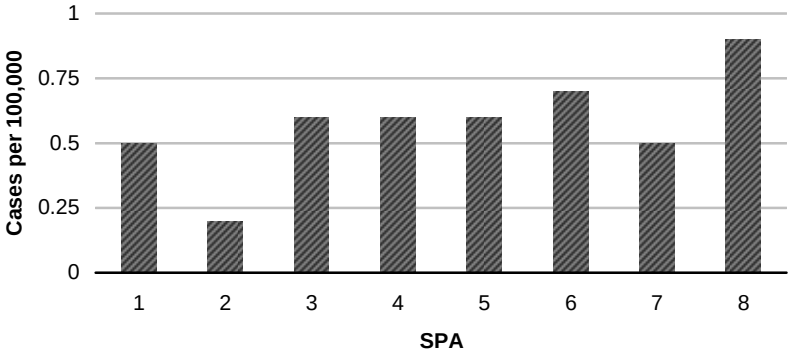
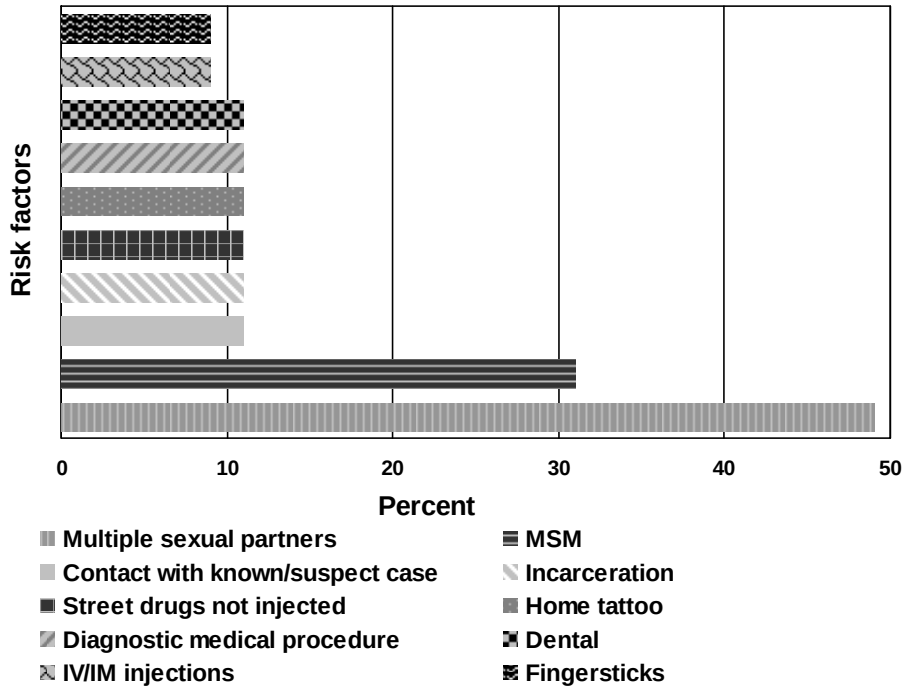


**Figure 4. Incidence Rates* of Acute Hepatitis B by SPA
LAC, 2010 (N=54)**



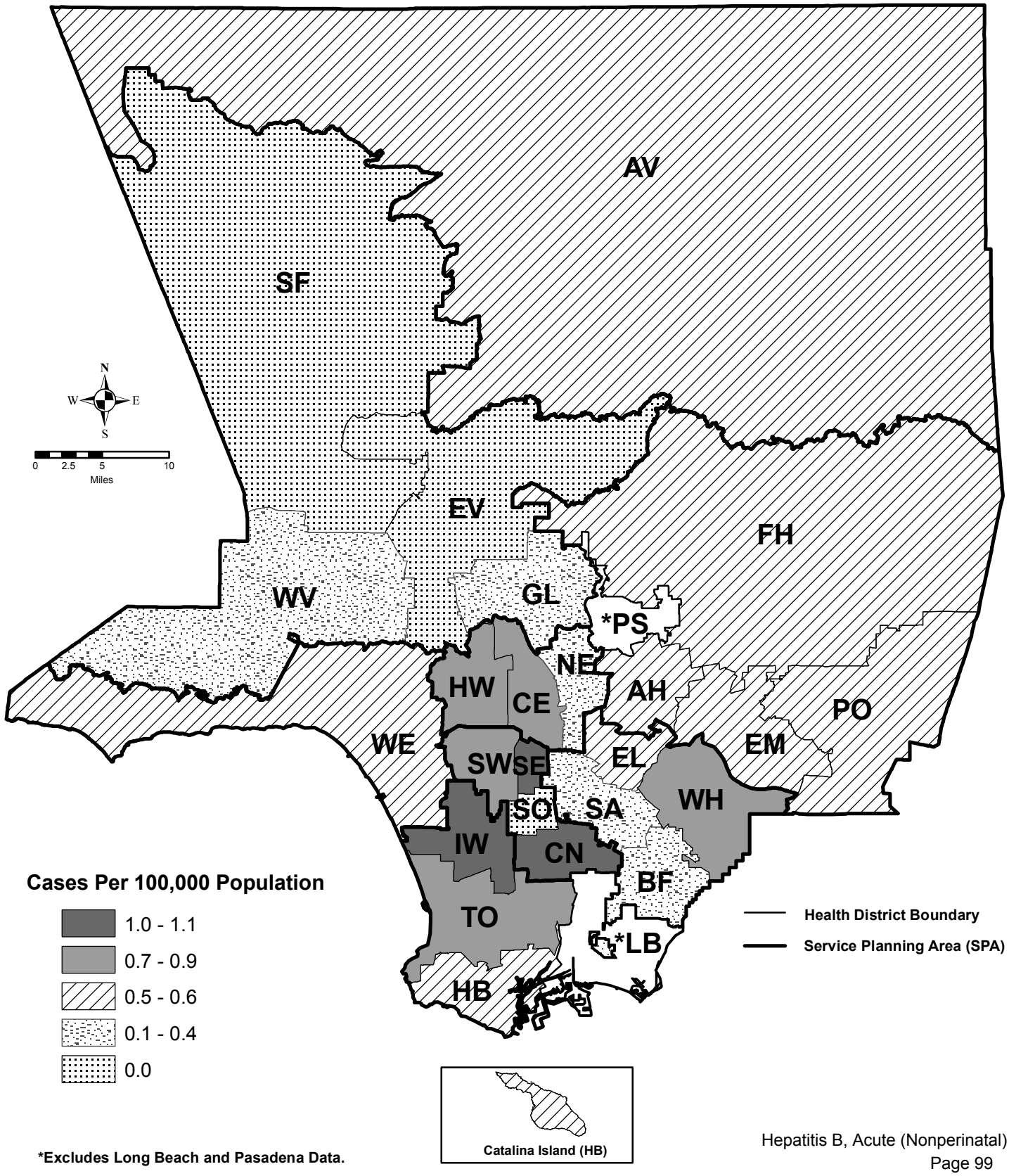
* Rates based on fewer than 19 cases are unreliable

Fig. 5. Hepatitis B Reported Risk Factors*
LAC, 2010 (n=35)



*Includes cases with multiple risk factors

Map 8. Hepatitis B
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, PERINATAL

CRUDE DATA	
Infants Born to HBsAg+ Mothers	669
HBsAg+ Infants	1
Incidence of Exposure[a]	
LA County	4.8
Maternal Age at Diagnosis	
Mean	31.9 years
Median	32 years
Range	17-44 years
Infant Age at Diagnosis	13 months

[a]Number of infants born to HBsAg-positive mothers per 1000 live births in 2010.

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 been demonstrated to be 85 to 95% effective in preventing acute and chronic HBV infection in infants born to mothers who are positive for both HBsAg and hepatitis B e-antigen. Post-vaccination serologic (PVS) testing is recommended at age 9–18 months after completing immunoprophylaxis to verify vaccine success or failure. The LAC Immunization Program's Perinatal Hepatitis B Prevention 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).

2010 TRENDS AND HIGHLIGHTS

- In 2010, 669 infants (including 16 sets of twins) were born to 653 HBsAg+ women.
- In 2010, the incidence of exposure decreased by 14% from 5.6 to 4.8 per 1000 infants born in 2010 (Figure 1).
- Over 68% (n=448) of women screened for HBsAg were between 15 and 34 years of age.
- As consistent with previous years, in 2010 the majority of HBsAg+ women were Asian (n=491, 75.2%) followed by Hispanic (n=50, 7.7%, white (n=38, 5.8%), unknown (n=33, 5.1%), black (n=22, 3.4%) and other (n= 19, 3%) (Figures 2 and 3).
- Half of the HBsAg+ women reside in Service Planning Area (SPA) 3 (n=329, 50.4%), which has a large Asian population (Figure 4).
- The majority of infants (n=659, 98.5%) received the first dose of Hepatitis B vaccine and HBIG within 24 hours of birth (Figure 5).
- In 2010, 18.2 % (n=124) of infants born to HBsAg+ women received post-vaccination serology (PVS) testing to determine immunity to hepatitis B after receipt of one dose of HBIG and completion of the three dose hepatitis B vaccination series. PVS results for one infant was HBsAg+, indicating infection (Figure 6).
- Among the HHCs, 36.4% were the age groups 0-10 years (n=324) and 31.5% in 31-40 years (n=280) (Figure 7).
- Hepatitis B virus maker status of HHCs (n=887): 56% (n=494) were previously immunized, 18% (n=162) were HBsAg negative, 4% (n=36) were infected, 14% (n=128) were immune, and 5% (n=51) were susceptible to hepatitis B. The Hepatitis B vaccine series was recommended for those who were susceptible (Figure 8).

Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Maternal Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=803)			2007 (N=774)			2008 (N=778)			2009 (N=760)			2010 (N=653)		
	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	1	0.1	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	613	76.3	22.0	567	73.3	20.1	550	70.7	19.2	520	58.4	18.4	448	68.6	15.2
35-44	190	23.7	12.6	206	26.6	13.7	225	28.9	14.9	237	31.2	10.7	204	31.2	14.2
45-54	0	0.0	0.0	0	0.0	0.0	3	0.4	0.2	3	0.4	0.2	0	0	0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		1	0.2	
Race/Ethnicity															
Asian	627	78.1	49.3	636	82.2	49.5	611	78.5	46.9	570	75.0	43.8	491	75.2	37.4
Black	30	3.7	3.6	28	3.6	3.3	32	4.1	3.7	33	4.0	3.9	22	3.4	2.6
Hispanic	90	11.2	1.9	70	9.0	1.5	71	9.1	1.5	76	10.0	1.6	50	7.7	1.1
White	51	6.4	1.8	29	3.7	1.0	30	3.9	1.0	40	5.0	1.4	38	5.8	1.3
Other	4	0.5	14.0	11	1.4	52.8	34	4.4	137	41	5.0	1.6	19	2.9	40.4
Unknown	1	0.1		0	0.0		0	0.0		0	0.0		33	5.1	
SPA															
1	6	0.7	1.7	8	1.0	2.2	4	0.5	1.1	6	0.8	1.6	9	1.4	2.4
2	99	12.3	4.6	100	12.9	4.6	96	12.3	4.4	117	15.4	5.3	85	13	3.8
3	396	49.3	23.0	392	50.6	22.7	394	50.6	22.7	355	46.7	20.5	329	50.4	19.0
4	97	12.1	7.7	88	11.4	7.0	96	12.3	7.5	83	10.9	6.7	83	12.7	6.6
5	37	4.6	5.8	33	4.3	5.2	37	4.8	5.7	32	4.2	4.9	19	2.9	2.9
6	41	5.1	3.9	33	4.3	3.2	43	5.5	4.1	38	5.0	3.6	19	2.9	1.8
7	58	7.2	4.2	54	7.0	3.9	55	7.1	4.0	50	6.6	3.6	42	6.4	3.0
8	56	7.0	5.0	66	8.5	5.9	50	6.4	4.4	75	9.9	6.7	58	8.9	5.2
Unknown	13	1.6		0	0.0		3	0.4		4	0.5		9	1.4	

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

Figure 1. Perinatal Hepatitis B Incidence of Exposure LAC, 1999-2010

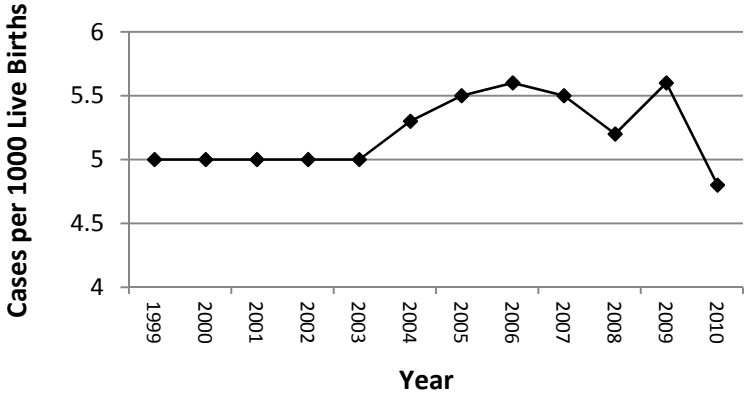
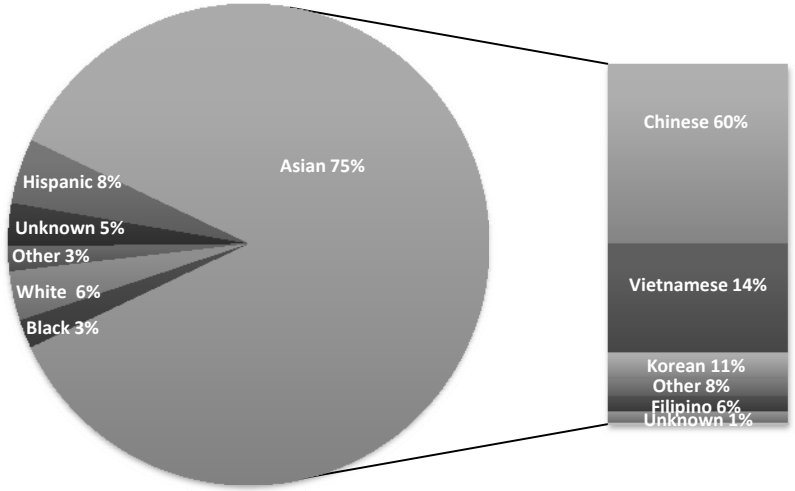


Figure 2.
Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2010 (N=653)



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, 2004-2010 (N= 5263)

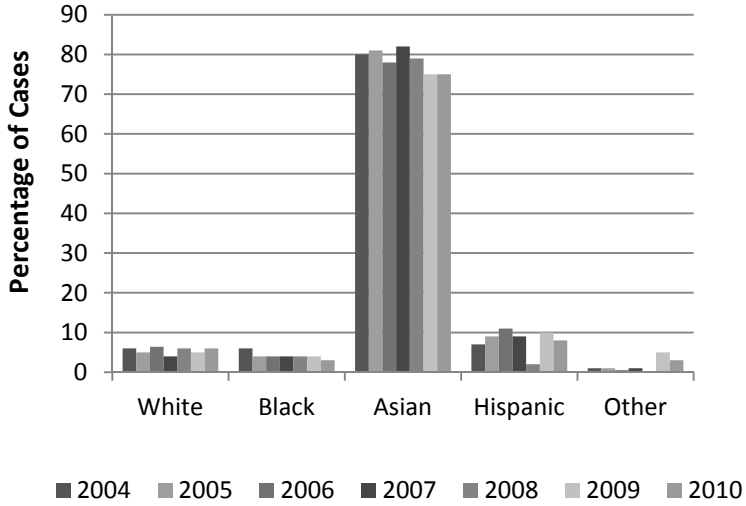


Figure 4. Perinatal Hepatitis B Maternal by SPA LAC, 2010 (N=653)

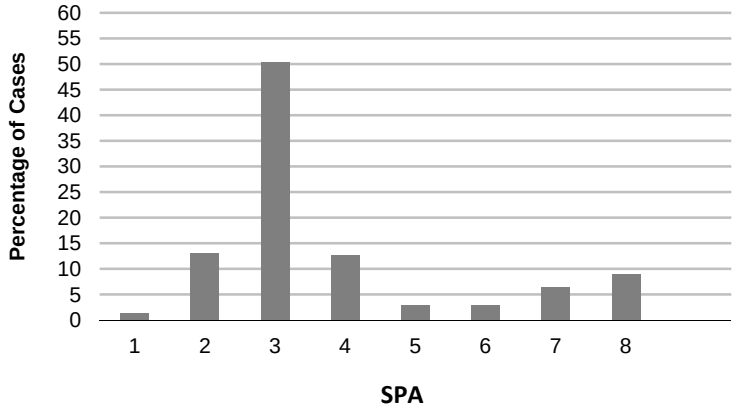
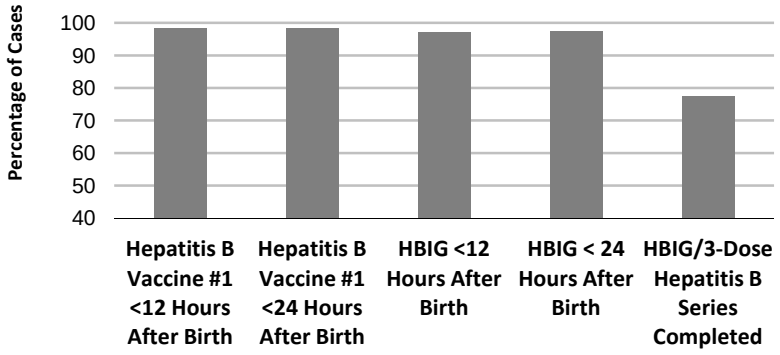
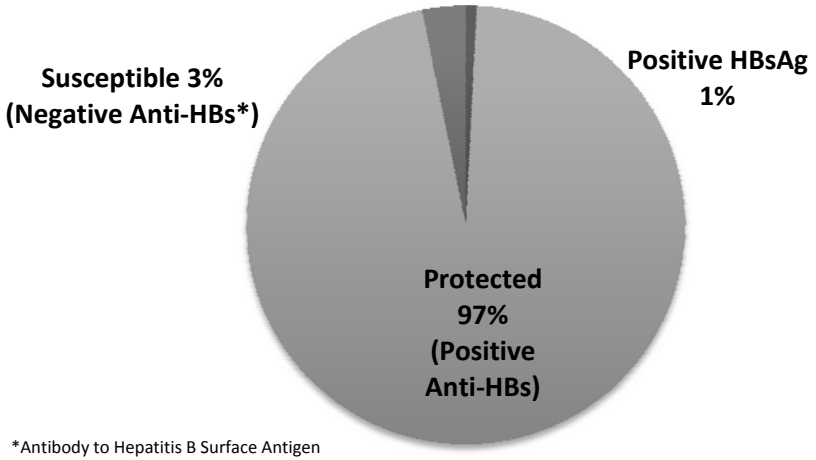


Figure 5. Perinatal Hepatitis B Summary of Infant Hepatitis B Immunoprophylaxis, LAC, 2010 (N=669)



Note: As of the date of this report, many infants born in the later part of 2010 are not due to receive the 3rd dose hepatitis B vaccine.

Figure 6. Perinatal Hepatitis B Infant Post Vaccination Serology (PVS) Results LAC, 2010 (N=124)



*Antibody to Hepatitis B Surface Antigen
Note: As of the date of this report, many infants born in the later part of 2010 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, 2010 (N=890)

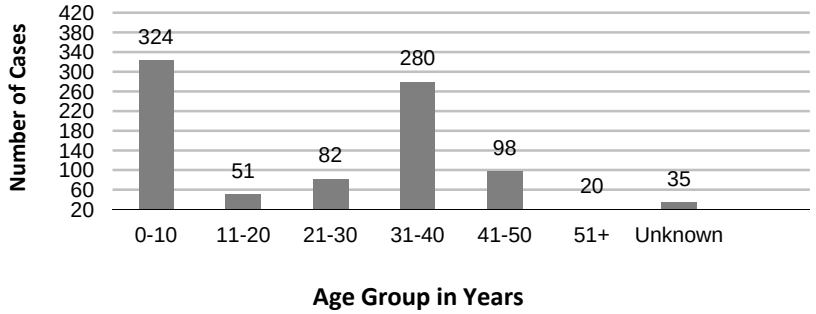
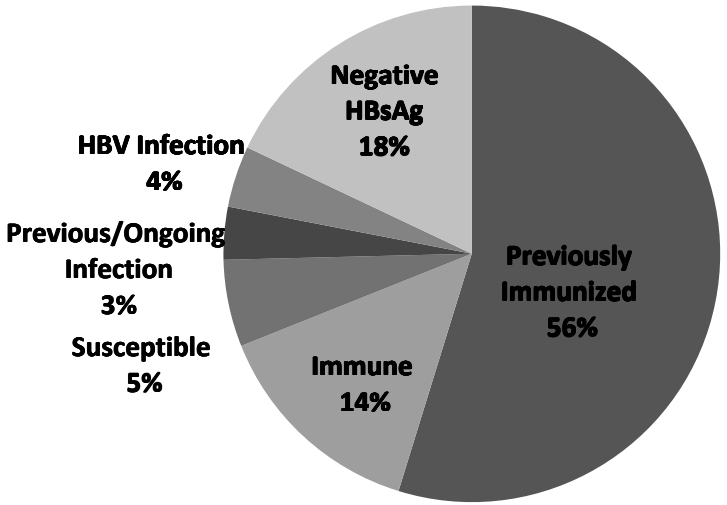


Figure 8. Hepatitis B Status of Household Contacts LAC, 2010 (N=887)



HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	4
Annual Incidence	
LA County	0.04[a]
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	37
Median	35
Range	26-48 years

[a]Rates calculated based on less than 19 cases or events are considered unreliable.
[b]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

DESCRIPTION

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

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

Traditional risk factors include: receipt of a blood transfusion prior to 1989, injection drug use (IDU), hemodialysis, birth to infected mothers, having multiple sexual partners, needle-sticks to healthcare or public safety workers, and tattoos or body-piercing. Sexual and perinatal transmission of HCV appears to occur much less frequently; 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 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 infrequently; however; recognition of cases associated with nonhospital health-care settings has been increasing.

Since the US introduction of blood product screening in 1989, reduction of high-risk behaviors is the primary recommendation for preventing transmission, especially, since there is no vaccine or post-exposure prophylaxis. Vaccines for hepatitis A and B do not provide immunity against hepatitis C. Educational efforts aimed at reducing high-risk behaviors (e.g., sharing injection drug and tattoo equipment, engaging in unprotected sex) may help to reduce new hepatitis C cases

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.

2010 TRENDS AND HIGHLIGHTS

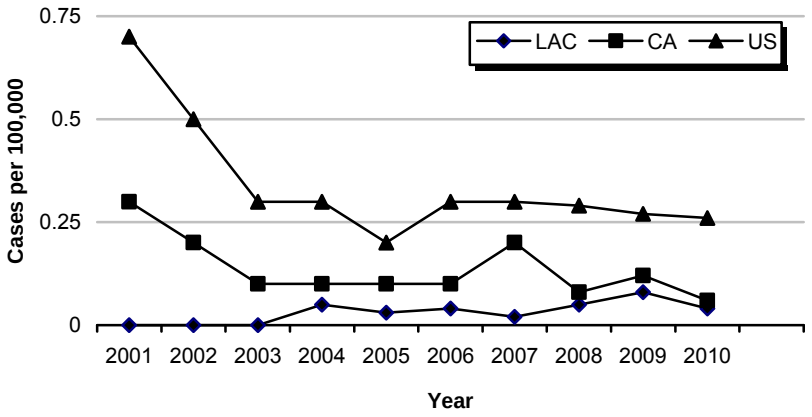
- 46 reports of possible hepatitis C were investigated in 2010 but only four (9%) were found to meet the CDC/CSTE case criteria for acute hepatitis C.
- The four cases ranged in age from 26 to 48 years; the median age was 35 and the mean age was 37 years (Figure 2).
- The majority of cases were white (N=3, 75%) (Figure 3).
- The male to female ratio was 1:1.
- Risk factors were identified in 100% (n=4) of the confirmed cases, including some with multiple risk factors. Using street drugs but not injecting was the most common risk factor reported (n=3, 75%), followed by having contact with a suspect or confirmed case (n=2, 50%), exposure to someone else's blood (n=1, 25%), injection of street drugs (n=1, 25%), having multiple sexual partners (n=1, 25%) and incarceration (n=1, 25%).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=4)			2007 (N=3)			2008 (N=5)			2009 (N=8)			2010 (N=4)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
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	0	0.0		2	66.7		1	20.0		1	12.5		1	25.0	
35-44	2	50.0		0	0.0		1	20.0		2	25.0		2	50.0	
45-54	0	0.0		0	0.0		2	40.0		3	37.5		1	25.0	
55-64	1	25.0		0	0.0		0	0.0		1	12.5		0	0.0	
65+	1	25.0		0	0.0		1	20.0		1	12.5		0	0.0	
Unknown	0	0.0		1	33.3		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0		0	0.0		1	20.0		1	12.5		0	0.0	
Black	1	25.0		0	0.0		0	0.0		0	0		0	0.0	
Hispanic	2	50.0		1	33.3		1	20.0		1	12.5		1	25.0	
White	1	25.0		1	33.3		3	60.0		6	75.0		3	75.0	
Other	0	0.0		0	0.0		0	0.0		0	0		0	0.0	
Unknown	0	0.0		1	33.3		0	0.0		0	0		0	0.0	
SPA															
1	0	0.0		0	0.0		0	0.0		1	12.5		0	0.0	
2	0	0.0		0	0.0		3	60.0		0	0.0		3	75.0	
3	0	0.0		0	0.0		1	20.0		0	0.0		0	0.0	
4	0	0.0		1	33.3		0	0.0		2	25.0		0	0.0	
5	0	0.0		0	0.0		0	0.0		2	25.0		0	0.0	
6	1	25.0		0	0.0		0	0.0		0	0.0		0	0.0	
7	0	0.0		1	33.3		0	0.0		1	12.5		0	0.0	
8	2	50.0		0	0.0		1	20.0		2	25.0		1	25.0	
Unknown	1	25.0		1	33.3		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, 2001-2010**



*Rates based on fewer than 19 cases are unreliable

**Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2010 (N=4)**

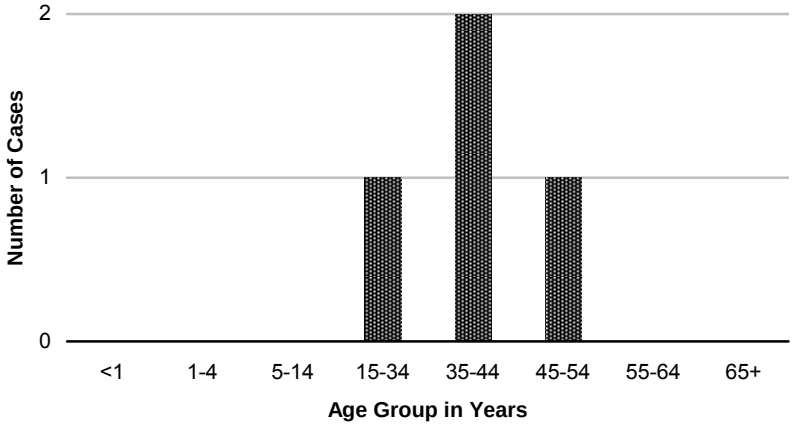
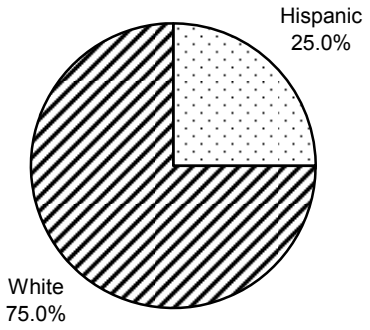


**Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2010 (N=4)**



KAWASAKI SYNDROME

CRUDE DATA	
Number of Cases	65
Annual Incidence[a]	
LA County	0.66
California[b]	N/A
Age at Diagnosis	
Mean	2.7
Median	2
Range	6 months – 11 years

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

DESCRIPTION

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

CDC Case Definition

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

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

2010 TRENDS AND HIGHLIGHTS

- A total of 65 persons, including four with atypical KS, and one recurrent case met the CDC surveillance case definition in 2010, representing a 7% decrease from 2009 (n=70) (Figure 1).
- Eighty-five percent (n=55) of confirmed cases were in children under five years old. Mean age was 2.7 years old, and the age range was from six months to eleven years old. The highest incidence rate occurred in children one to four years old (8.4 per 100,000) followed by children ages <1 year of age (4.3 per 100,000) (Figure 2).
- The male to female ratio was 1.2:1. 55% of confirmed cases were male, 45% were female.
- Hispanics had the highest number of cases (n=29, 45%) in 2010. However, the highest incidence rate occurred among Asians (1.6 per 100,000), which is consistent with previous years (Figure 3, 6).
- Service Planning Area (SPA) 1 had the highest incidence rate—1.3 per 100,000 and SPA 5 had lowest incident rates—0.2 per 100,000, respectively (Figure 4).
- KS occurs year-round, but more cases are reported in winter and spring. In 2010, 17% (n=11) of confirmed cases were reported in May (Figure 5).
- There were no fatal cases in 2010. Two cases in the same family were reported.
- Forty percent of cases (n=26) had cardiac complications including cardiac coronary aneurysms (12%, n=3), cardiac coronary artery dilatation (31%, n=8), and valvular abnormalities (42%, n=11).
- All but one of the cases was treated with intravenous immune globulin (IVIG) and high doses of aspirin.

Reported Kawasaki Syndrome Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=75)			2007 (N=52)			2008 (N=55)			2009 (N=70)			2010 (N=65)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	18	24.0	12.4	9	17.3	6.1	10	18.2	7.0	9	12.9	6.6	6	9.2	4.3
1-4	50	66.7	8.6	35	67.3	6.1	32	58.2	5.6	50	71.4	8.9	49	75.4	8.4
5-14	7	9.3	0.5	8	15.4	0.6	13	23.6	0.9	11	15.7	0.8	10	15.4	0.8
15-34	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
35-44	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0
55-64	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
Unknown	0	0.0		0	0.0		0	0.0							
Race/Ethnicity															
Asian	25	33.3	2.0	13	25.0	1.0	17	30.9	1.2	15	21.4	1.2	22	33.9	1.6
Black	8	10.7	0.9	5	9.6	0.6	3	5.5	0.2	5	7.1	0.6	8	12.3	0.9
Hispanic	28	37.3	0.6	26	50.0	0.6	28	50.9	0.6	39	55.7	0.8	29	44.6	0.6
White	11	14.7	0.4	3	5.8	0.1	4	7.3	0.1	8	11.4	0.3	8	11.4	0.3
Other	3	4.0	10.5	3	5.8	14.4	3	5.5	12.2	3	40.0	-	5	7.7	0.2
Unknown	0	0.0		2	3.8		0	0.0		0	0	0	1	1.5	-
SPA															
1	1	1.3	0.3	1	1.9	0.3	1	1.8	0.3	2	2.3	0.5	5	7.7	1.3
2	14	18.7	0.7	8	15.4	0.4	11	20.0	0.5	12	17.1	0.5	12	18.5	0.5
3	13	17.3	0.8	10	19.2	0.6	8	14.5	0.5	12	17.0	0.7	16	24.6	0.9
4	10	13.3	0.8	6	11.5	0.5	9	16.4	0.7	10	14.3	0.8	9	13.8	0.7
5	3	4.0	0.5	3	5.8	0.5	3	5.5	0.3	5	7.1	0.8	1	1.5	0.2
6	8	10.7	0.8	6	11.5	0.6	4	7.3	0.4	16	22.9	1.5	5	7.7	0.5
7	9	12.0	0.7	10	19.2	0.7	13	23.6	0.9	6	8.6	0.4	10	15.4	0.7
8	17	22.7	1.5	8	15.4	0.7	6	10.9	0.5	7	10.0	0.6	7	10.8	0.6
Unknown	0	0.0		0	0.0		0	0.0							

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

**Figure 1. Incidence Rates of Kawasaki Syndrome
LAC, 20000 - 2010**

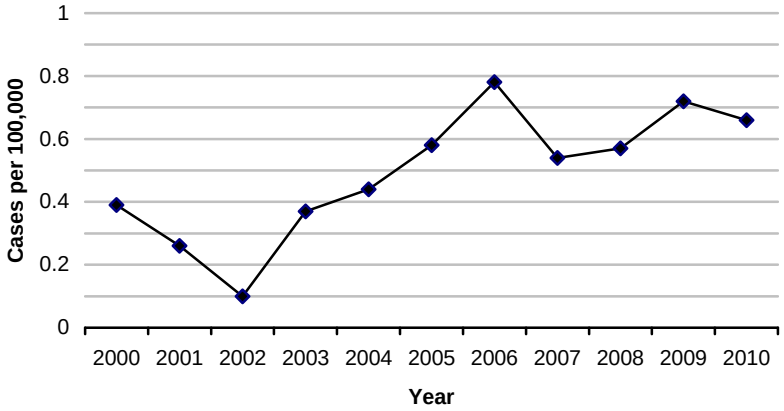


**Figure 2. Incidence Rates of Kawasaki Syndrome by Age Group
LAC, 2010 (N=65)**

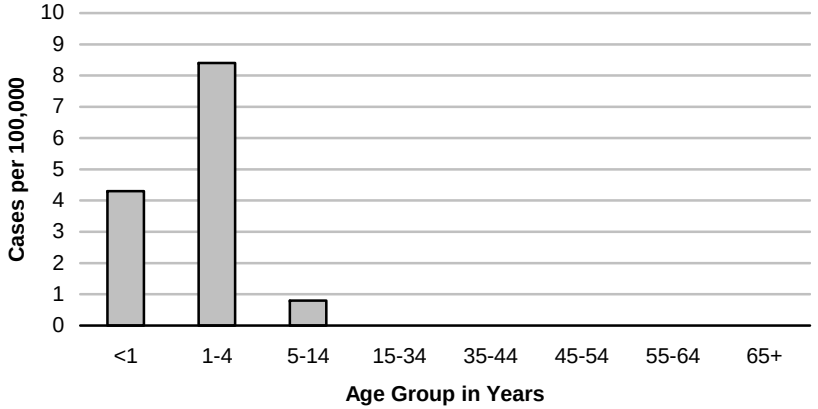
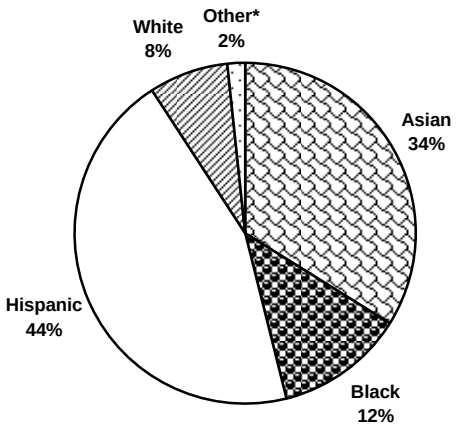


**Figure 3. Percent Cases of Kawasaki Syndrome
by Race/Ethnicity, LAC, 2010 (N=65)**



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

**Figure 4. Incidence Rates of Kawasaki Syndrome by SPA
LAC, 2010 (N=65)**

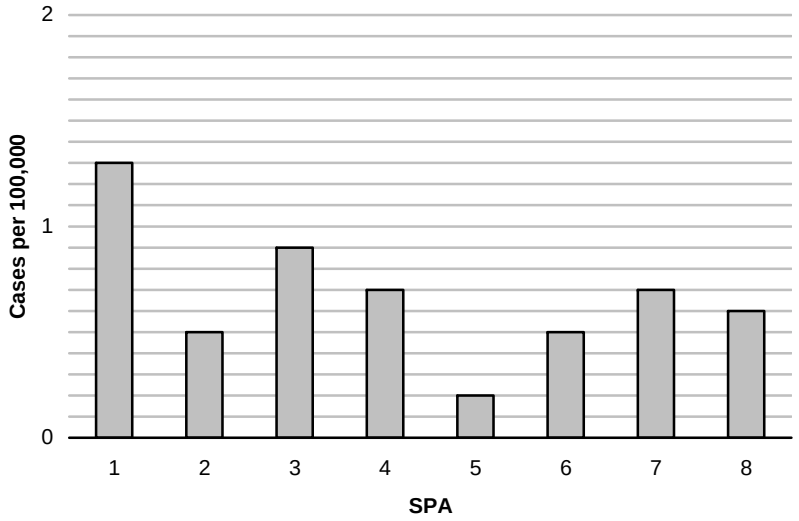


Figure 5. Reported Kawasaki Syndrome Cases by Month of Onset LAC, 2010 (N=65)

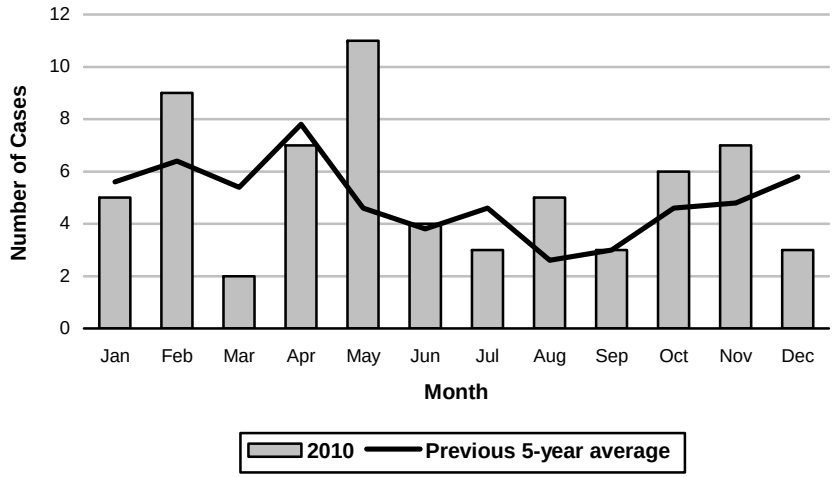
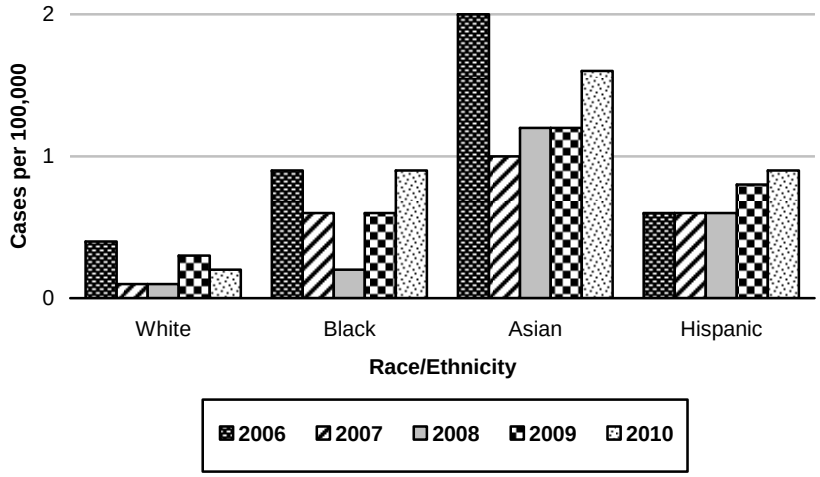
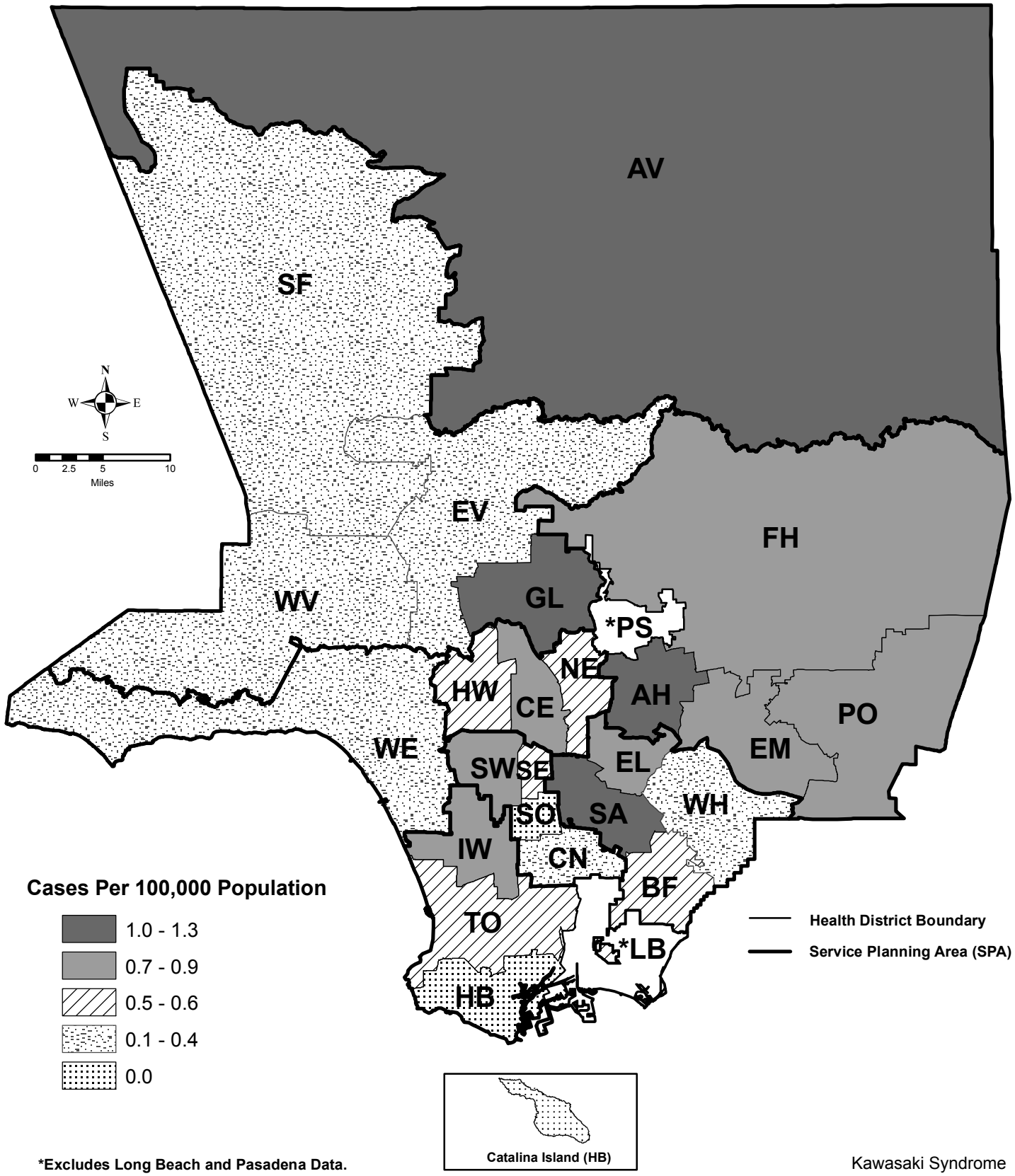


Figure 6. Kawasaki Syndrome Incidence by Race/Ethnicity LAC, 2006-2010



Map 9. Kawasaki Syndrome
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

LEGIONELLOSIS

CRUDE DATA	
Number of Cases	108
Number of Deaths	6
Annual Incidence[a]	
LA County	0.68
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	61.65
Median	60
Range	20-94

[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.

DESCRIPTION

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

The implementation of water safety plans to control the risk of transmission of *legionella* to susceptible hosts in hospitals, hotels and public places with water related amenities remains the primary means of reducing LD. Plans include periodic inspection of water source, 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.

2010 TRENDS AND HIGHLIGHTS

- Two cases of Pontiac fever were reported.
- The case fatality rate increased from 4.5% in 2009 to 5.5% in 2010.
- The most affected age group in LAC is 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) 5 sustained the highest incidence of any SPA since 2007 (Figure 3).
- The highest incidence rate occurred among blacks (2.9 per 100,000) followed by whites (1.4 per 100,000). Rates in all race catergories have risen steadily since 2006 (Figure 5). Analysis demonstrated no geo-clustering by race (though number of cases was small).
- People staying overnight in hotels during the incubation period accounted for approximately 7% of confirmed cases, an increase from 3% in 2009. According to the CDC, more than 20% of all LD cases reported are associated with recent travel. LAC investigated two cases a year apart who stayed in the same hotel during their respective incubation periods. No additional cases were found and no legionella bacteria was recovered from the environment after a thorough investigation.
- Two LAC cases that occurred six months apart were linked to an out-of-state hotel casino outbreak investigation from 2009-2010. Active case finding found no additional LAC residents linked to this particular outbreak.
- Many single legionella cases were associated with a variety of public settings, including a skilled nursing facility, assisted living facilities, fitness centers, a college campus, an office workplace, and dental offices. ACDC investigated each of these settings but no additional cases were found after enhanced surveillance and retrospective case finding.

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=24)			2007 (N=40)			2008 (N=59)			2009 (N=66)			2010 (N=108)		
	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	0.0	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		4.2	0.0	2	5.0	0.1	1	1.7	0.0	2	3.0	0.1	3	3.0	0.1
35-44	2	8.3	0.1	4	10	0.3	5	8.5	0.3	3	4.5	0.2	9	8.0	0.6
45-54	2	8.3	0.2	10	25	0.8	7	11.9	0.5	11	16.6	0.8	25	23.0	1.8
55-64	5	20.8	0.6	5	12.5	0.6	12	20.3	1.3	14	21.2	1.5	27	25.0	2.8
65+	14	58.3	1.4	19	47.5	1.9	33	55.9	3.2	36	54.5	3.4	44	41.0	4.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0		
Race / Ethnicity															
Asian	6	25.0	0.5	0	0.0	0.0	5	8.5	0.4	7	10.6	0.5	15	14.0	1.1
Black	3	12.5	0.4	6	15.0	0.7	11	18.6	1.3	14	21.2	1.6	25	23.1	2.9
Hispanic	5	20.8	0.1	12	30.0	0.3	13	22.0	0.3	13	19.6	0.3	25	23.1	0.5
White	10	41.7	0.3	22	55.0	0.8	30	50.8	1.0	32	48.4	1.1	41	38.0	1.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	2.0	
Unknown	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	1.7	0.3	0	0	0	2	1.8	0.8
2	3	12.5	0.1	8	20.0	0.4	18	30.5	0.8	14	21.2	0.6	22	20.3	1.0
3	4	16.7	0.2	6	15.0	0.3	9	15.3	0.5	7	10.6	0.4	13	12.0	0.7
4	7	29.2	0.6	7	17.5	0.6	7	11.9	0.5	9	13.6	0.7	15	13.8	1.2
5	1	4.2	0.2	7	17.5	1.1	8	13.6	1.2	13	19.6	2.0	12	11.1	1.8
6	0	0.0	0.0	7	17.5	0.7	4	6.8	0.4	10	15.1	1.0	12	11.1	1.1
7	7	29.2	0.5	4	10.0	0.3	4	6.8	0.3	8	12.1	0.6	13	12.0	0.9
8	1	4.2	0.1	1	2.5	0.1	8	13.6	0.7	5	7.5	0.4	16	14.8	1.4
Unknown	1	4.2		0	0.0		0	0.0		0	0.0		3	2.7	0.1

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

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 2001-2010

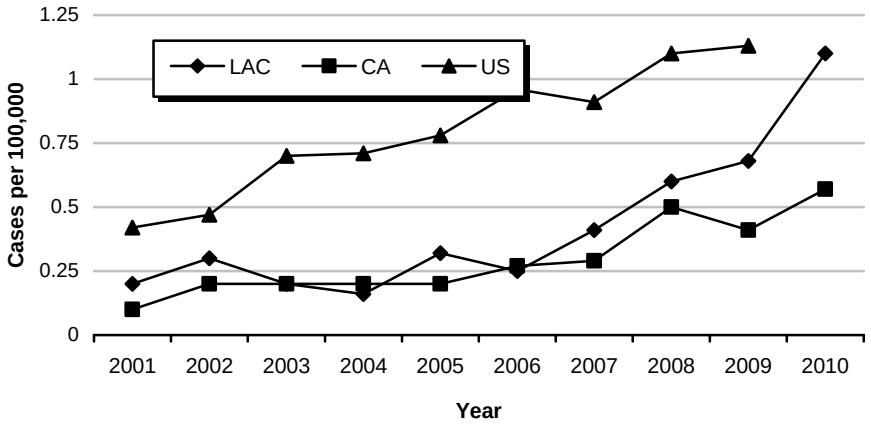


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2007-2010

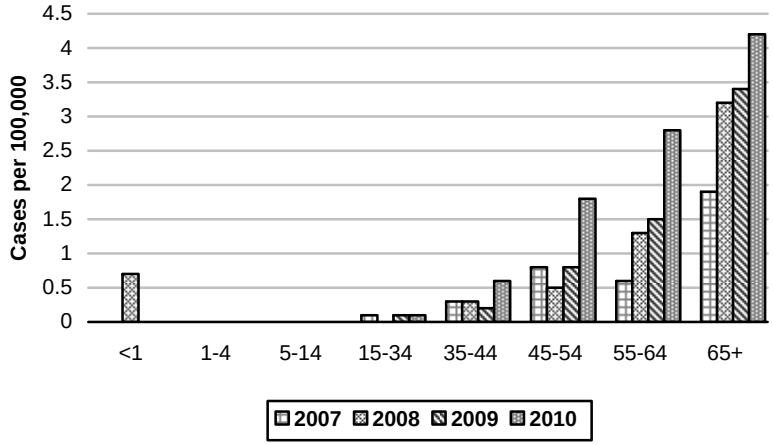


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2007-2010

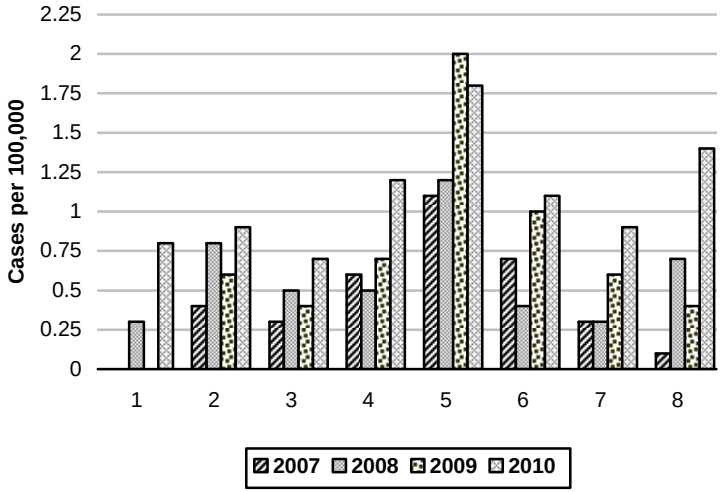


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2010 (N=108)

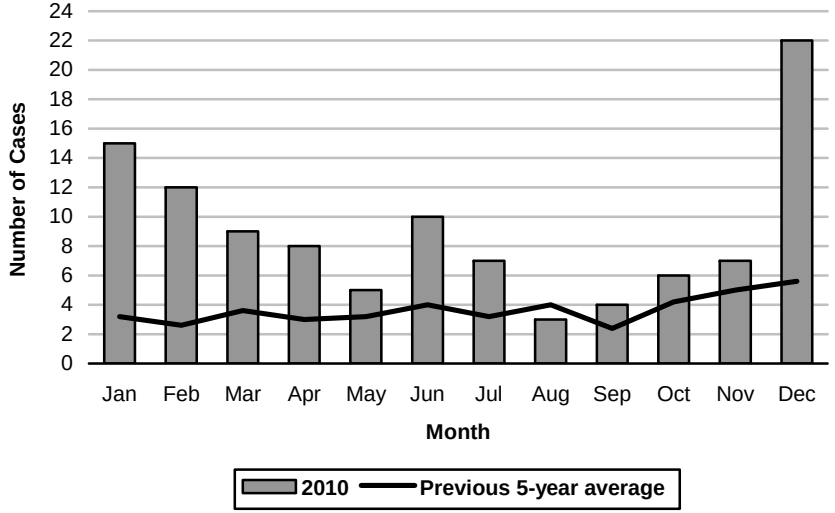
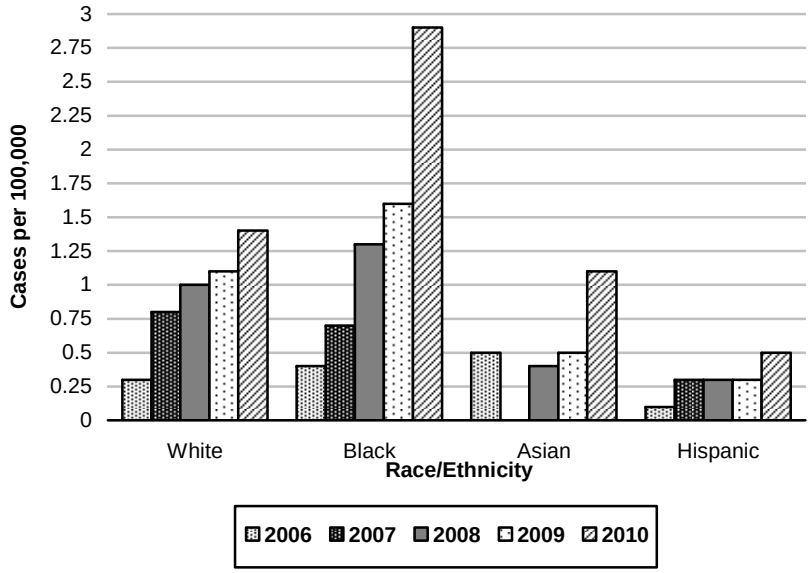
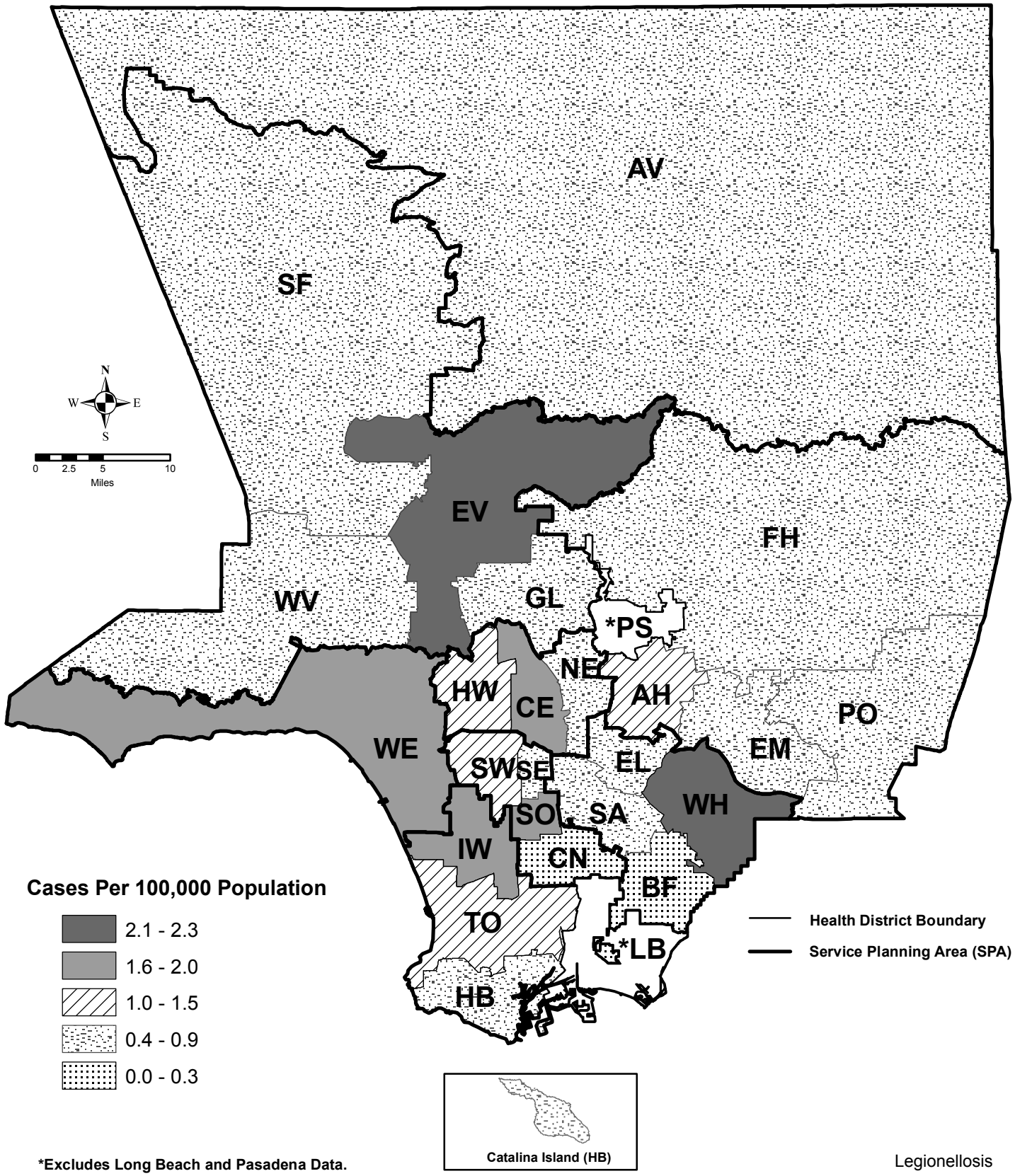


Figure 5. Legionellosis Rates by Race/Ethnicity
LAC, 2006-2010



Map 10. Legionellosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	14
Annual Incidence[a]	
LA County[b]	0.14
California[c]	--
United States[c]	--
Age at Diagnosis	
Mean	54
Median	54
Range	8-85

[a]Cases per 100,000 population.
[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 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.

2010 TRENDS AND HIGHLIGHTS

- Hispanics comprised 50% of all non-perinatal listeriosis cases. Whites comprised 36% of the remaining cases, with Asians and blacks each comprising 7% 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 (5%). Regionally there is greater incidence of listeriosis in Service Planning Area (SPA) 2 compared to other SPAs in LAC (Table).
- Historically the occurrence of listeriosis cases peaks in August and September (Figure 5). In 2010, however, there were no cases in September. Most of the cases still occurred during warm-weather months, consistent with previous trends
- Nonperinatal listeriosis disproportionately affects the elderly and immunocompromised. The median age of nonperinatal cases decreased from 67 in 2009 to 54 in 2010, reflecting a larger number of younger cases with immunodeficiencies.
- There were two deaths due to nonperinatal listeriosis, yielding a case-fatality rate of 14.3%.

Reported Listeriosis, nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=25)			2007 (N=21)			2008 (N=20)			2009 (N=15)			2010 (N=14)		
	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		1	5.0		1	6.7		1	7.1	
15-34	2	8.0		0	0.0		1	5.0		1	6.7		2	14.3	
35-44	1	4.0		0	0.0		1	5.0		0	0.0		2	14.3	
45-54	4	16.0		6	28.6		1	5.0		2	13.3		2	14.3	
55-64	6	24.0		6	28.6		5	25.0		1	6.7		2	14.3	
65+	12	48.0		9	42.9		11	55.0		10	66.7		5	35.7	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	3	12.0		3	14.3		6	30.0		0	0.0		1	7.1	
Black	1	4.0		0	0.0		1	5.0		1	6.7		1	7.1	
Hispanic	8	32.0		8	38.1		5	25.0		7	46.7		7	50.0	
White	13	52.0		10	47.6		8	40.0		7	46.7		5	35.7	
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	7	28.0		6	28.6		3	15.0		4	26.7		5	35.7	
3	8	32.0		4	19.0		6	30.0		2	13.3		1	7.1	
4	5	20.0		1	4.8		3	15.0		3	20.0		4	28.6	
5	4	16.0		4	19.0		1	5.0		0	0.0		0	0.0	
6	1	4.0		3	14.3		2	10.0		2	13.3		1	7.1	
7	0	0.0		3	14.3		3	15.0		2	13.3		1	7.1	
8	0	0.0		0	0.0		2	10.0		2	13.3		2	14.3	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

**Figure 1. Reported Cases of Nonperinatal Listeriosis
LAC, 2001-2010**

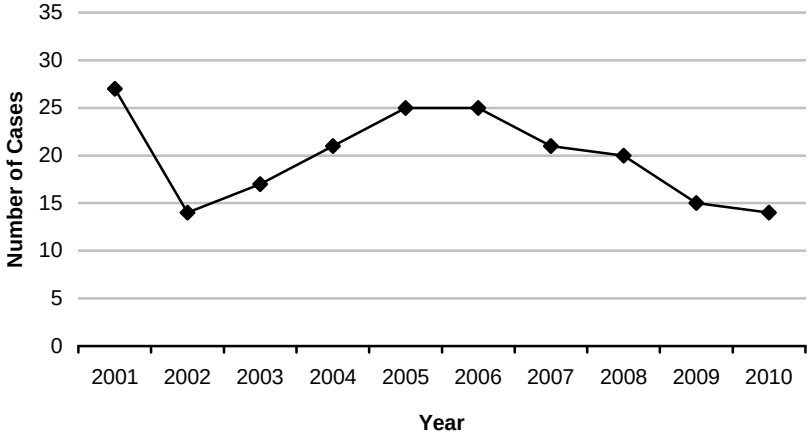


**Figure 2. Reported Cases of Nonperinatal Listeriosis
by Age Group, LAC, 2010 (N=14)**

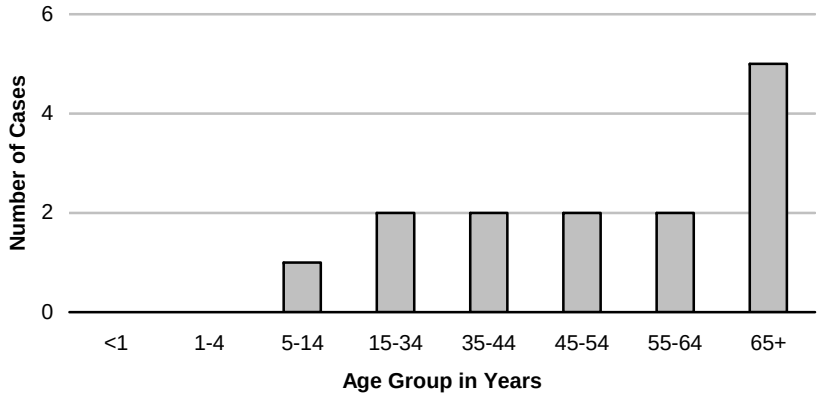


**Figure 3. Percent Cases of Nonperinatal Listeriosis
by Race/Ethnicity, LAC, 2010 (N=14)**

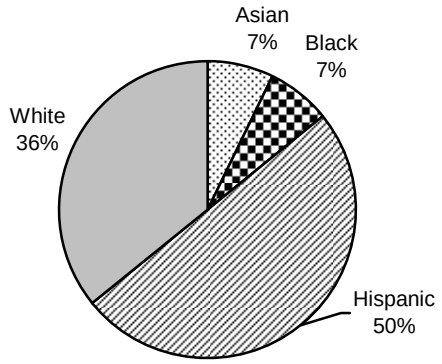


**Figure 4. Reported Cases of Nonperinatal Listeriosis by SPA
LAC, 2010 (N=14)**

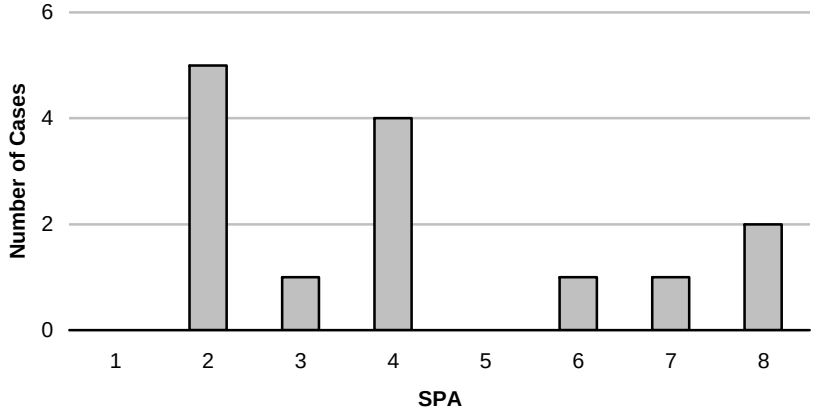
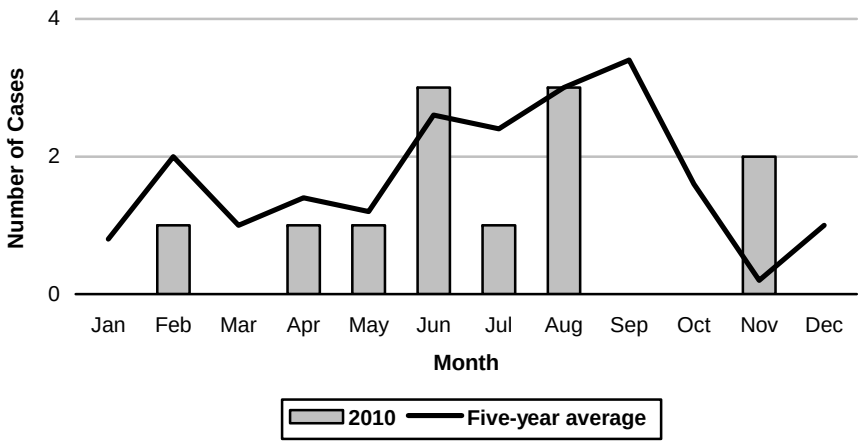


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset LAC, 2010 (N=14)



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	4
Annual Incidence[a]	
LA County[b]	3.23
California[c]	N/A
United States[c]	N/A
Age at Diagnosis	
Mean	27
Median	30
Range	26 - 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 checkups, outreach to Hispanic communities, and food safety notices at food and deli markets.

2010 TRENDS AND HIGHLIGHTS

- In 2010, there were four cases of perinatal listeriosis. Two cases were Hispanic expectant mothers; the other two cases were Asian and white, respectively. All of the cases were single gestations. Two of the babies were born sick, but none died.
- Maternal ages ranged from 26 to 38 years.
- The number of perinatal listeriosis cases in 2010 is consistent within the range of incidence of listeriosis over the past ten years, excluding an aberrant increase in 2006 (Figure 1).
- Hispanic women had the highest number of cases of perinatal listeriosis as in previous years (Figure 2). There have been no cases of perinatal listeriosis in black expectant mothers since 2006.
- One mother reported eating “natural” (unpasteurized, Mexican style) cheese while pregnant.

Reported Perinatal Listeriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=12)			2007 (N=6)			2008 (N=2)			2009 (N=5)			2010 (N=4)		
	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
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	8	66.7		5	83.3		2	100.		4	80.0		3	75.0	
35-44	3	25.0		1	16.7		0	0.0		1	20.0		1	25.0	
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	1	8.3		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	8.3		0	0.0		0	0.0		2	40.0		1	25.0	
Black	3	25.0		0	0.0		0	0.0		0	0.0		0	0.0	
Hispanic	7	58.3		5	83.3		2	100.		3	60.0		2	50.0	
White	1	8.3		1	16.7		0	0.0		0	0.0		1	25.0	
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	8.3		0	0.0		0	0.0		0	0.0		0	0.0	
2	1	8.3		1	16.7		0	0.0		0	0.0		2	50.0	
3	2	16.7		0	0.0		1	50.0		0	0.0		0	0.0	
4	3	25.0		2	33.3		0	0.0		2	40.0		0	0.0	
5	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
6	2	16.7		1	16.7		0	0.0		1	20.0		1	25.0	
7	2	16.7		1	16.7		1	50.0		0	0.0		1	25.0	
8	1	8.3		1	16.7		0	0.0		2	40.0		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Reported Cases of Perinatal Listeriosis LAC, 2001-2010

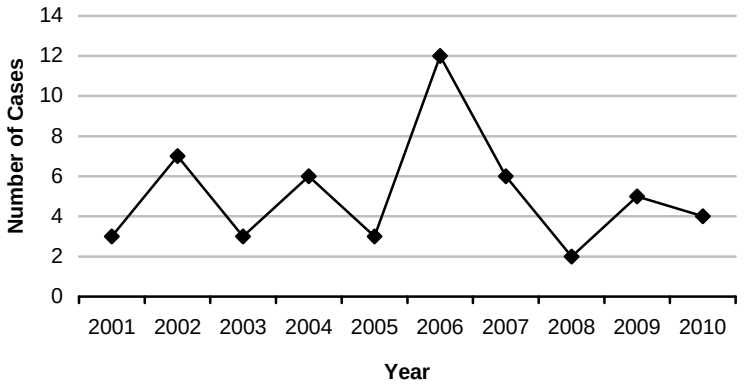


Figure 2. Perinatal Listeriosis Cases by Race/Ethnicity LAC, 2006-2010

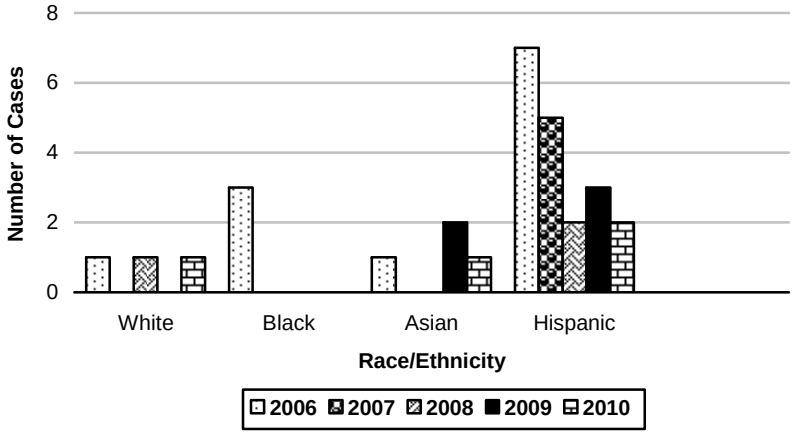
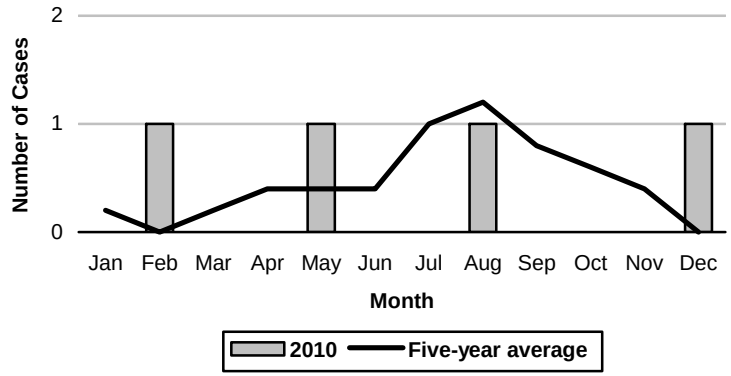


Figure 3. Reported Perinatal Listeriosis Cases by Month of Onset, LAC, 2010 (N=4)



LYME DISEASE

CRUDE DATA	
Number of Cases	5
Annual Incidence [a]	
LA County [b]	0.05
California [c]	--
United States [c]	--
Age at Diagnosis	
Mean	32.6
Median	33
Range	6-56

[a] Cases per 100,000 population.
[b] Rates calculated based on less than 19 cases or events are considered unreliable.
[c] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

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) requires 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 (EIA) or immunofluorescent antibody (IFA) screening test, and if positive or equivocal, followed by IgM and IgG Western immunoblotting[1].

Avoiding tick bite exposure is the primary means of preventing 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.

2010 TRENDS AND HIGHLIGHTS

- Even as the national incidence increases (from 6.0 per 100,000 in 1999 to 9.9 per 100,000 in 2009), the incidence in LAC (0.05 per 100,000) has remained relatively stable and well below the national rate (Figure 1).
- Of the five confirmed cases of LD, four cases were likely exposed in highly endemic LD regions of the US. One case did not have exposure outside of LAC; this case presented with physician-diagnosed EM.
- Only one case (20%) recalled a tick bite prior to onset of rash.

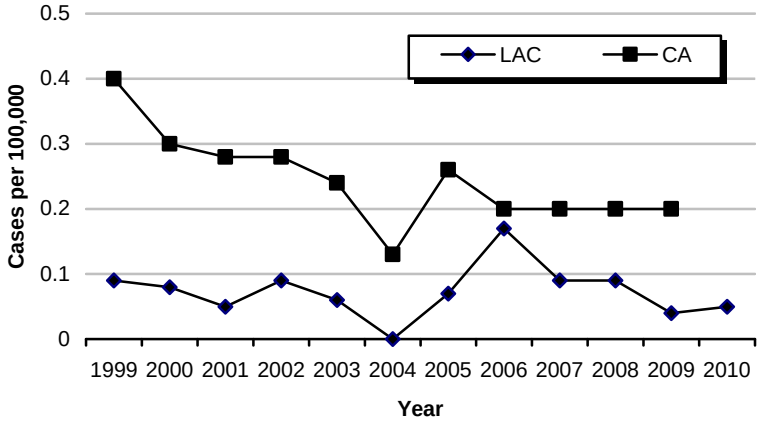
[1] Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. MMWR August 11, 1995/44(31);590-591, http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=16)			2007 (N=8)			2008 (N=9)			2009 (N=4)			2010 (N=5)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
1-4	0	0.0		0	0.0		2	22.2		0	0.0		0	0.0	
5-14	3	18.8		2	25.0		1	11.1		1	0.25		1	0.2	
15-34	7	43.8		3	37.5		1	11.1		0	0.0		2	0.4	
35-44	2	12.5		0	0.0		1	11.1		2	0.50		1	0.2	
45-54	2	12.5		2	25.0		3	33.3		0	0.0		0	0.0	
55-64	1	6.3		0	0.0		0	0.0		1	0.25		1	0.2	
65+	1	6.3		1	12.5		1	11.1		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	1	6.3		1	12.5		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	2	12.5		1	12.5		0	0.0		0	0.0		1	0.2	
White	11	68.8		3	37.5		9	100.		4	100		4	0.8	
Other	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Unknown	2	12.5		3	37.5		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	6	37.5		2	25.0		2	22.2		1	0.25		0	0.0	
3	0	0.0		1	12.5		0	0.0		0	0.0		0	0.0	
4	5	31.3		2	25.0		1	11.1		0	0.0		2	0.4	
5	2	12.5		2	25.0		4	44.4		1	0.25		2	0.4	
6	0	0.0		0	0.0		0	0.0		1	0.25		1	0.2	
7	0	0.0		1	12.5		0	0.0		0	0.0		0	0.0	
8	3	18.8		0	0.0		2	22.2		1	0.25		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

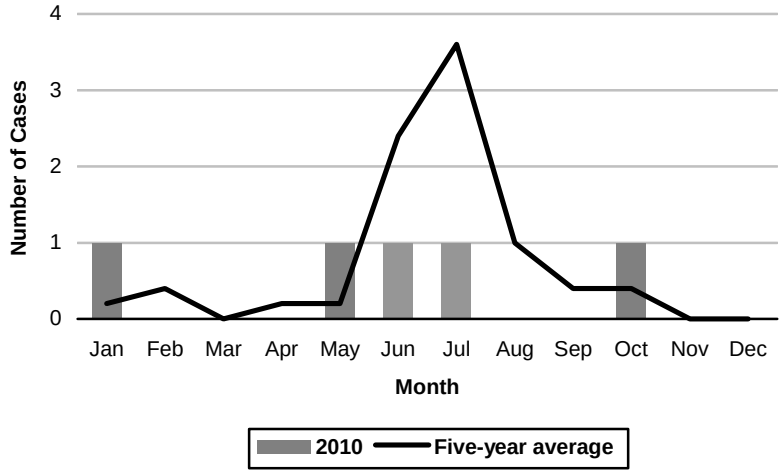
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Lyme Disease
LAC* and CA, 1999-2010



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

Figure 2. Reported Lyme Disease Cases by Month of Onset
LAC, 2010



MALARIA

CRUDE DATA	
Number of Cases	25
Annual Incidence[a]	
LA County	0.25
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	34.5
Median	32
Range	1-62

[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.

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*). 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. 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.

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

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

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

2010 TRENDS AND HIGHLIGHTS

- The number of reported cases (N=25) is similar to the previous year's (N=24) and continues a decreasing trend since 2003.
- Over half of all cases (n=16) were caused by *P. falciparum* (Figure 5).
- All cases reported a travel history to a country with endemic malaria (Table 1). This year, travelers to Africa represented 60% of all cases and 81% of *P. falciparum* cases.
- Only five of fifteen US resident cases (33%) used prophylaxis during their travels; none reported completing their regimen (Table 2). All cases who traveled for work/business purposes reported using prophylaxis.

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

	2006 (N=33)			2007 (N=26)			2008 (N=30)			2009 (N=24)			2010 (N=25)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	2	6.1	0.3	0	0.0	0.0	0	0.0	0.0	3	12.5	0.5	1	4.0	0.2
5-14	2	6.1	0.1	2	7.7	0.1	1	3.3	0.1	0	0.0	0.0	1	4.0	0.1
15-34	8	24.2	0.3	11	42.3	0.4	12	40.0	0.4	6	25.0	0.2	12	48.0	0.4
35-44	7	21.2	0.5	3	11.5	0.2	6	20.0	0.4	2	8.3	0.1	4	16.0	0.3
45-54	11	33.3	0.8	5	19.2	0.4	7	23.3	0.5	5	20.8	0.4	4	16.0	0.3
55-64	1	3.0	0.1	5	19.2	0.6	4	13.3	0.4	7	29.2	0.7	3	12.0	0.3
65+	2	6.1	0.2	0	0.0	0.0	0	0.0	0.0	1	4.2	0.1	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	5	15.2	0.4	7	26.9	0.5	4	13.3	0.3	3	12.5	0.2	8	32.0	0.6
Black	22	66.7	2.6	11	42.3	1.3	16	53.3	1.9	8	33.3	0.9	10	40.0	1.2
Hispanic	1	3.0	0.0	4	15.4	0.1	1	3.3	0.0	9	37.5	0.2	1	4.0	0.0
White	5	15.2	0.2	1	3.8	0.0	4	13.3	0.1	2	8.3	0.1	2	8.0	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	0	0.0		3	11.5		5	16.7		2	8.3		4	16.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	2	8.0	0.5
2	5	15.2	0.2	10	38.5	0.5	8	26.7	0.4	6	25.0	0.3	3	12.0	0.1
3	4	12.1	0.2	2	7.7	0.1	3	10.0	0.2	1	4.2	0.1	4	16.0	0.2
4	5	15.2	0.4	4	15.4	0.3	2	6.7	0.2	0	0.0	0.0	2	8.0	0.2
5	3	9.1	0.5	2	7.7	0.3	3	10.0	0.5	4	16.7	0.6	5	20.0	0.8
6	8	24.2	0.8	3	11.5	0.3	5	16.7	0.5	4	16.7	0.4	5	20.0	0.5
7	2	6.1	0.1	1	3.8	0.1	1	3.3	0.1	1	4.2	0.1	1	4.0	0.1
8	6	18.2	0.5	2	7.7	0.2	6	20.0	0.5	7	29.2	0.6	3	12.0	0.3
Unknown	0	0.0		2	7.7		2	6.7		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, 1999-2010

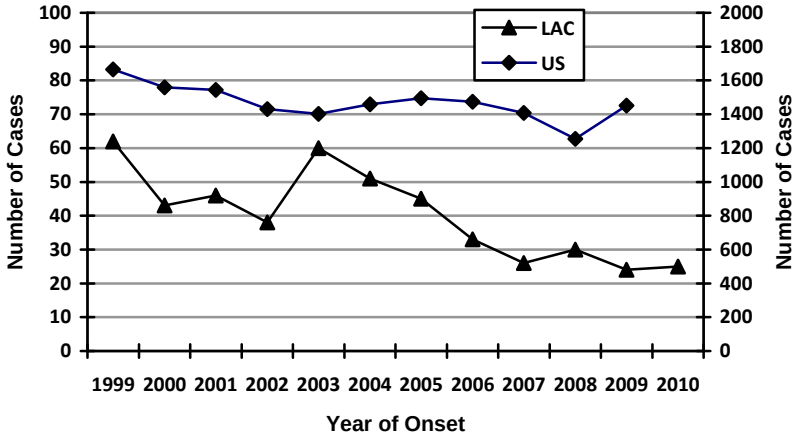


Figure 2. Malaria Cases by Age Group
LAC, 2010 (N=25)

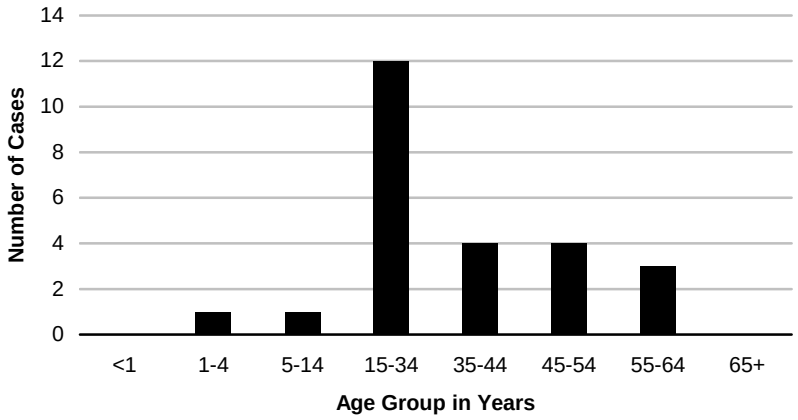


Figure 3. Percent Cases of Malaria by Race/Ethnicity
LAC, 2010 (N=25)

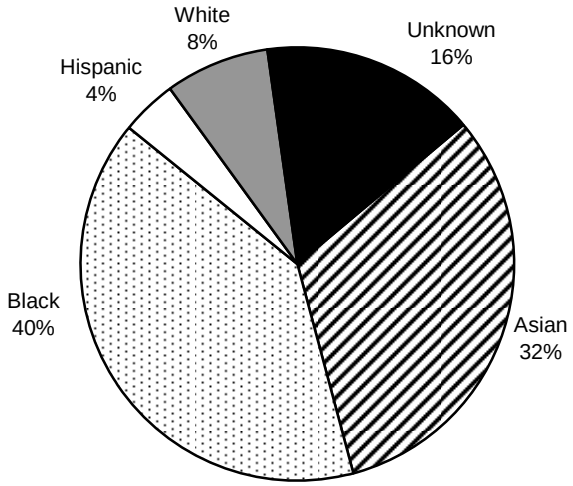


Figure 4. Number of Reported Malaria Cases by Race/Ethnicity
LAC, 2005-2010

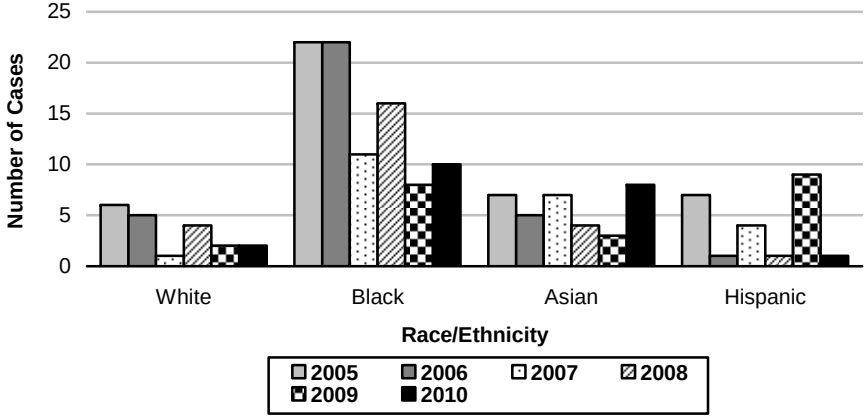


Figure 5. Percent Cases of Malaria by Species LAC, 2010

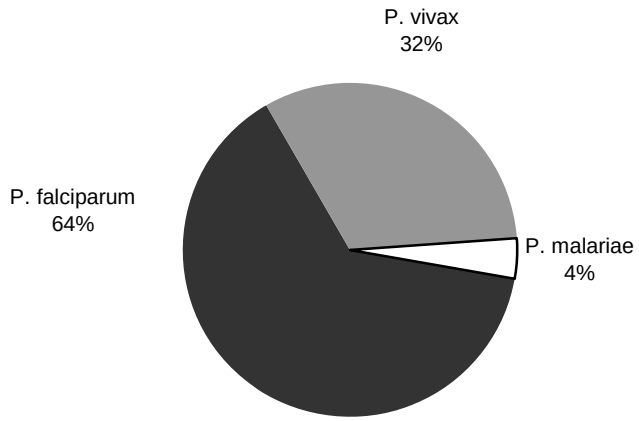


Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* species, 2010

Country of Acquisition	*P. falciparum*	*P. vivax*	*P. malariae*	Total
Africa	**13**	**1**	**1**	**15**
- Burkina Faso	1	0	0	1
- Ghana	3	0	0	3
-Guinea	1	0	0	1
- Kenya	0	1	0	1
- Nigeria	5	0	1	6
- Sierra Leone	1	0	0	1
-Togo	1	0	0	1
- Uganda	1	0	0	1
Asia/Oceania	**2**	**6**	**0**	**8**
- India	2	6	0	8
Latin America	**0**	**1**	**0**	**1**
- Guatemala	0	1	0	1
Unknown	**1**	**0**	**0**	**1**
Overall Total	**16**	**8**	**1**	**25**

Table 2. Prophylaxis Use Among US Residents with Malaria, 2010

Reason for Travel	Total Cases (n)	Prophylaxis Use (n)	(%)
Pleasure	10	2	20
Work	2	2	100
Other/Unknown	3	1	33
Total	**15**	**5**	**33**

MEASLES

CRUDE DATA	
Number of Cases	8
Annual Incidence[a]	
LA County	0.08[b]
California[c]	--
United States[c]	--
Age at Diagnosis	
Mean	19.5 years
Median	19.5 years
Range	9 months – 38 years

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

DESCRIPTION

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

Immunization Recommendations:

- Measles disease can be effectively prevented by Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV) vaccine.
- Usually, two doses of measles-containing vaccine are given via MMR or MMRV vaccine. The first dose is recommended at 12 months of age. The second dose can be given as early as four weeks after the first dose, but is usually given at ages 4 to 6 years.
- Vaccination is recommended for those born in 1957 or later who have no prior MMR vaccination, no serological evidence of measles immunity, or no documentation of physician-diagnosed measles. Proof of immunization with two MMR doses is recommended for 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 vaccine.
- Measles is currently circulating in most regions of the world outside of North and South America. All international travelers who are not immune to measles should be vaccinated, ideally 2 weeks prior to travel. Unvaccinated infants 6 months of age and older should be vaccinated if they are traveling out of the country.

2010 TRENDS AND HIGHLIGHTS

- During 2010, the California Department of Public Health issued multiple health alerts related to measles activity in California related to international travel. There was a three-fold increase in the number of cases reported in 2010 (n=27) compared to 2009 (n=9) (Figure 1).
- Eight cases were reported in LAC in 2010, which is the highest number of cases reported since 2001 (Figure 2).
- Similar to previous years, all cases were < 45 years of age. Only one case was age <1 year and was too young to be vaccinated. The remaining cases (n=7) were eligible for vaccination but were not up-to-date (Figure 3, Figure 7).
- SPA 2 accounted for the highest proportion of cases followed by SPA 7. Although there were no epidemiological linkages in SPA 2, the three cases in SPA 7 represented a household cluster (Figure 5).
- In temperate areas, measles occurs primarily in late winter and spring. Although 62.5% of the cases (n=5) occurred from March to May, cases were also reported in the summer and fall (Figure 6).
- All of the cases were associated with travel. Two cases were US citizens that traveled internationally for vacation. Three cases were foreign nationals that were visiting the US. Three cases were associated with domestic travel and attendance at a large conference which had participants from all over the world.

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=1)			2007 (N=0)			2008 (N=1)			2009 (N=1)			2010 (N=8)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0.0		1	12.5	
1-4	1	100.		0	0.0		1	100.		0	0.0		1	12.5	
5-14	0	0.0		0	0.0		0	0.0		0	0.0		2	25.0	
15-34	0	0.0		0	0.0		0	0.0		0	0.0		2	25.0	
35-44	0	0.0		0	0.0		0	0.0		1	100.		2	25.0	
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	1	100.		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		2	25.0	
Hispanic	0	0.0		0	0.0		1	100.		0	0.0		4	50.0	
White	0	0.0		0	0.0		0	0.0		1	100.		2	25.0	
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	100.		0	0.0		1	100.		1	100.		4	50.0	
3	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
4	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
5	0	0.0		0	0.0		0	0.0		0	0.0		1	12.5	
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		0	0.0		3	37.5	
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		0	0.0	

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

**Figure 1. Incidence Rates of Measles
LAC, CA and US, 2001-2010**

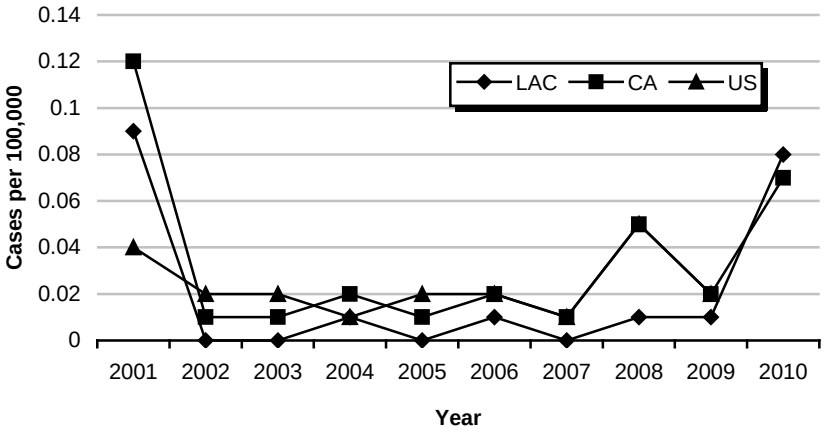


**Figure 2. Reported Measles Cases
LAC, 2001-2010**

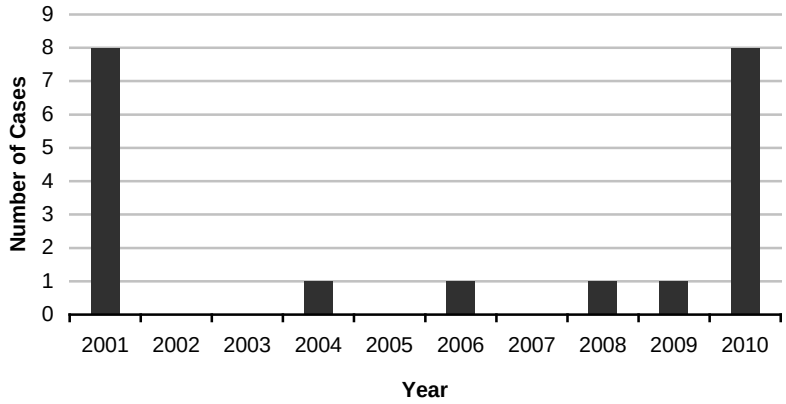


**Figure 3. Reported Confirmed Measles Cases by Age Group
LAC, 2010 (N=8)**

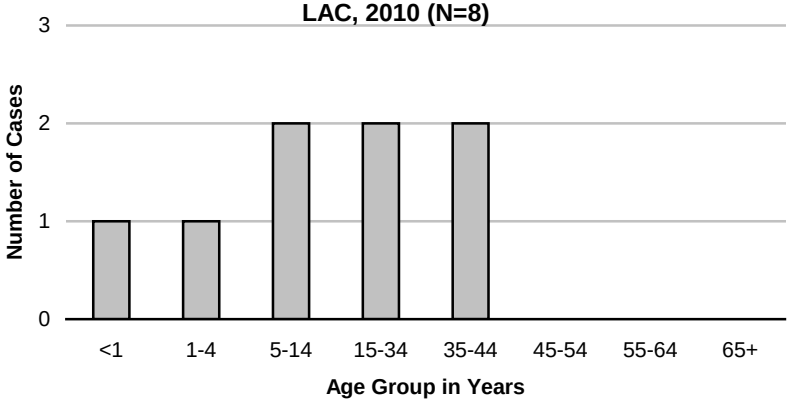


Figure 4. Percent Cases of Confirmed Measles by Race/Ethnicity LAC, 2010 (N=8)

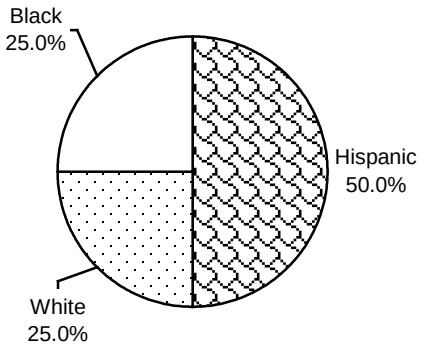


Figure 5. Reported Confirmed Measles Cases by SPA LAC, 2010 (N=8)

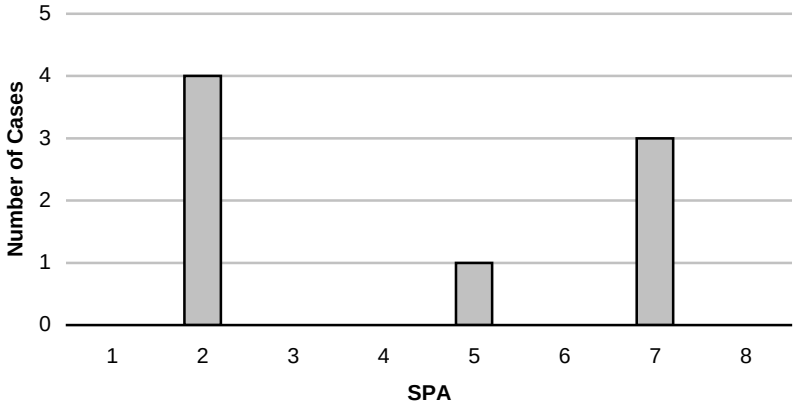


Figure 6. Reported Confirmed Measles Cases by Month of Onset LAC, 2010 (N=8) vs. Previous Five-Year Average

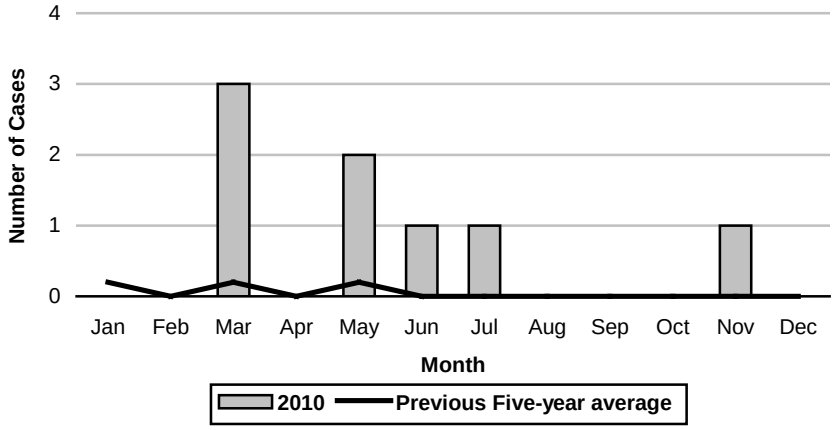


Figure 7. Vaccination Status of Reported Measles Cases LAC, 2010

	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	1	0	7	3
%	100%	12.5%	0.0%	87.5%	75.0%

[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	570
Annual Incidence[a]	
LA County	5.81
Age at Diagnosis	
Mean	22.8
Median	16
Range	0-92

[a]Cases per 100,000 population.

DESCRIPTION

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

The most common cause of viral meningitis is 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, varicella-zoster virus, mumps virus, lymphocytic choriomeningitis virus, human immunodeficiency virus, adenovirus, parainfluenza virus type 3, influenza virus, measles virus and arboviruses, such as West Nile virus (WNV). In most cases, supportive measures are the usual treatments for viral meningitis; several are vaccine-preventable; recovery is usually complete and associated with low mortality rates. Antiviral agents are available for viral meningitis associated with herpes simplex and varicella-zoster viruses.

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

2010 TRENDS AND HIGHLIGHTS

- In 2010, viral/aseptic meningitis incidence increased by 41% from 4.1 per 100,000 from 2009 to 5.8 cases per 100,000 (Figure 1).
- Viral/aseptic meningitis increased greatest among blacks in 2010 compared to other racial/ethnic groups, from 2.7 cases per 100,000 in 2009 to 7.5 per 100,000 in 2010 (Figure 6).
- SPA 1 (Antelope Valley) continually carries the highest rates of viral meningitis in LAC (12.1 per 100,000 in 2010) (Figure 4). This is most likely due to better reporting by the main hospital that serves the area rather than an effect of age group distribution. The proportion of SPA 1 that is <1 year of age is only slightly higher than LAC as a whole (1.7% versus 1.4%, respectively).
- Of the 78 cases (14%) in which an etiology was identified, 62 (79%) were caused by an enterovirus and 2 (<1%) by WNV.
- Three 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, 2006-2010

	2006 (N=373)			2007 (N=395)			2008 (N=597)			2009 (N=399)			2010 (N=570)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	71	19.0	49.0	75	19.0	50.7	80	13.4	57.3	53	13.3	38.6	89	15.6	63.8
1-4	14	3.8	2.4	11	2.8	1.9	24	4.0	4.2	14	3.5	2.5	33	5.8	5.7
5-14	47	12.6	3.2	45	11.4	3.1	148	24.8	10.5	71	17.8	5.2	138	24.2	10.4
15-34	111	29.8	4.0	120	30.4	4.3	164	27.5	5.7	148	37.1	5.2	164	28.8	5.6
35-44	53	14.2	3.5	58	14.7	3.9	52	8.7	3.4	42	10.5	2.8	56	9.8	3.9
45-54	42	11.3	3.2	42	10.6	3.2	44	7.4	3.3	34	8.5	2.5	39	6.8	2.9
55-64	23	6.2	2.6	14	3.5	1.6	29	4.9	3.2	18	4.5	1.9	17	3.0	1.8
65+	10	2.7	1.0	29	7.3	2.9	51	8.5	5.0	19	4.8	1.8	33	5.8	3.1
Unknown	2	0.5		1	0.3		5	0.8		0	0.0		1	0.2	
Race/Ethnicity															
Asian	29	7.8	2.3	30	7.6	2.3	37	6.2	2.8	21	5.3	1.6	36	6.3	2.7
Black	33	8.8	3.9	28	7.1	3.3	43	7.2	5.0	23	5.8	2.7	64	11.2	7.5
Hispanic	195	52.3	4.2	179	45.3	3.9	275	46.1	5.9	208	52.1	4.4	259	45.4	5.5
White	101	27.1	3.5	108	27.3	3.7	121	20.3	4.2	80	12.5	2.7	112	19.6	3.9
Other	5	1.3	17.5	6	1.5	28.8	20	3.4	81.1	4	1.0		13	2.3	
Unknown	10	2.7		44	11.1		101	16.9		63	15.8		86	15.1	
SPA															
1	45	12.1	12.9	35	8.9	9.8	69	11.6	18.8	46	11.5	12.5	45	7.9	12.1
2	72	19.3	3.4	84	21.3	3.9	80	13.4	3.7	88	22.1	4.0	86	15.1	3.9
3	78	20.9	4.5	63	15.9	3.6	86	14.4	5.0	63	15.8	3.6	98	17.2	5.6
4	23	6.2	1.8	16	4.1	1.3	24	4.0	1.9	18	4.5	1.4	29	5.1	2.3
5	10	2.7	1.6	13	3.3	2.0	29	4.9	4.5	22	5.5	3.4	13	2.3	2.0
6	31	8.3	3.0	42	10.6	4.0	79	13.2	7.5	45	11.3	4.3	76	13.3	7.1
7	59	15.8	4.3	73	18.5	5.3	131	21.9	9.5	62	15.5	4.5	92	16.1	6.7
8	52	13.9	4.7	63	15.9	5.6	90	15.1	8.0	53	13.3	4.7	121	21.2	10.8
Unknown	3	0.8		6	1.5		9	1.5		2	0.5		10	1.8	

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

Figure 1. Incidence Rates of Viral Meningitis LAC, 1999-2010

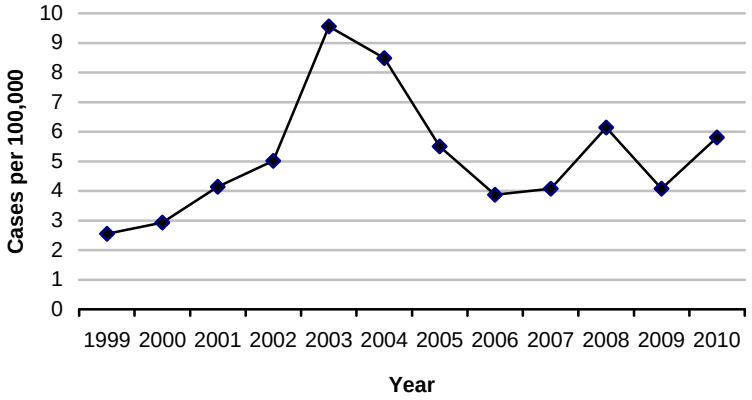


Figure 2. Incidence Rates of Viral Meningitis by Age Group LAC, 2010 (N=570)

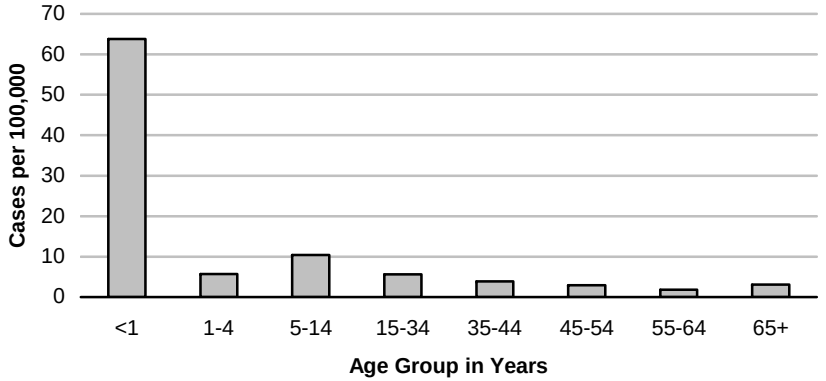


Figure 3. Percent Cases of Viral Meningitis by Race/Ethnicity, LAC, 2010 (N=570)

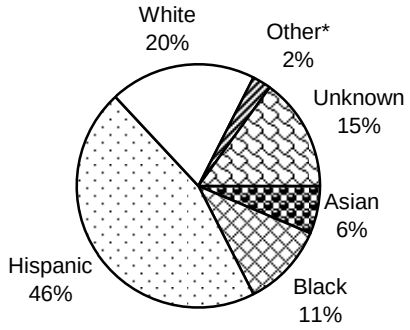
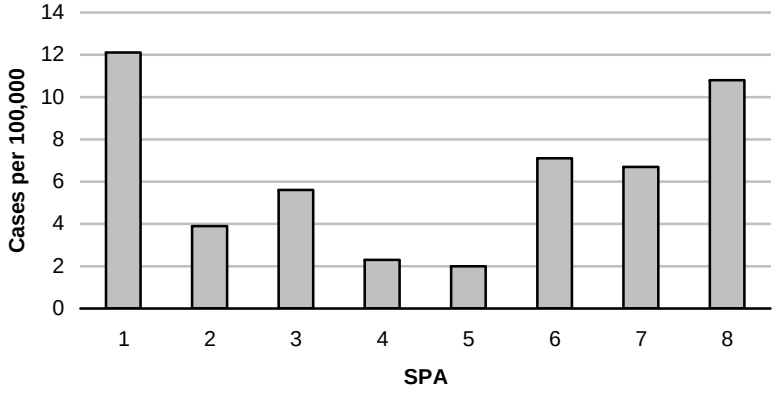


Figure 4. Incidence Rates of Viral Meningitis by SPA LAC, 2010 (N=570)



* 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, 2010 (N=570)

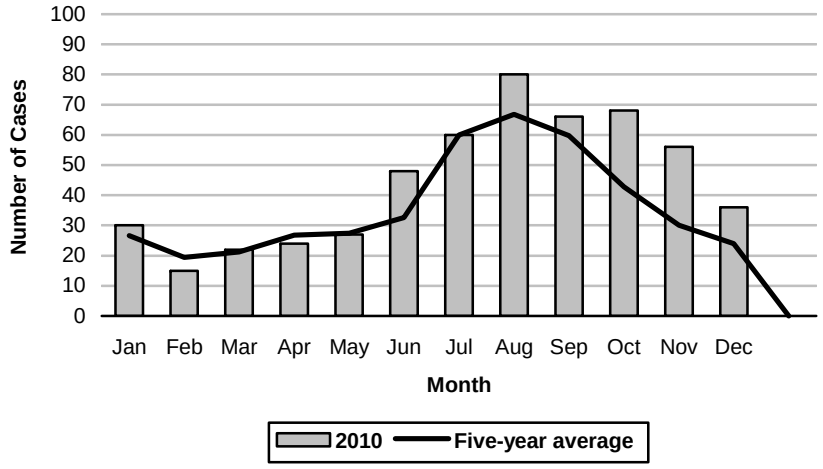
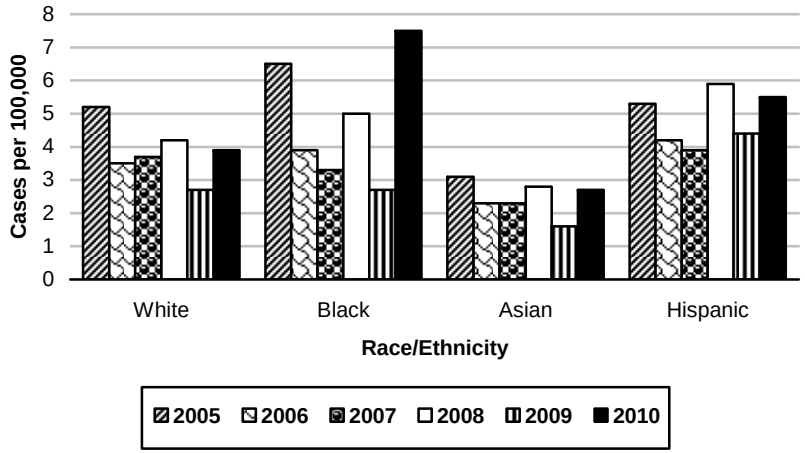
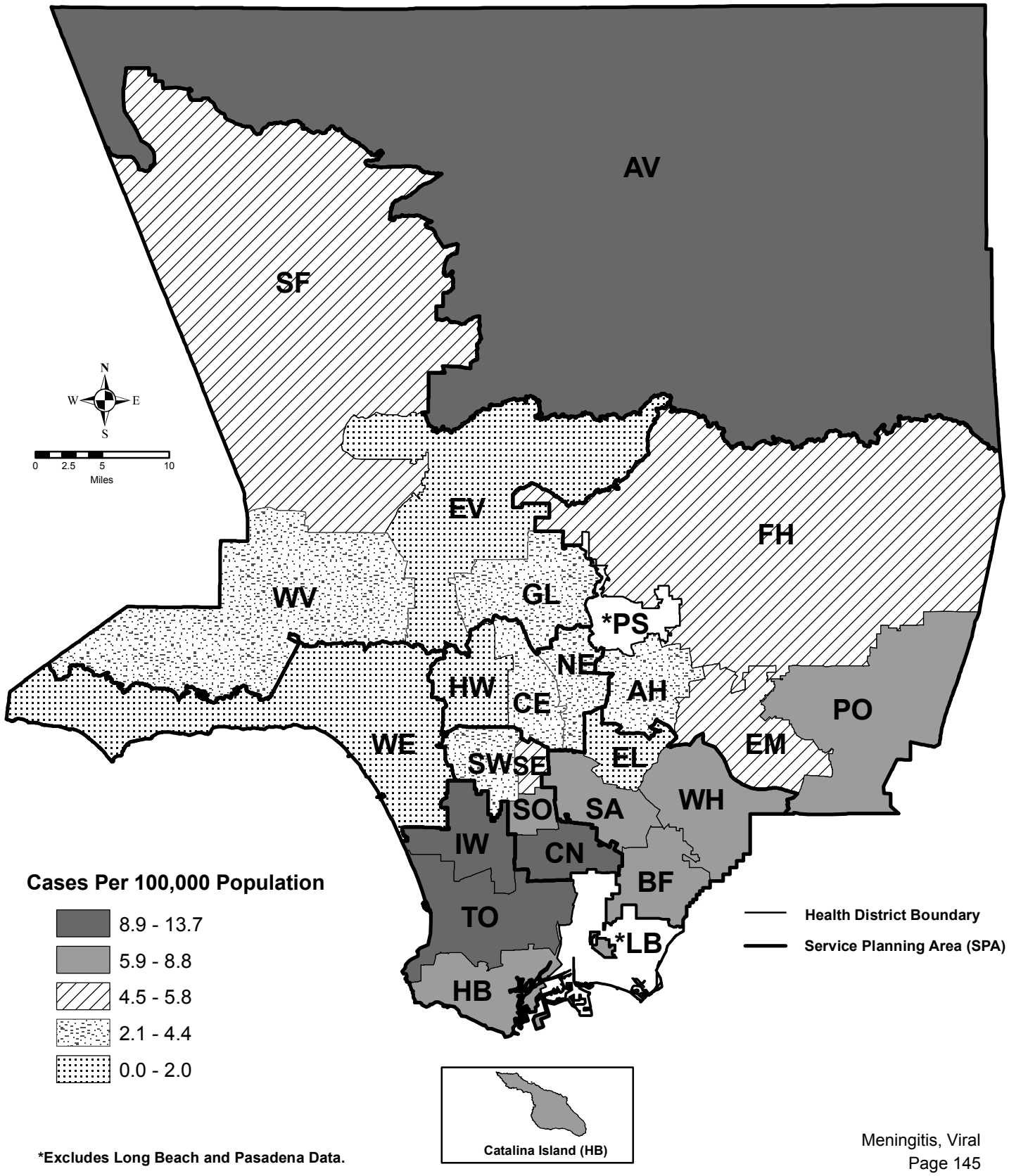


Figure 6. Incidence Rates of Viral Meningitis by Race/Ethnicity
LAC, 2005-2010



Map 11. Meningitis, Viral
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	26
Annual Incidence[a]	
LA County	0.27
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	34.6
Median	32
Range	0-83

[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.

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, C, Y, and W-135 are vaccine-preventable.

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

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.

2010 TRENDS AND HIGHLIGHTS

- There were 24 (92%) culture-confirmed cases: 15 (63%) cultured from blood, 3 (12.5%) from cerebrospinal fluid (CSF), 3 (12.5%) from both CSF and blood, 2 (8.3%) from synovial fluid, and 1 (4.2%) from meningeal tissue. Two cases were probable by PCR. Twenty- five cases (96%) had serogroup identified; 7 (28%) were serogroup B, 10 (40%) serogroup C, 6 (24%) serogroup Y, and 2 (8%) serogroup W-135.
- The incidence of meningococcal disease continued to decline (0.27 per 100,000) and slowly declining since 2001 (a peak of 0.64 cases per 100,000).
- No secondary cases or outbreaks were detected.
- Three deaths were documented (11.5%), which is consistent as in previous years.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=46)			2007 (N=24)			2008 (N=30)			2009 (N=21)			2010 (N=26)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1	1	4.8	0.7	2	7.7	1.4
1-4	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2	1	4.8	0.2	2	7.7	0.3
5-14	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4	1	4.8	0.1	1	3.8	0.1
15-34	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2	10	47.6	0.4	8	30.8	0.3
35-44	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3	0	0.0	0.0	4	15.3	0.3
45-54	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2	4	19.0	0.3	5	19.2	0.4
55-64	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4	4	19.0	0.4	1	3.8	0.1
65+	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2	0	0.0	0.0	3	11.5	0.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1	0	0.0	0.0	1	3.8	0.1
Black	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5	4	19.0	0.5	7	26.9	0.8
Hispanic	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4	9	42.9	0.2	11	42.3	0.2
White	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1	7	33.3	0.2	7	26.9	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	3.3		1	4.8		0	0.0	
SPA															
1	0	0.0	0.0	1	4.2	0.3	2	6.6	0.6	1	4.8	0.3	1	3.8	0.3
2	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1	5	23.8	0.2	3	11.5	0.1
3	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2	1	4.8	0.1	3	11.5	0.2
4	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5	2	9.5	0.2	2	7.7	0.2
5	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8	2	9.5	0.3	2	7.7	0.3
6	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7	5	23.8	0.5	6	23.1	0.6
7	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1	2	9.5	0.1	3	11.5	0.2
8	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1	3	14.3	0.3	6	23.1	0.5
Unknown	2	4.3		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, 1999-2010

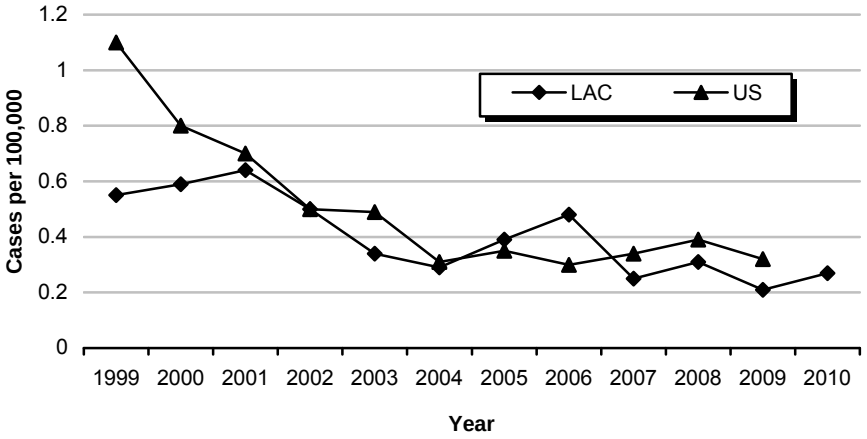


Figure 2. Incidence Rates of Meningococcal Disease by Age Group LAC, 2010 (N=26)

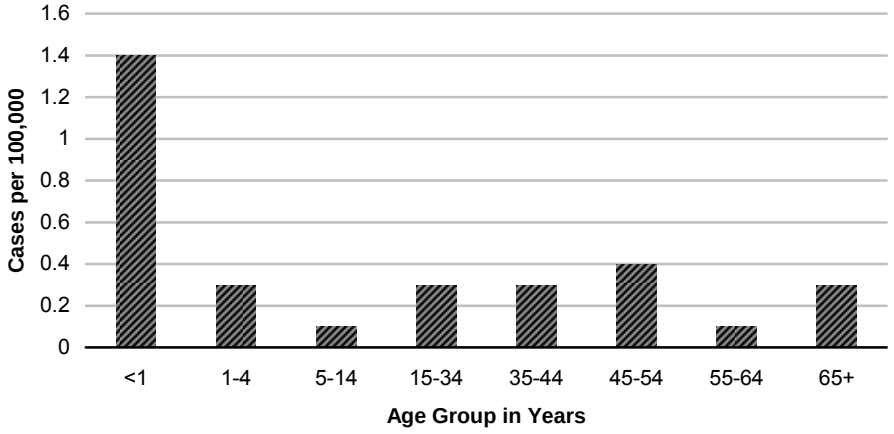


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2010 (N=26)

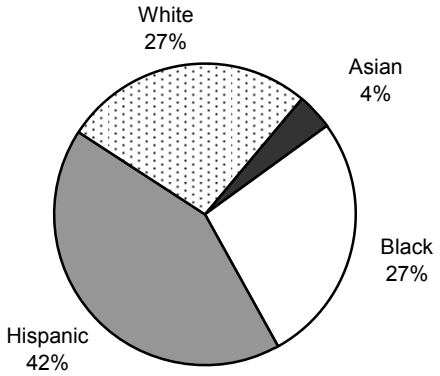


Figure 4. Incidence Rates of Meningococcal Disease Cases by Race/Ethnicity, LAC, 2005-2010

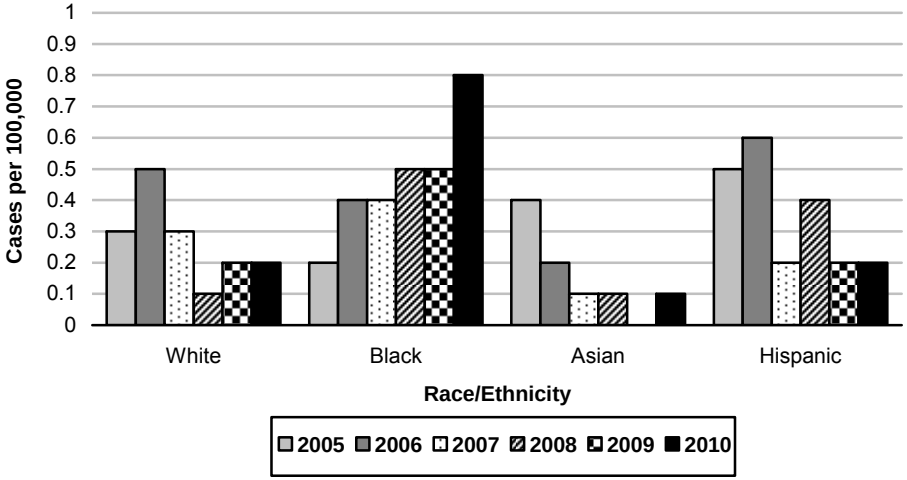


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2010 (N=26)

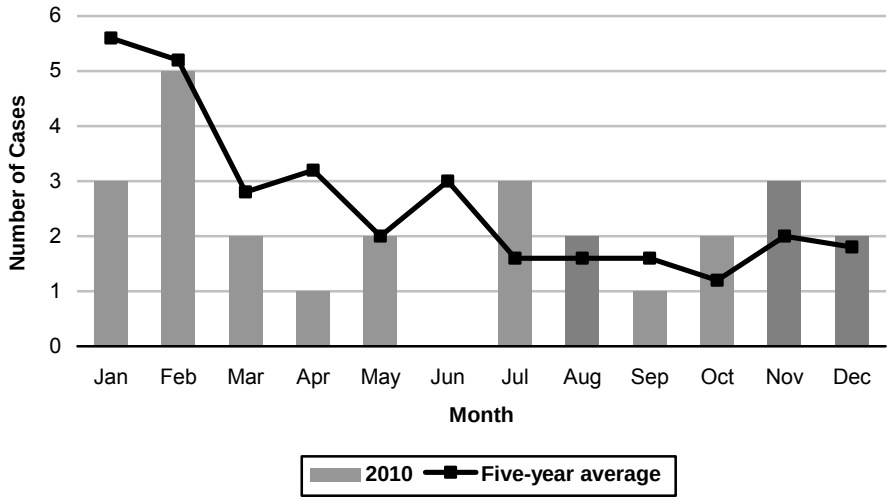


Figure 6. Incidence Rates of Meningococcal Disease by SPA LAC, 2010 (N=26)

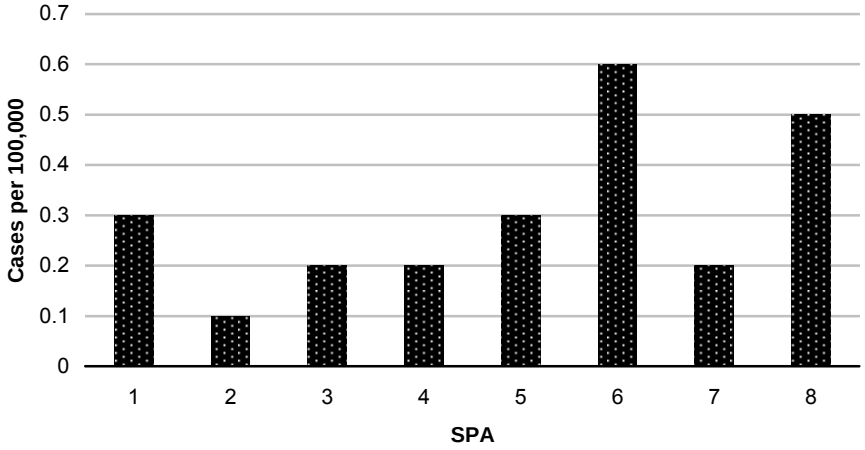
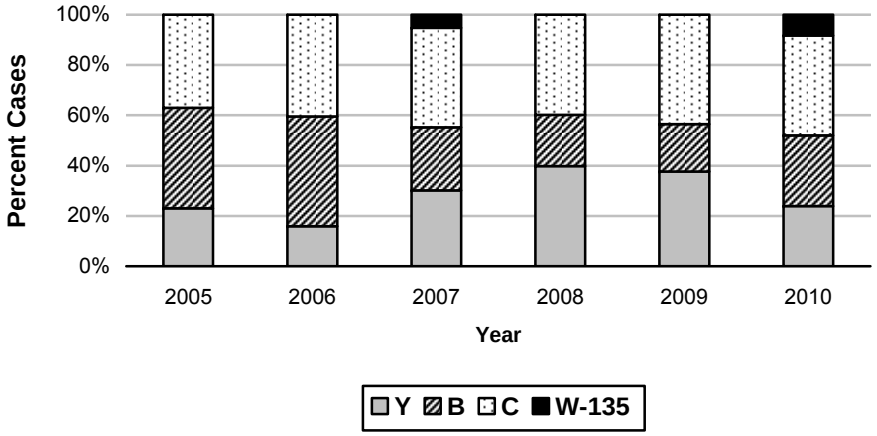


Figure 7. Meningococcal Disease by Serogroup LAC, 2005–2010



MUMPS

CRUDE DATA	
Number of Cases	20
Annual Incidence[a]	
LA County	0.20
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	20.0 years
Median	17.5 years
Range	4 - 56 years

[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.

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

2010 TRENDS AND HIGHLIGHTS

- In 2010, more than 2,500 mumps cases were reported in the United States (US). The outbreak started in June 2009 and was the largest mumps outbreak to occur in the US since 2006. The majority of cases were in adolescent boys in Observant Jewish communities in New York and New Jersey.
- Los Angeles County (LAC) released health alerts in January and March 2010. LAC's first identified case in the Observant Jewish community had onset of symptoms in late March. Subsequently, LAC released a third health alert in May and also worked with the Jewish community to implement three vaccination clinics in August.
- Twenty confirmed cases and one probable case were reported in LAC, which is the highest number of cases reported in the past ten years (Figure 2, Figure 8). Eleven of the cases (55%) were linked to the Jewish community. Greater media attention and public awareness may have also contributed to the increased numbers of mumps reports.
- Unlike previous years but similar to the US outbreak, the majority of confirmed cases (80%, n=16) were between 5-34 years of age (Figure 3). Similarly, the mean and median ages of the cases in 2010 (mean=20.0 years, median=17.5 years) decreased by at least four years compared to 2009 (mean=26.0 years, median=22.0 years).
- The majority of cases were reported in SPA 4, followed by SPA 8 and SPA 2 (Figure 5). Clusters were identified in SPA 2 (n=3), SPA 4 (n=4), and SPA 8 (n=4). Furthermore, Observant Jewish communities in LAC are clustered in SPA 2, SPA 4, and SPA 5.
- The majority of cases were not up-to-date with vaccine recommendations. Additionally, four of the confirmed cases had personal beliefs exemption school vaccine waivers (Figure 7). More work needs to be done to increase mumps vaccination coverage to prevent further transmission.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=10)			2007 (N=5)			2008 (N=7)			2009 (N=7)			2010 (N=20)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
1-4	1	10.0		0	0.0		0	0.0		2	28.6		1	5.0	
5-14	2	20.0		1	20.0		1	14.3		0	0.0		8	40.0	
15-34	2	20.0		1	20.0		2	28.6		4	57.1		8	40.0	
35-44	1	10.0		1	20.0		1	14.3		0	0.0		0	0.0	
45-54	3	30.0		2	40.0		3	42.9		0	0.0		2	10.0	
55-64	1	10.0		0	0.0		0	0.0		0	0.0		1	5.0	
65+	0	0.0		0	0.0		0	0.0		1	14.3		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	3	30.0		3	60.0		1	14.3		3	42.8		0	0.0	
Black	0	0.0		0	0.0		0	0.0		1	14.3		1	5.0	
Hispanic	3	30.0		2	40.0		3	42.9		2	28.6		3	15.0	
White	3	30.0		0	0.0		3	42.9		1	14.3		16	80.0	
Other	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Unknown	1	10.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0		1	20.0		1	14.3		1	14.3		0	0.0	
2	4	40.0		1	20.0		2	28.6		1	14,3		4	20.0	
3	0	0.0		1	20.0		1	14.3		1	14.3		1	5.0	
4	2	20.0		0	0.0		1	14.3		0	0.0		7	35.0	
5	2	20.0		0	0.0		2	28.6		2	28.6		2	10.0	
6	0	0.0		1	20.0		0	0.0		1	14.3		0	0.0	
7	2	20.0		1	20.0		0	0.0		0	0.0		0	0.0	
8	0	0.0		0	0.0		0	0.0		1	14.3		6	30.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

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

Figure 1. Incidence Rates of Confirmed Mumps
LAC, CA and US, 2001-2010

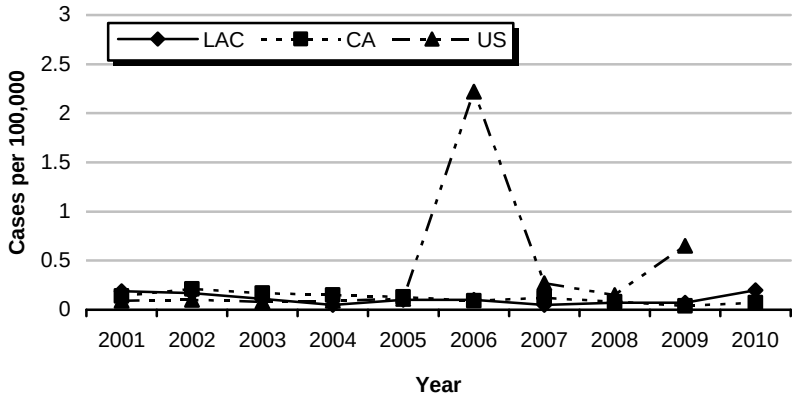


Figure 2. Reported Confirmed Mumps Cases
LAC, 2001-2010

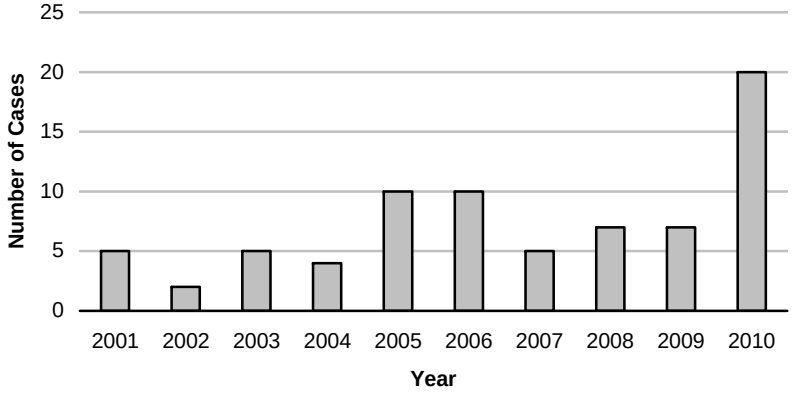


Figure 3. Reported Confirmed Mumps Cases by Age Group
LAC, 2010 (N=20)

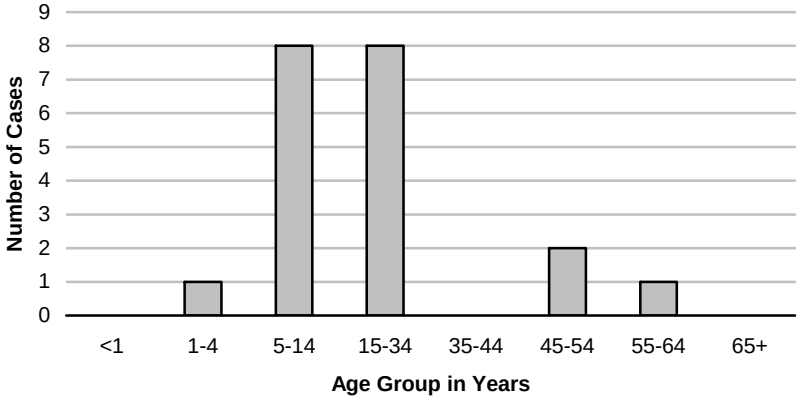


Figure 4. Percent Cases of Confirmed Mumps by
Race/Ethnicity LAC, 2010 (N=20)

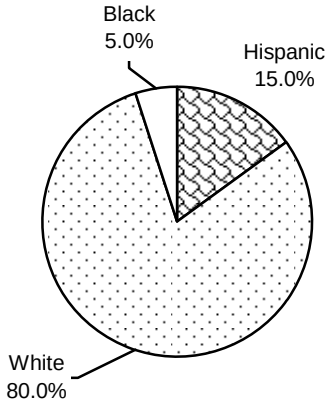


Figure 5. Reported Confirmed Mumps Cases by SPA LAC, 2010 (N=20)

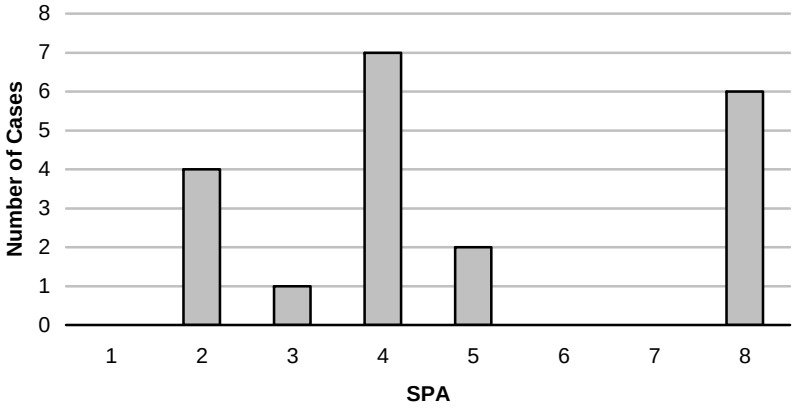


Figure 6. Reported Confirmed Mumps Cases by Month of Onset LAC, 2010 (N=20) vs. Previous Five-Year Average

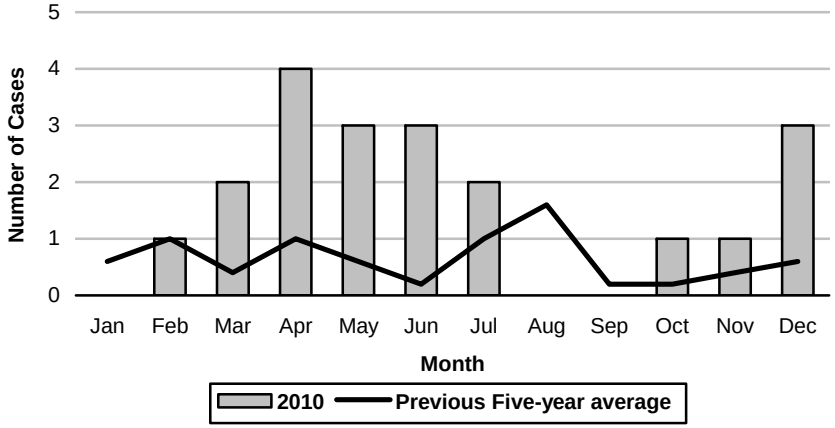


Figure 7. Vaccination Status of Reported Confirmed Mumps Cases, LAC, 2010

	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=13)
No.	20	0	7	13	4
%	100%	0%	35.0%	65.0%	30.8%

[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, 2010 vs. Previous Two-Year Average*

	Confirmed		Probable	
	2010	2008-2009 Average	2010	2008-2009 Average
Total Cases	20	7	1	1
Age at Onset (years)				
Mean	20.0	30.6	5.0	9.0
Median	17.5	33.0	5.0	9.0
Range	4.0 – 56.0	2.0 – 67.0	n/a	6.0 – 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	972
Annual Incidence[a]	
LA County	9.91
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	12.2 years
Median	7.0 years
Range	Birth – 88 years

[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.

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 5-10 years following their last dose. In Spring 2005, two Tdap vaccines were licensed for use in adolescents and adults. A single dose of Tdap is recommended for persons aged 10-64 years.
- In 2010, Tdap recommendations were expanded to include children age 7-9 years who did not receive all five doses of DTaP and adults age 65 years and older who were not previously vaccinated with Tdap.

2010 TRENDS AND HIGHLIGHTS

- Pertussis incidence has peaked every three to five years, with the last peak occurring in 2005. In 2010, a resurgence occurred, as Los Angeles County's (LAC) highest peak in incidence in over 50 years occurred with 972 cases (696 confirmed, 276 probable) reported (9.91 cases per 100,000) (Figure 1, Figure 2). The resurgence started in April and peaked during the summer months of July-September (Figure 7). Four deaths were also reported in LAC; all were infants less than three months of age. A total of 9,120 cases were reported in California for a state rate of 23.3 cases per 100,000.
- Similar to previous years, infants less than one year of age had the highest incidence rate (195.6 cases per 100,000) (Figure 3). However, infants accounted for a smaller proportion of cases (28.1%) compared to an average of 46.7% from 2006-2009. Cases continue to increase among adolescents and adults. For the first time, the 5-14 year age group accounted for the highest proportion of cases (31.3%). Furthermore, the median age of cases increased by six years in 2010 (7.0 years) compared to 2009 (10.5 months).
- Similar to previous years, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5).
- Unlike previous years, SPA 6, SPA 4, and SPA 2 had the highest incidence rates (Figure 6). Household clusters were identified in SPA 2 (n=20), SPA 3 (n=26), SPA 4 (n=16), SPA 5 (n=4), SPA 6 (n=15), SPA 7 (n=7), and SPA 8 (n=22). Except for SPA 1, all of the SPAs increased their incidence rates by three-fold compared to 2009.
- Of the total 972 cases, 57.2% (n=556) cases were either too young to be vaccinated (8.6%) or were not up-to-date with the immunization recommendations for their age (48.6%) indicating that more work needs to be done to increase pertussis vaccination rates. Additionally, 4.2% (n=33) of the cases age less <18 years of age had personal beliefs exemption school vaccine waivers (Figure 8).

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=150)			2007 (N=69)			2008 (N=80)			2009 (N=156)			2010 (N=972)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	58	38.7	40.0	31	44.9	21.0	42	52.5	30.1	79	50.7	57.6	273	28.1	195.6
1-4	14	9.3	2.4	4	5.8	0.7	7	8.8	1.2	10	6.4	1.8	158	16.2	27.2
5-14	33	22.0	2.2	13	18.8	0.9	13	16.3	0.9	18	11.5	1.3	304	31.3	22.9
15-34	21	14.0	0.8	14	20.3	0.5	12	15.0	0.4	20	12.8	0.7	122	12.5	4.1
35-44	8	5.3	0.5	4	5.8	0.3	1	1.3	0.1	9	5.8	0.6	40	4.1	2.8
45-54	7	4.7	0.5	1	1.4	0.1	2	2.5	0.1	12	7.7	0.9	28	2.9	2.1
55-64	6	4.0	0.7	2	2.9	0.2	2	2.5	0.2	5	3.2	0.5	24	2.5	2.5
65+	3	2.0	0.3	0	0.0	0.0	1	1.3	0.1	3	1.9	0.3	23	2.4	2.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	8	5.3	0.6	8	11.6	0.6	4	5.0	0.3	10	6.4	0.8	32	3.3	2.4
Black	4	2.7	0.5	1	1.4	0.1	4	5.0	0.5	6	3.9	0.7	50	5.1	5.9
Hispanic	79	52.7	1.7	42	60.9	0.9	52	65.0	1.1	100	64.1	2.1	655	67.4	13.8
White	59	39.3	2.1	18	26.1	0.6	18	22.5	0.6	39	25.0	1.3	216	22.2	7.5
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.6	3.9	2	0.2	7.7
Unknown	0	0.0		0	0.0		2	2.5		0	0.0		17	1.8	
SPA															
1	12	8.0	3.5	1	1.4	0.3	2	2.5	0.5	9	5.8	2.4	19	1.9	5.1
2	32	21.3	1.5	16	23.2	0.7	12	15.0	0.5	21	13.5	0.9	209	21.5	9.4
3	21	14.0	1.2	8	11.6	0.5	4	5.0	0.2	24	15.4	1.4	147	15.1	8.5
4	14	9.3	1.1	9	13.0	0.7	17	21.3	1.3	18	11.5	1.4	162	16.7	12.9
5	11	7.3	1.7	8	11.6	1.2	10	12.5	1.5	17	10.9	2.6	57	5.8	8.6
6	17	11.3	1.6	9	13.0	0.9	9	11.3	0.9	24	15.4	2.3	158	16.3	14.8
7	27	18.0	2.0	8	11.6	0.6	13	16.3	0.9	22	14.1	1.6	129	13.3	9.4
8	16	10.7	1.4	10	14.5	0.9	13	16.3	1.2	21	13.5	1.9	90	9.3	8.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		1	0.1	

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

Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2001-2010

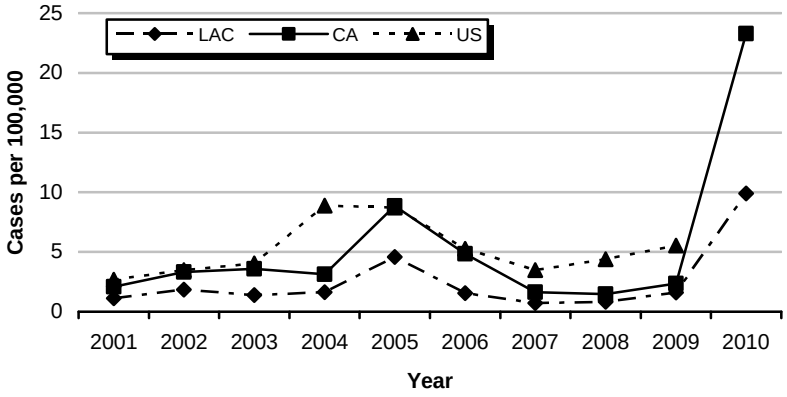


Figure 2. Reported Cases of Pertussis
LAC, 2001-2010

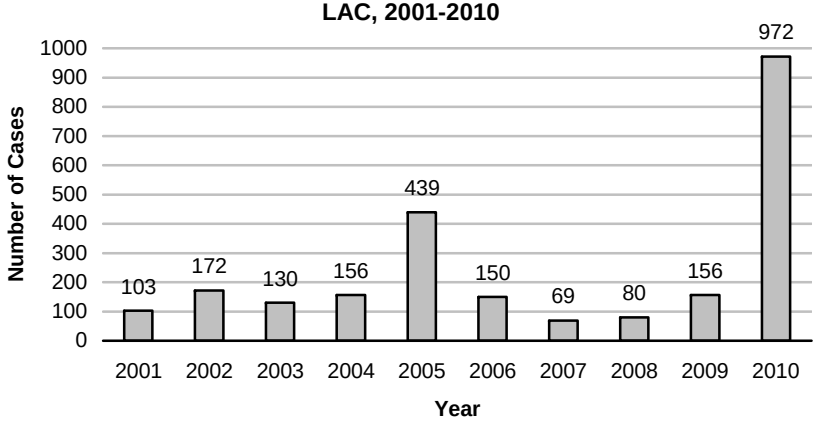


Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2010 (N=972)

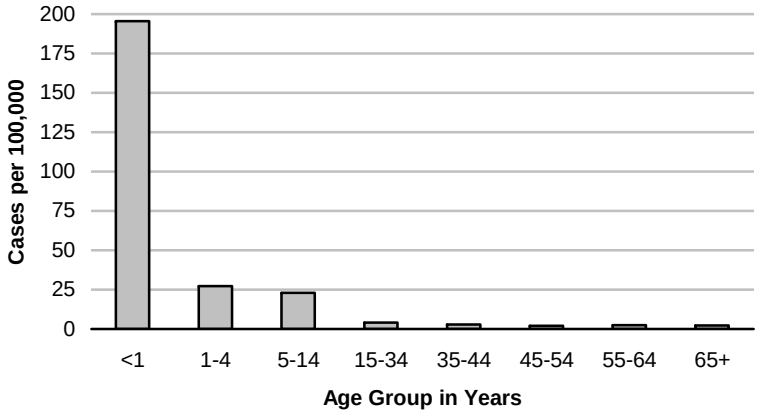
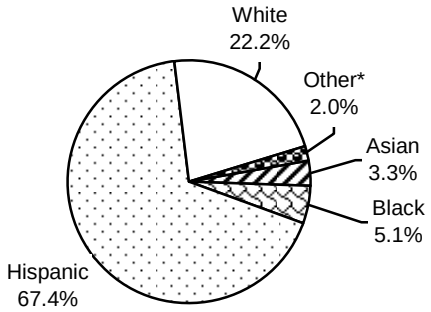
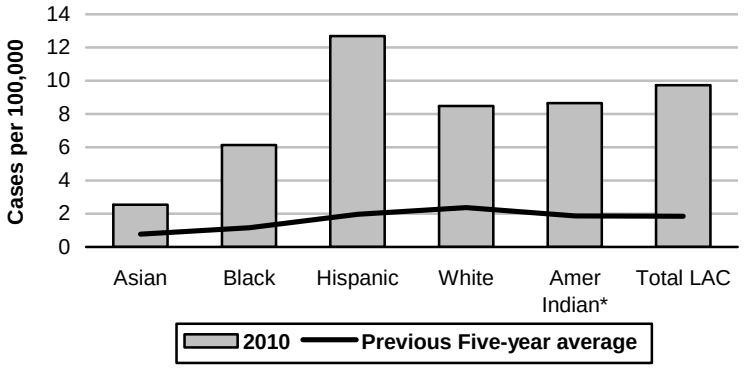


Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2010 (N=972)



* 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, 2010 (N=972) vs. Previous Five-Year Average



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

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2010 (N=972)

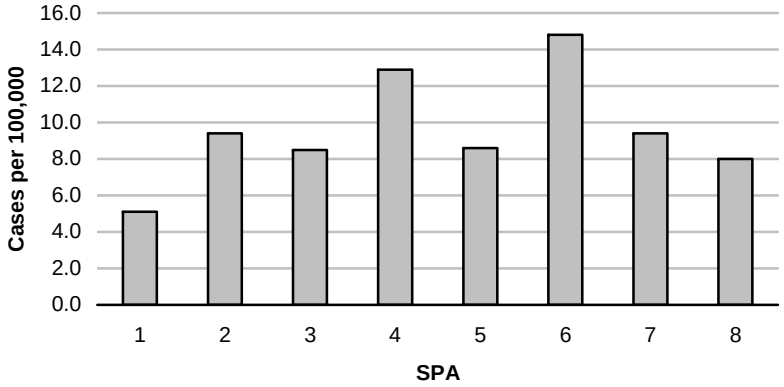


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2010 (N=972) vs. Previous Five-year Average

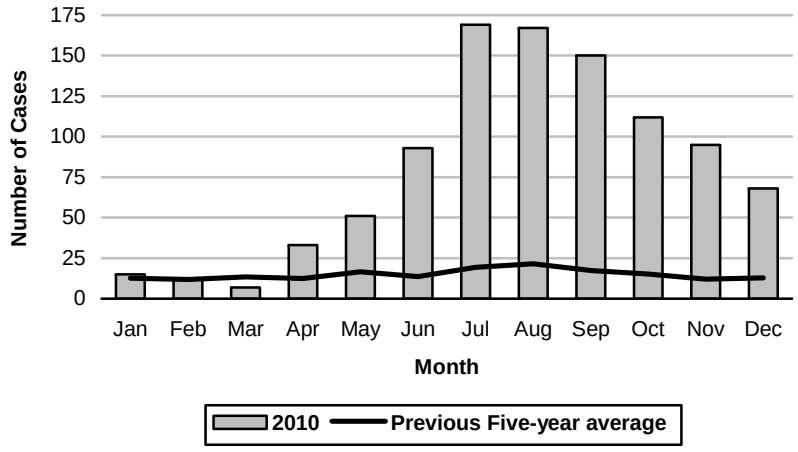
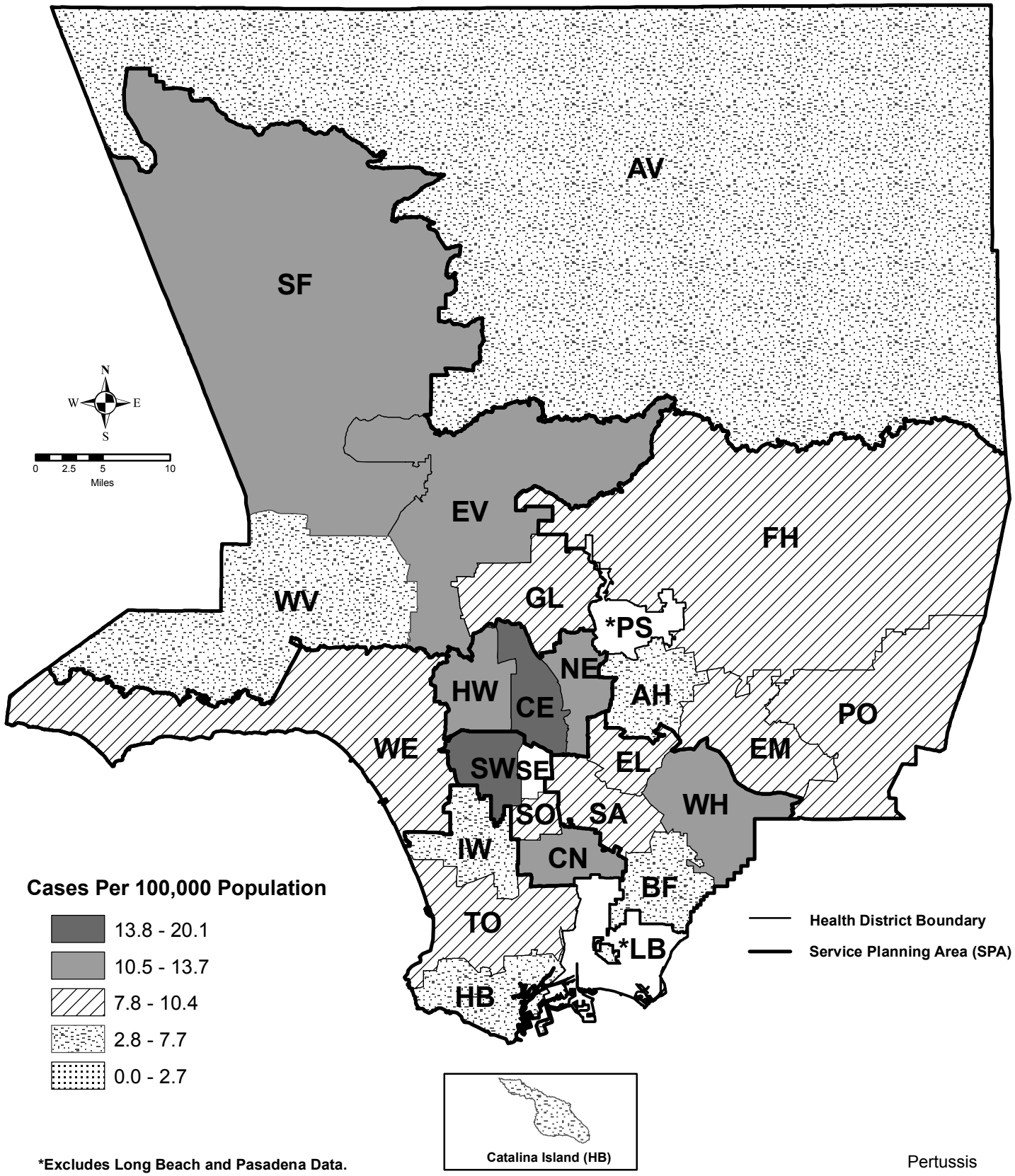


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2010

	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=784)
No.	972	84	416	472	33
%	100%	8.6%	42.8%	48.6%	4.2%

[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 12. Pertussis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	576
Annual Incidence[a]	
LA County	5.87
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	53
Median	58
Range	1 mos – 102 yrs

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

DESCRIPTION

Invasive pneumococcal disease (IPD) is a leading cause of illness in young children and causes considerable illness and death in the elderly. The infectious agent, *Streptococcus pneumoniae*, is spread by direct and indirect contact with respiratory discharge and can cause pneumonia, bacteremia, meningitis, and death. While *S. pneumoniae* is one of the most common bacterial causes of community acquired pneumonia and otitis media (inner ear infections), 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 conducted a special antibiotic resistance surveillance project since late 1995 and IPD became reportable in LAC 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.

Three vaccines may prevent pneumococcal disease. Two brands of 23-valent polysaccharide vaccine, Pnu-Imune®23 and Pneumovax®23 have been available for several years. A 13-valent conjugate vaccine Prevnar13® was introduced in February 2010.

2010 TRENDS AND HIGHLIGHTS

- Between 2006 and 2009, the rate of IPD increased in LAC. In 2010, IPD incidence decreased.
- IPD incidence rate has been stable over the past five years and 2010 rate was among the lowest in the last 10 years, except in 2006 (5.5 cases per 100,000 people), and also 26% lower than previous year's rate (8.0 cases per 100,000, N=785); and 11% lower than the previous five-year average annual incidence rate (6.6 per 100,000).
- Mortality was 15.6% (n=88 deaths). Validating and interpreting a mortality trend is difficult because disease outcome data were missing for 36-63% of the cases in 2005-2009 while in 2010 only 5% (n=30) of cases were missing disease outcome. Unadjusted mortality in the previous five years ranged from 7-14% (n=51-88).
- In 2010, 90% (n=519) of cases were reported hospitalized (2% missing). In 2005-2009, 73% of cases were hospitalized (20% missing).
- Median length of hospital stay was 6 days (n=502; mean=10, range=0-130 days). Length of stay was missing for 3% (n=17) of hospitalized cases. Length of hospital stay was not recorded for most of 2009 and all of 2004-2008.
- Incidence rates decreased or remained stable amongst all age groups compared to the previous 5-year average (Figure 2). Amongst cases <1 year old, the incidence rate was 32% lower than the previous 5-year average (from 12.6 to 8.6 cases per 100,000). Rate decreases were also seen among age groups 1-4 (11%), 15-34 (12%), 35-44 (27%), and 45-54 (18%). Rate changes for the other age groups remained within 10% of their previous 5-year averages.
- Cases aged 65 years and older and 55 to 64 years had the highest incidence rates (20.6 and 11.2 per 100,000, respectively) (Table,

Figure 2). In 2009, cases <1 year old had the second highest incidence rate among all age groups.

- Similar to previous years, the incidence rate in blacks was the highest compared to other race/ethnic groups (Table, Figure 3). Compared to the 2009, the 2010 incidence rate decreased slightly. However, valid comparisons cannot be made across years as race information was missing for 32% to 46% of cases in previous years. Race/ethnicity information was missing for 5% of cases in 2010.
- As in previous years, Service Planning Area (SPA) 6 had the highest incidence rate of IPD (7.4 cases per 100,000; Table, Figure 4).
- IPD peaked in January in 2010, unlike the December peaks seen in the previous five years (Figure 5). Compared to the average monthly incidence of the previous five years, the numbers of incident IPD cases in 2010 were substantially lower during October (52%) and April (39%).
- The percentage of isolates susceptible to penicillin increased 10% compared to the previous five years. Susceptibility to erythromycin (78% of isolates) was slightly lower than the previous 5 years (85%, Figure 6).
- Improvements in data quality have been made in 2010; outcome, hospitalization, and/or race-ethnicity were missing for ≤5% 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, 2006-2010

	2006 (N=533)			2007 (N=624)			2008 (N=662)			2009 (N=785)			2010 (N=576)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	12	2.3	8.3	23	3.7	15.6	19	2.4	11.5	20	2.5	14.6	12	2.1	8.6
1-4	47	8.8	8.1	48	7.7	8.3	57	8.6	10.1	56	7.1	10.0	47	8.2	8.1
5-14	16	3.0	1.1	23	3.7	1.6	11	1.8	0.9	33	4.2	2.4	21	3.6	1.6
15-34	34	6.4	1.2	47	7.5	1.7	30	4.4	1.0	64	8.1	2.3	39	6.8	1.3
35-44	53	9.9	3.5	67	10.7	4.5	67	10.6	4.6	75	9.5	5.0	46	8.0	3.2
45-54	92	17.3	7.1	90	14.4	6.8	98	14.2	7.0	136	17.3	9.9	84	14.6	6.2
55-64	95	17.8	10.9	106	17.0	11.9	114	17.4	12.6	123	15.6	12.9	108	18.8	11.2
65+	178	33.4	18.2	214	34.3	21.2	264	40.2	26.1	278	34.4	26.2	218	37.8	20.6
Unknown	6	1.1		6	1.0		2	0.3		1	0.1		1	0.2	--
Race / Ethnicity															
Asian	19	3.6	1.5	33	5.3	2.6	32	4.8	2.5	50	6.4	3.8	46	8.0	3.4
Black	86	16.1	10.2	70	11.2	8.2	76	11.5	8.9	86	10.9	10.1	82	14.2	9.6
Hispanic	107	20.1	2.3	135	21.6	2.9	124	18.7	2.6	197	25.1	4.2	208	36.1	4.2
White	136	25.5	4.7	102	16.3	3.5	135	20.4	4.6	192	24.4	6.6	206	35.8	7.0
Other	1	0.2	3.5	0	0.0	0.0	0	0.0	0.0	9	1.1	35.4	8	1.4	31.0
Unknown	184	34.5		284	45.5		295	44.6		252	32.1		26	4.5	--
SPA															
1	23	4.3	6.6	24	3.8	6.7	18	2.7	4.9	25	3.2	6.8	13	2.3	3.5
2	95	17.8	4.4	100	16.0	4.6	137	20.7	6.3	156	19.8	7.0	130	22.6	5.9
3	90	16.9	5.2	104	16.7	6.0	99	15.0	5.7	116	14.8	6.7	80	13.9	4.6
4	52	9.8	4.1	66	10.6	5.2	62	9.4	4.9	103	13.1	8.3	70	12.2	5.6
5	35	6.6	5.5	36	5.8	5.6	48	7.3	7.4	54	6.9	8.3	44	7.6	6.7
6	81	15.2	7.8	92	14.7	8.8	107	16.2	10.1	111	14.1	10.6	79	13.7	7.4
7	66	12.4	4.8	79	12.7	5.7	73	11.0	5.3	102	13.0	7.4	69	12.0	5.0
8	68	12.8	6.1	98	15.7	8.8	78	11.8	6.9	89	11.3	7.9	77	13.4	6.9
Unknown	12	4.3		25	4.0		40	6.0		30	3.8		14	2.4	--

*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, 2000-2010

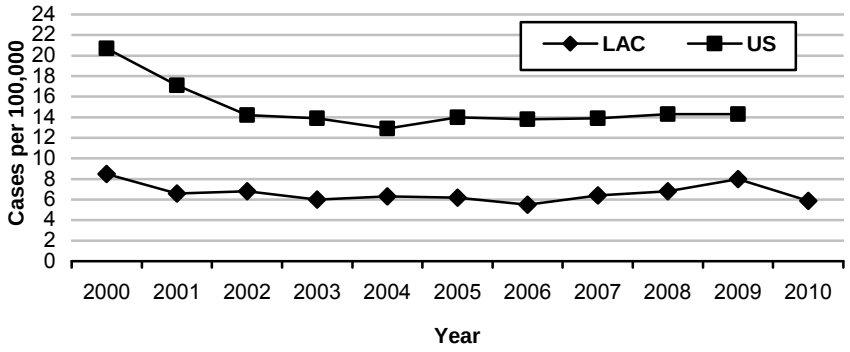


Figure 2. Annual Incidence Rates of Invasive Pneumococcal Disease by Age Group, LAC, 2005-2010

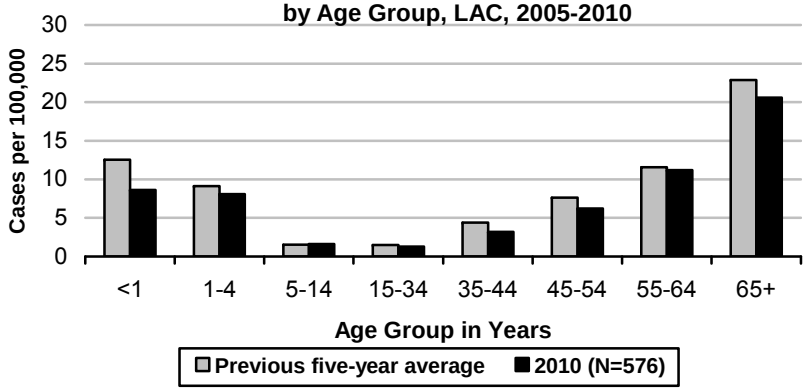
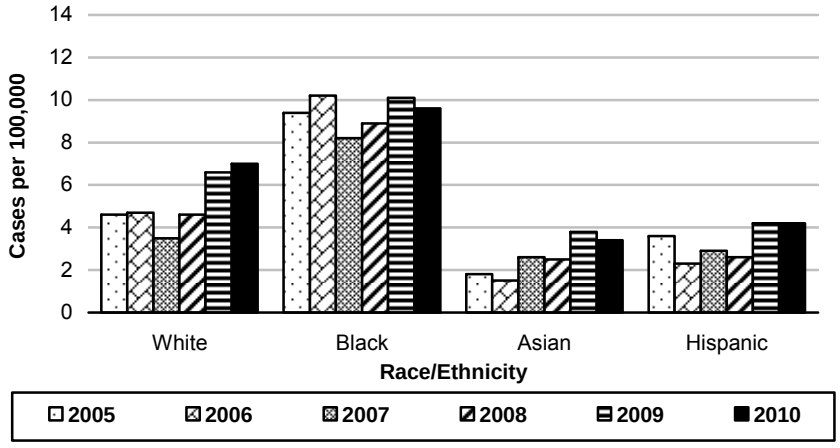


Figure 3. Annual Incidence Rates of Invasive Pneumococcal Disease by Race/Ethnicity, LAC, 2005-2010



* For 2005, 2006, 2007, 2008, 2009, and 2010, total numbers of cases (and percent with race-ethnicity missing) were 590 (32%), 533 (35%), 624 (46%), 662 (45%), 785(32%), and 576 (5%), respectively.

Figure 4. Annual Incidence Rates of Invasive Pneumococcal Disease by SPA, LAC, 2005-2010

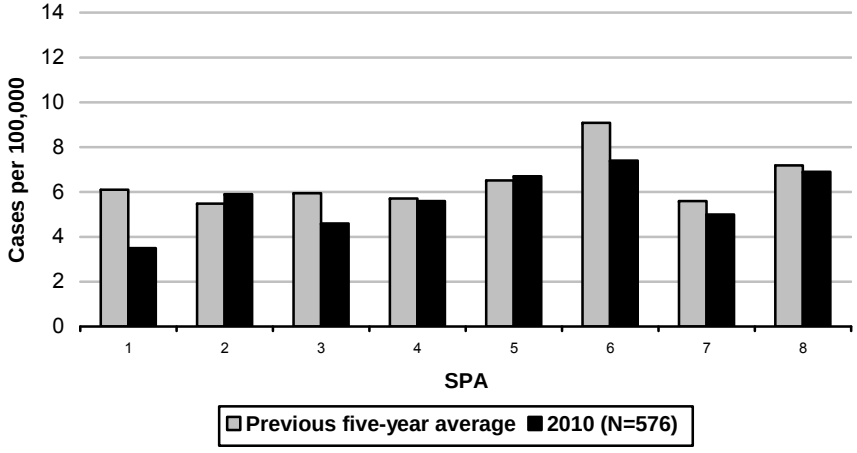


Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2005-2010

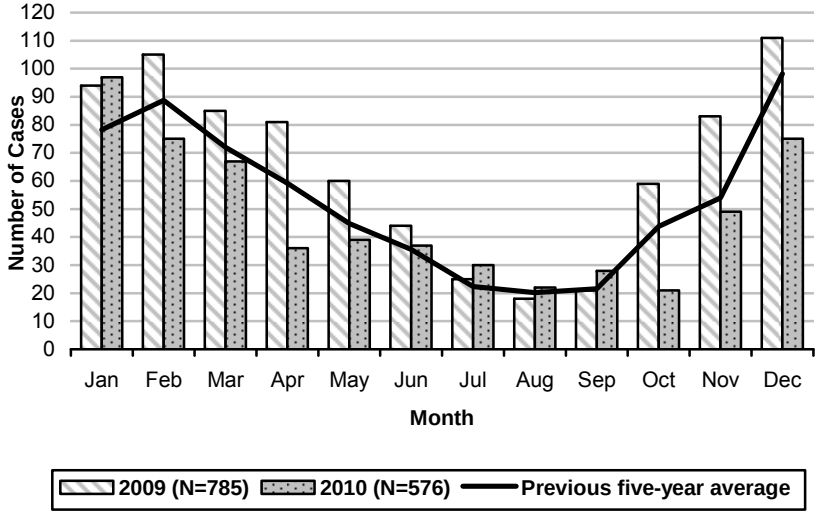
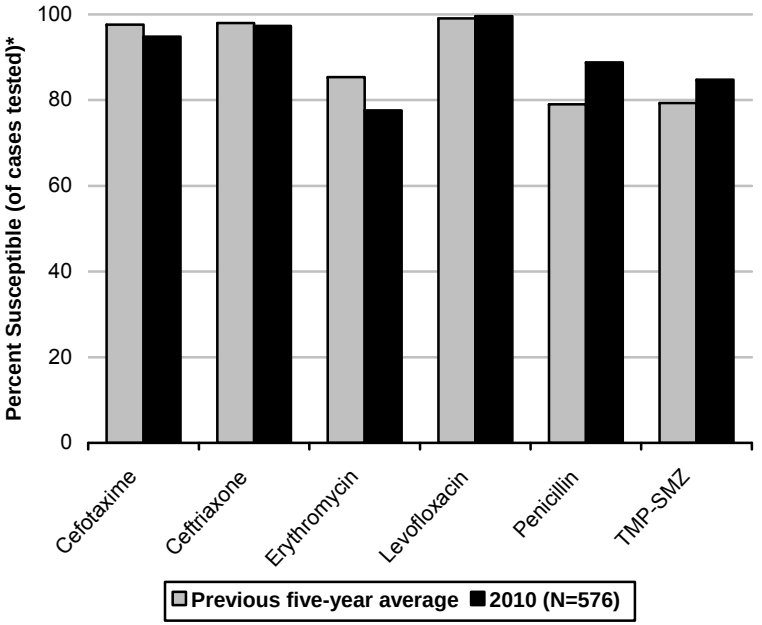
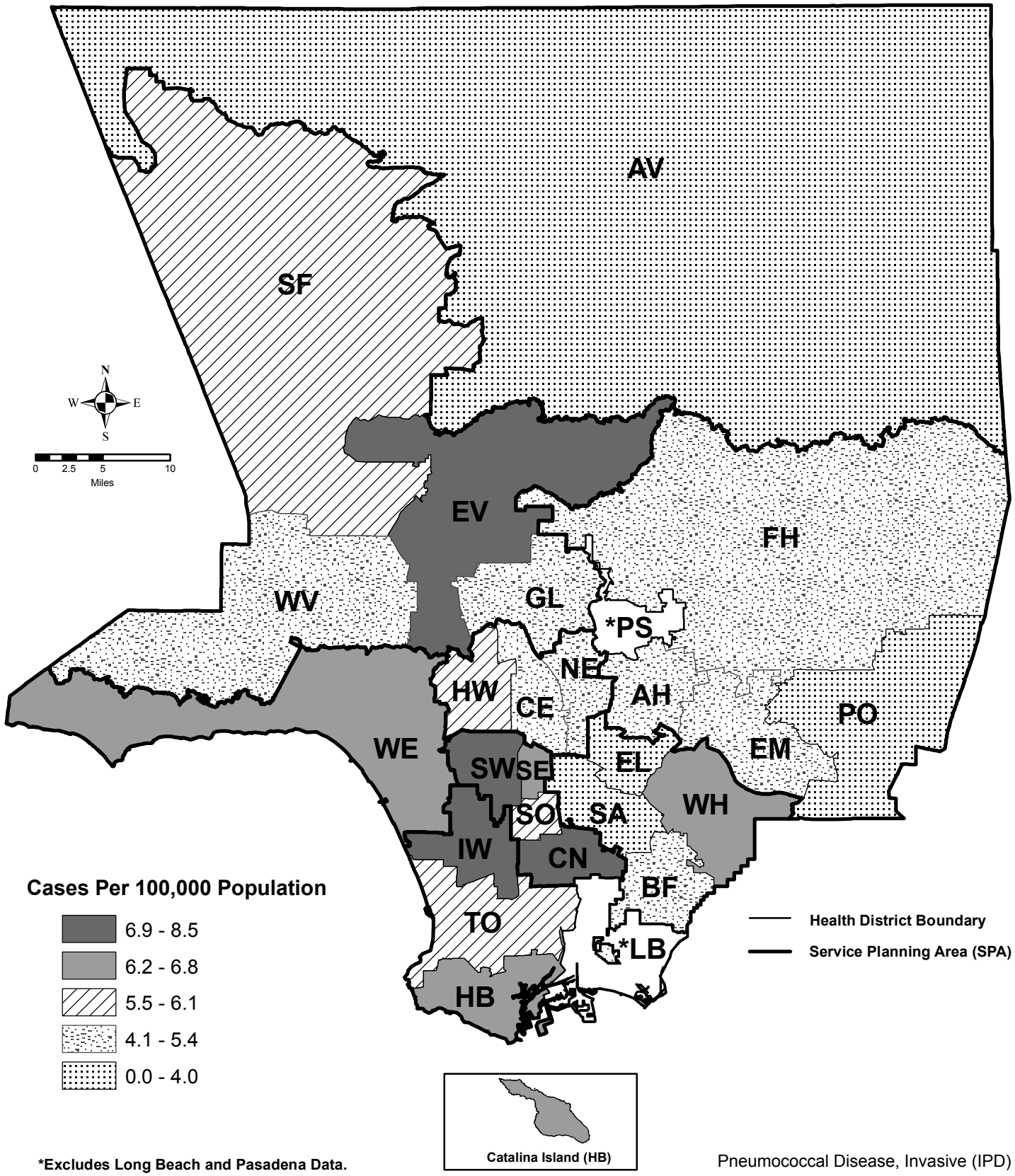


Figure 6. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2005-2010



*Range of number of isolates tested 2005-2010: Cefotaxime (301-389), Ceftriaxone (280-485), Erythromycin (271-455), Levofloxacin (262-394), Penicillin (490-667), and TMP-SMZ (150-330).

Map 13. Pneumococcal Disease, Invasive
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

SALMONELLOSIS

CRUDE DATA	
Number of Cases	1142
Annual Incidence[a]	
LA County	11.6
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	30.2
Median	27
Range	<1- 98

[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.

DESCRIPTION

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

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

Reptile-associated salmonellosis (RAS) decreased from 9.2% (n=102) of non-outbreak related cases in 2009 to 6.2% (n=66) in 2010. Among RAS cases, turtle related cases decreased from 62% to 44%. The rates among infants and children age <5 years dropped 37% and 20% respectively from 2009 rates. This improvement may be due to interventions of an interdisciplinary RAS working group established in 2007 to address the issue. Among the interventions were (see ACDC Special Studies Report 2009 and 2010):

- 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.

2010 TRENDS AND HIGHLIGHTS

- There were four salmonellosis outbreaks investigated in 2010; all were foodborne. One LAC outbreak was a subcluster of a national outbreak associated with an Iowa egg farm. For more information see the 2010 Foodborne Illness Outbreak summary in this ACDC Annual Morbidity Report 2010.
- SPA 2 had the highest rate followed by SPA 5 (Figure 4), consistent with 2009.
- Sixteen percent of cases were hospitalized for two or more days.
- There were six deaths in persons diagnosed with salmonellosis. Ages ranged from 24 to 73 years with a mean of 61 years. A 24 year old woman died at home due to possible illicit drug intoxication. The other cases had chronic medical problems such as immunodeficiency, cancer and diabetes.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=1217)			2007 (N=1081)			2008 (N=1638)			2009 (N=1194)			2010 (N=1142)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	100	8.2	69.0	99	9.2	66.9	89	5.4	63.7	89	7.5	64.9	56	4.9	40.1
1-4	221	18.2	38.1	183	16.9	31.7	613	37.4	108.	229	19.2	40.8	186	16.2	32.0
5-14	208	17.1	14.1	172	15.9	12.0	170	10.4	12.1	195	16.3	14.3	174	15.2	13.1
15-34	251	20.6	9.0	226	20.9	8.0	278	17.0	9.7	271	22.7	9.6	262	22.9	8.9
35-44	105	8.6	7.0	114	10.5	7.6	151	9.2	10.0	110	9.2	7.4	131	11.5	9.1
45-54	112	9.2	8.6	85	7.9	6.4	116	7.1	8.6	101	8.5	7.4	87	7.6	6.4
55-64	80	6.6	9.2	75	6.9	8.5	91	5.6	10.0	76	6.4	8.0	100	8.8	10.4
65+	140	11.5	14.3	124	11.5	12.3	127	7.8	12.4	123	10.3	11.6	146	12.8	13.8
Unknown	0	0.0		3	0.3		3	0.2					0		
Race / Ethnicity															
Asian	138	11.3	10.9	114	10.5	8.9	114	7.0	8.7	103	8.6	7.9	115	10.0	8.6
Black	95	7.8	11.3	64	5.9	7.5	77	4.7	9.0	75	6.3	8.8	50	4.4	5.9
Hispanic	609	50.0	13.2	539	49.9	11.6	1071	65.4	22.9	620	52.0	13.3	570	50.1	12.0
White	351	28.8	12.2	339	31.4	11.7	326	19.9	11.2	367	30.7	12.6	387	33.9	13.5
Other	4	0.3	14.0	10	0.9	48.0	3	0.2	12.2	10	0.8		3	0.3	
Unknown	20	1.6		15	1.4		47	2.9		19	1.6		17	1.5	
SPA															
1	33	2.7	9.5	39	3.6	10.9	35	2.1	9.5	40	3.4	10.9	36	3.2	9.6
2	270	22.2	12.6	243	22.5	11.3	657	40.1	30.0	316	26.5	14.3	303	26.5	13.7
3	189	15.5	11.0	186	17.2	10.8	204	12.5	11.8	179	15.0	10.3	221	19.4	12.7
4	179	14.7	14.2	148	13.7	11.7	135	8.2	10.6	138	11.6	11.1	156	13.7	12.4
5	104	8.5	16.3	74	6.8	11.5	46	2.8	7.1	107	9.0	16.4	86	7.5	13.0
6	142	11.7	13.6	132	12.2	12.6	123	7.5	11.7	134	11.2	12.7	86	7.5	8.0
7	175	14.4	12.7	146	13.5	10.6	309	18.9	22.3	152	12.7	11.0	140	12.3	10.2
8	123	10.1	11.1	113	10.5	10.1	129	7.9	11.5	128	10.7	11.4	114	10.0	10.2
Unknown	2	0.2		0	0.0		0	0.0							

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

Figure 1. Reported Salmonellosis Rates by Year
LAC, CA and US, 2001-2010

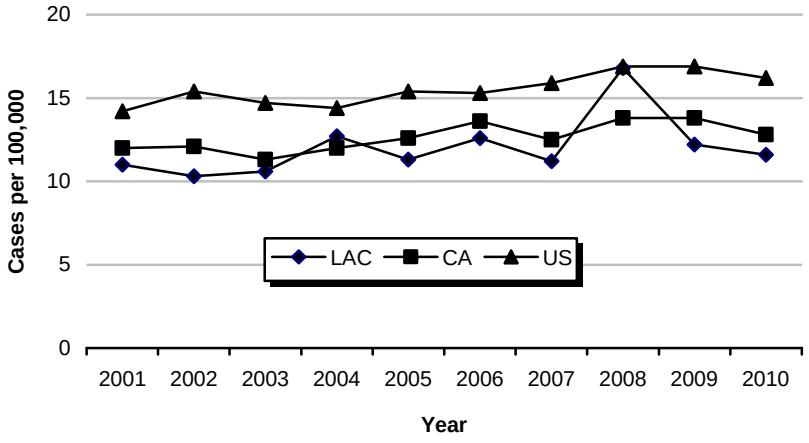


Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2010 (N=1142)

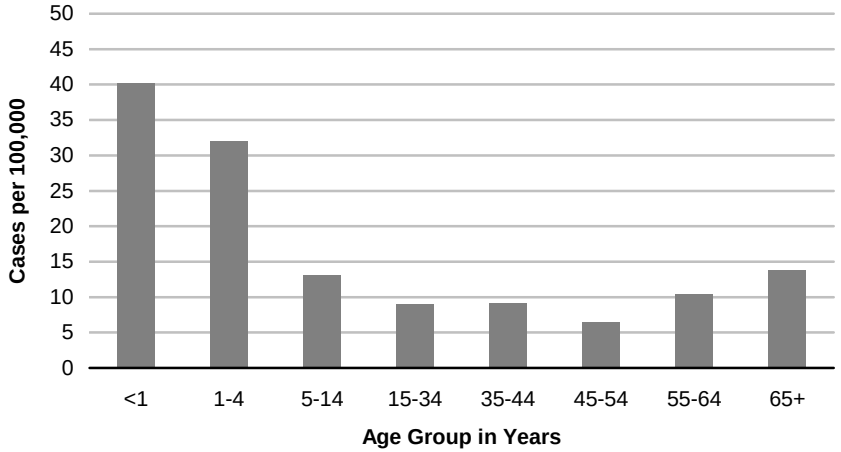


Figure 3. Reported Cases of Salmonellosis by Race/Ethnicity
LAC, 2010 (N=1142)

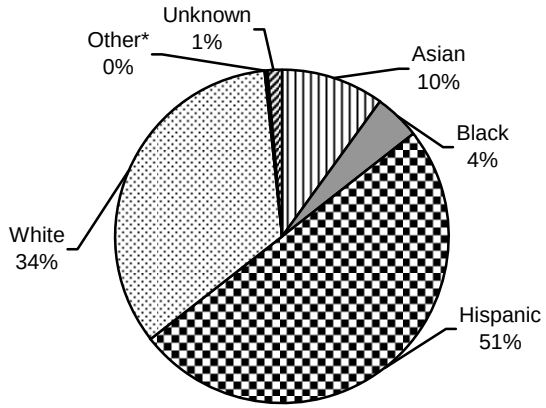
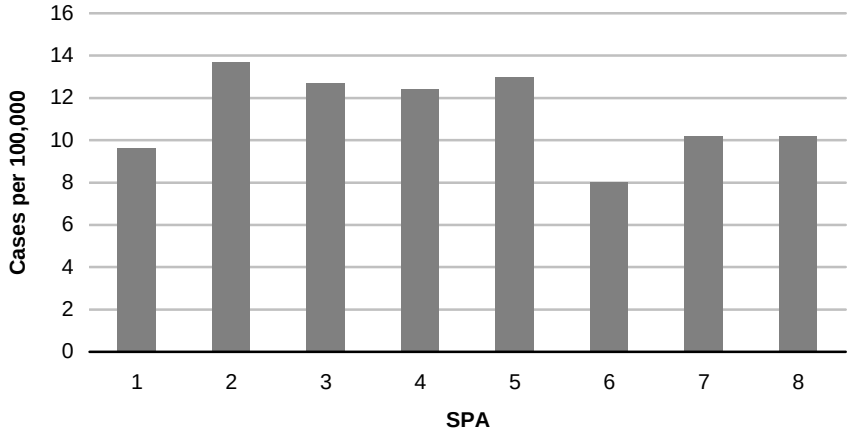
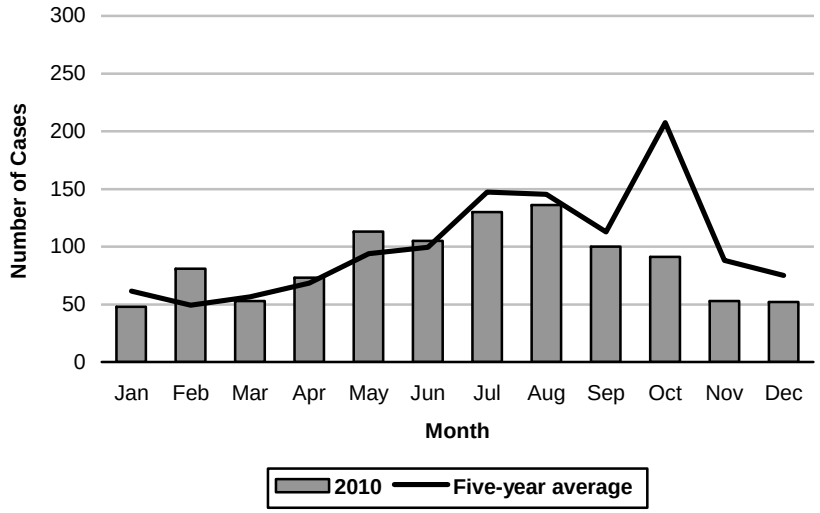


Figure 4. Reported Salmonellosis Rates by SPA
LAC, 2010 (N=1142)

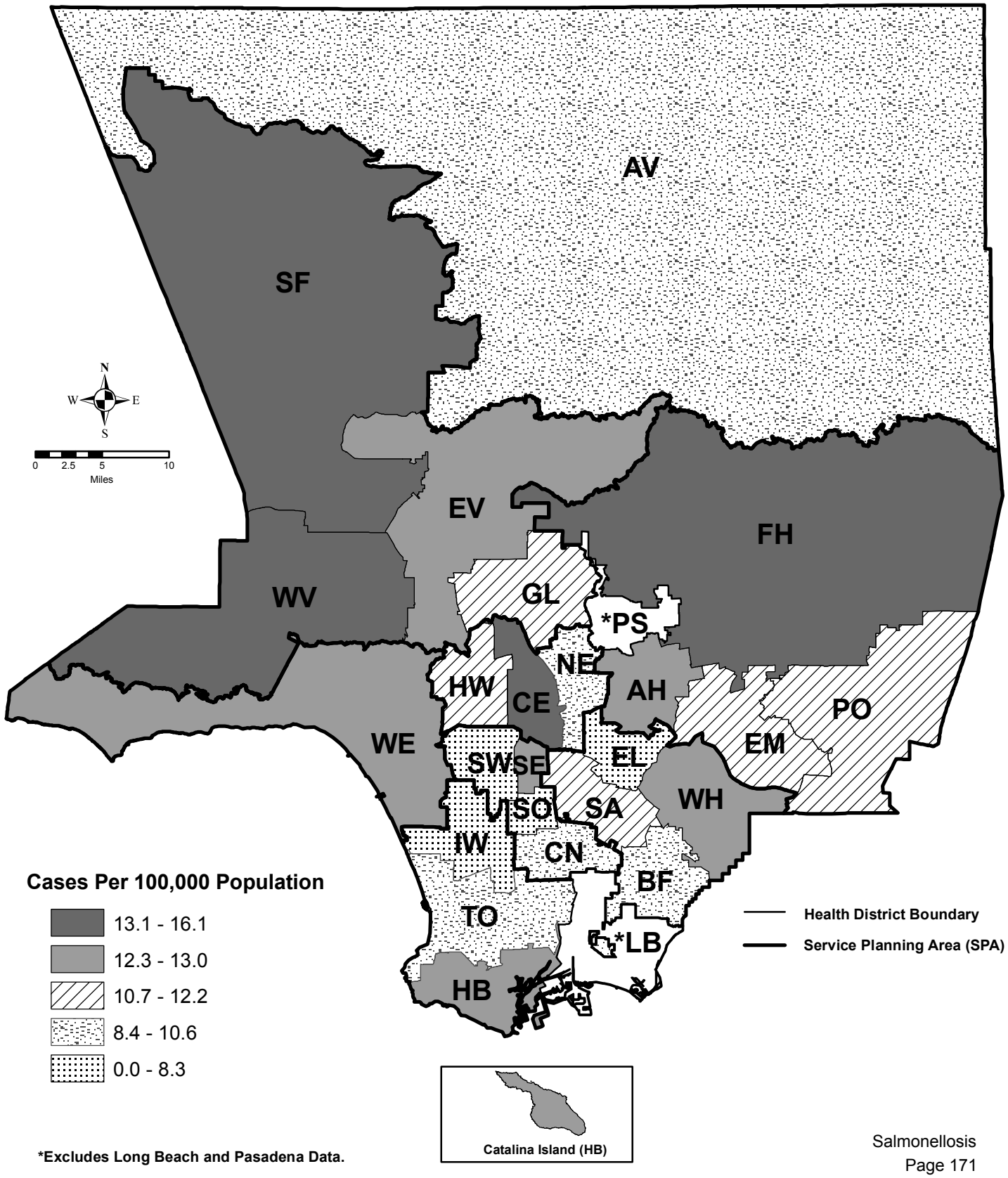


* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2010 (N=1142)



Map 14. Salmonellosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	355
Annual Incidence[a]	
LA County	3.62
California[b]	--
United States[b]	--
Age at Diagnosis	
Mean	25
Median	25
Range	0-99

[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.

DESCRIPTION

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

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

2010 TRENDS AND HIGHLIGHTS

- There was a 37% increase in reported cases in 2010 after a 48% decrease in cases during 2009 (Figure 1). These increases were observed among all races (Figure 6).
- The highest age group incidence rate was observed in the 1 to 4 years age group (13.6 per 100,000) (Figure 2) (not adjusted for race/ethnicity).
- Although the shigellosis rate in the 1 to 4 years age group in LAC this year is double that of last year's (13.6 versus 6.1 per 100,000) it is within the range of rates seen in the last four years (range: 6.1 to 20.8 per 100,000).
- The incidence of shigellosis among the Hispanic population (58% of cases, 4.3 per 100,000) remained highest, consistent with previous years (Figures 3, 6). Much of this is believed to be due to overcrowded living situations and contact with visitors from endemic countries.
- Service Planning Area (SPA) 4 sustained the highest rate (7.2 per 100,000), followed by SPA 6 (5.4 per 100,000) (Figure 4).
- In 2010, the monthly incidence peaked in August, however the incidence during 2010 was below the five-year average, except for the winter months (Figure 5).
- Two shigella-associated outbreaks were investigated in 2010 by LAC DPH community health services.
- In 2010, the percentage of shigellosis cases hospitalized for at least two days decreased to 13.2% (N=47) from 24% (N=63) in 2009. One death was reported among diagnosed shigellosis cases; the fatal case had other medical problems including respiratory failure, acute kidney injury, and sepsis contributing to the death.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=524)			2007 (N=463)			2008 (N=498)			2009 (N=259)			2010 (N=355)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	5	1.0	3.5	13	2.8	8.8	8	1.6	5.7	4	1.5	2.9	1	1.1	0.7
1-4	118	22.5	20.3	100	21.6	17.3	118	23.7	20.8	34	13.1	6.1	79	22.2	13.6
5-14	134	25.6	9.1	90	19.4	6.3	137	27.5	9.8	47	18.1	3.4	68	19.1	5.1
15-34	111	21.2	4.0	104	22.5	3.7	122	24.5	4.3	67	25.9	2.4	75	21.1	2.5
35-44	71	13.5	4.7	67	14.5	4.5	42	8.4	2.8	51	19.7	3.4	63	17.7	4.4
45-54	39	7.4	3.0	43	9.3	3.3	26	5.2	1.9	33	12.7	2.4	36	10.1	2.7
55-64	17	3.2	2.0	20	4.3	2.3	23	4.6	2.5	12	4.6	1.3	17	4.7	1.8
65+	29	5.5	3.0	26	5.6	2.6	22	4.4	2.2	11	4.2	1.0	15	4.2	1.4
Unknown	0	0.0		0	0.0		0	0.0		0	0	0	0	0	0
Race/Ethnicity															
Asian	23	4.4	1.8	26	5.6	2.0	10	2.0	0.8	6	2.3	0.5	15	4.2	1.1
Black	42	8.0	5.0	27	5.8	3.2	25	5.0	2.9	17	6.6	2.0	31	8.7	3.6
Hispanic	356	67.9	7.7	281	60.7	6.1	376	75.5	8.0	154	59.5	3.3	203	57.1	4.3
White	99	18.9	3.4	56	12.1	1.9	71	14.3	2.4	69	26.6	2.4	94	26.4	3.3
Other	1	0.2	3.5	4	0.9	19.2	3	0.6	12.2	0	0	0	0	0	0
Unknown	3	0.6		69	14.9		13	2.6		13	5.0	0	12	3.3	--
SPA															
1	6	1.1	1.7	10	2.2	2.8	11	2.2	3.0	5	1.9	1.9	3	0.8	0.8
2	87	16.6	4.1	93	20.1	4.3	89	17.9	4.1	46	17.7	2.1	61	17.2	2.8
3	62	11.8	3.6	72	15.6	4.2	66	13.3	3.8	23	8.9	1.3	33	9.2	1.9
4	103	19.7	8.2	87	18.8	6.9	71	14.3	5.6	74	28.6	5.9	91	25.6	7.2
5	34	6.5	5.3	29	6.3	4.5	23	4.6	3.6	22	8.5	3.4	30	8.4	4.5
6	106	20.2	10.2	80	17.3	7.7	109	21.9	10.3	41	15.8	3.9	58	16.3	5.4
7	84	16.0	6.1	64	13.8	4.6	93	18.7	6.7	33	12.7	2.4	54	15.2	3.9
8	41	7.8	3.7	28	6.0	2.5	34	6.8	3.0	14	5.4	1.2	25	7.0	2.2
Unknown	1	0.2		0	0.0		2	0.4		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, 2001-2010

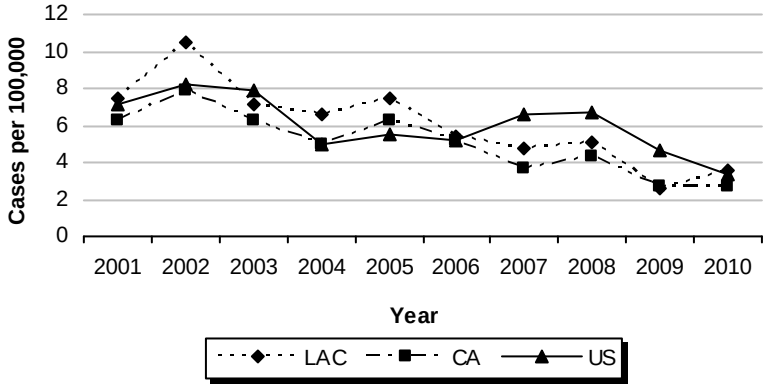


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2010 (N=355)

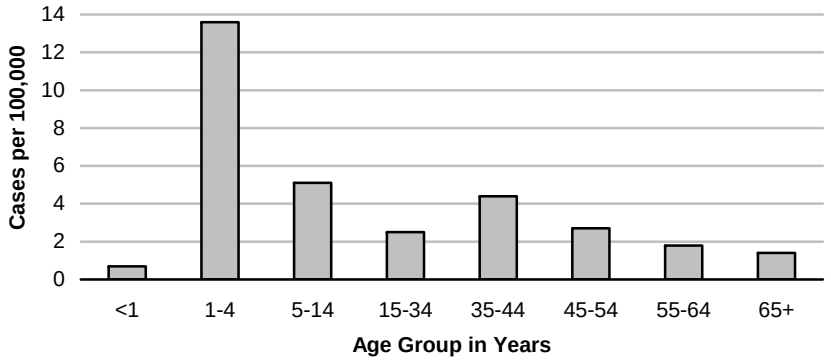


Figure 3. Percent Cases of Shigellosis by Race/Ethnicity
LAC, 2010 (N=355)

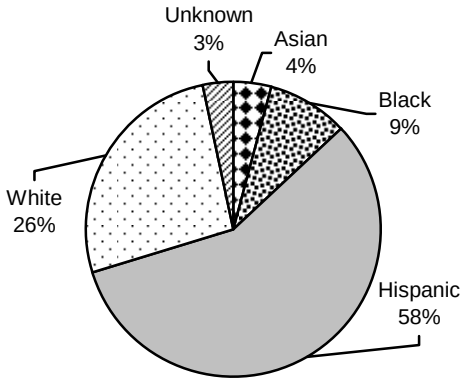


Figure 4. Reported Shigellosis Rates by SPA
LAC, 2010 (N=355)

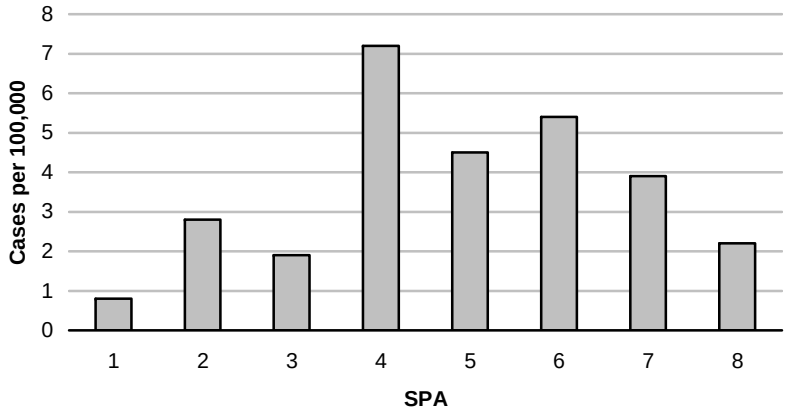


Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2010 (N=355)

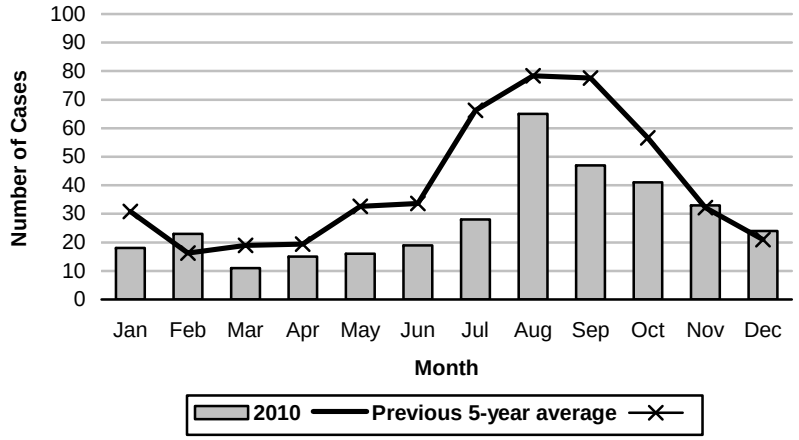
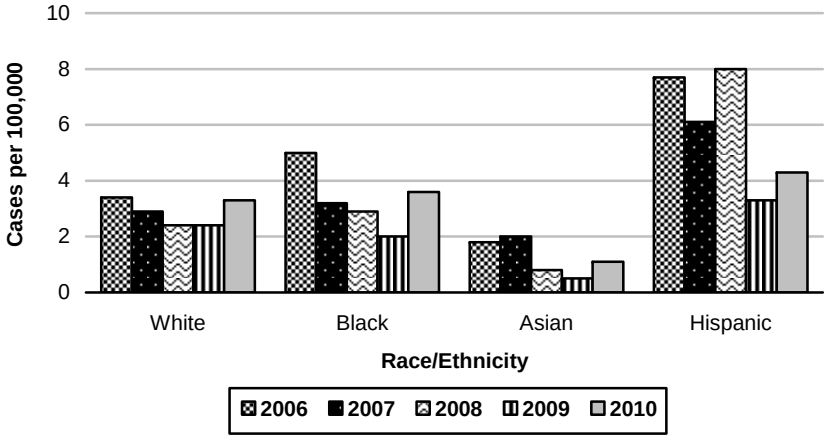
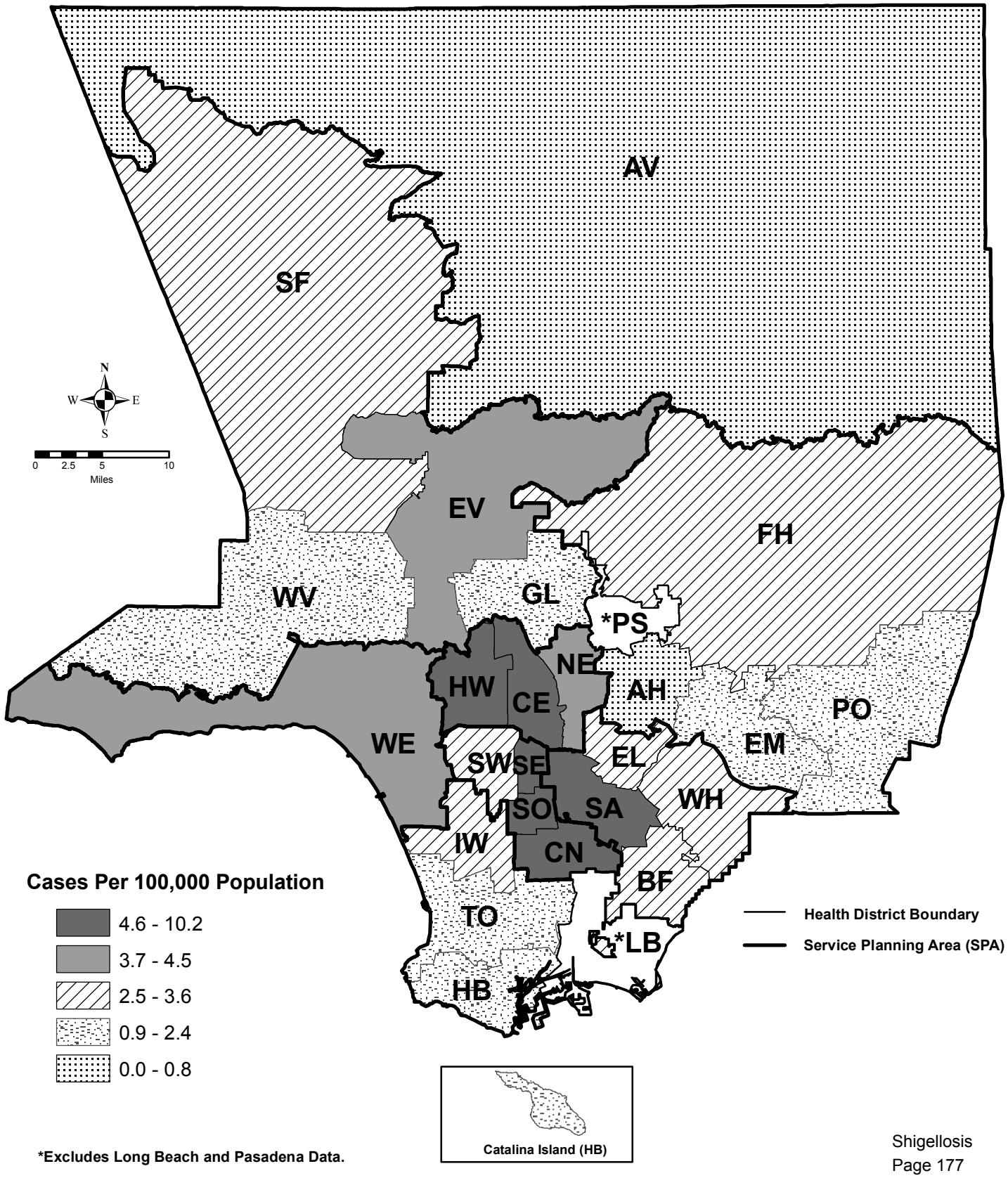


Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2006-2010



Map 15. Shigellosis
Rates by Health District, Los Angeles County, 2010*



*Excludes Long Beach and Pasadena Data.

SEVERE *STAPHYLOCOCCUS AUREUS* INFECTION IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	28
Annual Incidence	
LA County[a]	0.29
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	42
Median	46
Range	0-88 years

[a]Cases per 100,000 population.
[b]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). In addition, the patient must be previously healthy, (i.e., no hospitalizations, surgery, dialysis, residence in long-term care, or percutaneous device/indwelling catheter within the past year).

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

2010 TRENDS AND HIGHLIGHTS

- Cases aged less than one year had the highest rate (0.7 per 100,000) followed by cases aged 45-54 years (0.5 per 100,000), and cases aged greater than 65 years (0.5 per 100,000) (Figure 1).
- Blacks (0.5 per 100.000) and whites (0.5 per 100,000) had the highest rates of severe *S. aureus* infection. Hispanics had the lowest rate at 0.1 cases per 100,000 (Figure 2).
- The incidence rates for all eight SPAs ranged from 0.2 per 100,000 to 0.3 per 100,000 (Figure 3).
- The number of cases of severe *S. aureus* infection peaked during the month of November (Figure 4).
- The percentage of *S. aureus* infections resistant to methicillin was 39% (Figure 5).
- Diabetes and liver disease were reported more than any other risk factors (Table 1).
- Severe *S. aureus* cases presented most often with bacteremia, and pneumonia (Table 2).
- Forty-three percent of cases were reported by only four hospitals 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, 2008-2010

	2006			2007			2008 (N=25)			2009 (N=27)			2010 (N=28)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.7	0	0.0	0.0	1	4.0	0.7
1-4	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0	1	3.7	0.2	0	0.0	0
5-14	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1	2	7.4	0.1	3	10.7	0.2
15-34	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.0	5	18.5	0.2	6	21.4	0.2
35-44	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1	3	11.1	0.1	3	10.7	0.2
45-54	N/A	N/A	N/A	N/A	N/A	N/A	7	28.0	0.5	6	22.2	0.4	7	25.0	0.5
55-64	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.4	4	14.8	0.4	3	10.7	0.3
65+	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.8	6	22.2	0.6	5	17.9	0.5
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.2	1	3.7	0.1	4	14.2	0.3
Black	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.5	3	11.1	0.4	4	14.2	0.5
Hispanic	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.1	12	44.4	0.3	7	25.0	0.1
White	N/A	N/A	N/A	N/A	N/A	N/A	13	52.0	0.4	11	40.7	0.4	13	46.4	0.5
Other	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0		0	0.0		0	0.0	
SPA															
1	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.5	3	11.1	0.8	1	4.0	0.3
2	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.2	2	7.4	0.1	6	21.4	0.3
3	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.5	4	14.8	0.3	6	21.4	0.3
4	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1	3	11.1	0.2	4	14.2	0.3
5	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.5	1	3.7	0.2	2	7.1	0.3
6	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.2	9	33.3	0.9	2	7.1	0.2
7	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1	2	7.4	0.1	4	14.2	0.3
8	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.3	2	7.4	0.2	2	7.1	0.2
Unknown	N/A	N/A	N/A	N/A	N/A	N/A		0.0		1			1		

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

Figure 1. Incidence Rates* of Severe *S. aureus* Infection by Age Group LAC, 2010 (N=28)

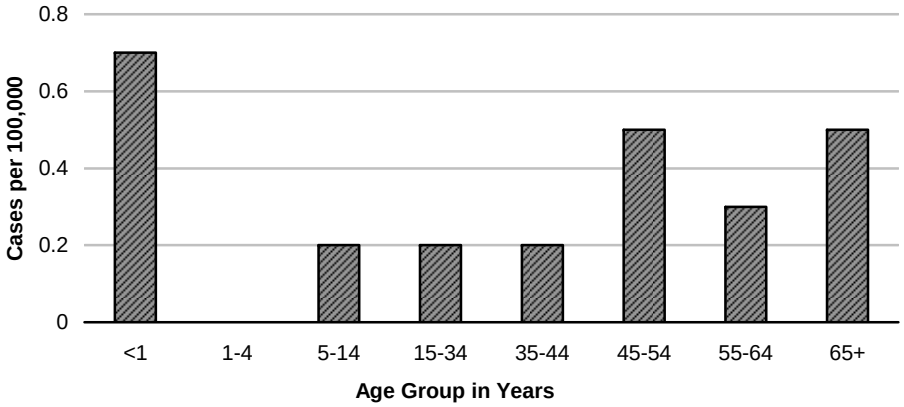


Figure 2. Severe *S. aureus* Infection Incidence Rates* by Race/Ethnicity LAC, 2010 (N=28)

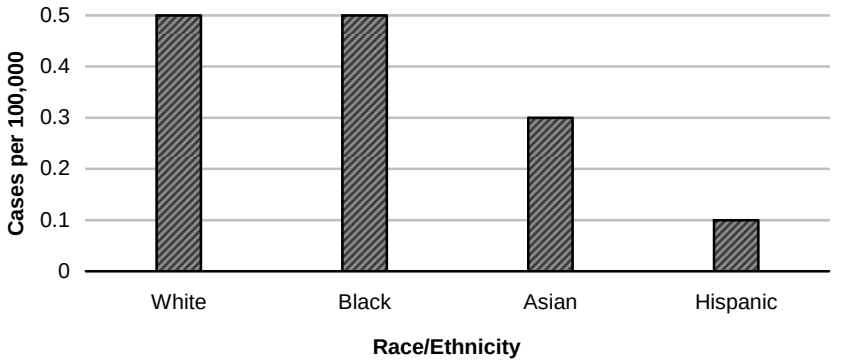


Figure 3. Incidence Rates* of Severe *S. aureus* Infection by SPA LAC, 2010 (N=28)

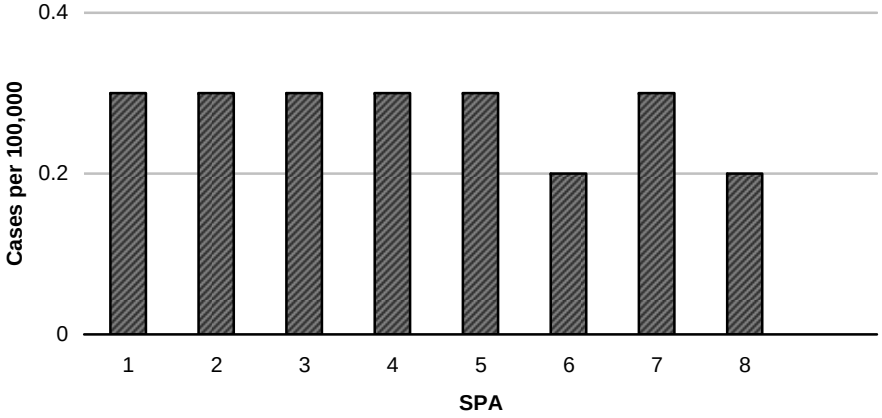
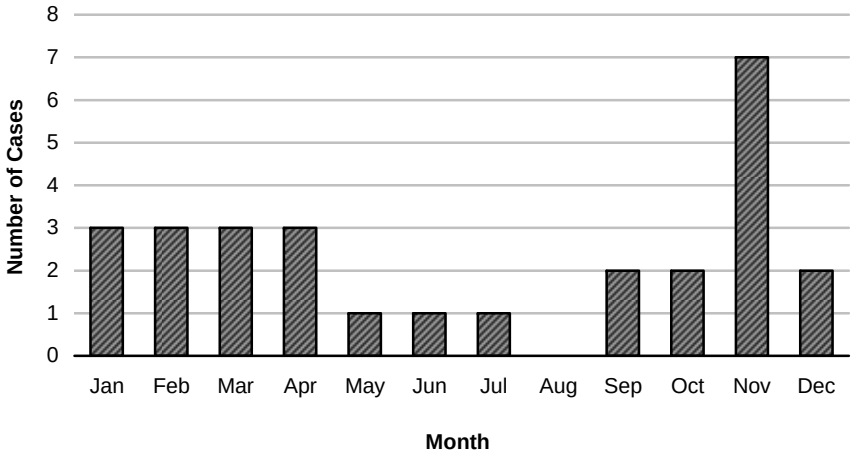
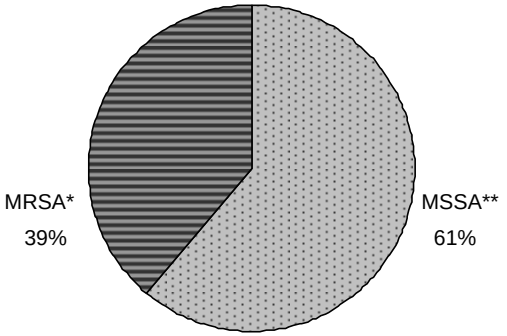


Figure 4. Reported Severe *S. aureus* Cases by Month of Onset LAC, 2010 (N=28)



*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, 2010 (N=28)



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

x

Table 1. Severe *S. aureus* Risk Factors by Date of Onset, 2009-2010

	2009 N = 27	2010 N = 28
	%*	%*
Diabetes	15	32
Current Smoker	7	4
Emphysema	0	0
Alcohol Abuse	0	4
Asthma	4	4
Intravenous Drug Use	15	4
HIV/AIDS	4	4
Malignancy	4	0
Liver Disease	0	14
Other Skin Condition	0	4
Other	41	29
None	22	39

*Overlapping risk factors will total over 100%.

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2010

Syndrome	Number	Percent*
Bacteremia (without focus)	16	57
Pneumonia	11	40
Septic emboli	4	14
Wound Infection	4	14
Endocarditis	4	14
Skin Infection	3	11
Osteomyelitis	2	7
Meningitis	1	4
Septic Arthritis	1	4
Other	6	21

*Overlapping syndromes will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	191
Annual Incidence[a]	
LA County	1.95
California[b]	N/A
United States[c]	--
Age at Diagnosis	
Mean	50
Median	52
Range	0–99 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 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.

2010 TRENDS AND HIGHLIGHTS

- The incidence rate of reported IGAS was 1.95 per 100,000 (n=191) during 2010, slightly higher than that of the previous five-year average (Figure 1).
- Cases aged 65 years and older had the highest rate of IGAS (5.5 per 100,000) followed by cases aged 55 to 64 years (3.0 per 100,000) (Figure 2). The age groups of <1 and 65 years and older showed the most significant increases in rates relative to the previous four years. The incidence rates for all age groups overall were higher compared to previous years.
- Blacks continued to have the highest rate of IGAS and while the rate increased within this group compared to last year, the rate is lower relative to two recent years (2007 to 2008). Although rates among whites and Latinos were higher compared to last year, rates remain the same compared to the average of the previous four years. Asians rates increased compared to the previous four years (Figure 3).
- SPA 4 had the highest incidence rate at 3.0 cases per 100,000. This is not consistent with the prior four years as SPA 5 or 6 normally had the highest rate of cases by SPA (Figure 4).
- In 2010, the number of cases peaked in March and June. October continued to have the lowest number of reported cases. Number of reported cases throughout the year was overall higher than the previous five-year average (Figure 5).
- IGAS cases presented most often with bacteremia and cellulitis (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 (30%) reported having none of the traditional risk factors (Table 2).

Reported Invasive Group A Streptococcus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=197)			2007 (N=173)			2008 (N=156)			2009 (N=129)			2010 (N=191)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.5	0.7	3	1.7	2.0	2	1.3	1.4	1	0.8	0.7	4	2.1	2.9
1-4	9	4.6	1.6	6	3.5	1.0	6	3.8	1.1	3	2.3	0.5	6	3.1	1.0
5-14	15	7.7	1.0	8	4.6	0.6	14	9.0	1.0	9	7.0	0.7	6	3.1	0.5
15-34	20	10.2	0.7	20	11.6	0.7	24	15.4	0.8	15	11.6	0.5	33	17.3	1.1
35-44	34	17.3	2.3	18	10.4	1.2	22	14.1	1.5	14	10.9	0.9	21	11.0	1.5
45-54	36	18.4	2.8	33	19.1	2.5	13	8.3	1.0	29	22.5	2.1	34	17.8	2.5
55-64	29	14.8	3.3	29	16.8	3.3	27	17.3	3.0	23	17.8	2.4	29	15.2	3.0
65+	52	26.5	5.3	56	32.4	5.5	48	30.8	4.7	35	27.1	3.3	58	30.4	5.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	9	4.6	0.7	11	6.4	0.9	14	8.3	1.1	10	7.8	0.8	16	8.4	1.2
Black	23	11.7	2.7	34	19.7	4.0	30	17.8	3.5	16	12.4	1.9	25	13.1	2.9
Hispanic	59	29.9	1.3	49	28.3	1.1	50	29.6	1.1	43	33.3	0.9	52	27.2	1.1
White	65	33.0	2.3	52	30.1	1.8	49	29.0	1.7	40	31.0	1.4	53	27.7	1.8
Other	3	1.5	10.5	4	2.3	19.2	0	0.0	0.0	1	0.8	3.9	3	1.6	11.6
Unknown	38	19.3		23	13.3		26	15.4		19	14.7		42	22.0	
SPA															
1	7	3.6	2.0	5	2.9	1.4	4	2.6	1.1	3	2.3	0.8	2	1.0	0.5
2	43	21.8	2.0	43	24.9	2.0	35	22.4	1.6	22	17.1	1.0	34	17.8	1.5
3	28	14.2	1.6	20	11.6	1.2	19	12.2	1.1	17	13.2	1.0	30	15.7	1.7
4	27	13.7	2.1	15	8.7	1.2	24	15.4	1.9	9	7.0	0.7	38	19.9	3.0
5	23	11.7	3.6	15	8.7	2.3	17	10.9	2.6	6	4.7	0.9	12	6.3	1.8
6	24	12.2	2.3	35	20.2	3.3	14	9.0	1.3	14	10.9	1.3	29	15.2	2.7
7	16	8.1	1.2	18	10.4	1.3	15	9.6	1.1	16	12.4	1.2	12	6.3	0.9
8	19	9.6	1.7	17	9.8	1.5	22	14.1	2.0	12	9.3	1.1	13	6.8	1.2
Unknown	10	5.1		5	2.9		6	3.8		30	23.3				

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

Figure 1. Incidence Rates of Invasive Group A Streptococcus LAC and US, 2000-2010

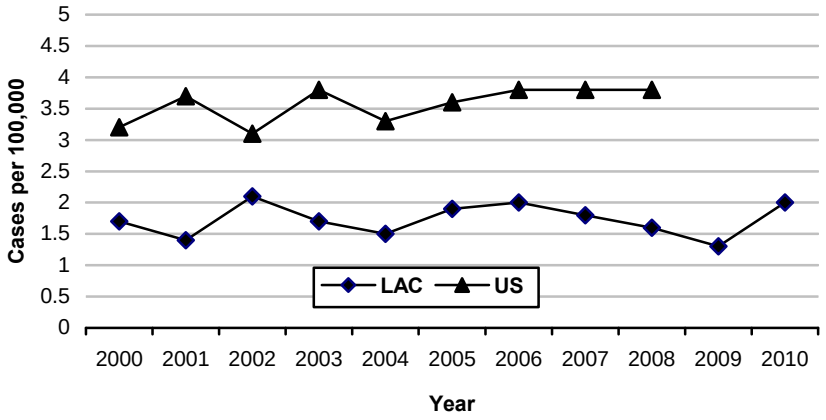
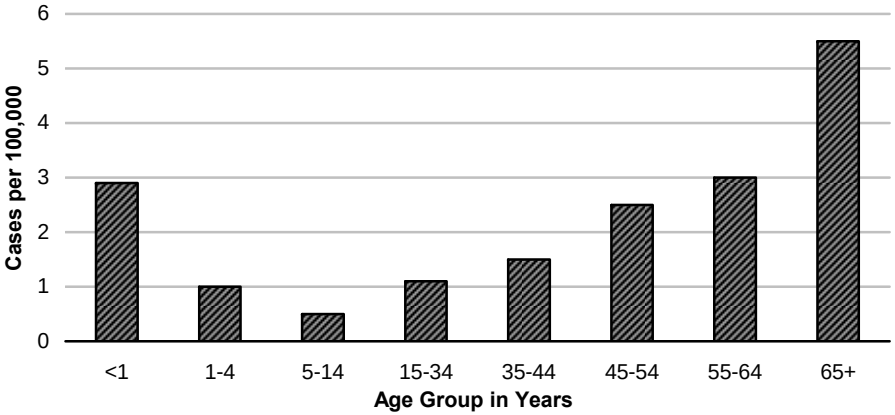
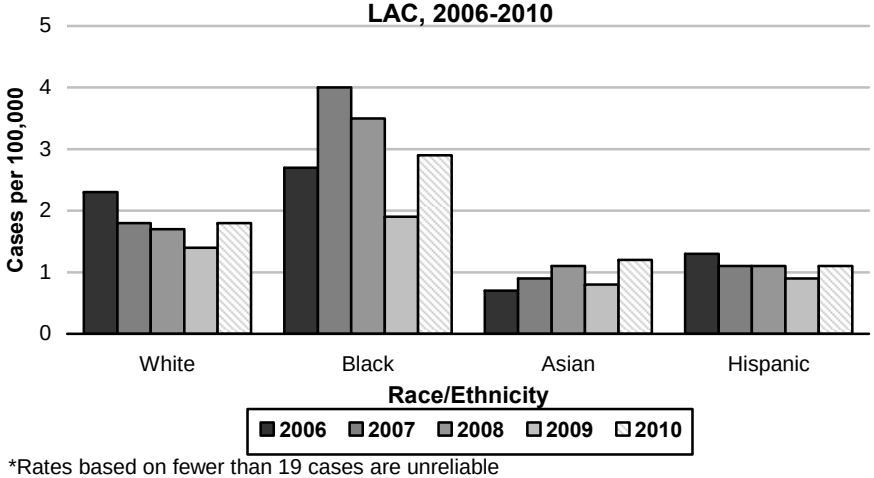


Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2010 (N=191)



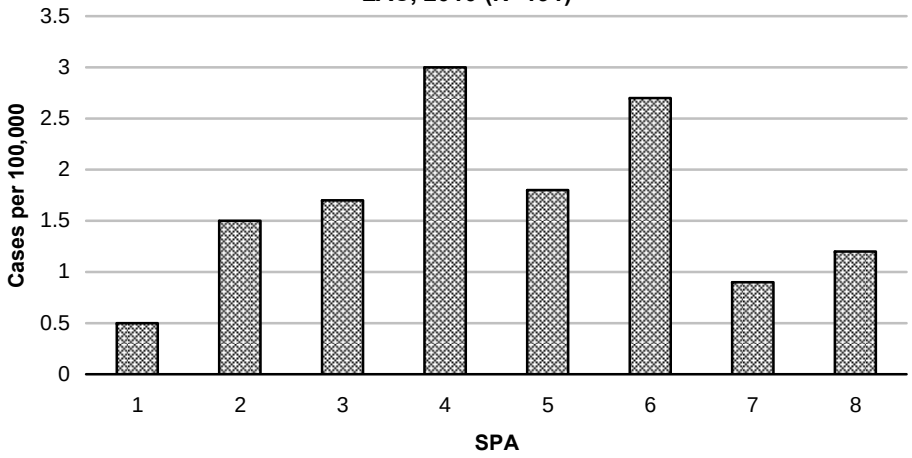
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence Rates* by Race/Ethnicity LAC, 2006-2010



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates* of Invasive Group A Streptococcus by SPA LAC, 2010 (N=191)



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2010 (N=191)

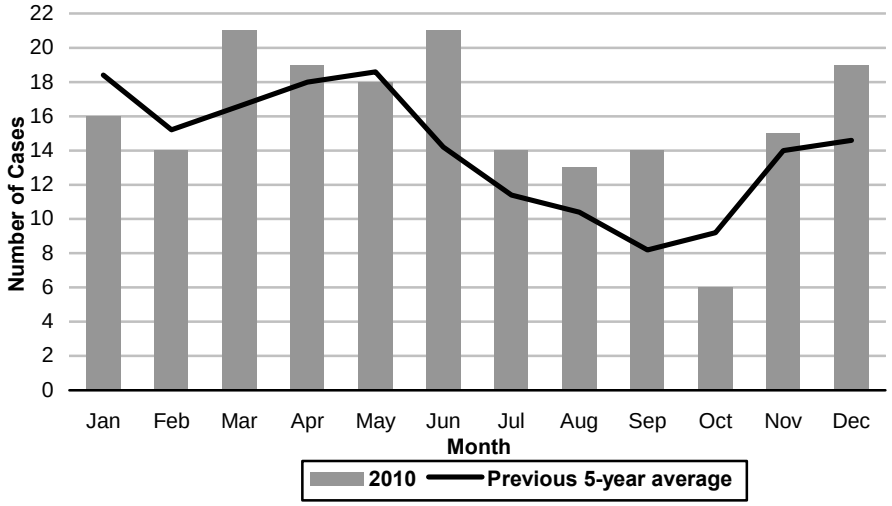


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2010

Syndrome	Number	Percent*
Cellulitis	64	34
Bacteremia (without focus)	50	26
Pneumonia	31	16
STSS	27	14
Non-Surgical Wound Infection	22	12
Necrotizing Fasciitis	12	6
Other	40	21

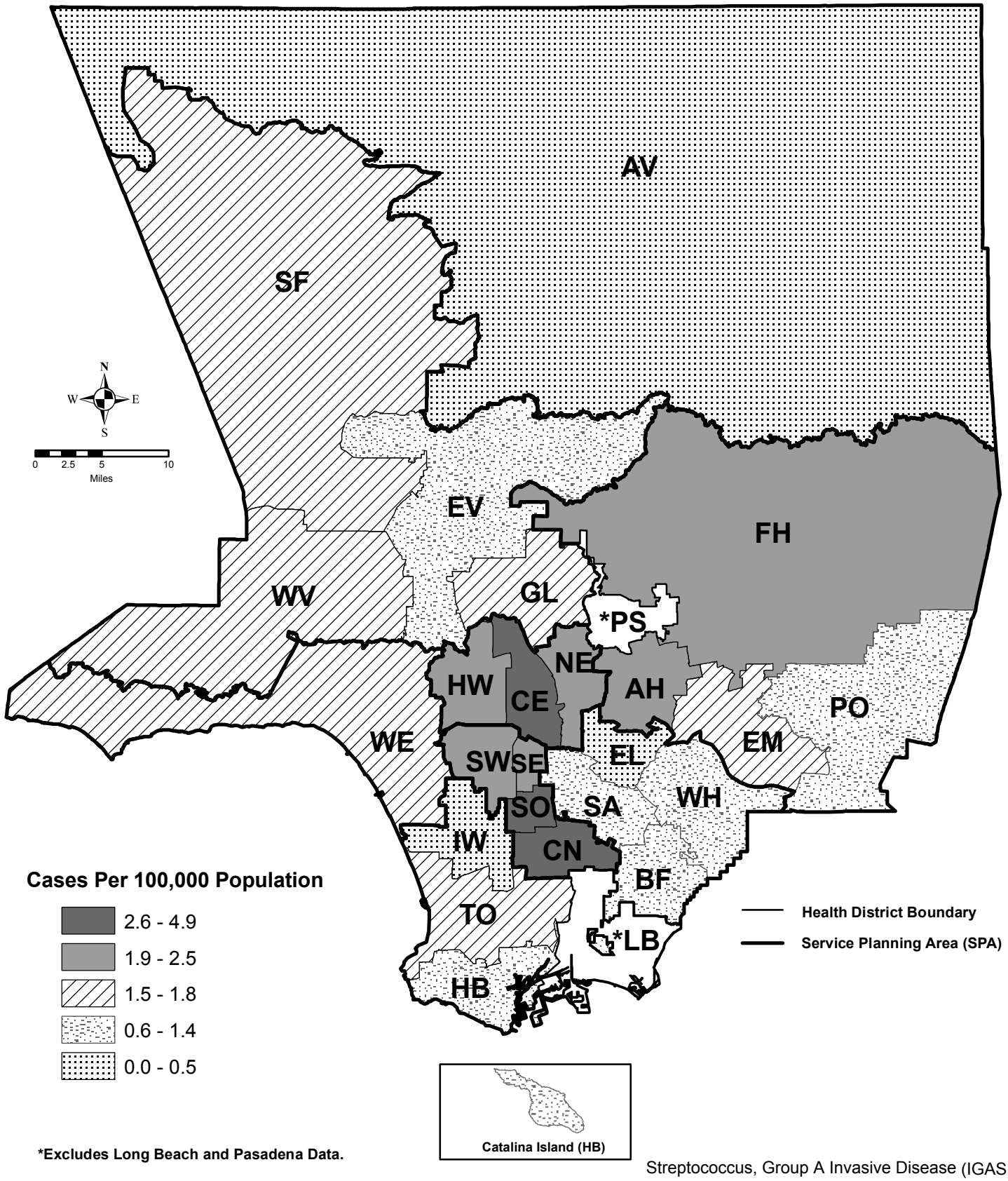
*Overlapping syndromes will total over 100%.
**Cases with unknown symptoms excluded.

Table 2. Percentage of IGAS Risk Factors – Based on Date of Onset Between 1/1/08-12/31/2010

	2008 (N=138)	2009 (N = 113)	2010 (N =191)
	%	%	%
Alcohol Abuse	10	16	6
Chronic Heart Disease	11	12	12
Chronic Lung Disease	3	4	6
Cirrhosis	5	3	4
Diabetes	21	33	23
History of Blunt Trauma	5	8	10
HIV/AIDS	3	2	1
IV Drug Use	4	3	3
Malignancy	12	10	5
Other	17	17	26
None	43	30	30

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

Map 16. Streptococcus, Group A Invasive Disease Rates by Health District, Los Angeles County, 2010*



*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]	--
United States[c]	--
Age at Diagnosis	
Mean	21.2
Median	18
Range	2-56

[a]Cases per 100,000 population.
[b]Rates based on less than 19 observations are unreliable.
[c]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

DESCRIPTION

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

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

Hand washing after using the toilet, before preparing or serving food, and before and after caring for others is important in preventing the spread of typhoid. When traveling to locations where sanitary practices are uncertain, foods should be thoroughly cooked and served at appropriate temperature; bottled water should be used for drinking as well as for brushing teeth and making ice. Vaccination should be considered when traveling in high endemic areas. Los Angeles County (LAC) 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 the isolation order and offers the case the chance to clear the infection with antibiotics.

2010 TRENDS AND HIGHLIGHTS

- The LAC rate for acute typhoid fever cases is comparable to the US rate (Figure 1).
- Asians continue to comprise the highest percentage of acute cases (Figure 3).
- Service Planning Area (SPA) 2 continues to have the highest number of acute cases (Figure 4).
- Typically most cases occur in the summer; in 2010, cases were also observed in the spring and early fall (Figure 5).
- Four 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, 2006-2010

	2006 (N=17)			2007 (N=17)			2008 (N=14)			2009 (N=17)			20010 (N=15)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0		0	0	
1-4	2	11.8		0	0.0		1	7.1		0	0		3	20.0	
5-14	5	29.4		1	5.9		5	35.7		3	17.6		4	26.6	
15-34	8	47.1		10	58.8		5	35.7		6	35.2		5	33.3	
35-44	1	5.9		0	0.0		1	7.1		3	17.6		1	6.6	
45-54	1	5.9		2	11.8		0	0.0		4	23.5		1	6.6	
55-64	0	0.0		3	17.6		1	7.1		1	5.8		1	6.6	
65+	0	0.0		1	5.9		1	7.1		0	0		0	0	
Unknown	0	0.0		0	0.0		0	0.0		0	0		0	0	
Race / Ethnicity															
Asian	7	41.2		9	52.9		8	57.1		9	52.9		11	73.3	
Black	0	0.0		0	0.0		0	0.0		0	0		0	0	
Hispanic	8	47.1		7	41.2		5	35.7		8	47.0		3	20	
White	1	5.9		1	5.9		1	7.1		0	0		1	0	
Other	0	0.0		0	0.0		0	0.0		0	0		0	0	
Unknown	1	5.9		0	0.0		0	0.0		0	0		0	0	
SPA															
1	0	0.0		2	11.8		0	0.0		0	0		1	6.6	
2	3	17.6		6	35.3		5	35.7		4	23.5		6	40	
3	7	41.2		4	23.5		3	21.4		3	17.6		2	13.3	
4	0	0.0		1	5.9		3	21.4		2	11.7		2	13.3	
5	2	11.8		0	0.0		0	0.0		3	17.6		1	6.6	
6	1	5.9		2	11.8		1	7.1		2	11.7		2	13.3	
7	3	17.6		1	5.9		2	14.3		0	0		1	6.6	
8	1	5.9		1	5.9		0	0.0		3	17.6		3	20.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0				

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

Reported Typhoid Fever Carrier Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=3)			2007 (N=1)			2008 (N=4)			2009 (N=1)			2010 (N=4)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0		0	0.0		0	0		0	0	
1-4	0	0.0		0	0.0		0	0.0		0	0		0	0	
5-14	1	33.3		0	0.0		0	0.0		1	100		0	0	
15-34	0	0.0		0	0.0		1	25.0		0	0		0	0	
35-44	1	33.3		0	0.0		2	50.0		0	0		2	50.0	
45-54	0	0.0		1	100.		0	0.0		0	0		0	0	
55-64	1	33.3		0	0.0		0	0.0		0	0		2	50.0	
65+	0	0.0		0	0.0		1	25.0		0	0		0	0	
Unknown	0	0.0		0	0.0		0	0.0		0	0		0	0	
Race / Ethnicity															
Asian	1	33.3		0	0.0		1	25.0		0	0		2	50.0	
Black	0	0.0		0	0.0		0	0.0		0	0		0	0	
Hispanic	2	66.7		1	100.		3	75.0		1	100		2	50.0	
White	0	0.0		0	0.0		0	0.0		0	0		0	0	
Other	0	0.0		0	0.0		0	0.0		0	0		0	0	
Unknown	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	
2	0	0.0		1	100.		1	25.0		0	0		0	0	
3	0	0.0		0	0.0		1	25.0		0	0		1	0	
4	1	33.3		0	0.0		2	50.0		0	0		0	0	
5	0	0.0		0	0.0		0	0.0		0	0		2	0	
6	0	0.0		0	0.0		0	0.0		0	0		1	0	
7	2	66.7		0	0.0		0	0.0		0	0		0	0	
8	0	0.0		0	0.0		0	0.0		1	100		0	100	
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 by Years of Onset of Acute Typhoid Fever LAC and US, 2001-2010

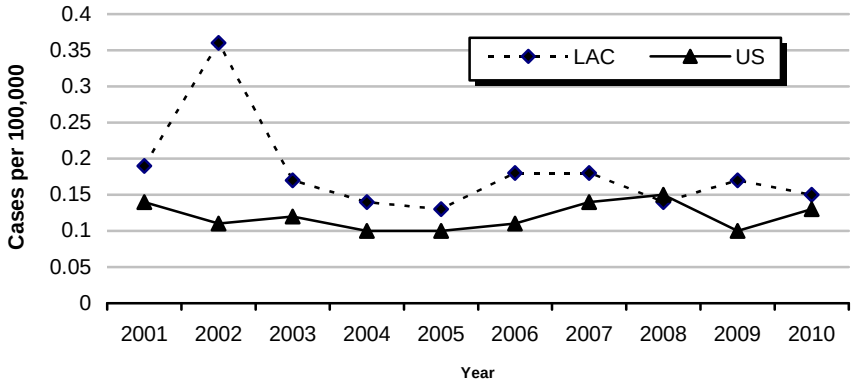


Figure 2. Acute Typhoid Fever Cases by Age Group LAC, 2010 (N=15)

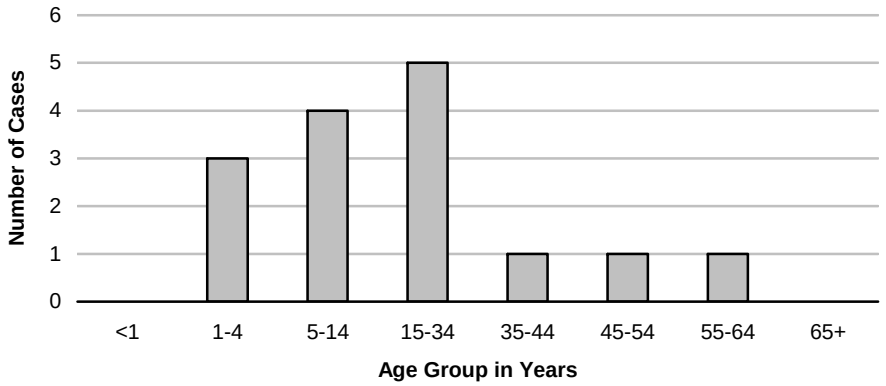


Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity LAC, 2010 (N=15)

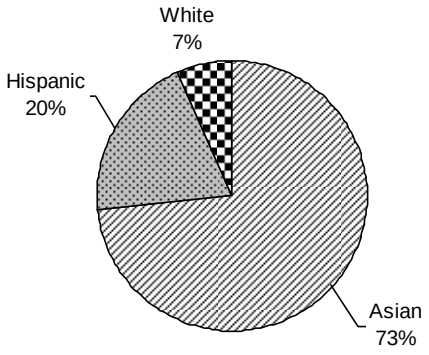


Figure 4. Reported Acute Typhoid Fever Cases by SPA LAC, 2010 (N=15)

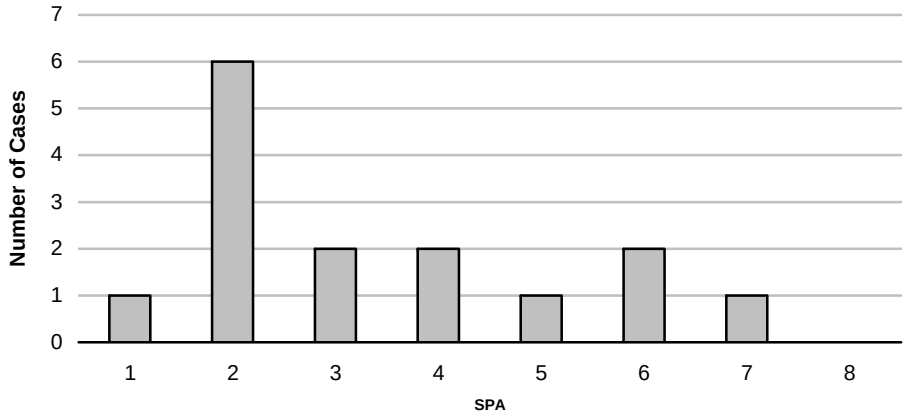


**Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2010 (N=15)**

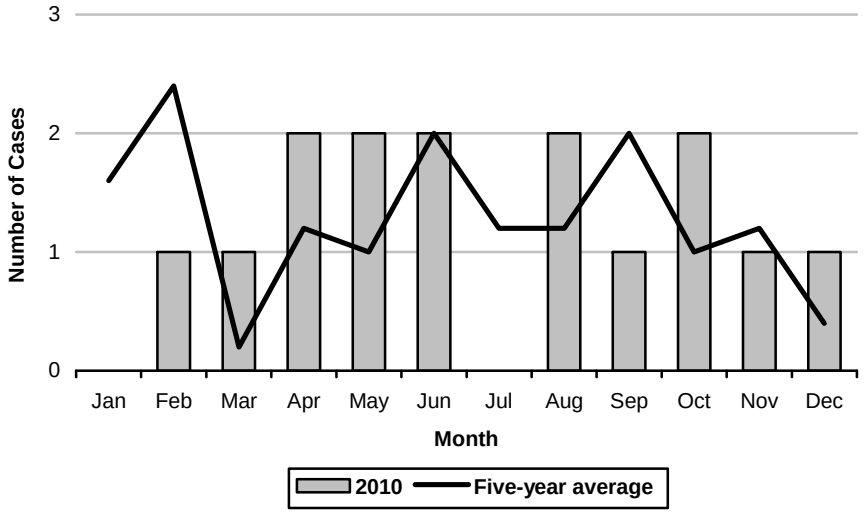
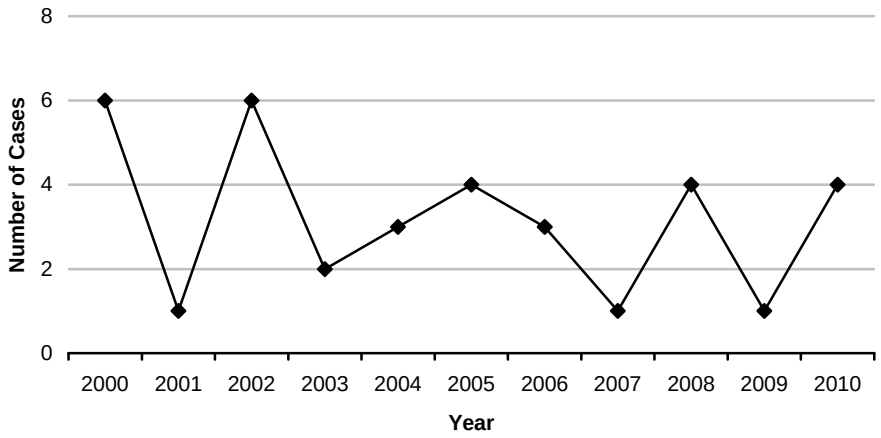


**Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 2001-2010**



TYPHUS FEVER

CRUDE DATA	
Number of Cases	31
Annual Incidence[a]	
LA County	0.32
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	44.5
Median	50
Range	7-74

[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 and opossums that live in areas with heavy foliage. In Los Angeles County (LAC), most reported cases of typhus occur in residents of the foothills of central LAC. Symptoms include fever, severe headache, chills, and myalgia. A fine, macular rash may appear three to five days after onset. Occasionally, complications such as pneumonia or hepatitis may occur. Fatalities are uncommon, occurring in less than 1% of cases, but increase with age. The disease is typically mild in young children. Typhus infection is not vaccine preventable, but can be treated with antibiotics.

Because typhus fever is not a nationally reportable disease, there is no standard case definition across county and state jurisdictions. In Southern California, a workgroup 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.

2010 TRENDS AND HIGHLIGHTS

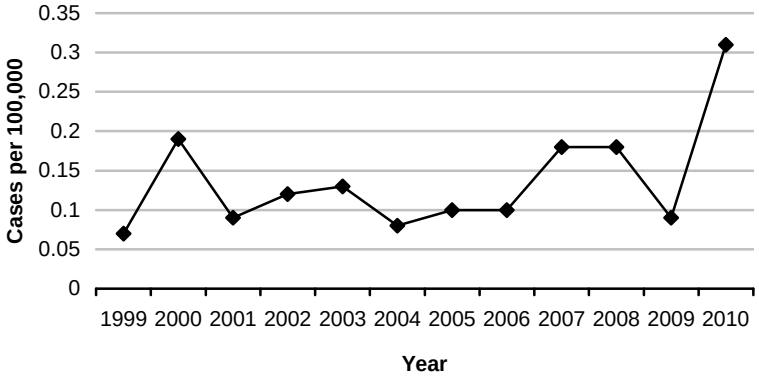
- Total cases of murine typhus increased by over 240% from 9 cases in 2009 to 31 cases in 2010 (Figure 1). LAC has not recorded this many cases in decades.
- In 2010, the incidence of typhus was highest in SPA 5 at 0.9 per 100,000 and cases were distributed in many areas of LAC not historically endemic for typhus. This is indicative of geographical spread of typhus in several locations in southern California.
- 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; and increased testing and reporting due to better educated physicians.

Reported Typhus Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=10)			2007 (N=17)			2008 (N=18)			2009 (N=9)			2010 (N=31)		
	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
1-4	0	0.0		1	5.9		0	0.0		0	0.0		0	0.0	0.0
5-14	1	10.0		1	5.9		3	16.7		2	22.2		3	9.7	0.2
15-34	1	10.0		3	17.6		3	16.7		1	11.1		4	12.9	0.1
35-44	5	50.0		3	17.6		4	22.2		0	0.0		7	22.6	0.5
45-54	0	0.0		6	35.3		4	22.2		4	44.4		5	16.1	0.4
55-64	1	10.0		2	11.8		3	16.7		2	22.2		10	32.3	1
65+	2	20.0		1	5.9		1	5.6		0	0.0		2	6.5	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	1	10.0		1	5.9		1	5.6		1	11.1		2	6.5	0.1
Black	0	0.0		0	0.0		0	0.0		0	0.0		2	6.5	0.2
Hispanic	3	30.0		1	5.9		5	27.8		1	11.1		10	32.3	0.2
White	6	60.0		13	76.5		12	66.7		7	77.8		14	45.2	0.5
Other	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
Unknown	0	0.0		2	11.8		0	0.0		0	0.0		3	9.7	
SPA															
1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
2	3	30.0		2	11.8		2	11.1		1	11.1		5	16.1	0.2
3	3	30.0		8	47.1		9	50.0		5	55.6		9	29.0	0.5
4	1	10.0		1	5.9		1	5.6		3	33.3		5	16.1	0.4
5	1	10.0		4	23.5		3	16.7		0	0.0		6	19.4	0.9
6	1	10.0		0	0.0		1	5.6		0	0.0		4	12.9	0.4
7	1	10.0		1	5.9		2	11.1		0	0.0		0	0.0	0.0
8	0	0.0		1	5.9		0	0.0		0	0.0		2	6.5	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

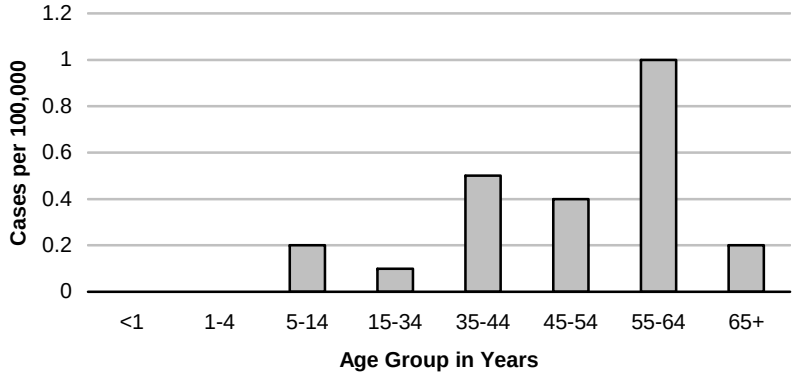
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Typhus Fever
LAC, 1999-2010



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

Figure 2. Incidence Rates* of Typhus Fever by Age Group
LAC, 2010 (N=31)



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

Figure 3. Percent Cases of Typhus Fever by Race/Ethnicity
LAC, 2010 (N=31)

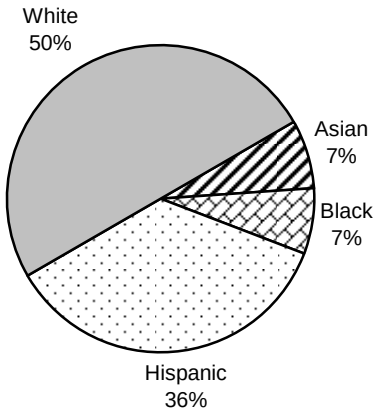
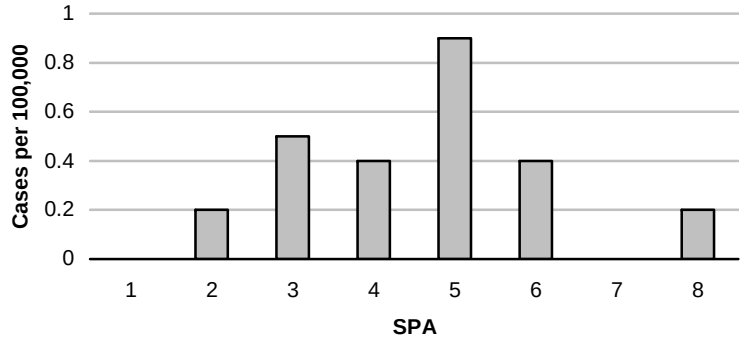


Figure 4. Incidence Rates* of Typhus Fever by SPA
LAC, 2010 (N=31)



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

Figure 5. Reported Typhus Fever Cases by Month of Onset
LAC, 2010 (N=31)

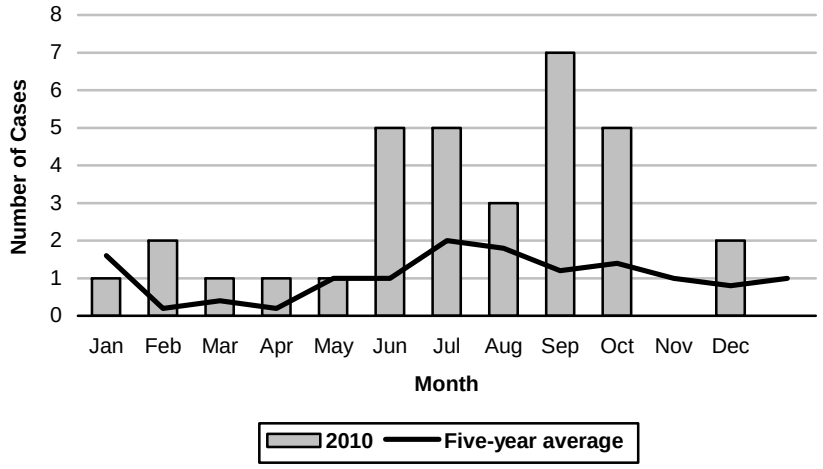
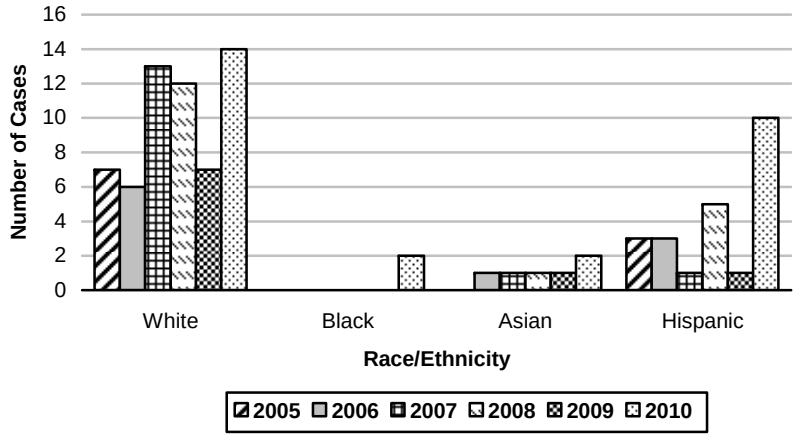


Figure 6. Reported Typhus Fever Cases by Race/Ethnicity
LAC, 2005-2010



VIBRIOSIS

CRUDE DATA	
Number of Cases	13
Annual Incidence[a]	
LA County[b]	0.13
California[c]	--
United States[c]	--
Age at Diagnosis	
Mean	37
Median	31
Range	8-78

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

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.

2010 TRENDS AND HIGHLIGHTS

- Vibriosis incidence is too low to extract reliable rate data, unlike in 2009 when there were enough cases to generate incidence rates from the year's data.
- In 2010, whites comprised the majority (62%) of all vibriosis cases (Figure 3). The number of cases among Asians and blacks remains consistently low or absent (Figure 6).
- Vibriosis in Los Angeles County generally is more common in Service Planning Areas (SPA) 5 and 8, both of which are coastal (Figure 4). Combined, these SPAs contained more than half of all vibriosis cases (54%).
- Typically vibriosis cases peak during the summer months. Both the 2010 cases and the five-year average of cases reflect this trend.
- *V. parahæmolyticus* was the most common etiologic agent reported (8), *V. alginolyticus* (3) *and V. choleræ* non-O1, non-O139 (2) were isolated from cases. Two *V. alginolyticus* cases had engaged in recreational water activity prior to diagnosis. Sources of *V. choleræ* non-O1, non-O139 were not determined. No case of cholera was reported.
- Six cases of vibriosis occurred among women, while seven cases occurred among men. Men are significantly more likely to contract vibriosis because they more often engage in recreational water activities and eat raw or undercooked seafood.[1] However this year's increase in the proportion of female cases reflects greater raw and undercooked seafood consumption among women.

[1] Altekruse SF, Yang S, Timbo BB, Angulo FJ. A multi-state survey of consumer food-handling and food-consumption practices. Am J Prev Med. 1999;16(3):216-21.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=18)			2007 (N=13)			2008 (N=18)			2009 (N=26)			2010 (N=13)		
	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	1	3.8	0.2	0	0.0	0.0
5-14	1	5.6	0.1	1	7.7	0.1	2	11.1	0.1	0	0.0	0.0	2	15.4	0.2
15-34	5	27.8	0.2	4	30.8	0.1	3	16.7	0.1	11	42.3	0.4	5	38.5	0.2
35-44	3	16.7	0.2	2	15.4	0.1	3	16.7	0.2	4	15.4	0.3	0	0.0	0.0
45-54	3	16.7	0.2	1	7.7	0.1	3	16.7	0.2	5	19.2	0.4	3	23.1	0.2
55-64	3	16.7	0.3	3	23.1	0.3	5	27.8	0.5	3	11.5	0.3	2	15.4	0.2
65+	3	16.7	0.3	2	15.4	0.2	2	11.1	0.2	2	7.7	0.2	1	7.7	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
Race / Ethnicity															
Asian	2	11.1	0.2	2	15.4	0.2	2	11.1	0.2	1	3.8	0.1	1	7.7	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	4	22.2	0.1	6	46.2	0.1	4	22.2	0.1	8	30.8	0.1	4	30.8	0.1
White	12	66.7	0.4	2	15.4	0.1	12	66.7	0.4	15	57.7	0.5	4	30.8	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	0	0.0		3	23.1		0	0.0		2	7.7		4	30.8	--
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	5.6	0.3	2	7.7	0.5	0	0.0	0.0
2	2	11.1	0.1	1	7.7	0.0	4	22.2	0.2	6	23.1	0.3	1	7.7	0.0
3	0	0.0	0.0	1	7.7	0.1	3	16.7	0.2	3	11.5	0.2	0	0.0	0.0
4	3	16.7	0.2	4	30.8	0.3	0	0.0	0.0	4	15.4	0.3	1	7.7	0.1
5	6	33.3	0.9	1	7.7	0.2	3	16.7	0.5	5	19.2	0.8	4	30.8	0.6
6	0	0.0	0.0	1	7.7	0.1	1	5.6	0.1	0	0.0	0.0	2	15.4	0.2
7	6	33.3	0.4	1	7.7	0.1	0	0.0	0.0	2	7.7	0.1	1	7.7	0.1
8	1	5.6	0.1	4	30.8	0.4	5	27.8	0.4	3	11.5	0.3	3	23.1	0.3
Unknown	0	0.0		0	0.0		1	5.6		1	3.8				

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

Figure 1. Reported Cases of Vibriosis
LAC, 2002-2010

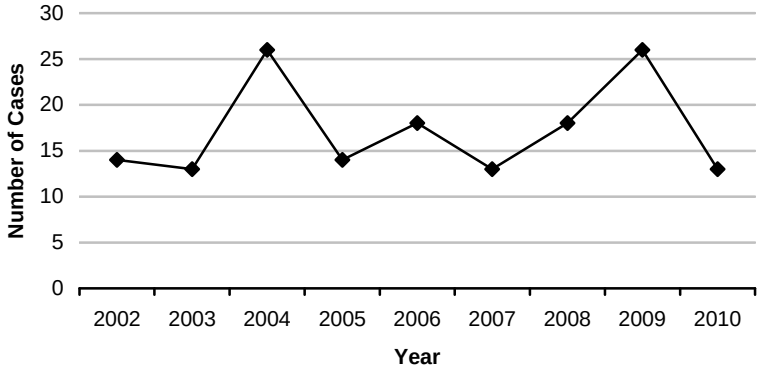


Figure 2. Reported Cases of Vibriosis by Age Group
LAC, 2010 (N=13)

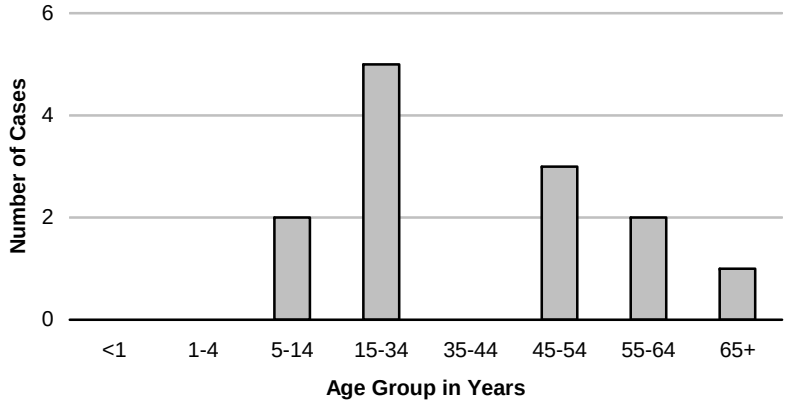


Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2010 (N=13)

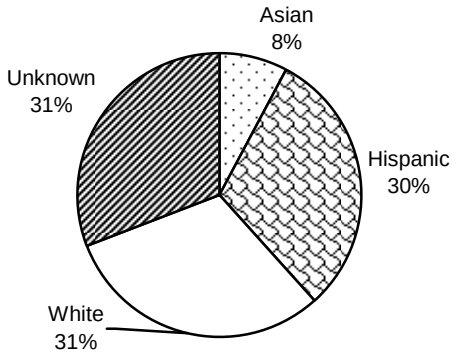


Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2010 (N=13)

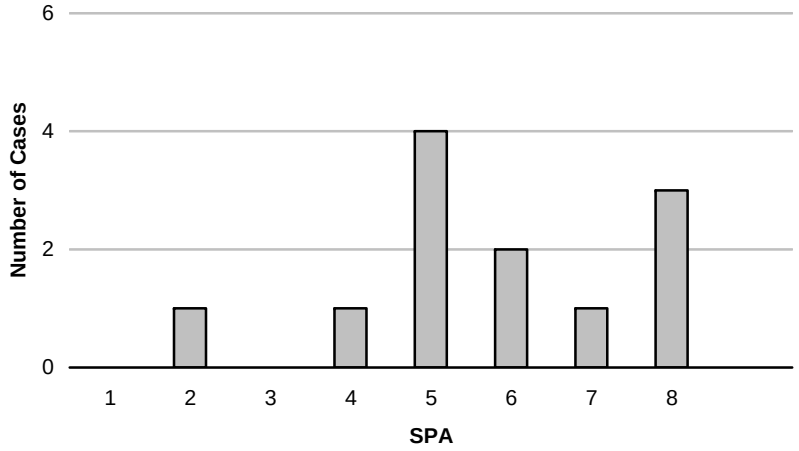


Figure 5. Reported Vibriosis Cases by Month of Onset LAC, 2010 (N=13)

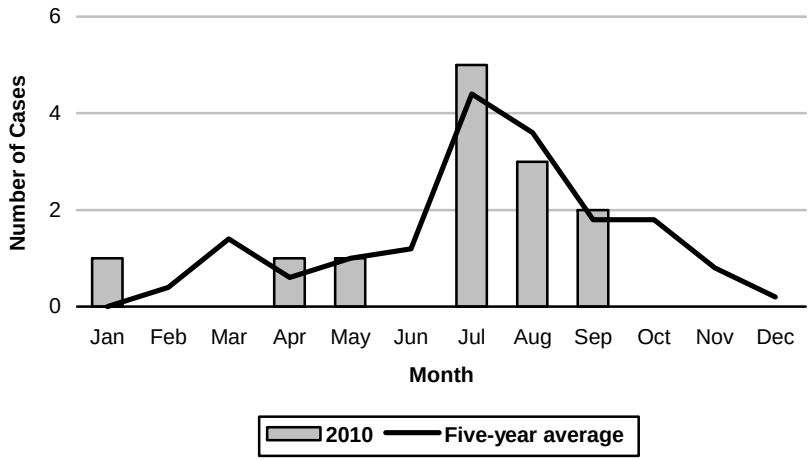
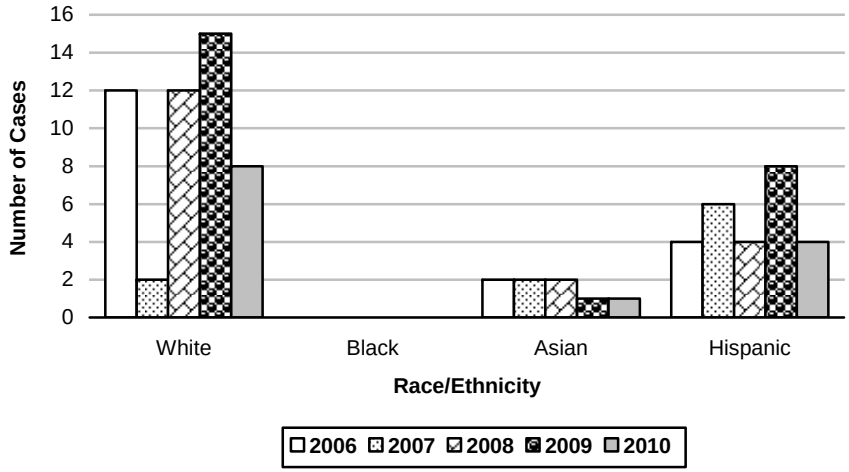


Figure 6. Reported Cases of Vibriosis by Race/Ethnicity LAC, 2006-2010



WEST NILE VIRUS

CRUDE DATA	
Number of Cases	4
Annual Incidence[a]	
LA County	0.04[b]
California	--
United States	--
Age at Diagnosis	
Mean	55.5
Median	49
Range	26-78

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c] See Final Summary of Nationally Notifiable Infectious Diseases, United States on MMWR website http://www.cdc.gov/mmwr/mmwr_nd/index.html.

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.

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.

No transmission associated with blood products has been reported in LAC. Additional routes of transmission that have been documented include transplantation of WNV-infected organs, 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.

2010 TRENDS AND HIGHLIGHTS

- The number of WNV infections reported in 2010 (n=4) was at an all time low since its introduction to California in 2003.
- WNV manifested as neuro-invasive disease in three reported infections (75%): two meningitis and one encephalitis. No WNV-associated deaths were reported.
- There was markedly less WNV activity in the LAC environment in 2009-2010,as measured in dead birds and mosquitoes.

Reported West Nile Virus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2006-2010

	2006 (N=16)			2007 (N=43)			2008 (N=170)			2009 (N=25)			2010 (N=4)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0		0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	
1-4	0	0.0		0	0.0	0.0	1	0.6	0.2	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	12.5		3	7.0	0.1	19	11.2	0.7	5	20.0	0.2	1	25.0	
35-44	5	31.3		0	0.0	0.0	15	8.8	1.0	0	0.0	0.0	0	0.0	
45-54	3	18.8		9	20.9	0.7	34	20.0	2.5	10	50.0	0.7	1	25.0	
55-64	3	18.8		12	27.9	1.4	36	21.2	3.9	4	16.0	0.4	0	0.0	
65+	3	18.8		19	44.2	1.9	65	38.2	6.4	6	24.0	0.6	2	50.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	1	6.3		0	0.0	0.0	6	3.5	0.5	1	4.0	0.1	0	0.0	
Black	0	0.0		0	0.0	0.0	5	2.9	0.6	0	0.0	0.0	0	0.0	
Hispanic	2	12.5		12	27.9	0.3	68	40.0	1.5	5	20.0	0.1	1	25.0	
White	13	81.3		29	67.4	1.0	75	44.1	2.6	16	64.0	0.5	3	75.0	
Other	0	0.0		0	0.0	0.0	3	1.8	12.2	0	0.0	0.0	0	0.0	
Unknown	0	0.0		2	4.7		13	7.6		3	12.0		0	0.0	
SPA															
1	0	0.0		1	2.3	0.3	5	2.9	1.4	12	48.0	3.3	0	0.0	
2	9	56.3		27	62.8	1.3	37	21.8	1.7	9	36.0	0.4	0	0.0	
3	4	25.0		9	20.9	0.5	61	35.9	3.5	2	8.0	0.1	2	50.0	
4	3	18.8		2	4.7	0.2	12	7.1	0.9	1	4.0	0.1	0	0.0	
5	0	0.0		0	0.0	0.0	1	0.6	0.2	1	4.0	0.2	0	0.0	
6	0	0.0		1	2.3	0.1	6	3.5	0.6	0	0.0	0.0	0	0.0	
7	0	0.0		2	4.7	0.1	44	25.9	3.2	0	0.0	0.0	2	50.0	
8	0	0.0		1	2.3	0.1	4	2.4	0.4	0	0.0	0.0	0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				

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

Figure 1. Incidence Rates of West Nile Virus
LAC, 2006-2010

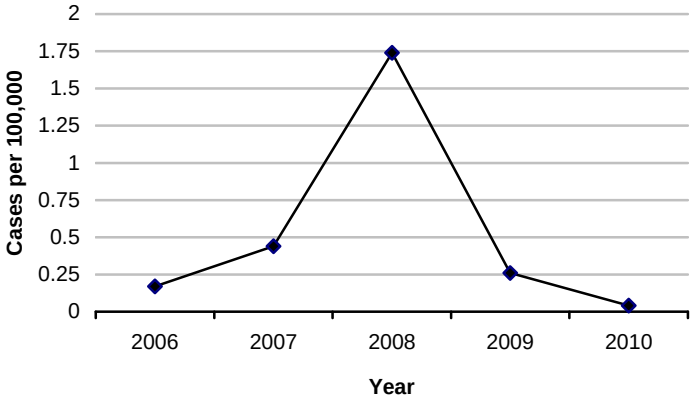


Figure 2. Incidence Rates of West Nile Virus by Age Group
LAC, 2010 (N=4)

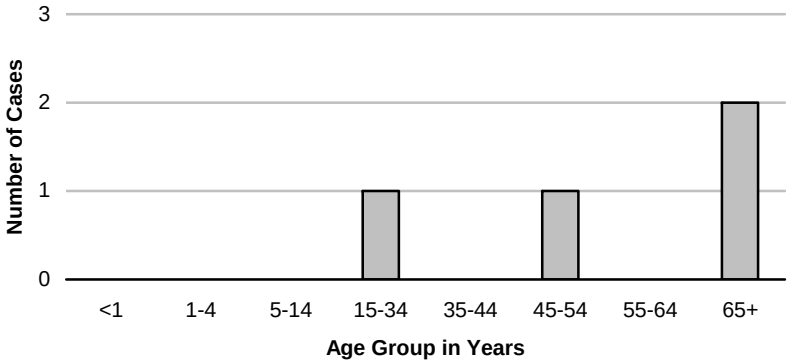
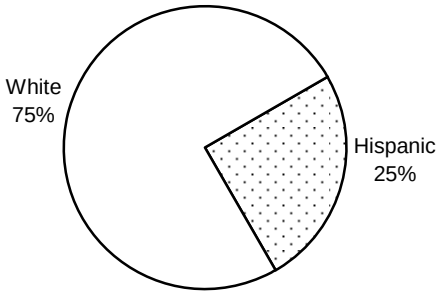


Figure 3. Percent Cases of West Nile Virus by Race/Ethnicity
LAC, 2010 (N=4)



* 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, 2010 (N=4)

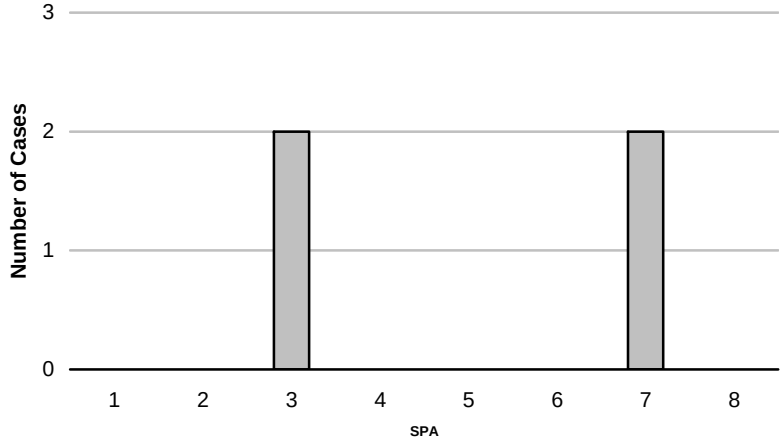


Figure 5. Reported West Nile Virus Cases by Month of Onset
LAC, 2010 (N=4)

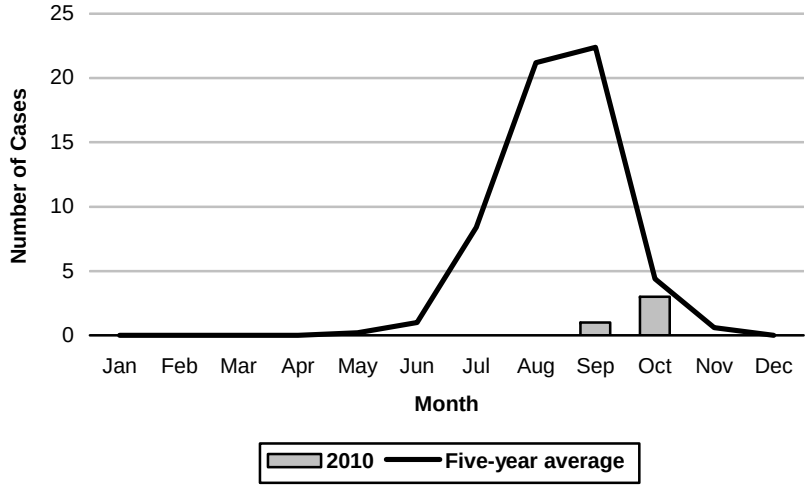
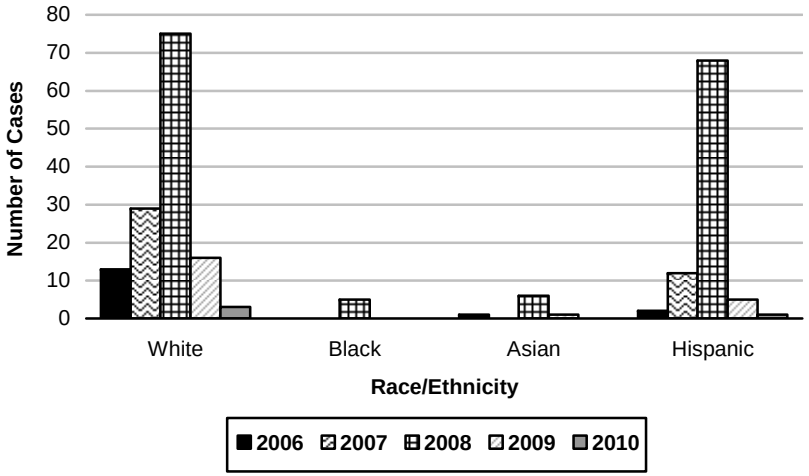


Figure 6. West Nile Virus Incidence by Race/Ethnicity
LAC, 2006-2010



DISEASE OUTBREAK SUMMARIES

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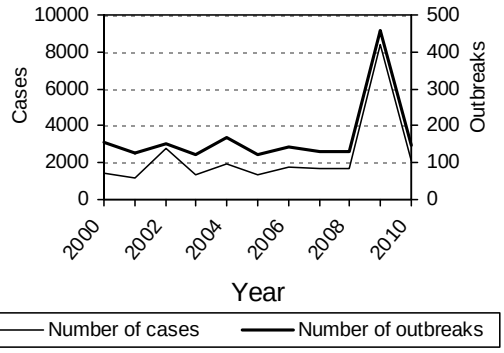
COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2010, 145 community-acquired disease outbreaks accounted for 2060 cases of illness. This represents realignment to customary levels after the increase caused by respiratory outbreak reports during the 2009 H1N1 influenza season (Figure 1).
- The top disease categories were gastroenteritis (GE) and ectoparasites with 37% and 23%, respectively.
- The percentage of community outbreaks caused by respiratory infections dramatically decreased in 2010 to 8%, from 79% in 2009 (Figures 1, 2).
- Pre-schools, schools, and group homes shared as the most common setting of community-acquired outbreaks, with 32%, 33% and 24% of all outbreaks (Figure 3, Table 2).

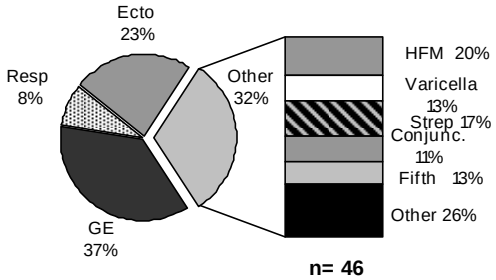
Figure 1
Community Acquired Outbreaks
Number of Persons Affected
LAC, 2000–2010



DATA

Disease outbreaks are defined as clusters of illness that occur in a similar time or place, with case numbers above baseline 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).

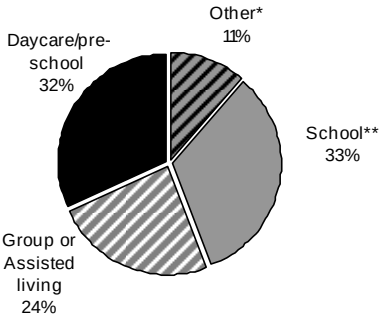
Figure 2
Community-Acquired Outbreaks by Type of Disease* LAC, 2010 (N=145)



Gastroenteritis (GE) and ectoparasites were the most common cause of outbreaks, comprising 37% and 23% of all reported outbreaks, respectively (Figure 2, Table 1). Respiratory illness outbreaks, so prominent the year before, dropped to only 8% of confirmed outbreaks in 2010. All of the respiratory outbreaks were of unknown etiology, most often due to lack of specific laboratory testing.

GE and pediculosis outbreaks had the highest incident-specific case average with a mean of 22 and 15 cases per outbreak, respectively. The single outbreak with the highest number of cases (149) was an unknown GE outbreak at an elementary school. Outbreaks caused by norovirus (n=11) or of undetermined GE etiology (n=40) had a mean of 28 and 21 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, especially among the very young and elderly. GE outbreaks were

Figure 3
Community Outbreaks by Setting
LAC, 2010 (N=145)



*Other includes: sites of detention, worksites and camps
** School includes: Elementary (46) and High School (2)

also the most commonly reported in group home settings - 63% of all group home outbreaks were GE in nature (Table 1).

The predominance of outbreaks affecting children in educational settings has been recognized over the last several years. In 2010 the most common outbreak settings were again pre-schools and schools accounting for 65% of all outbreaks. Events among younger age children were preferentially reported - pre-schools (46), elementary schools (46), and high schools (2) (Figure 3, Table 2).

Outbreaks were reported from all eight SPAs (Figure 4). SPA 3, San Gabriel (37) had the most outbreaks for 2010.

The chart of community-acquired outbreaks by onset month (Figure 5) further illustrates the impact of GE, ectoparasites, and respiratory infections. These three disease categories dominated the outbreak epidemic curve throughout the year. Outbreaks caused by other disease categories (e.g., Hand Foot and Mouth, Streptococcal disease, Fifth disease, conjunctivitis, ringworm) were seen earlier in the year (January – May). The summer months of June and July were low, perhaps affected by disease-specific seasonality and vacation.

Figure 4
Community Outbreaks by SPA
LAC, 2010 (N=145)

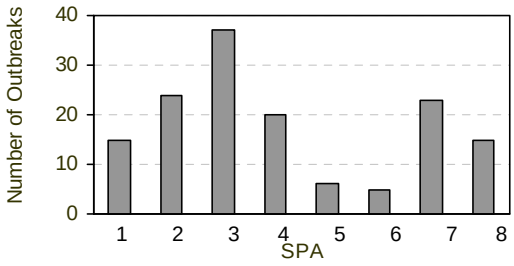
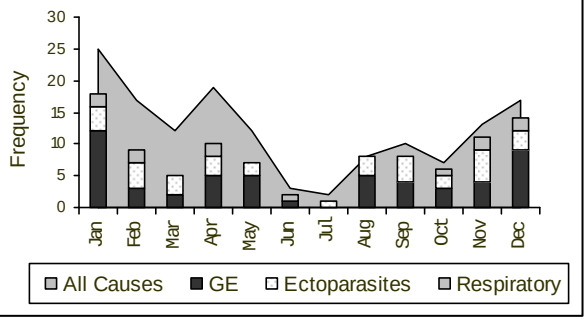


Figure 5
Community Outbreaks by Selected Diseases by Onset Month
LAC, 2010 (N=145)



COMMENTS

While the number of outbreaks and outbreak associated cases in 2009 was unprecedented, 2010 saw report levels quickly return to usual. In preparation for H1N1 activity in 2009, Public Health had made strong outreach efforts to school settings regarding illness transmission, prevention activities and reporting of clusters. These efforts may have had some continuing 'reporting effect' as locations were familiar with the outbreak reporting process.

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 (65% in pre-school, elementary, or high school). Gastroenteritis, pediculosis (head lice), respiratory, and varicella were most common in this young group. Only a residual of the respiratory outbreaks in 2009 were apparent this year, dropping from 363 to just 12. Of interest, despite the huge decline in overall respiratory reports, 92% and 93% of the respiratory outbreaks in 2009 and 2010 respectively, occurred in this young group (pre-school and school category). The second age group affected by outbreaks is an older population, often associated with group home settings (32%). 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.

While illness is often linked to a school, it must be noted that a school association might be serendipitous to the real etiologic location. Children who share a school setting have numerous 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.

Table 1. Community-Acquired Outbreaks by Disease— LAC, 2010

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Varicella	6	46	8	5-11
Streptococcal	8	55	7	2-17
Scabies	13	55	4	2-11
Hand, foot & mouth disease	9	100	11	5-19
Pediculosis	21	315	15	2-55
GE illness-Norovirus	11	305	28	10-57
GE illness-Shigella	2	8	4	3-5
GE illness-Salmonella	0	0	0	0
GE illness-Unknown	40	858	21	4-149
Fifth disease	6	110	18	7-37
Conjunctivitis	5	40	8	3-13
Influenza	0	0	0	0
Respiratory-Unknown	12	110	9	4-18
Other*	12	58	5	2-12
Total	**145**	**2060**	**14**	**2–149**

* Includes: Hepatitis B and C, measles, ringworm, viral meningitis, impetigo, and leishmaniasis.

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2010

Disease	Group Home[a]	School[b]	Preschool or Daycare	Other[c]	TOTAL
Varicella	0	6	0	0	**6**
Streptococcal	0	8	0	0	**8**
Scabies	6	2	1	4	**13**
Hand, foot & mouth disease	1	0	8	0	**9**
Pediculosis	1	13	6	1	**21**
GE illness-Norovirus	7	0	1	3	**11**
GE illness-Shigella	0	0	2	0	**2**
GE illness-Salmonella	0	0	0	0	**0**
GE illness-Unknown	15	5	16	4	**40**
Fifth disease (Parvovirus)	0	5	1	0	**6**
Conjunctivitis	1	1	3	0	**5**
Influenza	0	0	0	0	**0**
Respiratory-Unknown	1	7	4	0	**12**
Other	3	1	4	4	**12**
Total	**35**	**48**	**46**	**16**	**145**

[a] Includes centers for retirement, assisted living, and rehabilitation
[b] Includes elementary (46) and high school (2).
[c] Includes juvenile camps/jail/prison/detention (6), special ed. site (3), worksite (2) and camps/aftercare (2).

FOODBORNE 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, Food and Milk (F&M) Program investigates each FBIR by contacting the reporting individual and evaluating the public health importance and need for follow-up. When warranted, a thorough inspection of the facility is conducted. This 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 possible foodborne outbreaks with the greatest public health importance. An epidemiologic investigation will typically be initiated when there are illnesses in multiple households, multiple reports against the same establishment in a short period of time, or ill individuals who attended a large event with the potential for others to become ill. The objective of each investigation is to determine 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

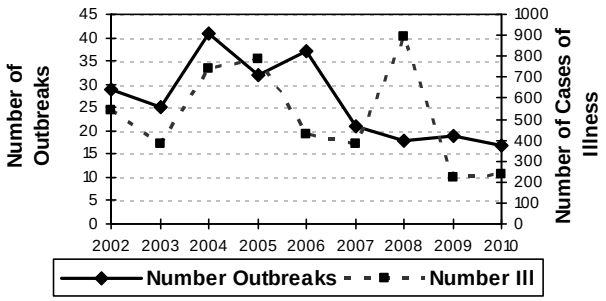
The number of FBIRs received in 2010 (1754) was similar to that received in 2009 (1709). Public reporting via the web accounted for 52% (n=918) of FBIRs this year. The F&M program contacted each person making the FBIR, and performed a site inspection on 36% of FBIR reports that were deemed high priority (n=631). Half of all complaints (52%) were referred to district Environmental Health offices, specialty programs, or other LAC agencies (n=914). The remaining FBIR's were duplicates, lost to follow-up, or referred to other agencies outside of LAC (N=209).

The ACDC Food Safety Unit conducted 20 outbreak investigations this year; 14 were initiated by FBIR complaints and six were initiated through other surveillance activities. Of these 20 investigations, three (15%) where not considered to be foodborne as the evidence collected during the investigations did not support a foodborne source (OB#8, 53 & 189). These outbreaks were due to norovirus which can easily be spread person-to-person in a food setting if one guest is sick when attending. In some of these investigations an ill guest at the party was identified. In other investigations a judgment 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 symptoms 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 in these outbreaks can be challenging as well as time and resource consuming.

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

The 17 outbreaks determined to be foodborne are listed in Table 1 and summarized below. These outbreaks represent 240 cases of foodborne illness and 18 hospitalizations (Figure 1). No deaths were identified. Outbreak occurred throughout the year, with slightly more occurring in the winter and spring months (Figure 2).

Figure 1.
Foodborne Outbreaks
Number of Persons Affected
LAC, 2002–2010

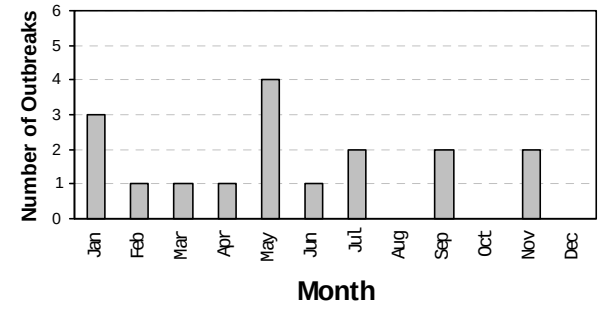


Causes of Foodborne Outbreaks

A meal was epidemiologically implicated in 59% (n=10) of foodborne outbreaks this year, with a specific food item implicated in 53% of these (N=9). Implicated food items included sandwiches (n=2), poultry (n=1), beef (n=1), fish (n=1), eggs (n=1), fruit (n=1), a rice dish (n=1) and salsa dish with multiple ingredients (n=1).

An ill food handler was implicated as the cause of one foodborne outbreak investigated this year (OB#160). F&M inspections identified contributing factors such as temperature violations, contamination, or proliferation issues that contributed to four other outbreaks (24%).

Figure 2.
Foodborne Outbreak Investigations
by Month of Onset
LAC, 2010 (N=17)

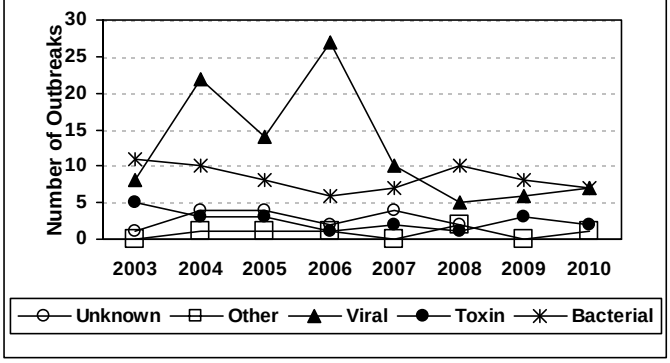


Foodborne Agents

An agent was identified in 94% of foodborne outbreaks this year (n=16) and confirmed in 47% (n=8) (Figure 3). Viral agents were responsible for eight outbreaks, bacterial agents were responsible for six outbreaks, bacterial toxin for one outbreak, and fish toxin for one outbreak (Figure 3).

Salmonella was responsible for five of the six foodborne bacterial outbreaks this year, similar to the previous year (n=7). LAC was part of two national salmonellosis outbreaks this year. One of these involved *Salmonella enteritidis*, which included 1,939 cases of illness nationally and was associated with contaminated eggs[1] (See 2010 ACDC Special Studies Report). Three LAC cases were confirmed as part of the outbreak (OB#141); however an estimated 153 LAC residents were ill by this food contamination. The farm producing the contaminated shell eggs (Wright County Egg of Galt, Iowa) conducted a nationwide voluntary recall of this product on August 13, 2010.

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



The other national outbreak of salmonellosis involved *Salmonella typhi* and included 9 cases of illness in two states: five cases of illness in LAC and four cases in Nevada. These illnesses were associated with the consumption of a contaminated mamey fruit pulp. The maker of this food product (Goya Foods, Inc of Secaucus, NJ.) announced a voluntary recall on August 13, 2010.

A large local outbreak of *Salmonella* serotype involving 49 cases of illness was associated with foods purchased from a LAC market (OB#47). Cooked carnitas sold by the market was implicated as the source of the outbreak. This food item was significantly associated with illness in the case-

control food analysis and also laboratory confirmed to be contaminated with the same rare salmonella serotype as that found in cases.

One of the two remaining salmonella outbreaks involved contaminated homemade foods served at a pot-luck (OB#105) and another involved an ill food handler (OB#160).

Norovirus was confirmed or suspected in seven foodborne outbreaks this year (41%), which is comparable to the number found in 2009 (n=6), but a considerable drop from the number seen in 2006 (N=25). This reduction may be due to better recognition of person-to-person spread.

The largest foodborne norovirus outbreak this year involved persons eating food at a hotel conference center in LAC (OB# 156). There were 26 persons in two separate conference groups on the same weekend that became ill. The case-control food analysis implicated a particular sandwich in each event, though the type of sandwich was different for both events. The F&M inspection did not identify any major violations or ill food handlers. The source of the outbreak was most likely an ill food handler who contaminated the sandwiches, but had recovered by the time of inspection. No other complaints or reports of illness were received involving this conference center.

Another norovirus outbreak involving 11 cases of illness occurred after persons ate take-out food at an LAC residence (OB#71). The rice dish was associated with illness in the case-control food analysis. Another norovirus outbreak involving seven cases of illness was associated with contaminated salsa prepared by a non-license caterer who could not be located for inspection (OB#177). Four other smaller norovirus outbreaks occurred where the small numbers of people involved made it difficult to identify a contaminated food item and the environmental inspections did not identify violations (OB#29, #71, #103, #130).

Other Foodborne Agents

An outbreak of enterotoxigenic *E. coli* (ETEC) (OB#25) involved 19 cases of illness in a work group at a hotel conference center. The case-control analysis of meals eaten at the conference identified the final meal as being associated with illness. However, no particular food item could be implicated. The foods at this meal were most likely contaminated by an ill employee who had recovered at the time of F&M inspection. No other complaints or reports of illness were received involving this conference center.

A suspected outbreak of Haff's disease (OB#109) occurred in two persons after eating buffalo fish purchased at an LAC market and prepared at home. No laboratory testing of the fish or patients is available to definitively confirm this disease, but the typical clinical course, exposure to the species of fish associated with this disease, acute onset of symptoms within five hours of fish ingestion, and similarity to a 1997 outbreak suggest that buffalo fish caused the illness.

An outbreak of acute hepatitis A (OB#180) occurred among five persons working for, and one persons working with, a film production studio in LAC. Illness onsets indicate a point source outbreak. A cohort food analysis implicated a cake garnished with several types of berries as the source, however the ultimate source and mechanism of contamination remains unknown. EH F&M inspection of the caterer and its bakery did not reveal major food safety violations. No other cases of hepatitis A among other purchasers of berry cake were identified.

A bacterial toxin was responsible for an outbreak involving 43 cases of illness in persons eating catered food at a workplace event. Chicken was associated with illness in the case-control food analysis and the F&M inspectors identified major food safety violations at the banquet facility where the chicken was prepared (OB#94).

Outbreak Locations

Locations for reported foodborne outbreaks included residents' homes (6), hotel or banquet halls (4), restaurants (2), a workplace (1) and a juvenile detention facility (1). Two outbreaks occurred throughout the community due to

widely distributed food products. The largest number of outbreaks was reported from Service Planning Area (SPA) 2 (29%) (Table 2). There was one multi-county outbreak, and two national outbreaks that involved multiple states.

Table 1.Foodborne Outbreaks 2010 (N=17)

	Agent	Strain/ Type	Confirmed/ Suspected	Outbreak (OB#)	Setting	Source	Cases	Health District (HD)
1	Norovirus		Yes	OB 156	Conference Center	Sandwiches	26	Pomona
2	Norovirus		No	2010-24	Hotel	Unknown	11	Hollywood-Wilshire
3	Norovirus		No	2010-29	Banquet	Unknown	5	Whittier
4	Norovirus		No	2010-71	Residence	Rice	8	Glendale
5	Norovirus		No	2010-103	Restaurant	Unknown	9	West Valley
6	Norovirus		No	2010-130	Hotel	Unknown	6	Inglewood
7	Norovirus		No	OB177	Residence	Salsa	7	West
8	Salmonella	Give	Yes	2010-47	Residence	Carnitas	49	El Monte
9	Salmonella	Branderrup	Yes	2010-105	Residence	Unknown	22	West Valley
10	Salmonella	SE 04	Yes	OB141-Sit#28/	Community	Eggs	3	Multi
11	Salmonella	Typhi	Yes	Sit#30	Community	Mamey	5	Multi
12	Salmonella	Thompson	Yes	OB160	Restaurant	Unknown	10	Hollywood-Wilshire
13	Bacterial Toxin		No	2010-94	Work Place	Chicken	43	Pomona
14	ETEC		Yes	21010-25	Hotel	Sandwiches	19	Hollywood-Wilshire
15	Hepatitis A		Yes	OB180	Residence	Berry Pie	6	Hollywood-Wilshire
16	Fish Toxin		No	2010-109	Residence	Fish	2	Glendale
17	Unknown		No	2010-58	Jail	Unknown	5	Antelope Valley

Table 2. Frequency of Foodborne Outbreaks by Service Planning Area or Location, LAC, 2010 (N=17)

SPA	Frequency	Percent
1	0	0%
2	5	29%
3	2	12%
4	4	24%
5	2	12%
6	0	0%
7	1	6%
8	1	6%
Multi-county	1	6%
Multi-state	2	12%

ADDITIONAL RESOURCES

Investigation Update: Multistate Outbreak of Human Typhoid Fever Infections Associated with Frozen Mamey Fruit Pulp. Website:
http://www.cdc.gov/salmonella/typhoidfever/index.html

Investigation Update: Multistate Outbreak of Human *Salmonella* Enteritidis Infections Associated with Shell Eggs. Website:
http://www.cdc.gov/salmonella/enteritidis/

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:

- Foodborne and Diarrheal Diseases Branch – http://www.cdc.gov/enterics/
- Outbreak Response and Surveillance Team – http://www.cdc.gov/foodborneoutbreaks/
- FoodNet – http://www.cdc.gov/foodnet/
- Norovirus Information – http://www.cdc.gov/ncidod/dvrd/revb/gastro/norovirus.htm

Other national agencies:

- FDA Center for Food Safety and Applied Nutrition – http://www.cfsan.fda.gov
- Gateway to Government Food Safety Information – http://www.FoodSafety.gov

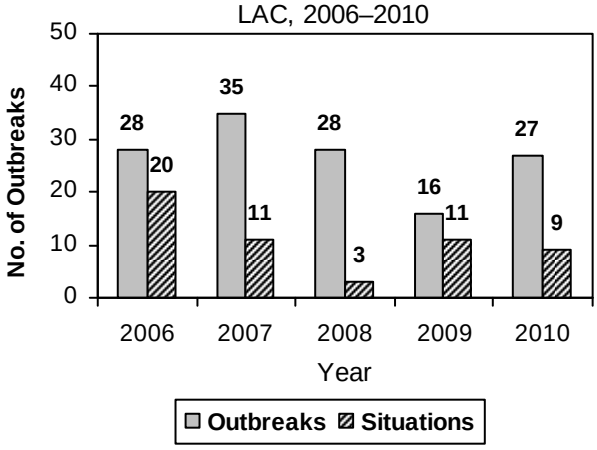
HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITALS

DEFINITION

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

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

Figure 1.
General Acute Care Hospital Outbreaks
and Situation Events
LAC, 2006–2010



ABSTRACT

There were 27 confirmed outbreaks reported in acute care hospitals in 2010 (Figure 1), an increase of 69% over 2009. Forty-one percent (n=11) occurred in a unit providing intensive or focused specialized care (e.g., neonatal intensive care, liver transplant and psychiatric units). Nineteen percent (n=5) occurred in a sub-acute unit located within the acute care hospital (Table 1). Scabies outbreaks increased from three in 2009 to five in 2010 and accounted for 19% of all outbreaks. Forty-four percent (n=12) of acute care hospital outbreaks were of bacterial etiology (Table 2) from a multidrug-resistant organisms (MDRO) such as *Acinetobacter baumannii (A. baumannii)*, *Klebsiella pneumoniae*, carbapenem-resistant (*CRKP*) and *Clostridium difficile* (Figure 2). The etiologic agents contributing the largest number of cases in acute care hospital outbreaks were norovirus (68, 22%) followed by *A. baumannii* (58, 18%) and *C. difficile* (56*, 18%)*. There were nine situation events reported in acute care hospitals in 2010. Sixty-seven percent (n=6) were of bacterial etiology and caused by multidrug-resistant organisms (Table 4).

Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2010

Outbreak Location	No. of Outbreaks
Cardiothoracic Intensive Care - Adult	2
Cardiothoracic Intensive Care - Pediatric	1
Intensive Care – Adult	3
Intensive Care- Neonatal	3
Liver Transplant	1
Multiple Units	8
Psychiatric	1
Pulmonary Clinic - Pediatric	1
Rehabilitation	2
Sub-acute Unit within a Hospital - Adult	3
Sub-acute Unit within a Hospital - Pediatric	2
Total	**27**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition—LAC, 2010

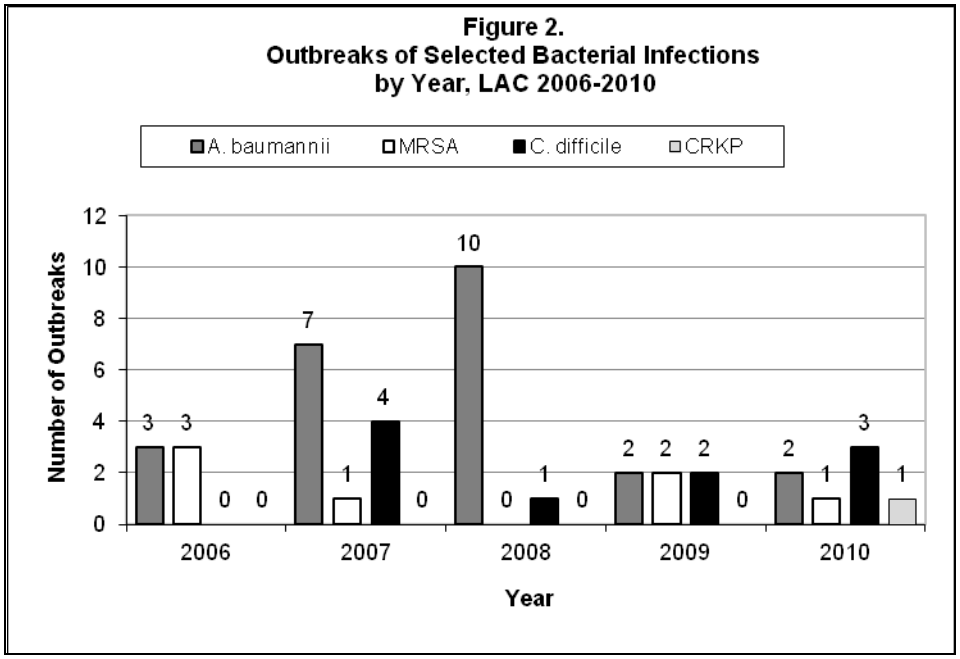
Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
A. baumannii	2	58
Aspergillosis	3	22
C. difficile	3	56
Conjunctivitis	1	3
E. meningoseptica	1	3
CRKP	2	29
MRSA	1	6
Norovirus	1	68
Pseudomonas aeruginosa	1	2
Respiratory Syncytial Virus	3	9
Scabies	5	34
Stenotrophomonas maltophilia	1	8
Unknown Gastroenteritis	1	10
Unknown Rash	1	4
Varicella Zoster Virus	1	4
Total	**27**	**316**

Table 3. General Acute Care Hospital Situation Events by Unit—LAC, 2010

Outbreak Location	No. of Events
Allergy-Immunology Clinic – Pediatric	1
Cardiology	1
Hematology-Oncology	1
Intensive Care – Adult	3
Intensive Care-Neonatal	1
Medical-Surgical	2
Total	**9**

Table 4. General Acute Care Hospital Situation Events by Disease/Condition—LAC, 2010

Disease/Condition/ Etiologic Agent	No. of Events	No. of Cases
A. baumannii	3	18
C. difficile	1	3
Epstein Barr Virus	1	2
Haemophilus influenzae	1	2
CRKP	1	4
MRSA	1	10
Norovirus	1	5
Total	**9**	**44**



COMMENTS

Short-term, acute care hospital inpatient services have traditionally provided for patients acute healthcare needs. Once recovered from their acute illness, patients who continued to require skilled medical or nursing services for a chronic condition remained hospitalized until ready for discharge. Over the past two decades, however, there have been an increasing number of medically complex patients admitted to acute care hospitals who required specialized care beyond the acute episode, resulting in a prolonged hospital stay. Since the mid-1980's, there has been a gradual shift in where these services are delivered, transitioning from the inpatient acute care hospital to a variety of other settings, located either within the hospital (hospital within a hospital model), or outside the hospital in a freestanding facility. This shift was partially the result of the changes in managed care and government payment systems.[1, 2]

In 2011, 19% (n=5) of Los Angeles County (LAC) acute care hospital outbreaks occurred in a sub-acute facility located within the acute care hospital and 11% (n=3) occurred in a free-standing long-term acute care hospital (LTAC). Both facilities fall under the umbrella of post-acute care services. According to the American Hospital Association, "post-acute care services support patients who require ongoing medical management, therapeutic, rehabilitative or skilled nursing care".[3]

Post-acute services are also provided in freestanding subacute care facilities, skilled nursing facilities (SNF), home health facilities, hospice, dialysis centers, and inpatient rehabilitation centers. All are components of the healthcare continuum and face similar challenges of healthcare associated infections (HAI), multidrug resistant bacterial infections, and related infection control and patient safety concerns.

Many medical, nursing, respiratory and surgical procedures, once performed exclusively in the acute care hospital, e.g. extensive wound debridement, cardiac monitoring and administration of inhalation medication for a ventilator dependent patient, are now provided in other healthcare settings as long as licensing and/or certification eligibility requirements are met.[4]

There are numerous definitions of sub-acute and long-term acute care which has led to some confusion among healthcare providers. For purposes of this report, sub-acute care is defined as a level of care needed by a patient who does not require hospital acute care, but who requires more intensive nursing

and other care than can be provided to patients in a skilled nursing facility (SNF).[5] Long-term acute care is defined as an acute care hospital that has its own governing body independent from the acute care hospital and must have a separate administrative and employee structure and distinct medical staff.[6, 7]

In California, healthcare facilities may participate in the CDPH Subacute Care Program and must meet specific criteria. The unit may be located within the acute care hospital and licensed as an acute care hospital with a distinct part (DP) or a SNF; or it may be licensed as a freestanding SNF and certified as a long-term care Medicare and Medi-Cal provider. A LTAC must also be licensed as an acute care hospital and meet the conditions for Medicare and Medi-Cal. Both types of facilities provide care to adult or pediatric medically complex patients with acute or chronic medical conditions.[8]

In 2010, ten outbreaks (37%) occurred in a neonatal intensive care unit (NICU), adult ICU, cardiothoracic ICU or transplant unit of the hospital. Forty-four percent (n=12) of reported outbreaks in Los Angeles County (LAC) were caused by a multi-drug resistant organism (MDRO) such as *C. difficile*, CRKP, and *A. baumannii*, an increase of 100% from 2009 to 2010. Of these, 3 outbreaks (25%) occurred in a freestanding LTAC. The Joint Commission, Centers for Disease Control and Prevention (CDC), Association for Professionals in Infection Control and Epidemiology, Society for Healthcare Epidemiology of America and national, state and local hospital organizations continue to work collaboratively to address the problem of multi-drug resistance and infection prevention in healthcare facilities.

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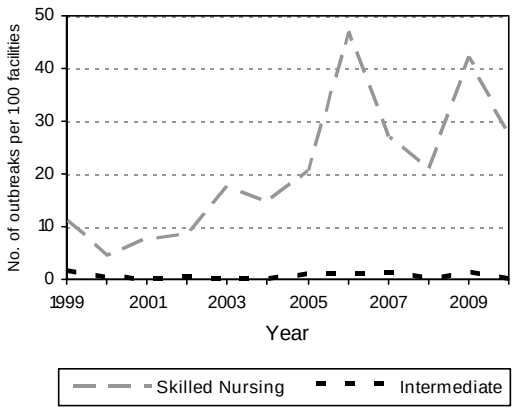
HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

DEFINITION

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

The sub-acute care category includes skilled nursing, intermediate care, psychiatric care, and free-standing dialysis centers, among other less common facilities. Skilled nursing facilities provide continuous skilled nursing care to patients on an extended basis. Intermediate care facilities also provide skilled nursing care to patients, but the care is not continuous. Psychiatric facilities provide 24-hour inpatient care for patients with psychiatric care needs.

Figure 1.
Sub-acute Facility Outbreaks
LAC, 1999–2010



ABSTRACT

- The total of confirmed sub-acute care associated outbreaks declined substantially from 169 outbreaks in 2009 to 110 outbreaks in 2010.This was largely due to substantial decreases in both gastrointestinal and respiratory outbreaks.
- The number of skilled nursing facility outbreaks decreased by 34% in 2010 from 166 in 2009 to 110. (Table 1). The rate of skilled nursing facility outbreaks also decreased from 42 per 100 facilities in 2009 to 27 per 100 facilities in 2010 (Figure 1).
- There were no outbreaks in intermediate care, psychiatric, or dialysis facilities in 2010.

Table 1. Number of Reported Outbreaks in Sub-acute Healthcare Facilities LAC, 2006–2010

	YEAR				
Type of Facility	**2006**	**2007**	**2008**	**2009**	**2010**
Intermediate Care Facilities	3	3	-	3	-
Psychiatric Care Facilities	-	3	2	-	-
Skilled Nursing Facilities	173	110	85	166	104
Total	173	116	87	169	104

Intermediate Care Facilities: No outbreaks were reported in intermediate care facilities in 2010. Three outbreaks were investigated in intermediate care facilities in 2009.

Psychiatric Facilities: As with 2009, no outbreaks were reported in psychiatric care facilities in 2010.

Skilled Nursing Facilities: Reported skilled nursing facility outbreaks decreased by 27% in 2010 compared to 2009. Scabies and rash outbreaks were the most frequently reported, accounting for 68% of

outbreaks. However, gastrointestinal outbreaks accounted for the most cases of illness, with 521 (47%) cases. Three *Clostridium difficile* outbreaks were reported in 2010 compared to four outbreaks reported in 2009. The total number of respiratory outbreaks was a third of those seen in 2009; six outbreaks were documented in 2010 compared to 19 in 2009. In 2009, six of 19 respiratory outbreaks were due to influenza compared to just one outbreak in 2010 (Table 2).

Table 2. Skilled Nursing Facility (SNF) Outbreaks by Disease/Condition—LAC, 2010

Disease/Condition	No. of Outbreaks	No. of Cases
Clostridium difficile enterocolitis	3	27
Invasive Group A Streptococcal	1	3
Gastroenteritis • Unspecified (n=9) • Norovirus (n=16)	25	521
Scabies	30	163
Scabies, atypical	1	1
Unknown Rash	45	325
Respiratory illness • Unspecified (n=5) • Influenza (n=1)	6	81
Total	**111**	**1121**

COMMENTS

LAC skilled nursing facilities experienced a decrease in the total number of reported outbreaks. There was a 60% decrease in gastrointestinal outbreaks in 2010 compared to 2009. Outbreaks due to *Clostridium difficile* are not commonly reported to DPH, however, three outbreaks were reported in 2010 and four the previous year. This may signal an increased prevalence of this organism in skilled nursing facilities, whose residents frequently transfer to and from acute care facilities; increased compliance with reporting outbreaks compared to previous years may also be responsible. An outbreak investigation of invasive group A streptococcus (IGAS) was conducted in 2010. Three cases were identified with one death. Investigation revealed several breaches in infection control including improper hand washing and infection control policies that were not standardized to CDC guidelines.

Just one confirmed influenza outbreak occurred in the sub-acute setting in 2010, totaling 25 cases, including six staff and 19 residents. Laboratory investigation revealed Influenza A subtype H3 that was included in the 2010 influenza vaccine. Over 50% of cases who received the influenza vaccination (3 staff, 14 residents) became ill with influenza. Several studies have reported diminished vaccine effectiveness in the elderly. Thus it is important for post-exposure antiviral prophylaxis to be administered during outbreaks involving the elderly even in the presence of a high vaccination coverage rate.

All but two LAC DPH districts investigated at least one subacute 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 such 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. 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.

LAC Guidelines for Prevention and Control of Scabies for Acute and Sub-Acute Care Facilities (accessible on ACDC website) is available to provide guidance to skilled nursing facilities experiencing scabies outbreaks, as well as to be a helpful guide to LAC DPH Community Health Services district public health nurses to investigate scabies outbreaks.

Acute Communicable Disease Control Program

Special Studies Report

2010

Los Angeles County
Department of Public Health

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

ACDC SPECIAL STUDIES REPORT 2010

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BOTULISM CASE REPORT SUMMARY, 2010

David Dassey, MD, MPH

Five suspected botulism cases were reported in 2010 in Los Angeles County and only one was confirmed; this excludes infant botulism cases. The confirmed case was a male injection drug user with a recent history of subcutaneous injection of black tar heroin. He had no acute wounds noted on admission and no recent consumption of suspicious foods, but did give a history of recent skin popping. Type A botulinum toxin was detected in serum, confirming the diagnosis of wound botulism. He recovered after treatment with antitoxin.

An elderly female developed progressive descending paralysis and ophthalmoplegia and was diagnosed with Guillain-Barré syndrome (GBS), Miller-Fisher variant. When she failed to respond clinically to treatment with intravenous immune globulin, her physician consulted Public Health to rule out botulism. There was no history of recent wounds or consumption of suspicious foods. Antitoxin was authorized and administered, without improvement. Tests on serum, gastric, and stool specimens showed no evidence for botulism. The final diagnosis was GBS.

A young male presented with descending weakness and difficulty with speech and swallowing. He gave no history of recent injections, wounds, or suspicious food items. Trivalent antitoxin was administered after collection of serum, gastric, and stool specimens, all of which were negative for indicators of botulism. The patient responded to plasmapheresis with return of lost motor functions, making the diagnosis of GBS, Miller-Fisher variant.

A homeless middle age male injection drug user complained of neck pain and weakness, trouble swallowing, and weakness in both arms; he also gave a history of a boil on his arm. On examination he had cellulitis of the neck. Although Public Health authorized release of botulinum antitoxin, his physician withheld its administration after noticing clinical response to antibiotic treatment of the cellulitis. No clinical specimens were submitted to the Public Health Laboratory (PHL), and the patient made a full recovery.

Another elderly female was reported as a possible case of botulism after presenting with ophthalmoplegia and areflexia. Antitoxin was not administered, but tests were performed on stool, which was negative on culture and toxin screen. The final diagnosis was viral meningitis.

The PHL was consulted regarding identification of an anaerobic Gram positive rod from a culture obtained during a gall bladder operation. The patient had no neurological symptoms or findings whatsoever. The submitting laboratory made the presumptive identification of *Clostridium sporogenes,* a non-toxigenic organism. The PHL showed the organism to be negative for toxin production by culture and mouse bioassay, and negative by polymerase chain reaction for any toxin genes, confirming the preliminary identity.

The California Infant Botulism Program reported four confirmed Los Angeles County cases of infant botulism in infants ranging from seven weeks to seven months of age. Three were female; two were Hispanic white, one was non Hispanic white, and one was Asian. There were three cases with type A intoxication and one case with type B.

In 2010, the Centers for Disease Control and Prevention (CDC) initiated a research study nationwide titled “Use of an Investigational New Drug, Heptavalent Equine-Based Botulinum Antitoxin (IND 6,7.50). Heptavalent botulinum antitoxin (H-BAT) consists of equine-derived antibody to the seven known botulinum toxin types (A-G). It replaces bivalent (AB) and monovalent (E) antitoxins previously used for treatment in the US. 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) remains available for infant botulism through the California Infant

Botulism Treatment and Prevention Program. BabyBIG is an orphan drug that consists of human-derived botulism antitoxin antibodies and is approved by FDA for the treatment of infant botulism types A and B.

DENGUE SURVEILLANCE, LOS ANGELES COUNTY 2009-2010

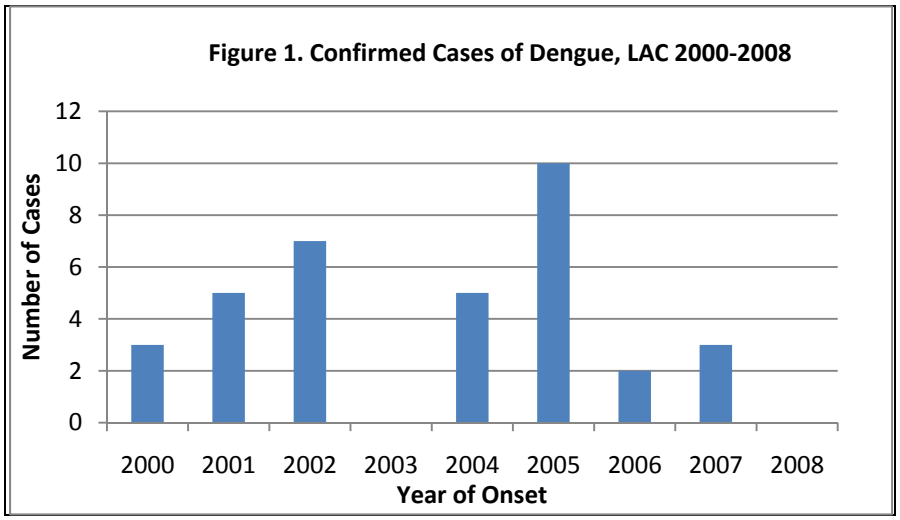
Van P. Ngo, MPH and Heather Maynard

INTRODUCTION

Dengue is the most common vector-borne viral disease in the world, causing an estimated 50-100 million infections and 24,000 deaths each year.[1] The virus that causes dengue, a single stranded RNA virus of the Flaviviridae family, is transmitted by the mosquitoes *Aedes aegypti and A. albopictus*. The disease has a range of clinical presentation from asymptomatic infection to severe systemic febrile illness. Treatment is supportive and there is no vaccine available to prevent dengue.[1,2]

In the United States (US), dengue has presented mainly as a travel-related disease. No cases of dengue acquired within the continental US were reported between 1946 and 1980.[3] However, all factors are present in many parts of the country that support local transmission including the presence of both mosquito vectors and warm temperatures (above 20°C) sustained through most of the year.[2,4] Since 1980, locally-acquired outbreaks have been documented in Texas, Hawaii, and most recently in Florida in 2009. Concern for the reemergence of dengue in Florida as well as increases in dengue among returning US travelers over the past 20 years has prompted heightened vigilance among the medical and public health community. Dengue was added to the list of Nationally Notifiable Infectious Conditions in 2009.[3]

Dengue has been a notifiable condition in California and Los Angeles County (LAC) for several decades. Between 2000 and 2008, zero to ten cases were confirmed annually in LAC, with a mean of 3.9 and median of three cases (Figure 1).[5] Confirmation of dengue requires laboratory confirmation of a clinically compatible case with paired serological testing of acute and convalescent specimens. Because there is little clinical need to obtain convalescent serology, reported cases of dengue are rarely confirmed in LAC, and current surveillance represents a considerable undercount of cases. In order to provide a more comprehensive picture of dengue in LAC, this report summarizes both probable and confirmed dengue cases from 2009 and 2010.



METHODS

Suspected dengue infections are reported to the LAC Department of Public Health (DPH) from healthcare providers and laboratories. Demographic information, medical histories and laboratory results were requested for review for each case reported with a positive immunoglobulin M antibody test or clinically suspected for dengue in 2009 through 2010. Clinically compatible cases had a fever of two or more days and one of the following accompanying signs (rash, leucopenia, hemorrhagic manifestations) or symptoms (ocular pain, headache, myalgia, arthralgia) and were categorized as confirmed or probable

according to the CDC's 2009 and 2010 requirements for laboratory evidence supporting dengue, as detailed in Table 1.

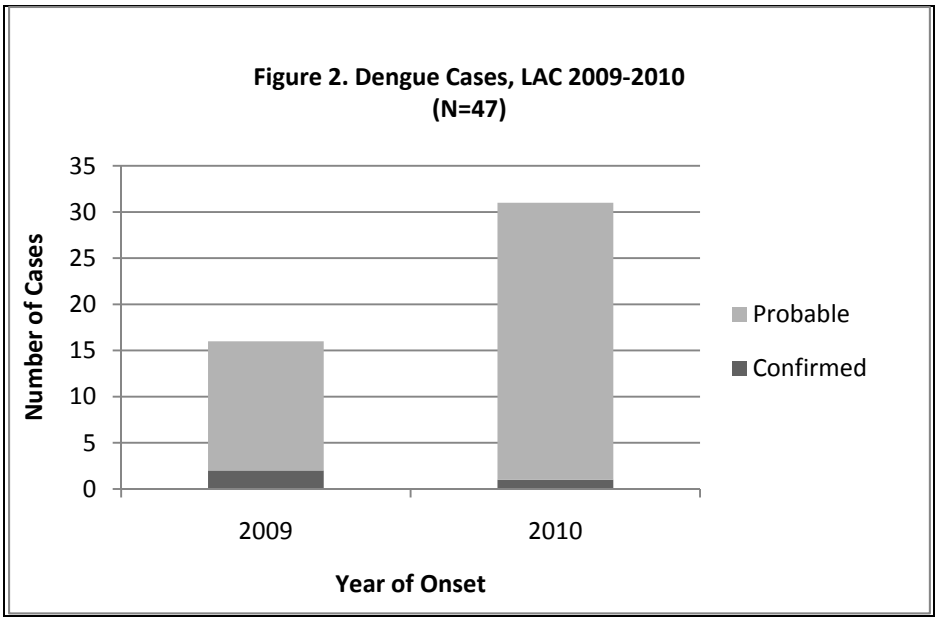
.Table 1. CDC Case Definitions for Dengue

	2009	2010
Confirmed	Demonstration of a ≥4 fold change in immunoglobulin M (IgM) or immunoglobulin G (IgG) antibody titers in paired serum samples	Seroconversion from negative to positive for IgM antibody in paired serum samples OR Demonstration of a ≥4 fold rise in IgG antibody titer in paired samples
Probable	A positive IgM antibody test on a single serum specimen	Dengue-specific IgM antibodies present in serum with a P/N ration ≥2

The analysis included confirmed and probable cases with an onset between January 1, 2009 and December 31, 2010, and reported residence in LAC. Age, gender, residence, race/ethnicity and travel history were abstracted. Incidence was calculated based on 2009 census estimates for LAC. Data were analyzed with Microsoft® Access.

RESULTS

During 2009-2010, 47 confirmed and probable dengue cases were reported to the LAC DPH, 16 in 2009 and 31 in 2010 (Figure 2), corresponding to an incidence of 0.17 and 0.33 per 100,000 population, respectively. Only two of the 16 cases (13%) in 2009 were classified as confirmed and one (3%) of the 31 cases in 2010. In 2009, October was the peak onset for cases. In 2010, the peak month was July (n=10). Before July 2010, zero to four cases occurred each month. After July 2010, the range rose slightly to two to five cases per month (Figure 3).



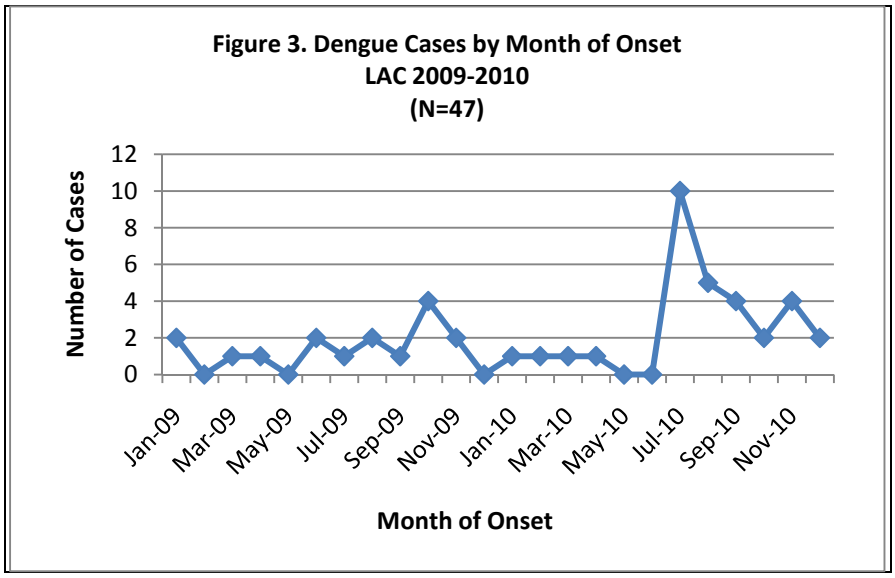


Table 2 displays the demographics of the case population. Cases were mostly male in 2009 with a male to female ratio of 1.7:1 but were less prevalent in 2010 (ratio 0.7:1). The mean ages were similar for both years, 43.8 years old overall (data not shown). In 2009 and 2010, the highest incidence rates occurred among Asians, with 0.23 per 100,000 and 0.38 per 100,000 population in respective years, followed by Hispanics. However, race/ethnicity data were missing for most cases, from 38%-52% were unknown each year.

Table 2. Demographics of Dengue Cases, LAC 2009-2010

		2009 N=16	2010 N=31
Age (yrs)	**Mean**	43.2	44.1
	Median	42.5	47
	Range	13-74	11-67
Gender n (%)	**Male**	10 (63)	13 (42)
	Female	6 (37)	18 (58)
Race/Ethnicity **Rate per 100,000 (n)**	**Asian**	0.23 (3)	0.38(5)
	Black	0 (0)	0.12 (1)
	Hispanic	0.13 (6)	0.15 (7)
	White	0.03 (1)	0.07 (2)
	Other	0 (0)	0 (0)
	Unknown	-- (6)	-- (16)

The majority of cases reported travel to a Latin American county, 64% (n=30), and 32% (n=15) reported travel to an Asian or Oceanic country. Mexico was the country most frequently reported in 2009 (n=8). Both Mexico and the Philippines were equally reported as travel destinations in 2010 (n=5 each). Reported country of travel was known for 96% of cases (n=45) (Table 3). Sixty-three percent (n=10) recalled a mosquito bite in 2009 and 45% (n=14) in 2010 (data not shown).

Table 3. Dengue Cases by Country of Acquisition, LAC 2009-2010			
	2009 N (%)	**2010 N (%)**	**Total**
Africa	0 (0)	0 (0)	0 (0)
Asia/Oceania	5 (31)	10 (32)	15 (32)
India	1	1	2
Indonesia	0	2	2
Philippines	3	5	8
Thailand	0	2	2
Vietnam	1	0	1
Latin America	10 (63)	20 (65)	30 (64)
Belize	0	1	1
Colombia	0	1	1
El Salvador	1	3	4
Grenada	0	1	1
Guatemala	0	4	4
Haiti	0	1	1
Mexico	8	5	13
Nicaragua	1	2	3
Puerto Rico	0	1	1
St. Martin	0	1	1
Unknown	1 (6)	1 (3)	2 (4)
Total	16	31	47

DISCUSSION

The number of confirmed and probable dengue cases nearly doubled from 2009 to 2010, rising from 16 to 31, respectively. Cases confirmed by paired serology represented very few of those cases (only two in 2009 and one in 2010). The low numbers of confirmed cases for 2009 and 2010 are typical of cases confirmed since 2002 in LAC. The addition of probable cases to dengue surveillance in 2009 and 2010, however, significantly increased the case count and enabled detection of an overall increase of dengue between the two years. This increase is most likely attributable to increased physician awareness ignited by the reemergence of dengue in Florida[3]. The Florida cases were published in late May 2010 in the Centers for Disease Control and Prevention (CDC) Morbidity and Mortality Weekly Report (MMWR) and other media, including a CDC press release in July. Subsequently, a spike of dengue cases was diagnosed and reported to LAC DPH. Other possible contributors to an increase in case reports include changes in travel patterns among LAC residents or an increase of dengue in travel destinations. The race/ethnicity make-up of the LAC case population, mainly Asian and Hispanic, reflect the distribution of reported countries of travel, which were also mainly Asian and Latin American countries.

This analysis is affected by underreporting inherent in a passive surveillance system. Further compounding underreporting, suspected dengue infections in LAC are largely submitted initially as positive laboratory results, and thus missing important demographic and clinical information that may be required to include the report in the case count. When supportive information is requested from healthcare providers, the response rates were fairly high, 100% of cases reported in 2009 and 77% in 2010. The information received, however, is often incomplete and interviews are not commonly obtained.
The reemergence of dengue in the continental US has sparked calls for the strengthening of dengue surveillance. Prompt detection of suspected dengue cases can facilitate a coordinated response resulting in the identification of locally acquired cases or helping to define new areas of transmission. Historically, LAC DPH has monitored only confirmed cases of dengue, which has limited detection of cases and

trends. The addition of probable cases to the surveillance case definition enabled the DPH to examine the details of dengue epidemiology in LAC.

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THE INCIDENCE AND CLINICAL PRESENTATION OF HERPES ZOSTER AMONG AFRICAN AMERICAN AND WHITE YOUTHS UNDER AGES 20 YEARS, ANTELOPE VALLEY, CALIFORNIA, 2002-2008

Amanuel Hussien, MSc, Christina Jackson, MPH, Rachel Civen, MD, MPH

BACKGROUND

Herpes zoster (shingles) is an acute cutaneous viral infection caused by the reactivation of varicella-zoster virus (VZV). After primary infection manifested as varicella disease, VZV lays dormant in the dorsal root ganglion until in undergoes local dermatomal reactivation in the form of the herpes zoster (HZ) [1]. Virus reactivation is associated with a decline in cell-mediated immunity due to age or to immunosuppressive illness or treatment [2]. In comparison to adults, HZ occurs infrequently in healthy children and its clinical course has been described as milder and with decreased pain [3,4,5]. However, immunocompromised children may experience similar or more severe symptoms as adults with HZ [6].

In 1995 a childhood varicella vaccination program was initiated in the US [7]. Since that time, the varicella vaccination coverage in Los Angeles County (LAC) has increased from 13.9% in 1996 to 92.2% in 2008 for children 19-35 months [8] while varicella disease morbidity and mortality declined by as much as 90% [9]. In 2000, the Varicella Active Surveillance Project (VASP) of Antelope Valley added HZ surveillance for children and adolescents aged < 20 years to its ongoing varicella surveillance program. Recently published data from VASP describing trends in youth HZ data from 2000 to 2007 showed that the incidence rate (IR) of HZ declined significantly in children <10 years but increased significantly in those 10-19 years. A risk model developed with these data revealed that vaccinated children in the <10 year old age group had significantly less risk of developing HZ than those who had never been vaccinated [10]. This finding is consistent with an earlier study which described a group of children with leukemia who were vaccinated with the live attenuated varicella vaccine and had less clinically severe varicella disease and fewer cases of HZ compared to children with leukemia with a history of wild type (natural) VZV infection [11]. Few epidemiologic studies have explored the relationship between the incidence of HZ and race. The few published reports present data showing that African Americans may have less risk of developing HZ compared to whites [12,13,14]. This report compares the HZ incidence and clinical presentation among African American (AA) and white youths <20 years of age who reside in Antelope Valley (AV), California from 2002 through 2008.

METHODS

Active surveillance for HZ has been conducted in children and adolescents <20 years since January 1, 2000 in AV. Nearly 200 surveillance sites, which include private medical providers, health maintenance organizations (HMOs), hospital emergency rooms, elementary, middle, and high schools, participate. All sites report HZ cases to VASP every two weeks, even if no cases are identified. Two large HMOs report electronically using International Statistical Classification of Disease (ICD9) HZ diagnostic codes on a monthly basis.

A case of HZ was defined as a child with acute onset of a unilateral vesicular rash located in at least one dermatome, diagnosed as herpes zoster by a licensed medical provider within the study period January 1, 2002 to December 31, 2008. History of varicella disease was defined as a clinical diagnosis of varicella during the child's lifetime regardless of varicella vaccination status; laboratory confirmation of varicella was not required. Varicella disease history was either self-reported by the parent or case as present or not present, or documented in a medical record. Varicella vaccination history was verified on each case using the vaccination record provided by the case, the school, or the medical provider.

Project staff completed a structured telephone interview with each case age 18 and older or the parent/guardian of younger cases to collect detailed demographic and clinical data. If a phone interview was not obtainable, medical records were reviewed. Race/ethnicity designation was identified by the

parent/guardian or case if age 18 years or older. Cases classified as white included those of both Hispanic and non-Hispanic ethnicity. Cases that were categorized as Asian, American Indian or unknown race/ethnicity were excluded from the analysis due to relatively few reported cases.

Data were entered into Microsoft® Access and data analysis was performed with SAS® 9.2. Only verified HZ cases with rash onset from January 1, 2002 to December 31, 2008 were included in the analysis. Annual HZ incidence rates (IR) by race were calculated using AV 2002-2008 US census data annual estimates as denominators for the AV. The relative risk of acquiring HZ by race was calculated by comparing the IR of HZ among whites compared to AA. The Chi-square test was used to assess statistical significance among variables.

RESULTS

From 2002 to 2008, 439 verified HZ cases were reported to the project. Of these cases, 60 (14%) were AA, 335 (76%) white, 30 (7%) of unknown race, and 14 (3%) were Asian or American Indian. Of the 60 AA, 20 (33.3%) were male and 40 (66.7%) were female. Of the 335 white cases, 167 (49.8%) were male and 168 (50.2%) were female. Of the 60 AA cases, 17 (28.3%) cases were less than 10 years of age and 43 (71.7%) were 10-19 years old. Of the 335 white cases, 77 (23%) cases were less than 10 years and 258 (77%) were 10-19 years old.

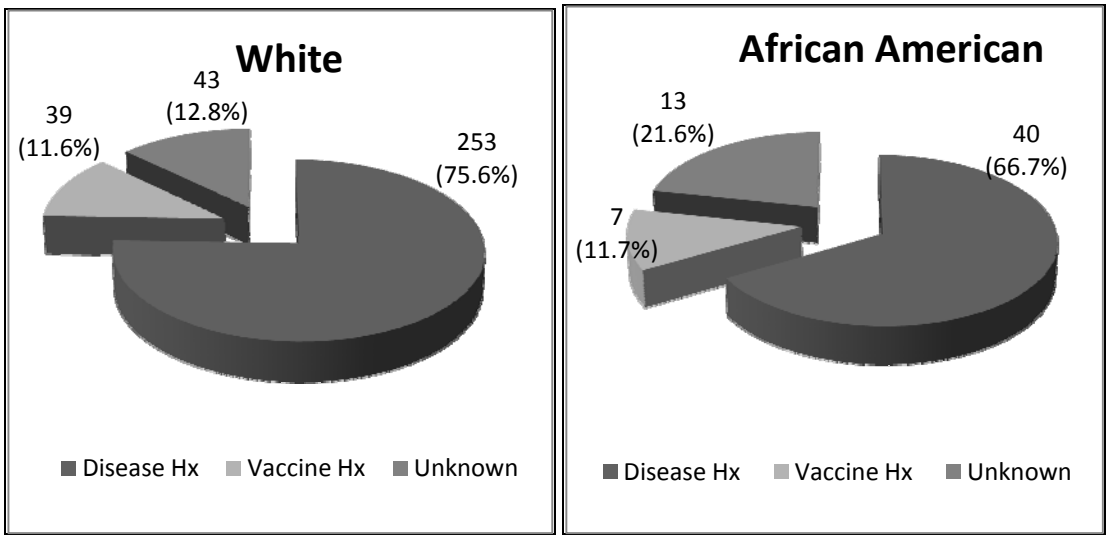
The overall HZ IR from 2002 to 2008 among AA and white youths <10 years of age were 3.2 and 2.8 cases per 10,000, respectively, RR=0.9 (CI: 0.7-1.1), P>0.05. Among youths 10-19 years, whites had significantly higher overall HZ IR than African Americans, 6.9 and 5.8 cases per 10,000, respectively, RR= 1.2 (1.1-1.3), P<0.05 (Table 1).

Table 1: Herpes Zoster Incidence by Age and Race/Ethnicity, AV, 2002-2008

Age Group	White		African American		RR (95% CI)	p-Value
	N (%)	IR*	N (%)	IR		
< 10 Years	77 (23.0)	2.8	17 (28.3)	3.2	0.9 (0.7-1.1)	0.10
10-19 Years	258 (77.0)	6.9	43 (71.7)	5.8	1.2 (1.1-1.3)	0.02**
Total	335 (100)	5.2	60 (100)	4.7	1.1 (1.1-1.1)	0.04**

** HZ Cases per 10,000 population ** p <0.05 Mantel Haenszel risk ratio*

Figure 1: Vaccination and Varicella Disease History among African American vs. White HZ cases <20 years, N= 395, 2002-2008, AV, CA



Of 335 verified HZ cases among white youth, 253 (75.6%) had history of varicella disease, 39 (11.6%) had history of varicella vaccination and 43 (12.8%) had unknown history of disease and/or vaccination. Of 60 verified HZ cases among AA, 40 (66.7%) had history of varicella disease, 7 (11.7%) had history of varicella vaccination and 13 (21.6%) had unknown history of disease and/or vaccination (Figure 1).

There were no significant differences between AA and white HZ cases by varicella disease history (40 (67%) vs. 253 (76%), P>0.05) or history of varicella vaccination (7 (12%) vs. 39 (12%), P>0.05), respectively.

Overall 78% of all youth HZ cases reported pain. There was no significant difference in the mean duration of pain among AA and white cases, 8.3 and 8.7 days, respectively. The characteristics of HZ lesions among AA and white cases were similar with 63.4% of AA and 63.9% of white cases reporting mostly vesicular lesions. There was also no difference in lesions described as macular-papular (33.3% and 35.5%) for AA and white cases, respectively. The reported rash size was also similar. Most cases reported rash size of <3 inches, with 71.7% of AA cases and 65.7% of white cases.

Most youth HZ cases received antiviral therapy from their healthcare providers to treat HZ. Although AA reported more antiviral use than whites, 75% vs. 67.2%, respectively, the results were not statistically significant.

CONCLUSION

HZ epidemiologic surveillance data has suggested that the incidence rates of HZ maybe lower among AA adults and children compared to whites [12,13,14]. This youth HZ surveillance data showed no overall differences in HZ incidence among both races among children <10 years of age. In contrast, white youths 10-19 years of age had a significantly higher risk of developing HZ compared to AA youths. HZ is a very rare disease in childhood and adolescents, so even relatively small changes in surveillance reports could result in statistically significant differences in IR. It is also possible the higher rate among whites than AA youth is due to better access to care leading to better reporting; alternatively the rash could be easier to diagnose in lighter skinned cases. The findings of increased risk in whites ages 10-19 are partially supported by a recent analysis of Kaiser Southern California HZ cases with a documented history of varicella vaccination, showing that AA youth $\leq$ 12 years had a significantly lower risk of developing of HZ compared to white children [12]. It should be noted that our study group differed from Kaiser's in that this

study included both unvaccinated and vaccinated cases whereas Kaiser included only vaccinated cases, and the age group extended to 19 years of age.

No difference was found in the clinical presentation of HZ among AA and white youth. The project team is not aware of any published study comparing the clinical presentation of HZ among AA and white adults or youths. Overall nearly 80 % of young HZ cases <20 years from both races reported moderate to severe pain from HZ lasting 8 days. The reported rash size and the proportion of vesicular lesions were also similar. Although a greater proportion of AA received antiviral therapy, the treatment difference was not significant. The study also found that there was no significant difference in the proportion of AA versus white HZ cases <20 years that had a history of varicella vaccination versus varicella disease.

There are at least two limitations to this study. A relatively small proportion of HZ diagnoses were laboratory-confirmed (approximately 3%). Consistency of reporting of youth HZ among this project's many surveillance sites may have varied, such that small changes in HZ reports could result in statistically significant differences in incidence.

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MENINGOCOCCAL DISEASE TRENDS IN LOS ANGELES COUNTY, 1995-2008

Van Ngo, MPH and Rachel Civen, MD, MPH

BACKGROUND

Neisseria meningitidis is an important cause of morbidity and mortality worldwide and a leading cause of bacterial meningitis and septicemia in the United States (US).[1] Infection with *N. meningitidis* in a normally sterile site—invasive meningococcal disease (IMD)—is characterized by sudden onset of fever, headache, stiff neck, petechial rash and lethargy; illness can progress to overwhelming sepsis, shock and death within hours. Despite antibiotic treatment, 10-14% of cases are fatal. Among those who survive, 10-20% have permanent hearing loss, cognitive deficiencies, or loss of limbs.[1,2]

Of the 13 serogroups of *N. meningitidis*, almost all invasive meningococcal disease is caused by serogroups A, B, C, Y, and W-135. Two vaccines are available in the US that protect against serogroups A, C, Y, and W-135, but not B.[3] Quadrivalent meningococcal polysaccharide vaccine (MPSV4), Menomune®, was licensed in 1981 for use among those ≥2 years old. In 2005, a new quadrivalent meningococcal conjugate vaccine (MCV4), Menactra®, was approved for use in the US. MCV4 is recommended for use in persons aged 2 to 55 years, although the use of MPSV4 is acceptable when MCV4 is not available. The latest approval of Menactra® also includes children as young as 9 months.[13] As of 2007, MCV4 is recommended for all adolescents between ages 11-18 years. Routine vaccination is also recommended for college freshman living in dormitories as they are at higher risk for meningococcal disease.[4]

Suspected cases of IMD are reportable at the local level; confirmed cases are reported to state and national level. Laboratory results indicating the detection of *N. meningitidis* from a sterile site are also reportable to the California Department of Public Health (CDPH) and Los Angeles County (LAC) Department of Public Health (DPH). The LAC DPH conducts surveillance of meningococcal disease to monitor disease trends and to identify close contacts of cases to ensure prophylaxis is offered and counseling on the symptoms of disease is provided. Antimicrobial chemoprophylaxis of close contacts of sporadic cases remains the primary means for prevention of meningococcal disease.

This study describes trends of IMD cases reported to LAC DPH from 1995 through 2008, with focus on changes in age, serogroup, and race/ethnicity distribution.

METHODS

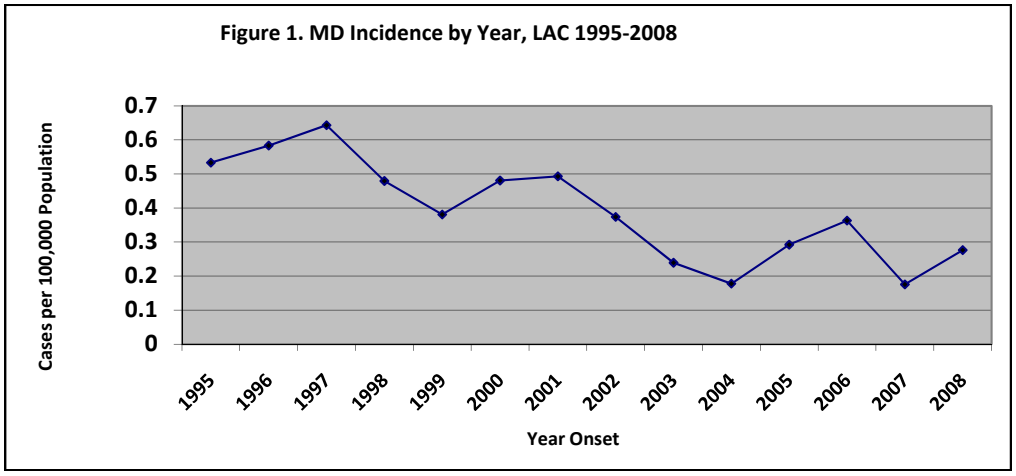
The cases included in this study had culture-confirmed *N. meningitidis* from a normally sterile site, consistent with the Centers for Disease Control and Prevention (CDC) case definition were residents of LAC, and had onset of illness between January 1, 1995 and December 31, 2008. Patients diagnosed with meningococcal disease by other laboratory evidence, such as by Gram stain or positive polymerase chain reaction (PCR) testing of sterile material, were excluded as cases of IMD. Suspected cases of IMD were interviewed with a standardized reporting form that includes variables for age, gender, residence, race/ethnicity, outcome, culture site, and date. Information was obtained via case interview and medical record review. LAC Public Health Laboratory performed serogrouping on all available culture isolates. Cases were defined as sporadic if no close contacts were reported with IMD within a 10-day period. Non-sporadic cases were then classified as either co-primary or secondary to another case. An organization-based outbreak is defined as the occurrence of three or more confirmed or probable cases of meningococcal disease of the same serogroup in ≤3 months among persons who have a common affiliation but no close contact with each other.[5]

Cases with missing outcome information were cross-referenced with death certificate records. If no death certificate was found indicating death, the case was presumed to have survived. Incidence rates were calculated based on LAC population estimates created by the Population Estimates and Projections System (PEPS) provided to the LAC DPH by Los Angeles County Urban Research. To analyze incidence trends through time, cases were grouped into three groups comprised of cases with onsets from 1995-

1999, 2000-2004, and 2005-2008. Differences in proportions were evaluated by chi square analysis. Pearson's coefficients were calculated from simple linear regression models.

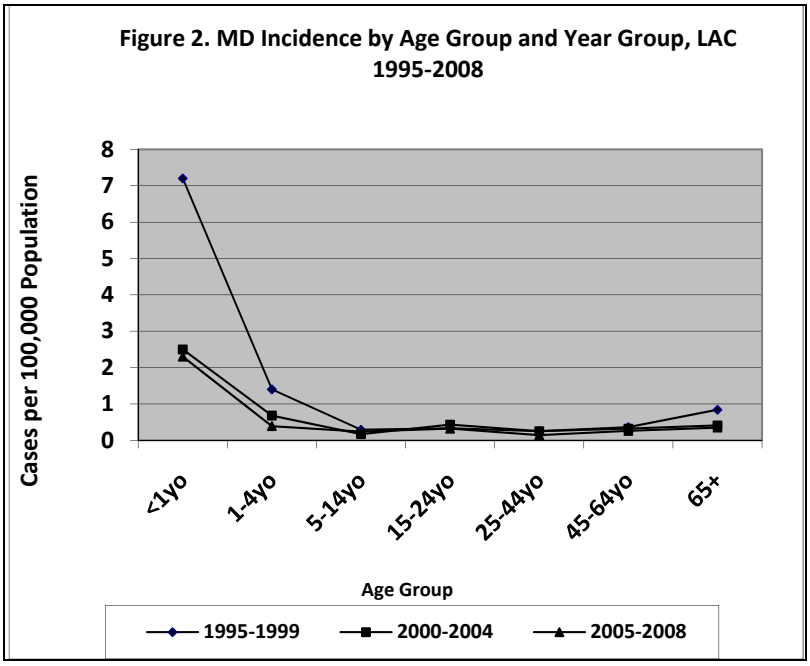
RESULTS

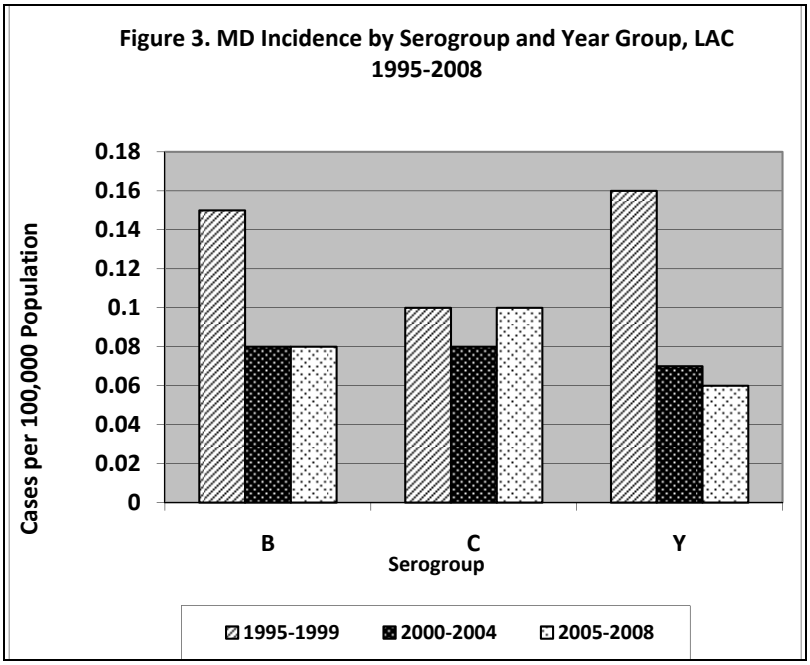
A total of 523 confirmed cases of IMD were reported to LAC DPH between 1995 and 2008. The number of cases confirmed annually ranged from 17 to 60 per year, with an annual mean of 37.4 cases. The overall incidence across the study period was 0.39 cases per 100,000, however, there was a steady decline in incidence from 0.53 cases per 100,000 in 1995 to 0.28 cases per 100,000 in 2008, a significant trend of 47% decline (Figure 1). All cases were sporadic except for 14 (2.6%). There were four secondary cases, including two that were a part of serogoup B clusters, one serogroup C, and one unknown serogroup (the primary case was serogroup C). Two pairs of cases were co-primaries (serogroup B clusters). The remaining case was involved in the only outbreak recorded during the 1995-2008 study period. An organizational outbreak occurred in 2001 involving three unacquainted men aged 19-22 years old who attended the same bar on the same night. The three MD cases included two culture- confirmed serogroup C cases and an additional third probable case that was associated with the outbreak.



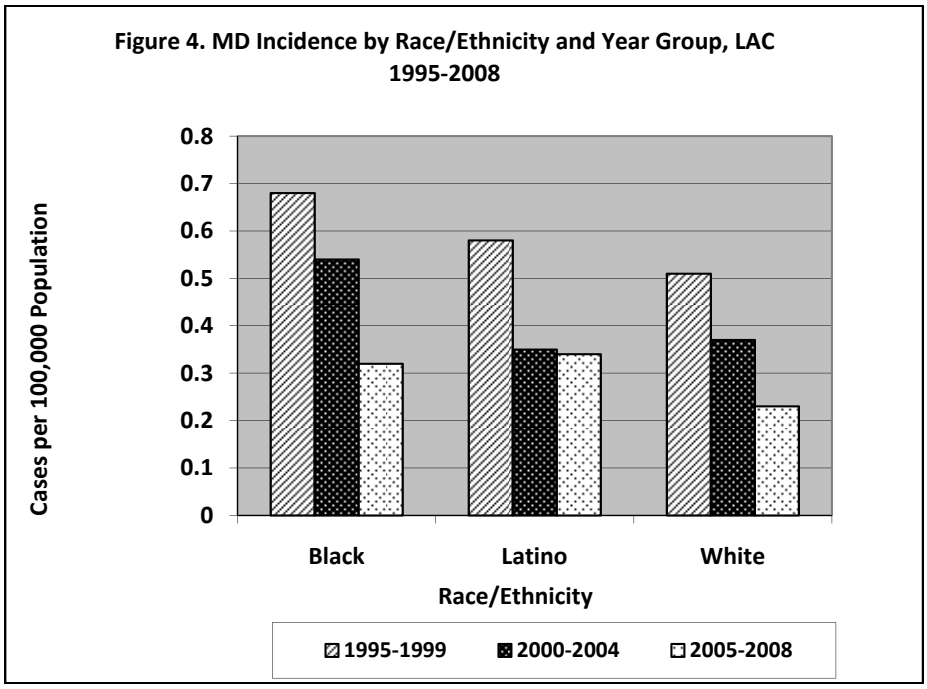
Infants <1 year old had the highest age group incidence for each of the three study periods, ranging from 7.2 per 100,000 during 1995-1999 and declining to 2.3 per 100,000 during 2005-2008 (R^2=0.78) (Figure 2). The most significant linear declines in incidence from 1995-1999 through the 2005-2008 year groups were seen in the <1, 1-4 (from 1.4 to 0.39 per 100,000, R^2=0.943), and ≥65 (from 0.84 to 0.35 per 100,000, R^2=0.840) year old age groups. All other age groups also experienced declines but with much less significant linear trend.

Serogroup was determined for 410 cases (78%). Over the 14-year study period, 35% of cases were serogroup B (n=144), 32% were Y (n=132), 30% were C (n=125), and 2% were W-135 (n=8); one case was determined to be Z. The serotype for 113 (22%) cases was not determined. Young children < 1 year old and those 1-4 years old accounted for the largest proportion of serogroup B cases (22%, n=32 and 19%, n=28, respectively). The largest proportion of serogroup C cases occurred among 25-44 year olds (22%, n=27), and in serogroup Y cases among those 65 years and older (28%, n=37). During the years 1995-1999, serogroup B constituted 37% (n=72) of cases among those with serogroup B or the vaccine-preventable serogroups C, Y, and W-135 (n=197). The proportion of serogroup B cases remained stable compared to the vaccine-preventable serogroups comprising 35% in 2000-2004 and 33% in 2005-2008 (chi square p=0.8297). The proportion of serogroup C cases increased from 24% (n=48) to 41% (n=40) while serogroup Y cases decreased from 38% (n=75) to 25% (n=24). The incidence of serogroup B cases, however, declined from 0.15 per 100,000 in 1995-1999 to 0.08 per 100,000 in 2005-2008 (R^2=0.75), a 47% decline. The incidence of serogroup Y cases also declined from 0.16 per 100,000 in 1995-1999 to 0.06 per 100,000 in 2005-2008 (R^2=0.824), a 63% decline. Serogroup C incidence remained stable ranging from 0.08 per 100,000 to 0.1 per 100,000 through the three year groups (Figure 3).

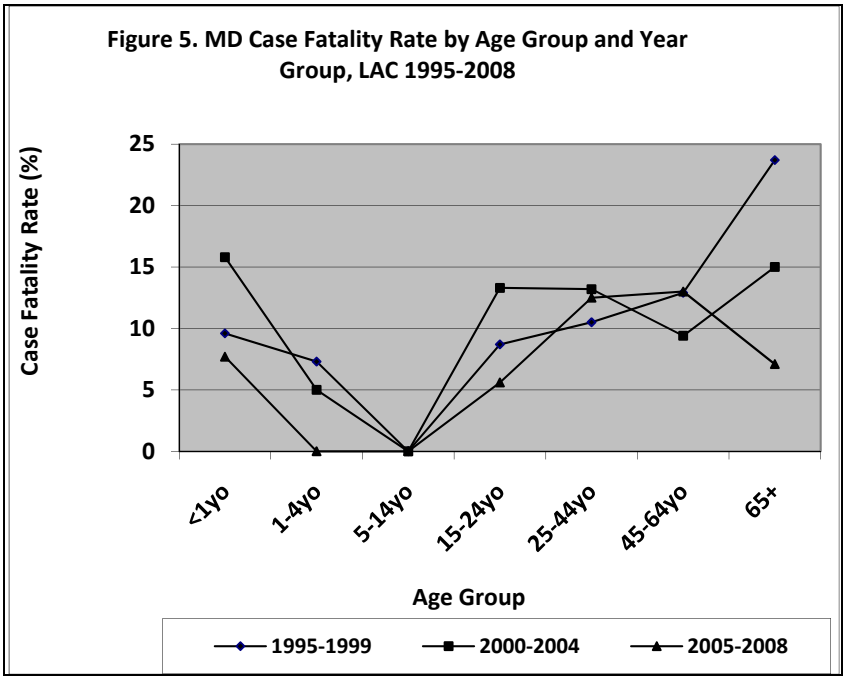




Race/ethnicity data was available for 517 cases (99%). The highest incidence occurred among blacks for two of the three year groups (Figure 4). The incidence of IMD declined among blacks, Latinos, and whites over the three study year groups. Incidence among blacks dropped from 0.68 to 0.32 per 100,000 (R^2=0.983), a 53% decline; Latinos from 0.58 to 0.34 per 100,000 (R^2=0.781), a 41% decline; and whites from 0.51 to 0.23 per 100,000 (R^2=1), a 55% decline.



The overall case fatality rate for the study period was 10.3% (n=40) and ranged from 2.9%-16.7% (1 to 8 cases per year. Fatalities occurred most frequently among serogroup C cases, 16.8% (n=21). In comparison, fatalities among serogroup B and Y cases occurred at 5.6% (n=8) and 8.3% (n=11), respectively. No deaths occurred for any other serogroups. The highest case fatality rates by age group occurred among those 65 years old and older and those <1 year old (Figure 5). The most dramatic decline in case fatality rate by age group occurred among the 65 and older age group, dropping from 23.7% in 1995-1999 to 7.1% during 2005-2008 . No deaths were reported in the 5-14 year age group.



DISCUSSION

The incidence of IMD in LAC has shown a continuous decline over the fourteen year study period with incidence rates declining from 0.53 cases per 100,000 in 1995 to 0.28 cases per 100,000 population in 2008. This follows the declining national trends of IMD incidence, which dropped from 1.23 per 100,000 in 1995[6] to 0.34 per 100,000[7] in 2008[1]. In LAC decreases in incidence were seen in all age groups, particularly among those within the <1 year, 1-4 year old and 65 years and older group. Theoretically, this decline might have resulted from the effect of herd immunity from MD vaccination, as these age groups fall outside of the age range recommended for meningococcal vaccination. However, vaccination cannot completely explain these declines in IMD incidence. Vaccinating children <2 years old is usually not recommended, even those at especially high risk for IMD (e.g., travelers to hyperendemic areas, persons with HIV or other underlying conditions). MCV4, which can reduce carriage of *N. meningitidis*, was not licensed until 2005[4] and the most significant incidence declines in both the youngest and oldest age groups occurred before this time. Further, the National Immunization Survey estimated that in 2007, only 32% of adolescents 13-17 years old had received 1 dose of MCV4[8]. Vaccination coverage, however, is rising; estimations for 2009 demonstrated that it has risen among that age group to nearly 54%.[9] It is possible that even more substantial decreases in IMD will be seen with increased use of vaccines.

Serogroup distribution changed over the course of the study period. The proportion of serogroup C cases in each age group increased as serogroup Y cases decreased while the proportion of serogroup B remained unchanged. Nationally, Hershey and Hitchcock report a different scenario documented by Active Bacterial Core Surveillance (ABC) data; serogroups B and C decreased from 46% and 45% of total cases, respectively, in 1989-1991 to 35% and 31%, respectively, by 2005-2008.[10] The change in serogroup distribution in LAC was driven by a drop in incidence of serogroups B and Y. As serogroup C incidence remained stable, the number of serogroup C cases increasingly represented more IMD cases overall.

Racial disparities in IMD incidence have also lessened during the study period. In the US, IMD has more commonly occurred among blacks, though this phenomenon is more likely a marker for other risk factors such as crowded living conditions, chronic underlying illness, or exposure to passive or active smoking.[11] In LAC, blacks experienced the highest rates of IMD during the 1995-1999 and 2000-2004 year groups compared to whites and Latinos, but declined by 53% by the 2005-2008 year group, by which time the differences in incidence diminished. It is unknown what underlying factors have played a part in this decrease. Results from the LAC Health Survey show a significant decline in the prevalence of adult smoking, from 18.2% in 1997 to 14.6% in 2005. However, smoking prevalence among blacks increased between 2002 and 2005.[12]

The highest proportion of fatalities occurred among cases with serogroup C disease. Nationally, the case fatality rate between 1998 and 2007 was highest among cases with disease caused by serogroup W-135, of which LAC had none.[10] The annual estimated case fatality rates caused by serogroups B, C, and Y nationally were 10.6%, 14.7%, and 12%, respectively. The mortality trends among the serogroups in LAC are much more extreme in comparison; the case fatality rate for serogroup C disease is three times as high as that of serogroup B disease (16.8% v. 5.6%). In LAC, the highest case fatality rates by age group occurred among those 65 years old and older and those <1 year old, while no deaths occurred in those 5-14 years old during14 years of surveillance. This is not the situation nationally between 1998 and 2007, where children less than 1 year old had among the lowest fatality rates (6%). The case fatality rate for children ages 5-13 years was 10.6%.[11] These study data might indicate some relationship between age and serogroup; however, serogroup B and Y affected the youngest and oldest age groups in higher proportions, but resulted in lower fatality rates.

The limitations of this study include underreporting due to a passive surveillance system. Any differences seen when compared with national ABC data, which are obtained by active surveillance, would be

[1] Incidence in 1995 was referenced from the MMWR Summary of Notifiable Diseases which includes both confirmed and probable MD cases. Incidence in 2008 was referenced from Active Bacterial Core Surveillance which includes only confirmed cases.

understated. The use of only confirmed cases in this analysis may also produce an underestimate of the burden of disease. As many as 10%-37% of cases reported each year to LAC DPH during 1995-2008 were classified as probable and thus excluded from this analysis. The grouping together of multiple years was done to enable a cleaner analysis of multiple variables, however, details of peaks and dips in incidence in specific years may have been missed.

The specific reasons for decline in IMD incidence in LAC from 1995-2008 remain unknown. However, changes in the distribution of cases among different age groups, serogroups, and race/ethnicity groups are clearly seen. These changes may be a result of changes in high risk behaviors and environments in these groups. LAC has seen an overall decrease in smoking prevalence. Emphasis on hand hygiene or respiratory hygiene in disease prevention over the years could also be impacting transmission of bacteria and decreasing colonization among portions of the population. With increased adherence to the childhood vaccine schedule, as evidenced by National Immunization Survey estimates, a greater decline in IMD in the adolescent age group as well as other age groups is expected due to herd immunity. Even with increased vaccination coverage, current available vaccines do not protect against serogroup B disease and have limited use for specific age groups and those with underlying risk factors for invasive IMD; they also have no impact on the rate of colonization or carriage. Therefore, clinicians must remain vigilant in suspecting invasive meningococcal meningitis and bacteremia as an important cause of life threatening bacterial meningitis and sepsis.

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VARICELLA ACTIVE SURVEILLANCE PROJECT
2009 SURVEILLANCE SUMMARY

Christina Jackson, MPH; Rachel Civen, MD, MPH

BACKGROUND

In September 1994, the Los Angeles County (LAC) Department of Public Health (DPH) entered into a cooperative agreement with the Centers for Disease Control and Prevention (CDC) to establish active surveillance for varicella disease in Antelope Valley (AV), California. Project objectives included obtaining population-based varicella incidence rates, to examine the clinical presentation of varicella, and to evaluate the transmission of varicella and varicella vaccine distribution practices. Baseline information on disease incidence and varicella vaccine coverage levels by age group, and the impact of increasing vaccine coverage have been collected since 1995.

The 2009 surveillance data represents the 15th year of varicella, the 10th year of pediatric and adolescent (≤ 19 years) herpes zoster (HZ), and the fourth year of adult HZ (50 years and older) surveillance. Additionally, in September 2009, the Varicella Active Surveillance Project (VASP) was awarded funding from the American Recovery and Reinvestment Act (ARRA) to carry out a case control study titled, "Incremental Effectiveness of the 2-dose Varicella Vaccination Regimen among Children aged 1 to 18 years," designed to assess added prevention benefits of two varicella vaccinations versus one versus no prior vaccination. In addition to collaborating with the West Philadelphia VASP site, VASP Antelope Valley has partnered with the Kaiser Permanente Research Division of Southern California in the recruitment of age matched vaccinated controls from the Kaiser Permanente vaccination registry, who are residents of the AV. This report summarizes highlights of varicella and HZ surveillance in 2009.

METHODS

VASP conducted active surveillance for varicella disease and HZ from more than 300 surveillance sites. Surveillance sites included public and private schools and day care centers with enrollments of 12 or more children; public health clinics, hospitals, skilled nursing facilities, private practice physicians and health maintenance organizations (HMO) offices; employers with 500 or more employees; correctional facilities; and others agencies likely to identify cases of varicella or herpes zoster. All sites submitted the surveillance logs of varicella and herpes zoster to VASP on a biweekly basis. If the log was not submitted, project staff contacted individual surveillance sites for follow-up. Vaccine providers submitted the *Varivax*® and *Zostavax*® immunization reports on a monthly basis, reporting total doses by age group. Additionally, Merck, manufacturer of both vaccines, reported the total vaccine distribution to providers within the AV for both vaccines.

Receipt of varicella vaccine was confirmed in one of three ways: 1) interviewees checked the vaccine immunization record at the time of the telephone case interview, 2) medical office staff checked the medical record, or 3) the school the child attended was contacted. If the varicella vaccination could not be documented, parental recall was utilized. Susceptible household contacts of varicella or HZ cases less than 20 years of age are re-interviewed four weeks after the initial contact to identify additional cases.

Case Definitions:

- A case of varicella was defined as illness with acute onset of a diffuse papulovesicular rash without other known cause that is diagnosed and/or reported by a licensed healthcare provider, school nurse, or parent.
    - A verified varicella case was the above case definition and had a completed case report which validated the diagnosis of varicella and resided in the AV. A case report was considered complete if an interview was carried out by the parent or guardian of a reported varicella case under age 18 years old or with a reported varicella case who was 18 years and older or medical chart review validated the diagnosis of varicella.
    - A probable varicella case was reported to VASP but did not have a completed case report.

  - A breakthrough varicella case was defined as a verified varicella case which occured more than 42 days after varicella vaccination.

- A case of HZ was defined as a unilateral vesicular rash in a dermatomal distribution, diagnosed by a licensed healthcare provider.
  - A verified HZ case met the case definition of HZ and had a completed case report or a medical chart review which validated the diagnosis of HZ.
  - A probable HZ case was reported by a licensed medical provider but did not have a completed case report or the medical chart was unobtainable for review.

A structured telephone interview was conducted with each varicella or HZ case or their parent/guardian to collect detailed demographic, clinical, varicella vaccine history and to determine if there were additional cases or susceptible contacts within the household. If a telephone interview was not obtainable, medical records were reviewed for all potential cases. Cases of varicella and HZ were excluded if they lived outside the surveillance area, if the reported case did not have the diagnosis of varicella or HZ that was consistent with the established case definitions noted above, or had an alternative diagnosis.

In HZ cases aged 50 years and older, the presence of post herpetic neuralgia (PHN) or persistent pain or discomfort associated with HZ lasting at least three months was evaluated in all cases where interviews were conducted. If pain was present at the time of the initial interview, a follow-up interview was conducted at four months after the herpes zoster rash had healed to assess the duration of the associated pain or discomfort.

In 2009, as in prior years, completeness of varicella reporting was estimated using a two-source capture-recapture method. To calculate incidence rates, census estimates were obtained through the DPH for each corresponding year. Aggressive manual and computer verification of data ensured quality control. Data were analyzed in collaboration with investigators from the CDC.

SUMMARY

The 2009 varicella surveillance data reflects three years of data collection since the endorsement of a second varicella vaccine to the childhood vaccine schedule by the Advisory Committee of Immunization Practices (ACIP) and American Academy of Pediatrics for children four to six years in 2006. In 2009, the total varicella vaccine doses (*Varivax*® and MMRV) administered by surveillance sites declined by 17% with 14,076 doses reported in 2009 compared to 17,016 doses in 2008; however, the number of doses administered in 2009 represents a significant increase (77.3%) from the 7,937 total doses reported in 2006. As in past years, the one-to-two year old group had the largest proportion of vaccine doses administered, 4,877 doses (34.6%), followed by five year olds with 2,274 (16.2%) doses, 13-19 year olds with 1,490 (15.6%) doses, three to four year olds with 2,009 (14.3%) doses, 10-12 year olds with 1,881 (13.4%) doses and six to nine year olds with 1,502 (10.7%) of total doses, respectively.

The overall varicella incidence rates have continued to decline from 1.9 cases per 1,000 in 2005 to 0.5 cases per 1,000 in 2009. In 2009, the highest varicella incidence was seen among both infants less than one year and children 10-14 years, with identical incidence rates of 1.9 cases per 1,000, followed by those five to nine years old at 1.6 cases per 1,000. Both infants less than one year and children ages one to four years old showed slight increases in incidence compared to 2008, reporting 1.7 and 1.9 cases per 1,000 in the less than one year age group and 1.3 and 1.4 cases per 1,000 in the one to four year age group in respective surveillance years. Children in all other age groups showed continued declines in incidence from 2008 to 2009. When comparing varicella incidence by race/ethnicity, Hispanics had the highest incidence of varicella at 0.6 cases per 1,000, followed by blacks (rates previously noted), whites (0.3 per 1,000) and Asian Pacific Islanders/American Indians (0.2 cases per 1,000). However, declines in incidence were also noted among all racial/ethnic groups from 2008 to 2009, most notably within blacks, whose rates declined from 0.8 cases per 1,000 in 2008 to 0.5 cases per 1,000 in 2009.

The proportion of breakthrough (BT) varicella cases has shown steady increases since 2000, with 16.8% of all verified varicella cases classified as BT in 2000 compared to 66.4% in 2008. Although the proportion of

BT cases declined in 2009 to 60.8%, the increasing trend in BT varicella disease remains important. In 2009, 30 (28.0%) of the total BT cases (107) received two doses of varicella vaccine, an increase from the 18 (13%) total BT varicella cases reported in 2008 and 11 (6%) cases in 2007. It will be essential to continue the documentation of varicella cases that have completed the recommended two dose schedule.

The total number of varicella outbreaks and cases per outbreak declined significantly in 2009, with only two outbreaks documented compared to six outbreaks in 2008 with six and seven varicella cases per outbreak documented in respective years. In addition to fewer outbreaks in 2009, the mean outbreak duration was the shortest since 2003 (both 31 days) compared to 50 days in 2008. The proportion of BT cases in each outbreak in 2009 was 50%, slightly lower than those of the prior three years, which ranged from 58.5 to 73.5%.

The clinical presentation of varicella continued to be a mild acute infection. In 2009, the largest proportion of cases reported <50 lesions (59.3%), compared to earlier surveillance years, followed by 50-249 lesions (37.0%) and those reporting 250-500 lesions (3.4%). No cases reported greater than 500 lesions in 2009, the first time since initialization of surveillance. As is 2008, there were no reports of hospitalized varicella cases, compared to one hospitalized varicella case in a previously healthy 14 year old male in 2007 and two immunocompromised adult females in 2006.

The total verified pediatric and adolescent HZ cases increased in 2009 compared to 2008, but the numbers were comparable to earlier surveillance years. In 2009, there was an 8% increase in verified HZ cases compared to 2008, with 67 and 62 verified cases reported from respective years. The increase in HZ case reports was most notable in children 10-19 years, with 50 and 60 cases reported in 2008 and 2009, respectively. In 2009, HZ incidence rates continued to decrease among children less than ten years but increased for those 10-19 years of age. An incidence rate of 14 HZ cases per 100,000 and 93 HZ cases per 100,000 population were documented in the less than ten year and 10-19 year old age groups, respectively, in 2009. During the ten years of pediatric and adolescent HZ surveillance, trends of increasing incidence in the 10-19 year old age group and decreasing incidence in the less than ten year old age group have become evident; however, incidence by race/ethnicity has remained stable.

In 2009, 422 verified cases of HZ in individuals aged 50 years and greater were documented among surveillance sites, 15% more that the 367 verified HZ cases documented in 2008. Consistent with prior surveillance years, HZ incidence increased incrementally within the ten year age groups. Individuals aged 70 years and older had the highest age-specific incidence, 6.5 cases per 1,000, followed by those 60-69 years, 5.3 cases per 1,000 and those 50-59 years, 3.5 cases per 1,000. These incidence rates were in general lower than that of published studies derived from administrative data sources, however, significantly higher than rates from the West Philadelphia VASP site.

The clinical presentation of HZ cases was consistent with the established description; over 90% of cases reported a unilateral vesicular rash in a single dermatome. In 2009, using a pain scale of 1-10, 82% of verified cases reported pain; of those 38% reported severe pain, rated 9 -10. HZ cases reported a mean and median pain score of 8. Both the percentage of cases reporting pain and reported mean/median pain score has remained consistent throughout the four years of surveillance. Five (1%) HZ cases were hospitalized for HZ in 2009, each case reporting rash in multiple dermatomes and severe pain. Nineteen complications following HZ rash onset were reported by cases and were verified through medical chart abstraction; bacterial superinfections and ocular complications occurred most frequently, with 3% and 1%, respectively.

In 2009, 22% of cases reported post-herpetic neuralgia (PHN); however, the proportion of cases reporting PHN has ranged from a high of 21% in 2006 to a low of 16% in 2007. During the four years of adult HZ surveillance, among the 1,223 (81%) adult HZ cases who completed telephone interviews and could be followed-up at four months after rash heal date, 288 (19%) reported PHN.

In 2006, *Zostavax*® was approved by the FDA as the first shingles prevention vaccine for individuals age 60 years and older. In 2008, *Zostavax*® usage was documented in two HMOs (Kaiser Permanente Medical group and High Desert Medical Group) which report vaccine doses electronically. Vons Pharmacies began submitting electronic reports documenting *Zostavax*® administration in 2009. As expected, the greatest

proportion of vaccine usage was in the 60-69 year old age group. In 2011, with the completion of five years of HZ surveillance, the project plans on analyzing the combined years of surveillance data to estimate HZ incidence rates to determine the proportion of HZ cases that experience PHN and the factors that may be associated with developing PHN.

CARBAPENEM-RESISTANT *KLEBSIELLA PNEUMONIAE* (CRKP) SURVEILLANCE LOS ANGELES COUNTY, JUNE - DECEMBER 2010

Patricia Marquez, MPH and Dawn Terashita, MD, MPH

Carbapenems are often the last line of defense in the treatment of severe infections caused by multi-drug resistant gram negative pathogens.[1] Misuse of antibiotics and selection pressure has led to an increased reliance on the use of carbapenems for infections caused by *Enterobacteriaceae,* the family of Gram-negative bacilli that includes such clinically relevant genera as *Klebsiella, Acinetobacter*, and *Pseudomonas.* Originally seen only in New York and New Jersey, carbapenem resistant *Klebsiella pneumoniae* (CRKP) has emerged in healthcare settings of other regions of the US where it was previously not found.

The Los Angeles County Department of Public Health (DPH) established CRKP as a laboratory reportable disease on June 1, 2010. Criteria for reporting included any isolate of *Klebsiella pneumoniae* showing resistance to carbapenems using 2009 Clinical and Laboratory Standards Institute (CLSI) criteria or the modified Hodge test. Isolates testing positive for extended spectrum beta-lactamase production but not carbapenem resistance were excluded from analysis. Laboratories were asked to report all susceptibility laboratory results when submitting cases to DPH.

Cases were defined based on the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) LabID module criteria. Positive specimens for cases that had already been reported were considered recurrent if the specimen was collected 14 or more days after previous positive lab report. Individuals with specimens collected on or before the 3rd day after admission were considered community-onset; those with specimens collected on the 4th day post admission or later were considered healthcare-onset.

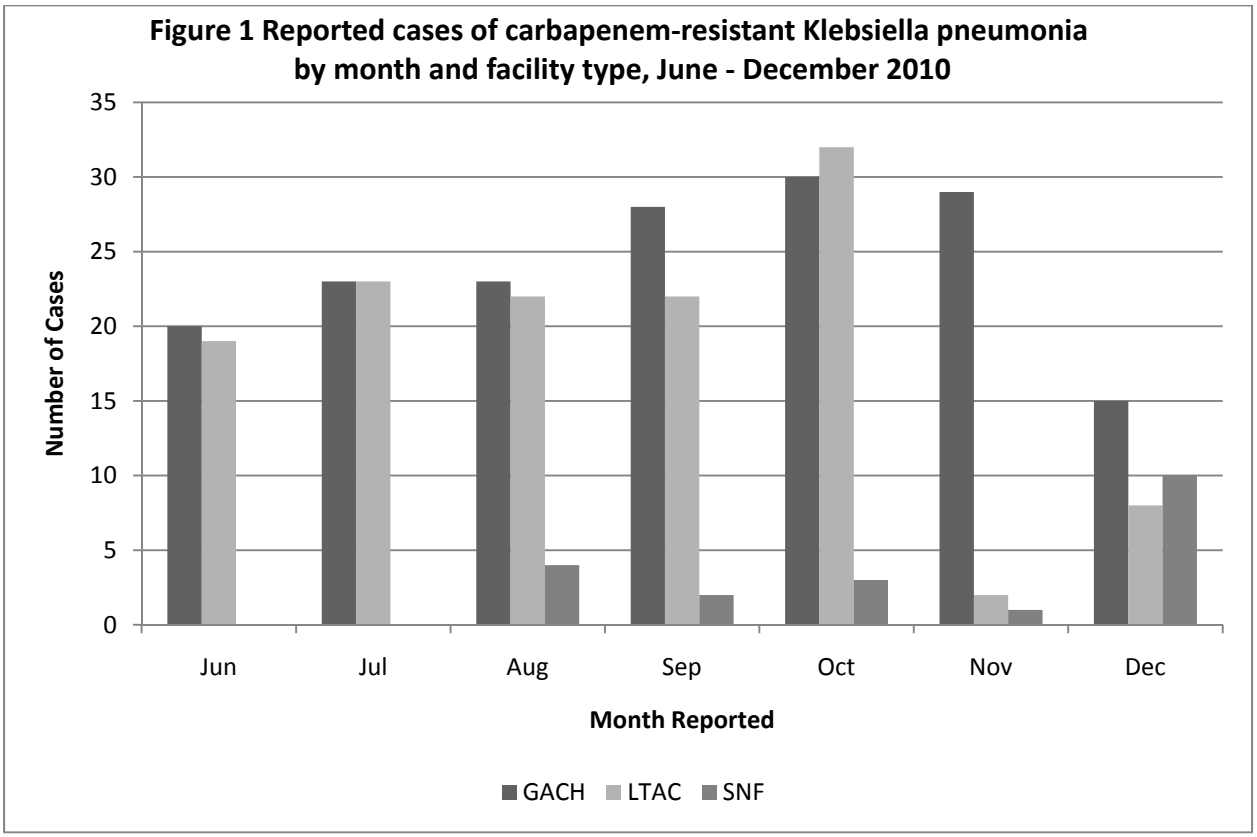
From June to December 2010 a total of 439 cases were reported to DPH; of these 350 were confirmed as CRKP; nine remain under investigation and are not included in this review. Of the 102 acute care facilities in LAC, 50 (49%) facilities and one large regional laboratory that mainly serves the skilled nursing facility population reported cases. All eight long-term acute care facilities (LTAC) in LAC reported cases, accounting for nearly half of all cases reported (172, 49%) (Figure 1). Of the cases reported by acute care facilities, 124 (35%) were admitted to hospital from skilled nursing facilities.

Females (193, 56%) accounted for a larger proportion of cases reported than males. The average age of CRKP cases was 73 years, with a range of 1-102 years. The one-year-old case demonstrated the New Delhi metallo-beta lactamase (NDM-1) and was the first such *K. pneumoniae* reported in LAC. This individual had recently travelled to and received medical care in Pakistan prior to hospitalization in the LAC facility. Positive specimen sources included urine (105, 45%), sputum (70, 30%), wounds (22, 9%) and blood (19, 8%). One hundred twenty-eight cases were positive for at least one other organism in the CRKP positive specimen. Of the 128 cases, 24 had a total of three organisms present in the specimen tested. The most frequently identified co-infections were *Pseudomonas aeruginosa*, vancomycin-resistant *Enterococcus*, and *Acinetobacter baumannii*.

Complete admission date and date of specimen collection information were available for 172 cases. The average length of hospitalization from admission to first CRKP positive test was 18 days with a range of 0-247 days. Cases with a longer length of hospitalization were generally reported from LTAC facilities. Forty-two cases (24%) had their positive specimen collected on the day of admission. The majority of cases (110, 64%) had their positive specimen collected four or more days after admission, and would be considered to have healthcare-onset infections by NHSN definitions. The remaining 20 cases with specimens collected within the first three days after admission were considered community-onset.

CDC laboratory surveillance of LAC hospitals indicated CRKP was previously identified very sporadically in the area, and its prevalence in our healthcare community was unknown. This passive surveillance system has identified more cases than expected in such a short period of time. Improving knowledge of

CLSI criteria for carbapenem-resistant *Enterobacteriaceae* in laboratories that serve the long-term healthcare community is one way to enhance surveillance and obtain a fuller understanding of how prevalent CRKP is in LAC. It is hoped that improved surveillance and collaboration with LTACs and selected skilled nursing facilities on control strategies will decrease the induction and spread of CRKP in LAC.



GACH = general acute care hospital
LTAC = long term acute care hospital
SNF = skilled nursing facility

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PAIN CLINIC HEPATITIS INVESTIGATION REPORT

Elizabeth Bancroft, MD, SM; Susan Hathaway, RN, PHN, MPH; and Alison Itano, MPH

BACKGROUND

On July 16, 2010, the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County Department of Public Health (LAC DPH) received a report of a patient with acute hepatitis C infection whose symptoms started in May 2010. When interviewed by staff at ACDC, the patient (case #1) reported no other standard risk factors for acute hepatitis C during the incubation period for hepatitis C except four epidural injections with intravenous (IV) sedation at Clinic A during January to April 2010. Since receiving injections for pain management has been implicated in hepatitis C transmission,[1] ACDC staff undertook an investigation of Clinic A to determine the source of hepatitis C infection in case #1, identify other cases, and control potential spread of the disease.

INVESTIGATION

Case Definition

A case patient was defined as having acute hepatitis B or C if they met the Council of State and Territorial Epidemiologists' definitions of acute hepatitis B or C.[2] A case patient was defined as having chronic hepatitis C if they had ever had a positive test for hepatitis C. A case patient was defined as having chronic hepatitis B if they had a positive serum test for HBsAg or HBV DNA but failed to meet the definition of an acute case.

Case/Source Identification

In order to identify possible source patients for case #1, ACDC investigators obtained the names and birthdates (if available) of patients who attended Clinic A on the same or adjoining days as case #1. The names were checked against the ACDC electronic hepatitis registry and the LAC DPH human immunodeficiency virus (HIV) registry. ACDC investigators also checked the hepatitis registry for the names and birthdates (if available) of patients who attended Clinic A on the same day as any additional cases of acute viral hepatitis identified during the investigation. ACDC investigators also submitted the list of patients who attended the clinic on the same days as any acute case of viral hepatitis to the California Department of Public Health (CDPH) for cross checking against its statewide hepatitis registry.

Case #1 had a total of four procedures on four separate days during January to April 2010. A total of 40 unique names of patients who attended Clinic A on the same or adjoining days were checked in the LAC hepatitis registry: three additional patients with chronic hepatitis C and one case of acute hepatitis B were identified (case #2). No cases of HIV were reported in these 40 patients.

Case #2, identified in the ACDC electronic hepatitis registry by review of patients who had procedures on the same or adjoining days as case #1, had a total of eight procedures from July 2009 to January 2010; the names of approximately 120 patients who also attended the clinic on those eight days were checked in the ACDC electronic hepatitis registry. No additional cases of hepatitis B or C were identified from that group.

The CDPH hepatitis registry did not identify additional cases of acute or chronic hepatitis.

[1] Williams IT, Perz JF, Bell BP. Viral hepatitis transmission in ambulatory health care settings. Clinical Infect Dis 2004; 38 (11): 1592-8.
[2] Nationally Notifiable Infectious Conditions, at http://www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis2011.htm

Overview of Clinic A

Two site visits at Clinic A were conducted by ACDC staff. Clinic A opened in 2000 and held voluntary certification from the Accreditation Association for Ambulatory Health Care, Inc. Its staff included an anesthesiologist with a specialty in pain medicine, two registered nurses (RN) and three medical assistants (MA). According to the physician, RN #1 worked at the site since January 2006 and RN #2 worked at the site since it opened. At the time of the investigation, the physician had a current license to practice medicine in California. Each RN also held a current license issued by the California Board of Registered Nursing. None of the three MAs had current MA certification.

According to the physician, he performed lumbar, cervical, and thoracic epidural injections; nerve blocks; facet and joint injections; and miscellaneous other procedures. At the time of the site visits, procedures were performed on Wednesday, Thursday and Friday. RN #1 typically worked on Wednesdays and Fridays assisting the physician with procedures and RN #2 worked on Thursdays. Approximately 10-20 procedures are performed on procedure days. Most patients who receive epidural or other para-vertebral injections also receive IV sedation with midazolam and/or fentanyl.

Chart Review

ACDC investigators reviewed charts for patients who had procedures on the same day as case #1 and the same day as case #2. All charts were reviewed for type of procedure performed, the names of the physician and nurses involved in the procedure, time of procedure, and medications administered during the procedure.

The chart review revealed that a patient with chronic hepatitis C (who had been identified in the ACDC electronic hepatitis registry) had a procedure immediately preceding case #1 on the same day in April 2010. Both patients received IV sedation from RN #1 as documented by her initials in the charts. No cases of acute or chronic hepatitis B were identified among patients receiving care on the same days as case #2 was treated.

Patient Interviews

Investigators from ACDC interviewed case #1 and interviewed the spouse of case #2. Both denied standard risk factors for acquiring acute viral hepatitis (multiple sex partners, drug use, blood transfusions, and medical procedures other than at Clinic A) during the incubation period before the onset of disease.[3]

Laboratory Investigation

Blood samples were obtained from case #1 and the patient with chronic hepatitis C who had a procedure directly before case #1 in April 2010. The Centers for Disease Control and Prevention (CDC) in Atlanta, GA, conducted genotype testing and species analysis to determine how closely related are samples of hepatitis C. According to the CDC, its testing revealed that “both specimens contain Hepatitis C virus variants that belong to genotype 2, subtype B. In addition, results from these specimens indicate the presence of several Hepatitis C virus variants that share identical and closely genetically related sequences of the analyzed viral genomic regions identified in both patients. The results are consistent with infection of both patients with same strain of Hepatitis C virus.”

Infection Control Observations

The overall appearance and set-up of the medical office was clean, and organized. There was a patient examining room, pre-procedure and post-procedure rest areas for patients, a procedure room, and a

[3] The incubation period for acute hepatitis B is 6 weeks to 6 months; the incubation period for acute hepatitis C is 2 weeks to 6 months. http://www.cdc.gov/hepatitis/index.htm

storage room. Hand washing sinks were located in the patient pre-procedure and post-procedure areas and outside of the procedure room.

Administration supplies and non-narcotic medications used for IV sedation were stored inside a medication cart in the procedure room or in the storage room. The injection medications were prepared on top of this cart. Narcotic medications were stored in the procedure room. RN #1 and RN #2 were responsible for preparing the IV medication and documenting use of any narcotics. A bedside table was used to set-up the sterile field and to prepare injections (mainly contrast, saline, steroid, and anesthetic) administered by the physician.

During the site visits, ACDC investigators observed both RNs insert intravenous heparin locks (heplock), prepare and administer IV sedation, monitor vital signs of patients under sedation, and assist the physician with preparing injection medications. ACDC investigators observed the physician perform epidural and transforaminal injections.

During site visit #1, the following breaches in infection control were observed by ACDC investigators[4]:

- Entering a multi-dose vial with a syringe and needle that was previously used on a patient.
    - RN #1 injected IV sedation into a patient's heplock and then used the contaminated syringe and needle to enter a multi-dose vial of saline. She withdrew several milliliters of saline and used this to flush the heplock. She then placed the multi-dose vial of saline back onto the medication cart where it could be used for subsequent patients. This practice was observed during procedures for two patients and was also observed when the nurse was asked to demonstrate her technique of administering medication and flushing heparin locks.
    - RN #1 stated she would use a single vial of normal saline for up to four different patients on the same day, then she would discard the last open vial of saline at the end of the day.
- Using single dose vials (SDV) of contrast (Omnipaque™), lidocaine, and sodium bicarbonate for multiple patients.
- Not using aseptic technique to access medication vials (i.e., not cleaning the top of open vials with alcohol swabs before entry).
- Open dates were not written on some of the unsealed multi-dose vials already in the room.
- Medications, intended to be given to multiple patients by IV or injection, were prepared in patient care areas.

On the second site visit, several of the identified infection control breaches identified during the first site visit were corrected, including:

- RN #2 did not enter a multi-dose vial of saline with a previously used needle and syringe.
- The physician stated that he no longer used contrast for routine procedures, thus eliminating the use of a single dose vial of Omnipaque™ for multiple patients.
- There was more consistent cleaning the top of mutli-dose vials with alcohol swabs before entry.

RECOMMENDATIONS MADE DURING THE INVESTIGATION

During site visit #1, ACDC investigators gave oral recommendations to the physician including:

[4] The practices observed at Clinic A were compared to the CDC recommendations for injection procedures found at: Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

- Stop all practice of re-entering multi-dose vials of medication with needles or syringes that had been in contact with patients.*
- Use single dose vials of medication as much as possible.
- Reserve use of single dose vials to one patient.

*The order to stop the practice of re-entering multi-dose vials with contaminated needles was reinforced with a letter sent by ACDC to the physician on August 25, 2010.

During site visit #2, ACDC provided oral recommendations to the physician including:

- Prepare epidural and injection medications in a clean room and transport them to the procedure room.
- Consider hiring an infection control consultant to assess facility practices and provide further recommendations regarding infection control.

A letter was sent by ACDC to the physician on November 5, 2010, informing him of the findings of the investigation, the conclusion that on at least one occasion hepatitis C was transmitted between patients at Clinic A probably due to poor injection safety procedures, and written recommendations for infection control improvement at the clinic. ACDC also provided references on how to improve infection control and injection safety at the clinic.

PATIENT NOTIFICATION

According to the CDC, patients at facilities where there has been a documented "Category A" infection control violation (including contaminating multi-dose vials with syringes/needles previously used on patients) should be notified of their risk of exposure to bloodborne pathogens.[5] Notification is recommended even if no transmission has been documented. Based on the conclusion that there was transmission of hepatitis C from at least one patient to another at Clinic A because of poor infection control procedures, the decision was made to notify all patients who had had an invasive procedure at Clinic A under the care of RN #1 from the start of her employment (January 16, 2006) until the day investigators told the RN and physician to cease accessing medication vials with contaminated syringes/needles (August 18, 2010).[6]

The physician provided an electronic file of patients with the following information: patient name, date of birth, address, city, state, ZIP code, referring provider, date of last visit and procedure codes. All of these patients had at least one procedure between January 16, 2006 and August 18, 2010. Of 2508 patients, 174 had no IV sedation or exposure to unsafe practices and an additional 41 who had been screened for bloodborne pathogens since August 18, 2010. Therefore, there were a total of 2293 patients who were thought to be at risk for bloodborne pathogen exposures and who did not know of their risk.

Based on the cities of residence, approximately 4% of the names lived outside of the LAC DPH jurisdiction. Most of the patients lived in the same area in Los Angeles County as where Clinic A is located. The age range was from 17-100 years, with a mean and median age of 65 and 68 years, respectively. Almost 90% of the patient procedures were some form of lumbar or cervical blocks or epidural steroid injections.

ACDC investigators drafted notification letters in English and Spanish. The letter provided an overview of the situation and encouraged patients to be tested for hepatitis B, hepatitis C, and HIV. Included in the patient letter was a page that patients could bring to their physician(s) that provided an overview of the situation and recommended specific follow-up tests (attached). Patients were encouraged to seek care

[5] Patel P, Srinivasan A, Perz J. Developing a broader approach to management of infection control breaches in healthcare settings. Am J Infect Contol 2008; 36: 685-90 http://www.cdc.gov/ncidod/dhqp/pdf/bbp/Patel_breaches_AJIC_2008.pdf

[6] Dudzinski DM, Hébert PC, Foglia MB, Gallagher TH. The Disclosure Dilemma — large-scale adverse events. N Engl J Med 2010; 363: 978-986.

with their usual physicians but the letter also included a list of low or no cost clinics, including LAC DPH clinics, where patients could be tested.

ACDC investigators also developed an extensive website on the investigation with an expanded Question and Answer section on hepatitis C (http://publichealth.lacounty.gov/acd/HepInfo.htm) with resources for both patients and clinicians. Employees of the Los Angeles County help line "211" were also provided with information about the situation in order to answer patients' questions, while physicians were referred to the main ACDC telephone number for assistance.

On January 7th, letters were sent to 2293 individual patients notifying them of their potential risk of bloodborne pathogen exposures. Of the 2293 letters which were sent to individual patients, 190 (8.3%) were returned to LAC DPH. Of the 190, 40 were identified as having died, 120 had letters re-sent based on up-to-date addresses, and 30 were unable to locate.

ACDC website statistics for the first month after the letters were released revealed that hepatitis was the most commonly searched for disease and that the web page dedicated to the outbreak was the third most viewed web page. There were a total of 84 calls made to ACDC and two calls made to the "211 LA County" hotline in the first week after the letter was released.

EPIDEMIOLOGIC ANALYSIS

ACDC investigators used the electronic hepatitis registry to identify previously reported cases of hepatitis B or C in the cohort of 2293 patients. Prior to patient notification in January 2011, there were a total of 59 patients with reports of hepatitis B, C, or both, in the electronic registry for a total prevalence of 2.6%. The majority of the cases were classified as chronic hepatitis C. The cases were first reported at a regular rate from 1995-2010 (one to eight cases per year). After the patient notification on January 7, 2011, 19 additional cases were reported to LAC DPH during January 10, 2011 to February 28, 2011. Of note, only one of the new reports was for chronic hepatitis B, the rest were all chronic hepatitis C reports. See Figure 1.

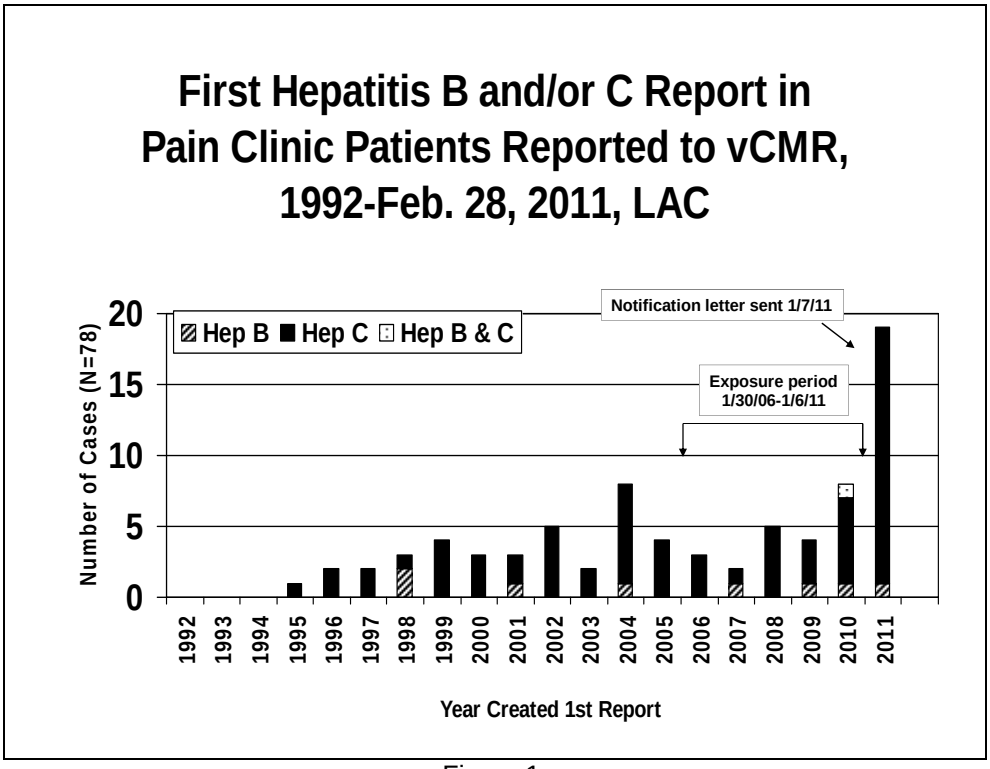

Figure 1.

ACDC did not identify a causal link between Clinic A and the 19 additional cases. The notification letter may have prompted patients who were at risk of acquiring chronic hepatitis for other reasons to be tested and reported for the first time.

Assuming a background prevalence of 2.6% for chronic hepatitis in this patient population, the 19 new cases represent approximately 730 people tested for hepatitis B and/or C after the notification letters were sent. These estimates are likely to be underestimates of the prevalence of hepatitis B or C in this population because: 1) not all laboratories regularly report hepatitis B or C results despite legal mandates and 2) not all of the 2293 patients are LAC residents and LAC DPH only receives positive test results on LAC residents.

The list of the 2293 patients was compared to the LAC DPH HIV registry: no cases of HIV were identified in these patients. The list of 2293 patients was also compared to the electronic death registry system. Four patients that matched by last name, first name, address, and date of birth had some form of liver disease in at least one of the following death certificate fields: immediate cause of death, consequence 1, 2, 3, or other significant conditions. Only one of those patients had been previously reported to LAC DPH with a positive test for hepatitis C.

CONCLUSIONS

Hepatitis B and C viruses can be transmitted easily if infection control procedures are not meticulously followed. Based on multiple lines of evidence (chart review, laboratory results, and observation of infection control deficiencies), ACDC investigators concluded that case #1 acquired acute hepatitis C while being treated at Clinic A in April 2010. This was most likely due to the cross contamination of a multi-dose vial of saline that was first used for a patient with chronic hepatitis C and then used again for case #1. This practice has been associated with the transmission of viral hepatitis in other settings.[7] Though a source patient was not found for case #2, given the lack of other risk factors for the acquisition of hepatitis B in this case-patient and the demonstrated transmission of viral hepatitis at Clinic A, the investigators believe that the most likely source of infection for case #2 was also receiving treatment at Clinic A. Because of the intermittent nature of the exposures (i.e., treatments) and the lengthy incubation and asymptomatic period associated with both hepatitis B and hepatitis C, it is not possible to identify the source of infection for any individual patient who had a procedure at Clinic A except for case #1.

Multiple infection control deficiencies were documented during two site visits at Clinic A that could have resulted in the transmission of bloodborne pathogens or the acquisition of bacterial infections in patients. According to the 2007 Healthcare Infection Control Practices Advisory Committee guidelines,[8] healthcare workers should use single-dose vials of medications whenever possible and use aseptic technique when accessing medication vials. Furthermore, healthcare workers should not administer medications from single-dose vials to multiple patients; should not keep multi-dose vials in the actual patient treatment area; and should not use a contaminated syringe to access medication that might be used for subsequent patients. All of these guidelines were violated during our site visits.

The identified infection control deficiencies could have resulted in the transmission of bloodborne pathogens, the development of bacterial infections, and risk to staff at Clinic A. Therefore, patients were notified of their increased risk of bloodborne pathogens so that they could seek medical advice and treatment should they test positive.

[7] Centers for Disease Control, Acute Hepatitis C Virus infection attributed to unsafe injection practices at and endoscopy clinic-Nevada, 2007. MMWR 2008; 57 (19): 513-517.
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5719a2.htm

[8] Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings.
http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

HEPATITIS B OUTBREAK IN AN ASSISTED LIVING FACILITY

Elizabeth Bancroft, MD, SM and Susan Hathaway, RN, PHN, MPH

BACKGROUND

On February 26, 2010, Acute Communicable Disease Control (ACDC) staff of the Los Angeles County (LAC) Department of Public Health (DPH) was notified by a physician of a possible outbreak of hepatitis B at an assisted living facility (ALF). A diabetic resident at the ALF tested positive for acute hepatitis B. The resident was asymptomatic but had elevated liver function tests in January 2010. At that time, there were two other insulin dependent diabetic residents who newly tested positive for hepatitis B. According to the ALF administrator and the attending physician, all three diabetics with newly diagnosed hepatitis B received diabetes care from the same home healthcare agency (HHA) during the incubation period of the acute hepatitis B case. An investigation was conducted by DPH staff to determine the source of the hepatitis B outbreak and control spread of the disease. The investigation was undertaken with the authority of the local health officer ("upon receiving a report made pursuant to reportable diseases or notification by laboratories, the local health officer shall take whatever steps deemed necessary for the investigation and control for the disease, condition or outbreak reported.")[i] The investigation consisted of site visits to the ALF, interviews with residents, detailed interviews with staff from the HHA regarding infection control procedures, and laboratory testing. Of note, the HHA stopped servicing the three diabetic residents at the end of January 2010, approximately one month before the cluster was reported to ACDC.

CONTEXT

The ALF is licensed for 120 residents but at the time of the outbreak the census was 84. The ALF had a staff of 22 who provided assistance with daily living activities which includes meal preparation, housekeeping, laundry, oral medication dispensing, assistance with grooming activities such as bathing, and urine incontinence assistance. The ALF did not employ any registered nurses or licensed vocational nurses; home health agencies provide any licensed nursing care required by the residents including diabetes management such as fingersticks and insulin injections. No medical records are kept on site for the residents except for oral medications lists.

DPH staff observed the residents' rooms, the dining area and the medication room. The overall appearance of the facility was neat and clean. The residents' rooms were furnished with two beds and had a bathroom which was shared if two residents were assigned to a room. The medication room contained extra syringes and a refrigerator for storage of insulin for the diabetic patients. DPH staff also observed a second refrigerator used for storage of insulin which was located in the kitchen; each resident's insulin vial was stored in an individual plastic bin. The insulin vials were labeled with the patient name and stamped with the pharmacy expiration date. Residents who performed their own fingersticks and insulin administration kept their own supplies in their room; they also had their own refrigerators to store insulin.

CASE FINDING

The names of the 84 current residents were entered in the LAC DPH hepatitis B registry to determine if any had ever been reported with hepatitis B infection. One of the diabetic residents had been reported to the registry in 2001. The second resident, whom the administrator identified as having liver cancer, was reported with hepatitis B in 2006. No other residents were found in the registry.

The investigation team also contacted the primary care provider for all eighty-four current residents to determine if they had elevated liver tests in last six months or if they had a record of a positive hepatitis test. No further cases of hepatitis B were identified by contacting the primary care providers.

BLOOD TEST RESULTS

In order to identify other cases of acute hepatitis B among diabetics at the ALF, blood samples of seven of eight diabetic residents were obtained by LAC DPH on March 10, 2010 and sent to the Centers for Disease Control and Prevention in Atlanta, GA, for testing. The tests revealed that all three viruses isolated from three newly diagnosed hepatitis B cases were essentially identical, implicating person-to-person transmission of the same virus among these patients. Results for the remaining three diabetic residents were negative, indicating that these residents are still at risk of becoming infected with hepatitis B. Test results for the final resident (the one who had been reported to the hepatitis registry in 2001) indicated past infection with immunity.

ACDC with several primary care providers at the facility ordered hepatitis B testing for 21 residents and 18 staff members. The ALF provided the test results. All 21 residents tested were negative for current infection with hepatitis B including one roommate of a diabetic resident and one diabetic resident. All eighteen staff members tested negative for active (infectious) hepatitis B.

INTERVIEWS

Interviews were conducted with 11 residents: eight identified diabetic residents, two roommates of the diabetic residents, and a resident identified by the facility administrator who had previously tested positive for hepatitis B and was recently diagnosed with liver cancer. The interviews consisted of questioning the residents to determine if they experienced any symptoms of hepatitis in last six months, reviewing their vaccination status, and questions to determine if there was a contributing factor that increased the residents' possibility of exposure to hepatitis B. None of 11 residents interviewed reported symptoms of hepatitis. None of 11 residents reported receiving hepatitis B vaccination.

Eight of 11 residents interviewed were diabetics who received fingersticks and insulin injections. Three of the diabetic residents with positive hepatitis B tests reported receiving fingersticks, blood glucose testing and insulin injections from the same HHA. One of eight diabetic residents reported receiving fingersticks from a different home health agency. The remaining four diabetic residents reported that they performed their own fingersticks and insulin injections. One of these four reported that he did have a home health agency perform fingersticks during December 2009 because of temporary disability; however he could not remember the name of the agency.

Two of the diabetic residents who tested positive for hepatitis B reported having engaged in sexual activity with a partner of the opposite gender during their incubation period, however not the same partner. One of four diabetic residents performing their own diabetic care reported receiving dialysis during the incubation period. Three of eight diabetic residents reported receiving podiatric care, however, a common podiatrist was not identified.

SURVEY OF KNOWLEDGE AND PRACTICES OF NURSING STAFF AT HHA

To assess infection control practices of the nursing staff at the HHA, a standardized telephone survey was conducted in March 2010 with seven staff members at HHA who were identified as providing diabetic care to three hepatitis B positive diabetic residents at the facility. No breaks in infection control were identified through the survey. However, it was noted that the HHA lacked written policies on injection safety and infection control relating to blood glucose monitoring.

SUMMARY

Outbreak investigations of hepatitis B in long-term care settings have repeatedly demonstrated person-to-person transmission as a consequence of inappropriate blood glucose monitoring practices, such as the sharing of equipment and inadequate aseptic technique during fingerstick blood glucose monitoring[ii]. LAC DPH has investigated several of these outbreaks in the past[iii,iv]. Hepatitis B can be easily transmitted if infection control procedures are not meticulously followed. The site visit and interviews with staff from HHA did not reveal any significant infection control lapses that would have explained this cluster of

hepatitis B but the interviews were conducted after the outbreak and the possible connection to HHA had been identified.

It appears more likely than not likely that there was person-to-person transmission of hepatitis B at ALF among diabetic patients who received diabetic care from a single home health agency. Patients who did not receive care from this agency did not acquire hepatitis B; based on the paucity of the evidence, HHA could not be proven to be responsible for the transmission of hepatitis B at the ALF. However, it was noted that HHA lacked written policies on injection safety and infection control relating to blood glucose monitoring.

In the year after the outbreak was reported, no new cases of hepatitis B were identified at ALF.

RECOMMENDATIONS/INTERVENTIONS

Given the extensive literature documenting transmission of hepatitis B and diabetes care, the investigation team recommended that the ALF:

- Ensure that all home health agencies that they work with have written infection control policies which include preventing exposure to patients from bloodborne pathogens during diabetes care and Injection safety to prevent transmission of disease to patients.
- Label the blood glucometer and pen lancet with each resident's name and keep in resident's room.
- Remind diabetic residents that blood glucometers, pen lancets, syringes, needles and insulin should never be shared with another person.
- Report to ACDC any resident that has symptoms of hepatitis (yellowing of the eyes, nausea, vomiting, abdominal pain) which may represent a newly acquired hepatitis infection.

The investigation team recommended to the HHA that they develop infection control policies regarding injection safety based on the principles in these two documents:

CDC's *Diabetes and Viral Hepatitis: Important Information on Glucose Monitoring*.
Available online at: http://www.cdc.gov/hepatitis/Settings/GlucoseMonitoring.htm

CDC's *Patient Safety, Injection Safety.*
Available online at: http://www.cdc.gov/ncidod/dhqp/injectionsafety.html

[i] Investigation of a Reported Case, Unusual Disease, or Outbreak of Disease. Title 17, California Code of Regulations, Section 2501

[ii] Thompson ND, Perz JF, Moorman AC, Holmberg SD. Nonhospital health care-associated hepatitis B and C virus transmission: United States, 1998–2008. Ann Intern Med. 2009 Jan 6;150 (1):33-9.

[iii] CDC Transmission of hepatitis B virus among persons undergoing blood glucose monitoring in long-term care facilities---Mississippi, North Carolina, and Los Angeles County, California, 2003—2004. MMWR. 2005;54(09):220-3.

[iv] Bancroft E. Hepatitis B transmission in a nursing home, Los Angeles County, 1999. Acute Communicable Disease Control Special Studies Report 1999.

http://www.lapublichealth.org/acd/reports/spclrpts/spcrpt99/spcl99.pdf Accessed February 2, 2011.

INVASIVE GROUP A STREPTOCOCCUS OUTBREAK IN A SKILLED NURSING FACILITY, LOS ANGELES COUNTY 2010

Elizabeth Bancroft, MD, SM

BACKGROUND

Infections with invasive Group A Streptococcus (IGAS)—defined as GAS, also called beta-hemolytic streptococococcus or *Stereptococcus pyogenes*, in a normally sterile site of the body including blood, joint fluid, and cerebral spinal fluid—can result in serious, life threatening disease. Age over 65 years, diabetes, and immunosuppression have all been documented risk factors for IGAS infections in Los Angeles County and elsewhere.[i,ii] There have been numerous reports of outbreaks of IGAS in healthcare settings, especially in long term care facilities where close, crowded living conditions and the frailty of the residents are conducive to the transmission and sequelae of these infections. The Centers for Disease Control and Prevention (CDC) defines an outbreak of IGAS in a skilled nursing facility to be two cases occurring within a year; a recent review of GAS outbreaks in long term care facilities revealed that most reported outbreaks lasted longer than one month and that multiple measures were often necessary to control the outbreak(s).[iii]

IGAS is a reportable disease in Los Angeles County (LAC). For all cases, medical records are reviewed and abstracted to a standard epidemiological form. To identify nosocomial cases of IGAS, since 2003 the LAC DPH IGAS epidemiological form contains questions about any surgical procedures, delivery, or admission to the hospital in the seven days before onset of IGAS infection. In 2007, a question was added to the form which asks if the patient had been admitted to the hospital from a long term care facility and the name of the facility. If the answer is yes to any hospital admission or residence in long term care facility, the case is classified as a "nosocomial." From 2008-2010, 7.5% of confirmed IGAS cases in Los Angeles County have been classified as nosocomial but no clusters were identified until 2010. This report presents a self-limited outbreak of IGAS in a long term care facility that resolved with no interventions.

In early June of 2010, three patients with IGAS were identified who had been admitted to two different hospitals in a 20-day period from the same 141-bed skilled nursing and rehabilitation facility (Facility A) in April. One patient died of necrotizing fasciitis less than 24 hours after admission to the hospital; the other two had blood cultures positive for GAS but were discharged from the hospital back to Facility A. One patient had terminal cancer and died shortly after readmission to Facility A. Two of the patients were immobile and remained in bed. An investigation was conducted to determine the source of the outbreak and to control the spread of IGAS.

METHODS

Case Finding

The investigation team at the LAC DPH Acute Communicable Disease Control Program (ACDC) obtained a list of all Facility A patients with fever who were transferred to a hospital during March 1, 2010 through June 8, 2010 and reviewed their medical records. The investigation team contacted the microbiology laboratories of all acute care hospitals to which patients from Facility A were discharged with a diagnosis of fever or suspected infection from January 1, 2010 through June 8, 2010 to determine if additional positive cultures for GAS were documented. The medical charts also were reviewed of Facility A roommates of known patients with IGAS as well as the microbiology reports of cultures taken while the case patients were at Facility A.

Review of Infection Control

Key informants were interviewed including the director of the Facility A, the nursing director and the director of staff development who worked as the infection preventionist (IP). The investigation team made

a comprehensive tour of the facility in June 2010 and observed infection control practices as healthcare workers tended to patients. Written infection control policies and procedures were reviewed.

Infection Control Survey

An anonymous employee survey was conducted at Facility A on infection control knowledge, attitudes and practices. The survey was written in English and distributed during each of the three daily shifts. Questions included current job, spoken language at home, self-reported knowledge and adherence to infection control practices, and impressions about fellow employees.

RESULTS

Case Finding

No other case of group A streptococcus was found in patients residing in or recently discharged from Facility A.

Infection Control Practices

Several deficiencies in infection control policy and procedures were discovered:

a. Lack of adherence to internal infection control policies. On multiple occasions, the investigation team observed breaches in contact precautions. For example, observations were conducted of hand washing practices by staff caring for two patients cohorted for *Clostridium difficile* infection. Four staff were observed to put on gloves without prior hand washing and then initiate patient care. These staff appropriately removed gown and gloves and placed these items in the disposal bin in the patient room and then washed their hands on exiting. Washing with soap and water was performed using the patients' bathroom. Paper towels were not consistently used to open and shut doors at the completion of hand washing. After completion of hand washing, two of four patient care staff were seen touching curtains, handrails, and walls prior to leaving the patient room which may have resulted in their hands becoming recontaminated with *C. difficile* or other pathogens.

b. Infection control policies were not standardized to CDC guidelines. At Facility A, when infection control precautions were indicated, a color-coded binder was placed at the entrance of the patient's room, designating the specific infection control precautions by organ systems such as fecal/enteric or urine. CDC guidelines are based on transmission risk and use a simple four step model for infection precautions: standard, contact, respiratory, and airborne precautions.

c. Access to hand hygiene supplies were limited or not well utilized.
   i. Alcohol based hand rub (ABHR) products were available in each patient care room but were not observed to be utilized by patient care staff.
   ii. Sinks utilized for hand washing were inside patient rooms which required opening and shutting a door by hand after hand hygiene, or were at the single nursing station on each floor.

d. By report, injection safety procedures were followed throughout Facility A.
   DPH staff reviewed multi-vial and single vial medication practices with staff. By report, all insulin and injectable medications were labeled with patient's name and utilized only by the specified patient; saline flushes were single-use only; and injectable pain medications were available in single-use vials only.

Results of Infection Control Survey

Of 70 total staff, 40 (57%) completed the survey. Most staff completing the survey were either licensed vocational nurses (LVNs, 60%), or nurse aides (23%); the remainder were registered nurses (RNs) and housekeeping staff. More than half of respondents speak Spanish at home.

In general, employees rated their knowledge of infection control as very good to excellent, however, their answers to more specific questions revealed gaps in knowledge. More than half of respondents (55%) said their knowledge about hand hygiene is “excellent” while the rest said their knowledge is “very good.” However, when asked about the hand hygiene policy at Facility A, only 85% reported they should wash hands both before and after touching patients. Furthermore, only 55% said hand hygiene is “extremely useful” for avoiding infection, 40% said it is “useful,” and 5% said the hand hygiene is “extremely useless.” A total of 45% said they think their fellow employees consider hand hygiene as “extremely useful,” 50% picked “useful” and 5% of respondents think their fellow employees consider hand hygiene “extremely useless” in avoiding infection.

Employees self-reported excellent practices for infection control but there were some gaps. A large majority (85%) of those completing the questionnaire responded that they “always” adhere to hand hygiene/infection control recommendations while 15% noted “almost always.” However, fewer thought that their fellow employees adhered to hand hygiene or infection control recommendations: 70% said their fellow employees adhere to hand hygiene recommendation “always” and 30% said “almost always.” Almost 95% of respondents said they use soap and water and only 5% said they use gel for hand hygiene. About 70% thought there is no barrier for hand hygiene and just over 20% considered unavailability of hand washing sinks as a barrier.

Despite the self report of a high level of knowledge and adherence to infection control policies, a large majority (80%) thought they could improve their hand hygiene. For training, the majority of respondents preferred interactive discussions, role playing and watching videos compared to just listening to lectures.

SUMMARY

The CDC defines an outbreak of IGAS in a skilled nursing facility as two or more cases in a one-year period. This situation met the definition of a nosocomial outbreak, even without definitive laboratory testing. The fact that two of the three patients were not mobile suggests that the infections were spread by healthcare workers. Most reported outbreaks of IGAS in skilled nursing facilities have been associated with breaches in infection control, including employees working while ill with "strep throat" or/and poor adherence with hand hygiene. While these conditions cannot be proven to have resulted in the spread of group A streptococcus at Facility A in April 2010, it is clear that infection control practices as observed during the investigation could have resulted in the spread of this infection and others.

Since the investigation, no more cases of IGAS have been reported from Facility A.

Recommendations given to Facility A

1) The IP at Facility A should regularly contact, within seven days of discharge, all hospitals to which Facility A patients have been admitted to identify any positive cultures or infectious disease conditions that may have been identified during hospitalization. These diseases or test results (if appropriate) should be noted in the medical chart of the patients upon return to Facility A. The IP should keep a list of patients, the hospitals, and infections to identify any pattern of infections that need to be addressed. If a cluster of the same infection is noted, it must be reported to the Department of Public Health immediately.

2) The IP should consider reviewing on a daily or weekly basis all positive tests for infectious diseases that occur in residents of Facility A.

3) Floor nurses should notify the IP of any patient who tests positive for group A streptococcus

4) Any new GAS infection in a resident or an employee until April 2011 should be reported to ACDC immediately.

5) There should be additional didactic sessions with the staff regarding infection control and the importance of hand hygiene. Sessions should be given in English and Spanish and handouts should be available in both languages. Sessions should include interactive discussions with demonstrations of good and sub-standard practices. Explanations for best practices should be made in simple language.

6) Appropriate hand hygiene should be encouraged, including more liberal use of ABHR which has been shown to increase compliance with hand hygiene. Consideration should be given to providing small bottles of ABHR for staff to carry and use between patients.

7) Policies and procedures on isolation practices should be updated. Isolation categories should conform to the CDC guidelines for infection control. Instructions and signage should be posted in both English and the dominant language of care givers in any facility. More information on guidelines for isolation precautions may be found at the CDC website: http://www.cdc.gov/ncidod/dhqp/gl_longterm_care.html.

8) Staff need to be reminded that hand hygiene must be performed before putting on gloves and gowns, and that after performing hand hygiene at the end of their duties in a patient room, nothing else should be touched before exiting the room.

Acknowledgement: Armin Shahronki, MD, Public Health Resident

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http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2869908/pdf/12558329.pdf

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NATION-WIDE OUTBREAK OF SALMONELLA ENTERITIDIS ASSOCIATED WITH CONTAMINATED EGGS

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BACKGROUND

In the summer of 2010, the Los Angeles County (LAC) Department of Public Health (DPH) was part of a nation-wide investigation that led to the largest egg recall in US history. Locally, this investigation involved collaboration and cooperation of multiple LAC Public Health Agencies, included Acute Communicable Disease Control (ACDC), Community Health Services (CHS), Environmental Health Food and Milk Program (EHFM) and the Public Health Laboratory (PHL). LAC DPH contributed significant investigational findings that assisted Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA) in identifying a food source and preventing further exposure.

ACDC identified the first signs of the outbreak in early June of 2010 when a county-wide increase in *Salmonella* enteritidis (SE) cases was observed. LAC typically receives 15-25 SE case reports in a summer month, but the number of reports increased to 43 in May of 2010. In Mid-June of 2010, the California Department of Public Health (CDPH) identified an increased number of SE cases being reported, many with a pulsed field gel electrophoresis (PFGE) pattern JEGX01.0004 (pattern 04). In July, the CDC identified a nation-wide increase in SE cases. The CDC determined that the most effective method of investigating this increase in SE cases was to focus on local clusters of cases associated with a common restaurant or event. Trace back of any food items identified in these clusters was encouraged.

METHODS

ACDC increased surveillance of local SE cases by reviewing SE case interviews performed by Public Health Nurses (PHNs) to identify any clustering of cases by demographics or common exposure. Cases were mapped to observe geographic clustering. Initial findings identified by ACDC were relayed to CHS investigating PHNs to focus their investigations. Follow-up interviews were conducted on SE clusters identified.

- EHFM made a site visit to any potential restaurant or food venue suspected in SE clusters identified by ACDC. EHFM performed trace-backs on any suspect food items.
- ACDC ensured that *Salmonella* case isolates were sent to the Public Health Laboratory (PHL) for confirmation, serotyping and PFGE analysis in a timely fashion.
- ACDC requested that PHL begin performing PFGE testing on all sporadic SE isolates. Except for outbreaks, PFGE testing on SE isolates is not routinely performed by PHL due to limited resources.
- ACDC compiled all cluster investigation findings from CHS, EHFM and PHL and relayed them to the CDPH.

RESULTS

ACDC review of LAC SE cases occurring in May and June of 2010 did not reveal obvious geographical clustering. SE cases were more likely to be non-Hispanic and more likely to be working-age adults in comparison to the typical demographics for salmonellosis cases. After review of PHN case investigations, ACDC identified a clustering of cases associated with the entertainment industry. On July 23, 2010, ACDC requested that PHNs inquire about these types of occupations among salmonellosis cases and their household contacts and notify ACDC.

Re-interview of salmonellosis cases in the entertainment industry revealed a cluster of cases working at the same transient movie set location in a neighboring county (n=3). All three cases reported eating various meals from the catering truck on the movie set. One case was hospitalized. All three cases were

later laboratory confirmed with SE, PFGE pattern 04 by the PHL. No epidemiologic food analysis was performed due to the small number of cases, lack of cooperation and poor food recall of cases.

ACDC contacted the movie set production official to obtain information about the set and catering arrangements. The official reported that there was only one food truck assigned to the movie set, which followed the film production from site to site. The food truck was based in LAC. EHFM contacted the caterer of the movie set in question, but were unable to perform a site inspection as movie production had been completed. The management stated that the omelet bar was the most popular feature, with more than half of the film production crew typically eating this meal. Trace back of the eggs used by this caterer revealed that they purchased eggs through only one distributor, which in turn purchased its eggs from a single egg farm in Iowa. The PHL confirmed the associated clinical isolates as SE pattern 04.

The CDPH combined this information with five additional SE outbreak investigations in other California jurisdictions which also implicated the same egg farm. These findings were conveyed to CDC and FDA on August 3, 2010. As a result, the egg farm recalled nearly half a million eggs on August 13.

ACDC estimated the number of LAC cases related to this outbreak based on the number of SE cases in excess of the fiver-year average for May through September, the outbreak period (Figure 1). There were 153 excess cases during the outbreak period were assumed to be associated with this outbreak. LAC also noted a shift in the demographics of SE cases in general, to a working age and non-Hispanic ethnic group.

The PHL performed PFGE testing on 270 LAC SE isolates with collection dates from May 11 through September 13, 2010; 196 (72.6 %) carried the 04 pattern. Though not all persons whose isolates had pattern 04 were part of the outbreak, PFGE allowed exclusion of SE cases with PFGE patterns other than pattern 04.

ACDC identified several additional potential LAC SE clusters during the national outbreak period. Many of these clusters (n=6) involved small numbers of cases ($n \leq 2$) eating food at a common restaurant within the outbreak time period. Due to the small numbers of cases and, in some instances, lack of cooperation of ill patrons, the information from these investigations was limited and did not identify a common source. However, many cases reported eating food items made from shell eggs. EHFM performed a trace back of the eggs used in these events. Trackbacks for five of the six SE clusters revealed the previously implicated egg supplier as the likely source.

The preliminary CDC report indicates that from May 1 to November 30, 2010, approximately 1,939 illnesses were likely associated with this outbreak in the U.S.. Epidemiologic investigations conducted by public health officials in 11 states identified 29 restaurants or event clusters where more than one ill person with the outbreak strain had eaten. Data from these investigations suggested that shell eggs were a likely source of infections in many of these restaurants or events. The Iowa egg farm was an egg supplier in 15 of these 29 restaurants or event clusters. Through trace-back and FDA investigational findings, a second Iowa farm was also identified as a potential source of contaminated shell eggs contributing to this outbreak. FDA's inspectional observations, in addition to sample results, indicate substantial potential for *Salmonella* to have persisted in the environment and to have contaminated eggs for an extended period. FDA collected nearly 600 samples from both farms during this investigation. Eleven environmental samples identified *Salmonella* with PFGE patterns indistinguishable from the outbreak strain.

DISCUSSION

Although the strict case definition used here identified only three LAC SE outbreak-related cases, there were an estimated 153 persons in LAC ill with SE potentially associated with the outbreak. Food trace-backs are intensive and could not be performed to subtype each individual SE case. LAC DPH's cluster investigation findings were one of a handful of CA investigation findings that helped CDC and FDA identify a source early on in the national investigation and request a recall of eggs. The CA DPH worked

diligently to compile the investigational results from multiple California jurisdictions and present the first evidence to CDC suggesting the source of the outbreak.

Many of the SE cluster investigations performed by multiple state health jurisdictions in this investigation identified eggs and poultry as common foods eaten by cases. It became challenging to determine how relevant these findings were, given that these foods are commonly eaten in the US. The 2006-2007 FoodNet Population survey [1] indicates that 72.5% of persons in California consume fresh eggs (nationally 75.4%) and 63.3% of California consume chicken prepared at home (nationally 64.9%) in the past seven days.

Nationally, the most common PFGE patterns of SE identified were 04 (45%), 05 (15%) and 02 (15%) with fairly equal frequency from each region of the US in relation to each labs submission frequency (Source: PULSNET representative in 2008). The remaining 35% of isolates were in the ≤2% category. Because of this, PFGE testing normally has limited use in SE cluster detection, but is valuable for supporting epidemiologic evidence. In LAC, SE pattern 02 had historically been the dominant PFGE pattern, representing 40% of a sample of SE isolates tested by PHL in 2005.

Other issues that may have delayed the identification of this outbreak source included the batching of bacterial isolates by private laboratories to PHL, delaying confirmation and serotyping. Thus, serotyping of isolates can take weeks after the *Salmonella* has been identified.

Food trace-backs can be very complex and time consuming and many times lead to multiple out of state sources. For example, one cluster trace-back involved 18 different egg farms as the possible source of eggs used in a suspect meal.

The high demand for eggs by California consumers has driven suppliers to supplement their egg supplies with out of state eggs. It is estimated that at least 30% of eggs consumed in California are from out of state sources. States outside of California may not have as strict a standard for egg quality assurance as California. The California Egg Quality Assurance Program (CEQAP) established in California is a voluntary pre-harvest food safety program designed to ensure product quality and food safety from *Salmonella* and chemical residues in eggs. Training, record-keeping, and research are integral components in documenting the program's success. Each participant implements an approved plan specific to their operation. Farms and processing facilities are annually reviewed by California Department of Food and Agriculture veterinarians to ensure compliance with the program components. The CEQAP was effective in reducing the incidence of SE in California- produced shell eggs during the 1990s.

CONCLUSION

This national outbreak investigation of *Salmonella* Enteritidis (SE) (PFGE pattern 04) involved considerable coordination and cooperation from federal, state and local entities to identify a source [2]. The outbreak occurred between May 1 and November 30, 2010 and implicated two farms in Iowa with nation-wide product distribution. Through the coordinated efforts of ACDC, EHFM, PHL and CHS, LAC DPH was able to identify one of six California outbreak-related clusters that led to identification of the source for the nationwide outbreak, resulting in a massive egg recall.

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RESOURCES

FDA egg recall posting
Website: http://www.fda.gov/Safety/Recalls/ucm222501.htm

Egg Quality Assurance Program, CA
Website: http://www.pacificegg.org/ceqap.html

DISEASE REPORTING PRACTICES AND ATTITUDES AMONG COMMUNITY CLINIC ASSOCIATION OF LOS ANGELES COUNTY (CCALAC) PROVIDERS, 2010

Alan Wu, MPH and Y. Silvia Shin, RN, PHN, MSN/MPH

BACKGROUND

Disease surveillance is an important function of public health. Timely and accurate reporting of communicable diseases (both confirmed and suspected cases) is a critical component of disease surveillance, prevention and control [1]. Routine collection and analysis of data gathered are essential to rapidly identify and effectively respond to new disease outbreaks [2]. Studies consistently demonstrate significant underreporting of communicable diseases, limiting the data available to guide local disease control efforts [2]. Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control Program (ACDC) estimates that only 5% of communicable diseases occurring in LAC are reported. In LAC more than 80 diseases are reportable by law to the local health department [1]. In addition, the potential threat of emerging diseases and bioterrorism-related disease activity further increases the need for prompt and thorough disease reporting [1].

Primary healthcare providers are frequently the first to recognize unusual occurrences or patterns of disease. Therefore, it is critical that healthcare providers report all reportable diseases as well as any unusual disease occurrences.

METHODS

To identify and assess key barriers and factors involved in underreporting ACDC conducted an online survey of local healthcare providers from January to June 2010. The survey specifically targeted providers who are members of the Community Clinic Association of Los Angeles County (CCALAC). CCALAC is an important network of 44 provider members whose main role is to represent and help non-profit community and free clinics serve their patients in an efficient and cost-effective manner. The association strives to identify and address the collective needs of members at the local, state and federal levels. CCALAC delivers a variety of member services including policy advocacy, education and peer support.

ACDC collaborated with CCALAC and presented the survey project at the CCALAC February 2010 medical directors' monthly meeting to invite their participation. At this meeting ACDC also provided an opportunity for members to complete the survey. A total of 14 responses were gathered. In February 2010, a 23-question survey was distributed to all current CCALAC members using a web-based survey tool, SurveyMonkey™. An initial email was sent with a link to the web-based survey generated in SurveyMonkey™ to all CCALAC members. Email reminders were sent to all members to encourage participation. The time period to respond to the survey was extended several times for as many members as possible to participate and to maximize response rates. All CCALAC provider members were contacted by email to complete the survey. The survey was closed on June 15, 2010. To capture the various types of providers common in this network (other than physicians), participation was also extended to part-time and per diem physicians, physician assistants (PAs), nurse practitioners (NPs), osteopathic physicians (DOs), and nurse-midwives.

RESULTS

Response Rate and Survey Population

The survey response rate was 37% with a total of 179 responses. The characteristics of the respondents are summarized in Table 1. Respondents were physicians (68%), physician assistants (12%), osteopathic physicians (3%), nurse practitioners (15%), and nurse-midwives (2%). A majority of the physicians (68%) were in family practice (52%) and female (63%). The highest percent of respondents have practiced

medicine in California from one to five years (26%) and are in the age group 31-40 years (37%). Ethnicity distribution was somewhat even among white (31%), Hispanic/Latino (28%), and Asian (24%).

Table 1. Demographic Characteristics of Providers Who Responded to Survey (N=179)

Variable	No. (%)
Job Title (n=155)*	
Physician	**106 (68)**
Nurse practitioner	23 (15)
Physician Assistant	19 (12)
Osteopathic physician	5 (3)
Nurse-midwife	3 (2)
Specialty (n=159)*	
Family Practice	88 **(52)**
Pediatrics	31 (19)
Internal Medicine	23 (14)
Obstetrics/Gynecology	25 (15)
General Practice	15 (9)
Infectious Disease	1 (1)
Other	9 (5)
Years of Practice as CA physician (n=173)	
<1 year	8 (5)
1-5 years	**45 (26)**
6-10 years	35 (20)
11-15 years	33 (19)
>25 years	23 (13)
16-20 years	17 (10)
21-25 years	12 (7)
Age (n=156)	
31-40	**58 (37)**
41-50	43 (28)
51-60	34 (22)
61-70	14 (9)
=< 30	5 (3)
> 70	2 (1)
Gender (n=156)	
Female	**99 (63)**
Male	57 (37)
Race (n=160)*	
White	**49 (31)**
Hispanic/Latino	41 (28)
Asian	38 (24)
Black/African-American	20 (13)
American Indian/Alaskan Native	3 (2)
Pacific Islander	2 (1)
Other	11 (7)

* Respondents can have multiple answers for this question

Disease Reporting Practices

Diagnosis and reporting experiences of respondents are presented in Table 2. Among the 155 respondents who have diagnosed reportable communicable diseases, 100 (64%) completed a diagnosis within the last 6 months from when this survey was conducted. Among the 135 participants with reporting experiences, 90 (67%) reported communicable diseases to LAC DPH within the last six months. Of the 131 respondents who reported diseases, 76 (58%) reported one to five times in the last year from when this survey was conducted.

Table 2. Providers' Reporting Experiences of Communicable Diseases (CDs) in LAC, 2010

Questions	No (%)
Ever diagnosed reportable CDs (n=168)	
Yes	155 (92)
No	13 (8)
Last time diagnosed a reportable CD (n=155)	
Within last 6 months	**100 (64)**
Within last year	32 (21)
Within 3-5 years	13 (8)
Over 5 years ago	4 (3)
Others	6 (4)
Ever reported to LAC DPH reportable CDs (n=153)	
Yes	134 (88)
No	19 (12)
Last time reported reportable CDs (n=135)	
Within last 6 months	**90 (67)**
Within last year	25 (19)
Within 3-5 years	11 (8)
Over 5 years ago	2 (1)
Others	7 (5)
Number of times of reporting in last year (n=131)	
1-5 times	**76 (58)**
6-10 times	30 (23)
> 30 times	9 (7)
Zero	7 (5)
11-20 times	7 (5)
21-30 times	2 (2)
Preferred methods for reporting (n=163)*	
Fax	**97 (60)**
Internet	80 (49)
Telephone	32 (20)
Handheld devices (PDAs, Blackberry, iPhone, Palm)	15 (9)
Reasons for not reporting (n=162)*	
Assume laboratory or office personnel, agencies will report	**35 (22)**
No feedback received from DPH if one reports	20 (12)
Notification form is not readily accessible	20 (12)
Don't know the reporting procedure	17 (11)
Lack of laboratory confirmation; only suspect case	17 (11)

* Respondents can have multiple answers for this question

The three most common reasons for not reporting were “assume laboratory or other office personnel, agencies will report” (22%), “no feedback received from health department if one reports” (12%), and “notification form is not readily accessible” (12%) (Figure 1). Among the non-reporting providers, the most common reason for not reporting was also “assume laboratory or other office personnel, agencies will report” (39%) followed by “did not have form or telephone number” (17%). The total of methods used provided does not equal to the total of all notifications reported by participants because most people used the same method for all their reporting.

Figure 1. Reasons for Not Reporting Communicable Disease Cases to LACDPH (n=162)

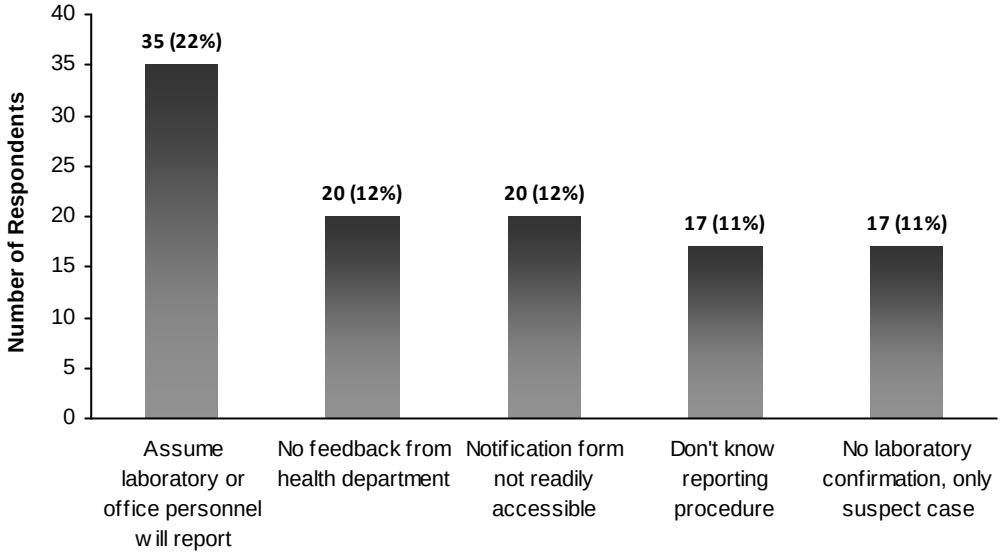

Table 3. Providers’ Attitudes on Use of Communicable Disease (CD) Reporting System in LAC, 2010

Questions	No (%)
What do you think about the LAC reporting system in general? (n=164)	
Convenient	**84 (51)**
Not familiar with system	32 (20)
Inconvenient	31 (19)
Other	17 (10)
Which reporting method(s) do you prefer to use? (n=163)*	
Fax	**97 (60)**
Internet	80 (49)
Telephone	32 (20)
Handheld devices (PDAs, Blackberry, iPhone, Palm)	15 (9)
What would help you be more likely to report CDs? (n=162)*	
Short, simple and readily accessible form	**137 (85)**
Feedback of disease information from LACDPH thru email, fax or tel	76 (47)
Preventative action is taken as a result of reporting	35 (22)
Simplify reporting procedure or process	34 (21)
Reward or incentives	16 (10)

* Respondents can have multiple answers for this question

Disease Reporting Attitudes

The attitudes of providers on the use of communicable disease reporting system in LAC is presented in Table 3. Although more than half of the providers (51%, 84) felt that the reporting system was convenient, 20% (32) of providers indicated that they were not familiar with the system. The percentages of the non-reporting providers who were not familiar with the system were significantly higher than those of the reporting providers (56% versus 12% respectively; $p<0.05$). If they could choose, most participants (60%, 97) preferred reporting through fax. The second most preferred method of reporting among participants is the internet (49%, 80).

The highest percentage of the reporting (85%) and non-reporting providers (94%) considered that short, simple and readily accessible form, among all measures, would increase their willingness to report. The second highest percentage of the reporting (50%) and non-reporting providers (39%) indicate that receiving feedback of disease information from LAC DPH would help them to more likely to report (Figure 2).

Figure 2. What Would Help Reporting and Non-Reporting Providers to More Likely Report Communicable Diseases? (n=132, 18)

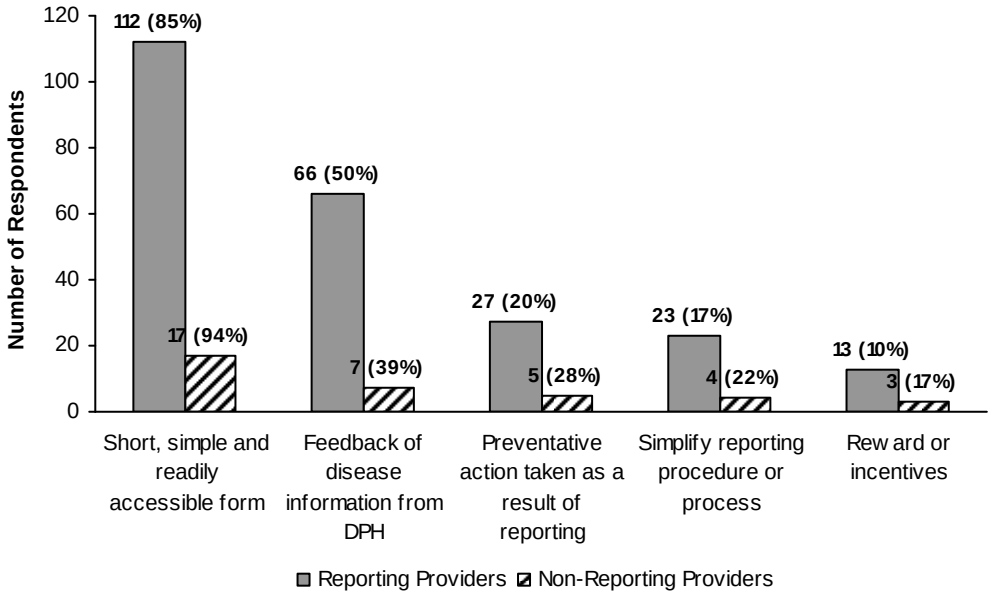

Table 4 presents providers' attitudes on reporting of communicable diseases. Among the reporting providers, 100% (129) agreed that disease reporting to public health department is important for disease surveillance. Almost all of the reporting providers agreed that reporting communicable diseases is one of the public health responsibilities of physicians (97%) and benefits patients and promotes public health (95%). Similarly, the non-reporting providers also agreed disease reporting is important for purpose of disease surveillance (94%), reporting communicable diseases is one of the public health responsibilities of physicians (89%) and benefits patients and promotes public health (89%).

Table 4. Attitudes of Responding Providers to Reporting of Communicable Diseases (CDs) in LAC, 2010

Statement of Attitudes	No. (%) of respondents, by answer (n = 147)			
	Agree (%)		Disagree (%)	
	Reporting	Non-Reporting	Reporting	Non-Reporting
Disease reporting to public health department is important for the purpose of disease surveillance	**129 (100)**	**17 (94)**	0	1 (6)
Reporting CDs is one of the public health responsibilities of physician	**125 (97)**	**16 (89)**	2 (2)	0
Reporting CDs benefits patients and promotes public health	**123 (95)**	**16 (89)**	1 (1)	1 (6)
It is NOT useful to me to report notifiable conditions	8 (6)	1 (6)	104 (81)	14 (78)
I do not feel responsible for reporting of CDs	2 (2)	2 (11)	119 (92)	14 (78)
I am less likely to report if patient's diagnosis is difficult to confirm	59 (46)	9 (50)	39 (30)	4 (22)
Reporting CDs violates patients' privacy and confidentiality	6 (5)	2 (11)	104 (81)	14 (78)
Reporting CDs is time-consuming and should not be done by busy doctors	27 (21)	4 (22)	73 (57)	9 (50)
I am less likely to report if the disease is NOT severe	22 (17)	5 (28)	92 (71)	10 (56)

LIMITATIONS

With a response rate of 37% the information gathered may not be representative of CCALAC providers and therefore, are not generalizable to all providers within the CCALAC providers. The tremendous workload of providers may explain the low response rate. In a study by Kaner et al. [3], a general increase in physicians' workloads is a primary factor for low response rates to surveys. This increase in workload could have biased the survey responses. Non-responders might have different opinion about communicable disease reporting from the responders or they were simply too busy to participate.

DISCUSSION

A majority of the responses indicate that providers' attitudes and perceptions of the importance, value, and responsibility of disease reporting are very positive. Given their positive attitude, the focus becomes how DPH can better facilitate and encourage regular disease reporting in their practice. The most frequent response was short, simple and readily accessible form would help them to more likely to report. This suggests that DPH may need to revisit the reporting forms to make changes and modifications to better meet and address the needs of providers.

The second most common factor raised is feedback of disease information from LAC DPH would help providers to report. For example, one respondent was interested to know what happens after information is reported and how reporting will impact patients. This suggests that DPH can more actively share and disseminate various communicable disease information, reports and updates via email, internet, listserv, and newsletters. Increased communication by DPH can also help to address the third most common factor of helping providers to be more aware of any prevention activities, initiatives and programs in response to their reporting.

Another common factor for not reporting is the assumption that laboratory, office personnel, or agencies will report. Better communication, coordination, and collaboration between providers and laboratory to ensure disease reporting needs to be in place.

The findings from this survey highlight important areas for ACDC to consider in increasing and encouraging disease reporting practices.

ACKNOWLEDGEMENTS

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ECSTASY OVERDOSES AT NEW YEAR'S EVE RAVE – LOS ANGELES, CALIFORNIA 2010

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ENGAGING EARLY CHILDHOOD EDUCATORS AND PARENTS WITH A *FOTONOVELA* INTERVENTION TO PREVENT INFECTIOUS DISEASE

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BACKGROUND

The Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control Program (ACDC) Planning and Evaluation Unit staff initiates collaborative projects which aim to strengthen the community's capacity to prevent infectious disease by increasing community resiliency, building relationships with diverse stakeholders, and mobilizing targeted social networks to engage in evidence-based strategies.

Reptile-associated Salmonellosis

ACDC surveillance data indicate that LAC has consistently had significantly higher rates of reptile-associated salmonellosis (RAS) than the national average. Though usually considered a foodborne disease, reptile exposure accounts for 6% of total *Salmonella* cases nationally. In contrast, in LAC, rates linked to reptile exposure have accounted for 9.2%-10.5% of total reported cases over the past several years. Reported cases in LAC have been highest among low-income Spanish-speaking Latino families with young children who live in apartments in SPAs 2 and 4 who have had exposure to baby turtles as pets. Historically, small turtles have been popular pets in child care programs and preschool classrooms.

Interdisciplinary Collaboration

In 2007, ACDC staff established the Reptile-associated Salmonellosis (RAS) Working Group to address the consistently high rates of the disease in vulnerable communities where children ages 0-5 years are at risk of serious consequences if exposed to the bacteria. Working Group members aimed to work with stakeholders to change community norms and reduce demand to purchase baby turtles, sold illegally in swap meets, streets and open air markets of LAC. In 2008, Working Group members from ACDC, Veterinary Public Health, and other key DPH programs decided to approach and engage the early childhood education (ECE) provider community, to develop prevention messages, materials, and activities to reach the parents and children they serve.

Staff attended the Los Angeles County-wide Child Care Planning Committee, attended by diverse ECE stakeholders, providers, parents, and representatives of community-based organizations, and provided public health updates on a range of infectious disease prevention topics during these monthly meetings. In 2009, ACDC staff conducted field visits with selected providers to exchange information with center-based and family-based ECE programs [1]. These site visits helped to build relationships and better understand the critical roles that ECE providers play in bridging low-income families with needed health and social services.

METHODS

Fotonovela

In 2009, ACDC staff reached out to health communications faculty at a local university, who assigned selected students to assist with RAS Working Group efforts to develop a piece of relevant, culturally competent health education material for Latino parents. Research in diverse communities has shown that educational material such as comics, stories, and pictures can effectively reach Spanish-speaking individuals with health messages [2]., ACDC staff suggested that a *fotonovela* could be effective in reaching and engaging the target population, since this format is widely used in magazines, health literacy projects, and patient education on diverse topics.

With guidance and feedback from the RAS Working Group, the team of graduate public health students drafted, field tested, and produced a 12-page glossy bilingual photograph and story booklet *fotonovela* based on real life stories and a harm reduction approach entitled, "Danger: Turtles! Not a Kid's Best Friend!; ¡Cuidado Con Las Tortugas! ¡No Son Las Mejores Mascotas Para Sus Niños!" [2]. ACDC allocated funding for a one-time printing of 10,000 color copies of the *fotonovela.*

Readers' Theater

ACDC staff suggested that the RAS *fotonovela* be strategically disseminated in order to reach the targeted audience and achieve the most impact, circulating the *fotonovela* within the social networks of low-income Latino parents of young children. Staff researched the concept of readers' theater, which has been successfully applied in group learning and problem-solving in the fields of education and community development, and then proposed applying this interactive method with *fotonovela* dissemination. In this way, ECE providers and parents would act out the story in front of groups of their peers. The readers' theater would enable parents to understand the story and disease prevention message through a variety of adult learning methods: listening to the readers tell the story, looking at the photographs, reading, and sharing their thoughts to in a group discussion.

Stakeholder Assessment

ACDC staff identified, contacted, and telephoned ECE providers throughout LAC to determine if they held regular parent meetings, and if so, in what language(s), as well as if they thought a readers' theater activity would be feasible for them to conduct during the course of the meeting. Staff determined the availability of selected ECE providers to participate in training-of-trainer (TOT) sessions, and when possible, scheduled field visits.

Tool Development

Staff sought ECE provider input on the development and revision of readers' theater tools and engaged in Plan-Do-Study-Act (PDSA) cycles for quality improvement throughout the process [3]. Tools were developed in order to systematize the process for presenting and discussing the *fotonovela,* along with following up with ACDC after each readers' theater session is facilitated. Three *fotonovela* project tools were developed to facilitate this intervention within the context of parent meetings of children ages 0-5 ages: 1) readers' theater leaders' guide, 2) group evaluation form, and 3) summary fax coversheet. Each of these tools had qualitative and quantitative elements. The leaders' guide consisted of a checklist of steps to facilitate the intervention. The group evaluation form had five items (Table 2). The summary fax coversheet had program contact information, date of training, and a seven-item summary evaluation of readers' theater numbers reached, challenges, successes, and next steps.

Training-of-Trainer Sessions and Follow-Up

Training-of-trainer sessions were planned, scheduled, and tracked on a Microsoft® Excel spreadsheet which included the date, ECE program name, number of *fotonovelas* and readers' theater tools distributed, and the number of follow-up plans completed.

RESULTS

Nine ECE programs were contacted and assessed; all had parent meetings that were conducted in English and Spanish. All participated in on-site *fotonovela* TOT sessions, representing seven of the eight LAC service planning areas (SPAs). A total of 120 early childhood educators were trained; TOT sessions conducted had a range of 3-66 participants. Six of the nine ECE programs (67%) had previously participated in ACDC Program site visits in 2009 (See 2009 ACDC Special Studies Report). Each TOT session lasted one hour; during the training, the *fotonovela* and readers' theater tools were introduced and the readers' theater was enacted with ECE providers playing each of the roles. Group discussion was facilitated and *fotonovelas* were distributed.

Participating programs had a total of 3,421 enrolled children under the age of five years in 2010, and ranged from 14-1,440 per program. Five programs (56%) were center-based, one (11%) was family-based, and three (33%) were both center-based and family-based. Five programs (56%) were based in SPAs 2 and 4, where the most cases of RAS were reported.

Table 1. Characteristics of RAS *Fotonovela* Train-the-Trainers Participants

ECE Program	# Staff Trained	# of *Fotonovelas* Received	Service Planning Area (SPA)	Center-based, Family-based, or Both?	Participated in Site Visit in 2009?
A	11	400	2	Center	Yes
B	9	320	5	Both	Yes
C	26	900	3, 4, 6	Both	Yes
D	11	400	5	Center	Yes
E	3	20	7	Family	Yes
F	16	100	4	Center	Yes
G	24	1,600	2	Both	No
H	12	400	4	Center	No
I	8	150	8	Center	No
Total	120	4,290			

Data was collected and analyzed from 78 ECE providers (65%) of those who participated in TOT sessions. A total of 211 parents in ECE Program C were reached with the readers' theater intervention (in English, Spanish, Mandarin, and Cantonese). The other eight program sites did not have evaluation data available for analysis.

Results indicate that most participants, whether ECE providers or parents, had seen baby turtles for sale. They noted that they saw these pets illegally sold on the streets of LAC, at swap meets, downtown in Santee Alley, and in Chinatown shops. When asked if they knew about the problem of reptile-associated salmonellosis prior to the training, nearly one in three (67%) ECE providers responded yes, whereas only one in four (25%) parents knew. Nearly all ECE providers and parents pledged to avoid buying a pet turtle, thought that the *fotonovela* is a good teaching tool, and committed to sharing what they learned with family, friends, and neighbors.

Table 2. Responses of RAS *Fotonovela* Education Participants

Group Evaluation Item	ECE Providers (n=78)	Parents (n=211)
Have seen baby turtles for sale	90%	84%
Before this meeting, knew that turtles could make you sick	67%	25%
Will not buy pet turtle if asked by child	97%	96%
Think this *fotonovela* is a good way to learn about the problem of *Salmonella*	99%	99%
Will share what you learned with others	100%	99%

Following the readers' theater session, ECE Program C staff committed to reduce the risk of RAS in the community by taking the following actions: 1) policy change, prohibiting reptiles from the classroom; 2) give parents homework to read the *fotonovela* to their child; 3) add the *fotonovela* to the classroom library corners; and 4) spread the word by sharing the *fotonovela* with neighbors, friends, and relatives. During this project implementation, one Program C staff member took the initiative to translate the *fotonovela* dialogue into Chinese and gave training sessions in both Mandarin and Cantonese to the 26 Chinese family child care providers she coordinates.

DISCUSSION

This intervention reached the low-income Latino families with young children through their early childhood education programs. Parents need to be aware of the risk of exposing young children and other vulnerable family members to reptile-associated salmonellosis. Parents and ECE providers are interested in learning more about zoonotic diseases, animals and children's health, emergency preparedness, dog bite prevention, bats and rabies, lice, bed bugs, and other health and safety topics.

Benefits to Parents of Young Children

ECE providers valued the readability of the *fotonovela*. Many parents are bilingual, while some are monolingual (Spanish or English), and the format and group discussion was designed to be inclusive and build community; as one provider stated, "It doesn't embarrass anyone. You can't tell who can read and who can't read; they can follow the pictures at the same time as the scenes are played out." ECE providers appreciated the nonjudgmental attitude and approach in the *fotonovela* readers' theater. According to several ECE providers, the parents they serve on occasion express concerns and fears, such as being seen as a bad parent if they purchase a turtle for their child. Furthermore, ECE providers say that street vendors are often visible in the community, at parks, selling items in front of child care programs and schools, and that even they and their neighbors work as vendors in the informal economy.

Trainer comments included:

- "Overall delighted to play parts and to be informed."
- "Many were not aware of the dangers of the turtles…they will inform others around their community. "
- "By the end of the workshop, some parents came to me and expressed that they gained knowledge…and they will share information with their kids and friends. They also expressed that the Chinese materials are very useful since they don't know English very well."
- "The (*fotonovela*) captures the attention…liked the vivid colors and pictures….will take extra copies to share with friends and relatives."
- "They (parents) loved the presentation… very interactive and the *fotonovelas* were very eye-catching."
- "Did not know that turtles could be so harmful to little ones."
- "Another parent said she will only buy plastic turtles or plush toys."
- "Great illustrations make you want to pick up the *fotonovela* and read it."
- "They enjoyed the process."
- "Great way to explain to others about it!"
- "I honestly thought that they're not just cute animals."
- "I think it's good for the intended audience."
- "Great tool to use with parents."
- "Very important information."

Challenges for ECE Providers

Many early childhood education providers identified several key barriers to implementing the *fotonovela* readers' theater. Increasingly significant are State budget cuts to ECE programs, which resulted in decreased funding for child care slots, subsequent lower enrollment, and reduced staffing; resulting in less staff time to devote to parent and health education activities. Furthermore, attendance at parent meetings can be low, since parents often work multiple jobs and struggle to find time to attend evening meetings while balancing family, work, school, and other commitments. Also, one ECE provider stated that following the *fotonovela* dialogue bubbles was initially a bit confusing

CONCLUSION AND RECOMMENDATIONS

This project aims to engage early childhood educators and parents in diverse communities throughout LAC through participation in a *fotonovela* readers' theater. Collaboration is critical in facilitating sustainable, culturally competent infectious disease prevention interventions.

Future strategies include involving ECE providers and parents in SPA 1, since Antelope Valley has not yet been reached through this project. Furthermore, the 42 ECE providers other than those in Program C in SPAs 2 through 8 who have been trained have not yet fully implemented the readers' theater; they will need to be reengaged, to the extent they are available, in the project. It would be strategic to roll-out the project to Head Start and Early Head Start programs through the Los Angeles County Office of Education's (LACOE) 28 delegate sites, which have both home-based and center-based programs serving low-income families. Efforts will be made to engage the incoming LACOE leadership in this effort.

One of the nine ECE programs, Program C, has been successful in effectively implementing the project as they had envisioned. Their staff has requested that additional parent education programming be developed, in the area of food safety. Initial collaborative planning meetings with ACDC and Program C staff indicate that adapting the *fotonovela* readers' theater method may be feasible and desired.

As *Healthy People 2020* affirms, it is vital to address the social determinants of health and health disparities to improve healthy working and living conditions for all. Collaborative disease prevention projects such as the *fotonovela* readers' theater aim to contribute to efforts to achieve health equity in LAC.

ACKNOWLEDGMENTS

The author thanks ACDC and DPH colleagues in the RAS Working Group, Dr. Debra Glik and her UCLA School of Public Health graduate students, Maria Elena Medina and Pamela Kwok of the International Institute, and early childhood education providers throughout Los Angeles County for their dedication to this project.

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EVALUATING THE LOS ANGELES COUNTY PUBLIC HEALTH URGENT DISEASE REPORTING SYSTEM

Amber Zelenay, MPH and Michael Tormey, 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, the 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 were performed in early-2006 [3] and early-2008. In June 2010 a follow-up test of the system was performed using the same methods.

BACKGROUND

LAC 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 the public health physician staff, but the exact schedule of test calls was kept secret. Dates and times of test calls were varied throughout the month.

RESULTS

During the month of June 2010, a total of nine test calls were made to the disease reporting system. Contact with an AO was made within 30 minutes for six calls (Table 1). Response times for successful calls ranged from three to 29 minutes with a mean of 11.5 minutes from initiating the phone call to reaching an AO. Of the six successful calls, three (50%) 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	
1	Business Hrs	Afternoon	CB	----	2.5 min	5 min	29 min
2	After Hrs	Morning	CB	0 sec	----	----	17 min
3	Business Hrs	Afternoon	WT	----	5 sec	10 sec	3 min
4	After Hrs	Evening	WT	0 sec	----	----	5 min
5	Business Hrs	Afternoon	WT	----	3 sec	5 sec	3 min
6	After Hrs	Evening	CB	0 sec	----	----	12 min

WT=Warm Transfer; CB=Callback

Successful Calls

Call #2, in particular, stood out for the smooth and professional manner in which it was handled. The CO was not only pleasant, but was a perfect example of customer service—they attempted a warm transfer, but first took the caller's information in case of a disconnected call. In addition, the CO kept checking back with the caller to let them know that they were still trying to reach an AO. The call ultimately ended in a call back, well within the recommended 30 minute time frame, but the steps leading to that point were the way every call from a healthcare professional should be conducted.

Unsuccessful calls

Three calls were not able to connect with an AO within the 30 minutes recommended by CDC (Table 2). In the first, the caller was connected to the CO, asked to leave a message and the CO would page the AO. The caller was told the CO would call them back once the AO had been reached. A callback was received 36 minutes after the call was initiated.

In the second call, the caller was initially referred to Immunization Program (IP), a program outside the protocol, but insisted that they would like to speak with someone in ACDC. The caller was transferred to a nurse, who told the caller to call back later to speak with an on-call physician. When the caller said she would like to speak to the physician then, they were told the physician was not in the office and to call back later. No offer was made to take a message and have the on-call physician return the call when they arrived in the office. The caller checked in with the administrator of the test, who then tried the test call again, posing as the original caller's "supervisor." Contact with an AO was eventually made, 30 minutes after the initiation of the first call.

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	
1	Business Hrs*	Morning	CB	0 sec	----	----	36 min
2	Business Hrs	Morning	WT	----	----	5 min	30 min
3	Business Hrs	Afternoon	NR	----	3 sec	0 sec	N/A

CB=Callback; NR=No Response
* Holiday

In the third call, the caller, posing as a physician, was transferred to ACDC from the Morbidity Unit. After reading the script, the caller was directed to call IP for assistance. The caller insisted that they would like to speak to another physician right then as it was an urgent case, but they were never transferred to an AO in ACDC. Instead, they were repeatedly directed to call IP.

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 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. The caller should never be instructed to call back at a later time.

2. Remind on-call physicians to keep their communication devices close by so that urgent business and after-hours calls can be handled in a timely manner.

3. Infectious disease calls that may regularly be handled by another program (e.g., IP) should still be forwarded to an appropriate internal AOD if the external healthcare professional insists on speaking with someone immediately.

DISCUSSION

Most test calls reached an AO within 20 minutes; 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. Test callers reported back that County Operator, Morbidity Unit and ACDC staff were pleasant and professional on the phone.

The evaluation of the LAC disease reporting system was successful in that it identified few problem areas in the response system that could be easily improved. 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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EVALUATING THE UTILITY OF SCHOOL ABSENTEEISM DATA 2009-2010 INFLUENZA SEASON

Cheryl Faustino, MPH; Patricia Araki, MPH; Emily Kajita, MS MPH; Megan Jones, MPH; and Bessie Hwang, MD MPH

BACKGROUND

The epidemiology of influenza has suggested that school aged children play an important role in the acquisition and spread of ILI.[1] During the pinnacle of the 2009-2010 H1N1 influenza pandemic, a principal focus on school absenteeism surveillance emerged — most notably as a non-traditional data source that could allow for earlier outbreak detection of like diseases.[2] It has been postulated that school absenteeism data may detect various disease outbreaks early under the presumption that disease spreads rapidly in dense school populations. No study to date has been reported on school absenteeism surveillance data in Los Angeles County (LAC), which contains near 90 independent school districts, including the second largest school district in the nation.[3]

OBJECTIVE

The purpose of this study was to evaluate the utility of LAC school absenteeism data from the largest school district in conjunction with current LAC Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Automated Disease Surveillance Section (ADSS) influenza-like-illness (ILI) surveillance systems during the 2009-2010 influenza season.

METHODS

Data Collection

LAC school district absenteeism data, collected from school attendance, are negative-based (i.e., absence only) and completed by teachers via an electronic student information system; once per day for elementary schools, once per period for middle/high schools. Any final corrections to daily attendance are made at the end of the school day through an electronic administrative portal. School absenteeism data are received by ACDC ADSS in near real-time on a biweekly basis via Secure File Transfer Protocol. The line listed variables available within the dataset contained: date of school absence, school name, school address and zip code, school sub-district, track number, number of total students enrolled per school per date, and number of students absent per school per date. Reason for absence was not reported by schools. Aggregate percent absenteeism was calculated per date, per school per date, and by school-age groups (elementary/middle [E/M] school and high school) per date.

ILI emergency department (ED) visits and over the counter (OTC) medication sales[4] are current in-place surveillance systems utilized by ACDC ADSS. School-age stratified ILI ED visits were determined by age; where ages 5-13 were categorized as E/M school and ages 14-17 were categorized as high school. School or age data were not available for either OTC cough/cold medication sales or OTC thermometer sales, thus school-age categories were not created.

Data Analysis

For the purposes of this study, data available from September 1, 2009 through February 28, 2010 were examined. The dataset included 140 schools: 78 E/M schools and 62 high schools. Extreme data points with known explanations for high absenteeism (e.g., days preceding and succeeding major school holidays and winter recess) were removed. Wilcoxon-signed rank tests were performed to measure median differences in school-age percent absenteeism and in number of school-age ILI ED visits. Retrospective time series analyses were conducted to examine the correlations between percent school absenteeism and: (1) ILI ED visits, (2) OTC thermometer sales, and (3) OTC cough/cold medication sales. Cluster analyses were performed to explore levels of significant absenteeism at the school level.

All statistical analyses were conducted with SAS® version 9.2.1 (Cary, N.C.) and spatiotemporal analyses were conducted with SaTScan™ version 9.0.[5] Statistical significance was set at p-values <0.01.

RESULTS

The study period of September 1, 2009 through February 28, 2010 included pandemic H1N1 influenza, as reported by LAC influenza tracking.[6] During this time, total percent school absenteeism ranged from 0.2% to 6.2% (median=3.3%; Figure 1). Two school absenteeism peaks were most notable on September 28th, (5.7%) and on February 25th (6.2%). Total ILI ED visits ranged from 571 to 1,596 (median=856), with the highest number of visits incurred on November 2nd. Similarly, OTC thermometer sales ranged from 105 to 866 (median=307), with the highest number sold on November 2nd. OTC cough/cold medication sales ranged from 4,686 to 17,743 (median=13,728), with most number sold on October 30th. Total percent school absenteeism correlated strongest with total ILI ED visits (r=0.57) and least with OTC cough/cold medication sales (r=0.52) and OTC thermometer sales (r=0.42). It has been reported that OTC thermometer sales are a strong correlate of f ILI ED visits.[7] This is consistent with this study's side analysis, where correlation between OTC thermometer sales and ILI ED visits had the strongest correlation (r=0.79).

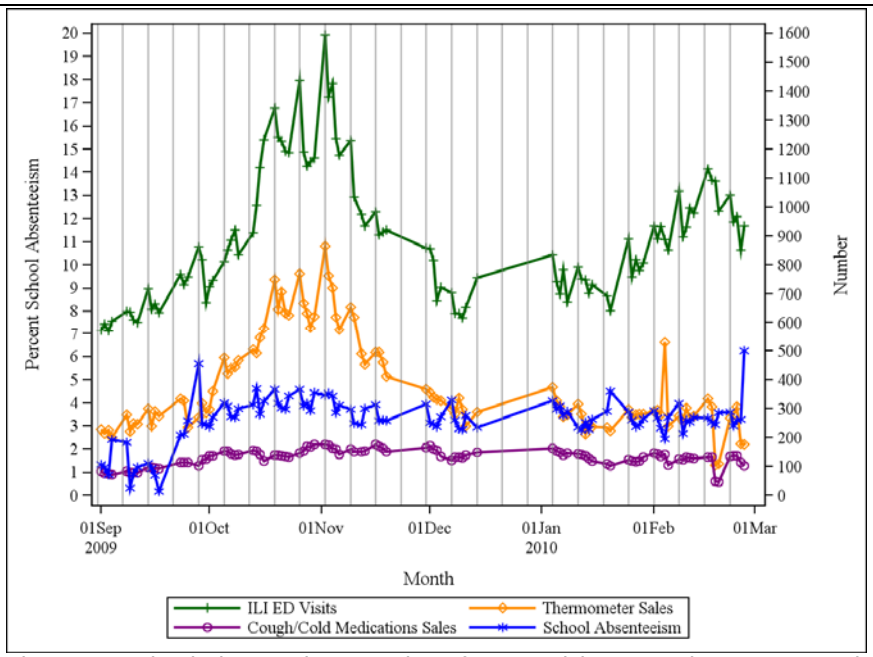

Figure 1. Total Percent School Absenteeism; Number of ILI ED Visits, OTC Thermometer Sales, and OTC Cough/Cold Medication Sales (hundreds of units).

Although a difference in percent school absenteeism between E/M and high school-aged groups has previously been reported[2], as shown in Figure 2, percent school absenteeism did not differ significantly between these age groups in LAC, with a median of 3.3% for E/M schools and 3.5% for high schools (p=0.06). Also, percent school absenteeism peaked similarly for both groups on September 28th (6.6% for E/M and 5.5% for high school). However, during the end of February, percent school absenteeism peaked much higher for the high school-aged group (7.5%) compared to the E/M school-aged group (4.8%).

Figure 3 shows the number of ILI ED visits stratified by school-age groups. Most notably, the E/M school-aged group had significantly more ILI visits to hospital emergency rooms than the high school-aged group (122 median visits versus 34 median visits, p<0.001). However, both groups had a similar trend in peak number of ILI ED visits between mid-October to early-November. These ILI ED trends are consistent with influenza tracking within LAC[6], where pandemic H1N1 influenza largely affected younger age groups.

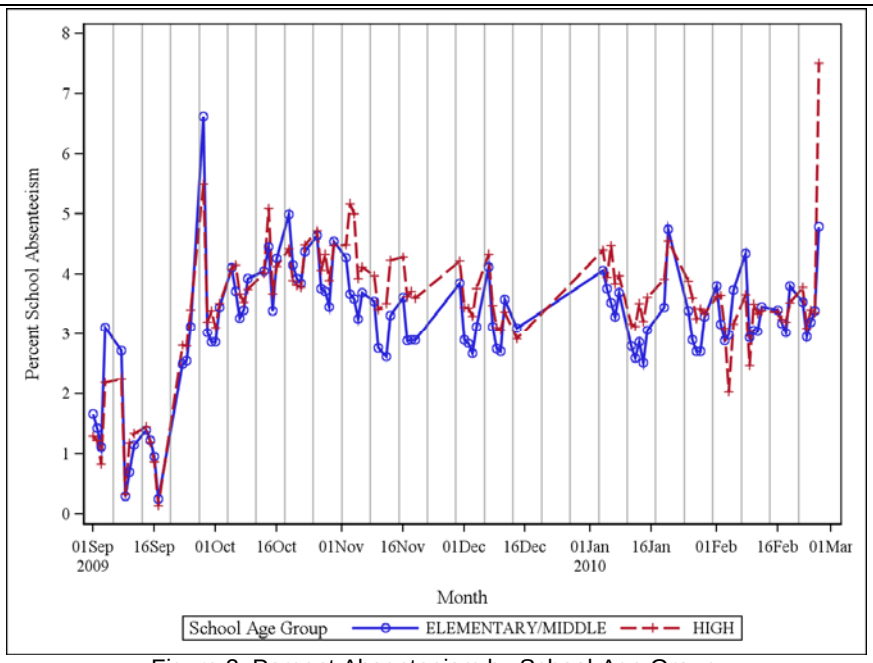

Figure 2. Percent Absenteeism by School-Age Group

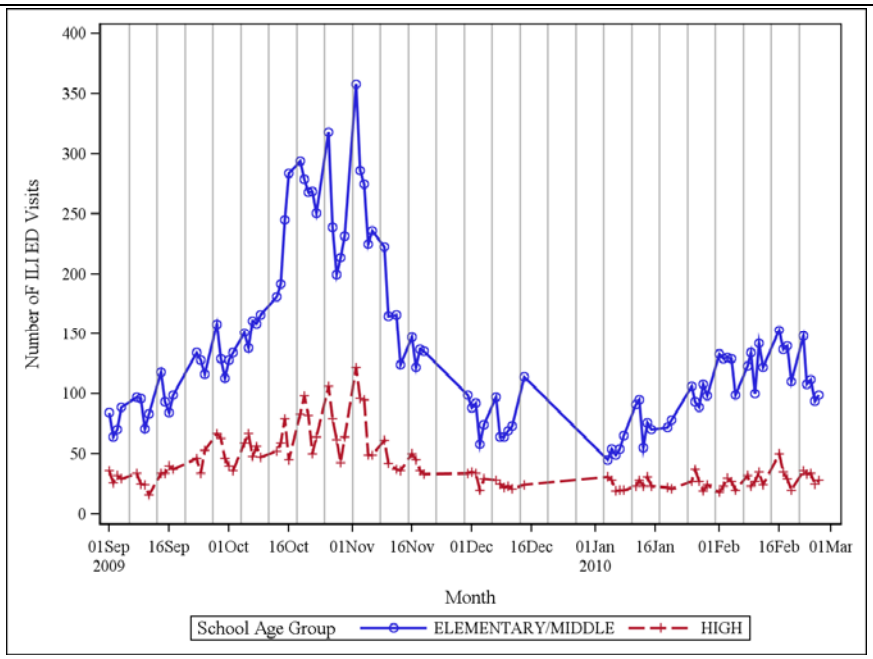

Figure 3. ILI ED Visits by School-Age Group

The correlations between school-age percent absenteeism, school-age ILI ED visits, OTC thermometer sales, and OTC cough/cold medication sales are shown in Table 1. During the study period of September 1, 2009 to February 28, 2010, both E/M and high school absenteeism showed relatively weak correlations to ILI ED visits, OTC thermometer sales, and OTC cough/cold medication sales. Moreover, correlations improved slightly when examined during the peak period of the influenza season, September 1st though December 14th. During this time frame, both E/M and high school-aged percent absenteeism correlated more with OTC cough/cold medication sales, followed by OTC thermometer sales (for high school group) and school-age ILI ED visits (for E/M school group).

Table 1. Pearson Correlation Coefficients by Dates and School-Age Group

	Full study Period 9/1/2009-2/28/2010		Peak Flu Period 9/1/2009-12/14/2009		Late Flu Period 12/15/2009-2/28/2010	
	E/M School	High School	E/M School	High School	E/M School	High School
School Absenteeism vs. ILI ED visits	0.45	0.36	0.57	0.49	-0.21	-0.19
School Absenteeism vs. OTC thermometer sales	0.40	0.41	0.55	0.62	-0.22	-0.31
School Absenteeism vs. OTC cough/cold medication sales	0.43	0.55	0.60	0.77	0.03	0.01

SaTScan™ spatiotemporal analysis was used to detect school absenteeism clusters during the peak period of the 2009-2010 influenza season (September 1-December 14), which included pandemic H1N1 influenza. Four statistically significant ($p<0.01$) school-specific absenteeism clusters were detected. The first cluster was detected at high school A on September 15-17 (observed/expected=15.1). The second cluster was detected at high school B on September 10-11 (observed/expected =23.1). The third and fourth clusters were detected at two different elementary schools but during the same time period of November 2-10 (elementary school A, observed/expected=4.6; elementary school B, observed/expected=2.81). These elementary school clusters coincided with the peak number of ILI ED visits observed in the E/M school-aged group on November 2nd (Figure 3).

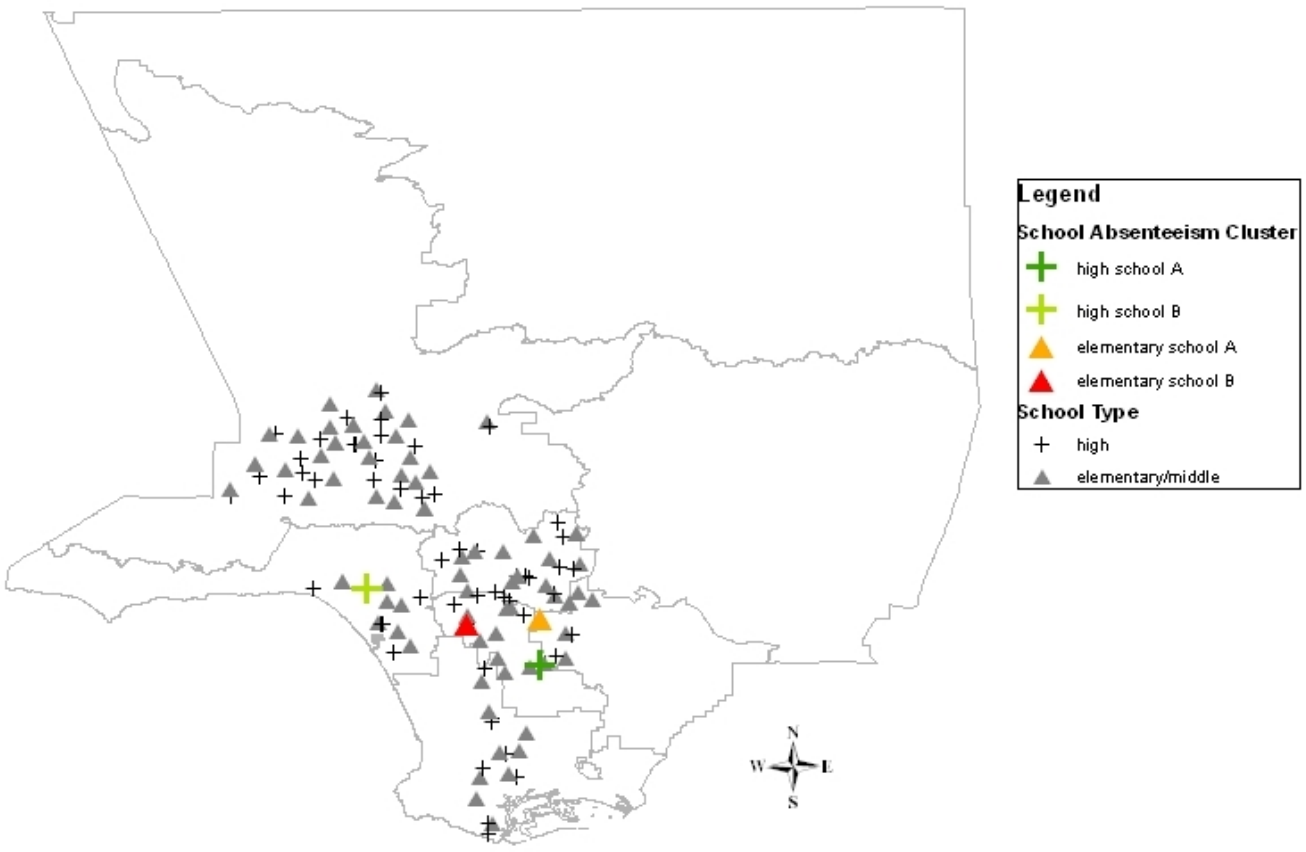

Figure 4. SaTScan™ Map of School Absenteeism Clusters and School Type, Los Angeles County.

DISCUSSION

Prior to establishing and maintaining any new surveillance system, evaluation of its potential utility is essential. From this evaluation of school absenteeism data within LAC, the findings revealed modest utility in conjunction with existing surveillance systems of ILI ED visits, OTC thermometer sales, and OTC cough/cold medication sales. In summary, during the 2009-2010 influenza season, analyses showed total school absenteeism correlated slightly with all three surveillance systems, with the strongest correlation to ILI ED visits. While ILI ED visits were significantly higher for E/M school-aged group, this trend was not paralleled in percent school absenteeism, with no significant difference between E/M and high school-aged groups. In addition to this inconsistency, peak activity within the 2009-2010 influenza season appeared to influence the strength of correlation between school absenteeism, ILI ED visits, OTC thermometer sales, and OTC cough/cold medication sales. However, SaTScan™ spatiotemporal analysis detected schools with high absenteeism, where two clusters were detected at two different elementary schools on the peak days of the 2009-2010 influenza season (November 2-10).

This evaluation of LAC school absenteeism data was not without limitations, including the major limitation of the lack of a "reason for absence" field. As concurred by other studies[2,8], providing reason for absence (e.g., ILI-related) improves disease-specific outbreak detection. Several other inherent data limitations included: (1) a 4-day to 4-week lag time of reported dates of absence, (2) the data were only available from Mondays through Fridays, with a likelihood of higher absenteeism on Mondays and Fridays (i.e., day of the week effect), (3) schools were on three different track systems with varying observed holidays/scheduled breaks, (4) only one year of data was available in this study, and (5) only 16% of the targeted LAC schools were represented in this analysis. Despite these limitations, school absenteeism data still afford insight into trends of illnesses in school-aged children that may not be detectable by clinical means. Subsequent to addressing the aforementioned limitations, monitoring aberrant activity in school absenteeism data could serve to assess the need for school closures during school-wide, district-wide and/or county-wide disease outbreaks.

In conclusion, interpreting medical outcomes and time trends from a non-traditional source such as school absenteeism is challenging. Examining school absenteeism during both mild and aggressive influenza seasons may be warranted to fully evaluate its utility of early outbreak detection. In addition, continued assessments of current data capture methods and quality of school absenteeism data within LAC will be addressed before integration into ACDC ADSS' syndromic surveillance systems.

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PATIENTS, HEALTHCARE WORKERS AND VARICELLA SCREENING: AN ARGUMENT FOR HOSPITAL POLICY CHANGE

Dawn Terashita, MD, MPH; L'Tanya English, RN, MPH

BACKGROUND

Healthcare worker (HCW) exposure to varicella continues to occur. Nosocomial transmission and outbreaks of varicella among patients, visitors and HCWs in the acute care hospital are well documented.[1-3] Prevention in this setting has significant and sometimes hidden economic costs for patients and HCWs, including disease surveillance, serologic testing, paid leave and isolation supplies and equipment for nosocomial cases of varicella.[4]

The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) and Hospital Infection Control Practices Advisory Committee (HICPAC) have recommended varicella screening of HCWs since 1997.[5] Professional healthcare organizations also recommend varicella screening of HCWs, such as the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians.[6, 7] The ACIP also recommends varicella immunization for susceptible HCWs especially those who have close contact with persons at high risk for serious complications, including a) premature infants born to susceptible mothers, b) infants who are born at less than 28 weeks of gestation or who weigh less than or equal to 1,000 g at birth (regardless of maternal immune status), c) pregnant women, and d) immunocompromised persons.

The CDC recommends that all healthcare personnel be immune to varicella. Evidence of immunity includes documentation of two doses of varicella vaccine given at least 28 days apart, history of varicella or herpes zoster based on physician diagnosis, laboratory evidence of immunity, or laboratory confirmation of disease.

In early spring 2010, Hospital A, a 400-bed acute care facility, notified Public Health of two cases of confirmed varicella infection (one herpes zoster [shingles], one varicella [chicken pox] among patients who were roommates in a six-bed room for three days. In addition, two healthcare workers (HCWs) were diagnosed with varicella. This report describes the investigation, management, control recommendations, and policy change implemented as a result of the investigation.

METHODS

A case was defined as a patient or HCW clinically diagnosed with either herpes zoster (HZ) or varicella. Our investigation included medical record review, conference calls, on-site investigation, telephone interviews, vaccination policy review, and antibody testing. We reviewed patient and staff exposures, staff vaccination status and staffing records. HCW evidence of varicella immunity is defined as documentation of age-appropriate vaccination with a varicella vaccine, laboratory evidence of immunity or laboratory confirmation of disease, and diagnosis or verification of a history of varicella disease or herpes zoster by a health care provider. The CDC and California Department of Public Health (CDPH) HCW vaccination recommendations were also reviewed.

RESULTS

Two patients, case patient 1 and case patient 2, and two employees, HCW case 1 and HCW case 2, met the case definition. The medical record was reviewed for both case patients. Prior history of varicella for case patient 1 was unknown. Case patient 2 did not have varicella as a child by self report. There was no documentation of a rash upon admission for either case patient.

Case patient 1, a 50 year old Hispanic White female, was hospitalized continuously for five months prior to rash onset on March 2, 2010. The rash was noted on the chest in a dermatomal area around the left breast, left upper back, upper thoracic and lower cervical area; itching and pain were prominent.

Treatment included oral antiviral medication. This patient was considered to be the index case, diagnosed with herpes zoster, which is a reactivation of VZV and not nosocomially acquired.

Case patient 2, a 45 year old non-Hispanic/non-Latin White female, was hospitalized three months prior to rash onset on March 18, 2010 which began with a blister on the chest and eventually extended to all of the body. Vesicles in different stages were noted on the chest, trunk, upper extremities and face, consistent with varicella. Treatment included oral antiviral medication and topical lotion. Case patient 2 resided in the same room as case patient 1 while case patient 1 was symptomatic.

Telephone interviews with both HCW cases were conducted utilizing the CDC Varicella Case Report form. Medical record information from their private healthcare providers was also reviewed. Both HCWs were born outside the United States. HCW case 1 was born in Mexico and HCW case 2 was born in Indonesia.

HCW case 1 had no prior history of varicella infection and reported receiving two doses of varicella vaccine, the first dose received during childhood in Mexico and the second dose given in California but the date of administration is unknown. HCW case 1 was symptomatic with fever three days prior to rash onset. Additional symptoms included headache, backache, nausea and malaise. HCW case 1 reported to a private medical doctor (PMD) for evaluation on the day of fever onset. This was not verified by PMD office staff, who stated that HCW case 1 was not seen in the office at any time during the month of fever onset.

HCW case 1 did not take any time off from work after initial symptom onset. Seventeen days after reported onset of fever, HCW case 1 was evaluated by hospital occupational health services (OHS), clinically diagnosed with varicella, taken off of work and advised to see the PMD. Later the same day, HCW case 1 was evaluated by a different PMD, had multiple erythematous open vesicles some final healing stages and some new vesicular non-open lesions, and was diagnosed with varicella. HCW case 1 had a PMD follow-up visit two weeks later and returned to work 19 days after being sent home. Staffing records indicated that HCW case 1 was assigned to provide care to case patient 1 and case patient 2 while they were symptomatic.

HCW case 2 self reported varicella at age 12 years. HCW case 2 had fever onset eleven days after the onset of symptoms for HCW case 1. Symptoms included a maculo-papular, vesicular rash two days after fever onset, chills, malaise and sore mouth. HCW case 2 was evaluated by the PMD, diagnosed with varicella, and taken off work five days after initiation of symptoms. During a PMD follow-up visit one week later, HCW case 2 was diagnosed with mild local cellulitis. Treatment included an oral antibiotic and antiviral and pain medications. HCW case 2 returned to work 16 days after being taken off work. HCW case 2 was assigned to case patient 1 prior to the patient's symptomatic period. HCW case 2 and HCW case 1 were friends and ate lunch together on several occasions during the period of communicability of HCW case 1.

ACDC public health nursing staff collected skin scrapings from HCW case 1 and HCW case 2. A skin scraping was obtained from case patient 2 by hospital staff. All scrapings were submitted to the Public Health Laboratory (PHL) for confirmatory testing. Test results for HCW case 1 showed that one specimen was varicella zoster virus (VZV) positive and one specimen was VZV negative by polymerase chain reaction (PCR). Test results for HCW case 2 showed both specimens were VZV positive by PCR. A skin scraping collected by facility staff on case patient 2 tested VZV positive by PCR. All skin scrapings were also submitted to the CDC to differentiate community or wild type strain versus reactivation from the attenuated vaccine strain. The scrapings for case patient 2 and HCW case 2 were VZV positive, wild type. The scraping for HCW case 1 was VZV negative at the CDC; this result may be due to the timing of specimen collection. The specimen was collected 16 days after rash onset, and the sensitivity of PCR for skin scraping result begins to decrease 5 days after rash onset. A skin scraping specimen was not available for case patient 1.

The hospital implemented control measures after each case patient was diagnosed. Control measures implemented for case patient 1 included contact and respiratory precautions, covering the lesions, and

enhanced surveillance to identify new cases. After diagnosis, case patient 2 was placed on airborne precautions in a negative air pressure room.
Two conference calls were conducted with hospital administration, medical, infection control, nursing, pharmacy and occupational health services staff. Outbreak management, HCW VZV serology and/or varicella immunization status, movement of potentially exposed patients and related topics were discussed. Interim recommendations were also provided and included:

- determine which patients and staff had exposure with any case during the infectious period, defined as 5 days prior to rash onset until the crusting of the lesions
- interview exposed patients and staff for history of clinically diagnosed chicken pox, a varicella serologic titer showing evidence of past infection, or documentation of varicella vaccination by a health care provider
- test serum specimens from all non-immune exposed patients and HCW for varicella antibodies
- perform skin/vesicle scraping on patient cases for confirmation of diagnosis
- conduct enhanced surveillance for additional cases
- offer vaccine to all susceptible exposed individuals
- establish if any pregnant or immunosuppressed patient was eligible for varicella-zoster immune globulin (VariZIG™). It was subsequently determined that post exposure prophylaxis with VariZIG™ was not applicable since it was already beyond the 96 hours exposure time period

The hospital followed up on Public Health recommendations. Hospital administration notified staff by memorandum and provided two status updates. Information regarding outbreak management, possible exposure, varicella antibody status, vaccine availability and related data was provided.

Staffing records and work assignments for both HCW cases were reviewed to establish if either HCW case had been assigned to either patient case prior to the outbreak. The records indicated that HCW 1 was assigned to provide care to case patient 1 and case patient 2. HCW 2 was assigned to case patient 1 during the patient's exposure period. HCW 2 was not assigned to case patient 2.

A site investigation was conducted to discuss the outbreak status and management activities, gather additional data, tour the unit, and provide feedback and recommendations. Participants included administration, nursing, physicians, infection control and OHS. The facility was clean and orderly upon visual inspection and no lapses in staff infection control practices were noted.

A list of potentially exposed patients and staff was requested to project the amount of vaccine that may be needed. There were 248 staff and 49 patients who had close contact with at least one of the four cases, for a total of 297 potentially exposed individuals. Four of the 297 potentially exposed individuals were pregnant.

The hospital accepted a verbal history of varicella and did not require written documentation of HCW varicella vaccination. VZV serologies were obtained on 24 of the 248 exposed HCWs who could not verify prior disease or vaccination; these were tested by the PHL to determine varicella antibody status. Twenty-one HCWs had VZV antibody detected and three HCW did not have antibody detected. All VZV antibody negative HCWs were informed of their antibody status by hospital staff and offered varicella vaccine. It is unknown if the VZV antibody positive HCWs were notified of their antibody status. None of the 49 exposed patients had serology drawn.

The hospital estimated the anticipated number of varicella vaccine doses required to vaccinate potentially exposed individuals (n=72). The Department of Public Health Immunization Program delivered 70 doses of varicella vaccine for exposed individuals. Seven of forty-nine exposed patients hospitalized on the same unit as the two case patients were assessed and identified as potentially exposed. Six received their initial varicella vaccine dose and one refused the vaccine. The status of the remaining 42 patients was not provided. Two exposed HCW who did not have detectable VZV antibody also received varicella vaccine. The vaccination status of the third non-immune exposed HCW was unknown.

A draft employee immunization policy dated March 2010 was reviewed and determined to be consistent with community standards. There was no prior HCW immunization policy.
California law does not require proof of varicella antibody status for HCWs prior to employment in a healthcare facility, although ACIP strongly recommends that healthcare institutions ensure that all HCW provide evidence of varicella immunity. [8, 9] Per the California Code of Regulations (CCR), Title 22, §70723, Employee Health Examinations and Health Records: [10]

- Personnel evidencing signs or symptoms indicating the presence of an infectious disease shall be medically screened prior to having patient contact. Those employees determined to have infectious potential as defined by the Infection Control Committee shall be denied or removed from patient contact until it has been determined that the individual is no longer infectious.
- Personnel shall be made aware of recommended vaccinations for preventable diseases that can be prevented by vaccination.

The California Department of Industrial Relations, Division of Occupational Health and Safety, also known as Cal/OSHA, designated varicella an aerosol transmissible disease in September 2010 and developed new requirements to protect HCWs in the event of occupational exposure.[11] HCWs must be offered vaccines against aerosol transmissible diseases, including varicella, free of cost to the worker.

DISCUSSION

Varicella (chicken pox) is a highly contagious disease caused by VZV. The incubation period is 14-16 days with a range of 10-21 days. Herpes zoster is caused by reactivation of VZV and is seen most frequently in aging and immunosuppressed individuals. Transmission is person to person by direct contact with individuals with varicella or zoster and occasionally occurs by airborne spread from respiratory tract secretions, and rarely, from zoster lesions. People are usually infectious 1-2 days prior to rash onset and until all lesions are crusted (exposure period). Hospital varicella outbreaks that began with a herpes zoster infection of the index case, although infrequent, have been documented in the literature.[12, 13]

In California, laws and regulations concerning employee health are found in the CCR, the California Health and Safety Code and CalOSHA. CCR Title 22 provides general legislation for hospitals to address HCWs health status upon hire and annually thereafter, which consists of an initial health examination and tuberculosis (TB) screening, with annual TB screening thereafter. HCWs must be free of signs or symptoms of infectious disease and be medically screened prior to patient contact. The law also addresses record maintenance as well as employee awareness of vaccinations for vaccine preventable diseases. There were no definitive varicella screening or vaccination policies presented to us at the time of the outbreak.

Two patients and two HCWs met the case definition. The index case, case patient 1, was clinically diagnosed with HZ; no specimen was available for testing. The roommate, case patient 2, was clinically diagnosed with varicella 16 days after exposure to the index case and was VZV positive by PCR. Both case HCWs cared for case patient 1 and were diagnosed with varicella by PCR of skin scrapings. We hypothesize that the index case was likely the source of transmission to case patient 2 while both were roommates. Transmission to HCW case 1 most likely occurred while caring for case patient 1. Transmission to HCW case 2 most likely occurred while caring for case patient 1 or from HCW case 1 to HCW case 2.

Two hundred ninety-seven potentially exposed individuals (248 HCWs, 49 patients) had close contact with at least one case. VZV serologies obtained on 24 exposed HCWs without verified prior disease or vaccination indicated 21 (87.5%) with and 3 (12.5%) without VZV antibody. Seven (14%) of 49 patients were identified as susceptible; 6 received varicella vaccine and one refused vaccine. The status of the remaining 42 patients was unknown. Two potentially exposed HCWs who did not have detectable VZV antibodies were vaccinated. The vaccination status of the third susceptible HCW was unknown.

Although there were HCWs who were possibly exposed and whose vaccination status or disease history was unknown, we were informed that no HCWs were furloughed from work or temporarily reassigned, which is not consistent with recommended guidelines for HCWs. None of the 49 possibly exposed patients had varicella serology drawn. Six patients (12%) received varicella vaccine and one patient refused the vaccine.

CONCLUSION

The CDC recommends that healthcare institutions establish protocols for screening and vaccinating HCW and for management of HCWs after VZV exposure in the workplace. Prior to the outbreak, HCW varicella screening was inconsistent and HCWs were not required to provide evidence of varicella immunity. As a result of this investigation, the draft policy was changed to require evidence of immunity or lab confirmation of disease. The policy covers hospital employees including contract staff, volunteers, trainees and students. It addresses several communicable diseases, including aerosol transmissible diseases, verification of immunity, mandatory declination for declined vaccinations, and work restrictions, if indicated. This policy change may help to prevent future varicella transmission to susceptible patients and HCWs.

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A RESURGENCE OF MUMPS IN LOS ANGELES COUNTY RELATED TO EXPOSURES IN THE NORTHEAST UNITED STATES

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BACKGROUND

From June 2009 through most of 2010, an outbreak of mumps occurred in several counties in New York and New Jersey as well as Quebec, Canada. The outbreak originated in New York when a boy returned from a trip to the United Kingdom and subsequently became ill with mumps while attending a summer camp for tradition-observant Jewish boys. Multiple campers and staff members contracted mumps and the outbreak spread to other sites when campers returned home. As of the last publicly released update, over 2,700 cases related to this outbreak were reported, with more than 98% of case-patients belonging to the tradition-observant Jewish community; approximately 74% were male and the median age was 15 years (1,2).

Los Angeles County (LAC) has one of the largest tradition-observant Jewish populations in the United States (US). Because air travel is now acknowledged as a primary factor in the spread of infectious diseases around the world and the two most recent large-scale mumps outbreaks in the US (2006 and 2009-2010) were most likely introduced by transatlantic travel, the Centers for Disease Control and Prevention (CDC) issued an alert expressing concern that the significant amount of air travel, as a prelude to the observance of Passover, might increase the spread of mumps cases internationally.

The concern with mumps, as a vaccine-preventable disease caused by an RNA paramyxovirus, is its transmission by direct contact with respiratory droplets from infected persons and the severe complications that can develop during illness. The Council of State and Territorial Epidemiologists (CSTE) has established standards for the classification of mumps and other reportable infectious diseases in the US. The most current 2008 clinical case definition for mumps is an acute onset of unilateral or bilateral swelling of the parotid or other salivary glands lasting $\geq$2 days without other apparent cause. Complications include encephalitis, meningitis, orchitis, arthritis, and deafness. A clinically compatible illness is defined as an infection with mumps virus that may present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis or other salivary gland swelling, mastitis or pancreatitis. 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. A probable case meets the clinical case definition without lab confirmation and has an epidemiological linkage to a clinically compatible case.

Mumps disease can be prevented by Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV) vaccine. The first dose of MMR 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.

IMPACT IN LOS ANGELES COUNTY

LAC experienced an increased number of mumps reports in 2010, double the number of the three previous years. Half of the reports were received in the second quarter of 2010, a 250% increase from the same time periods in 2009 and 2008. Passover occurred in 2010 from sundown March 29 to sundown April 6. LAC's first identified case in the tradition-observant Jewish community had onset of symptoms in late March and the last case had disease onset in late July. By the end of 2010, 20 confirmed cases and one probable case were reported in LAC, which is the highest number of cases reported in the past ten years. Eleven (55%) of the cases were linked to the tradition-observant Jewish community. Six of the eleven cases had

traveled to New York/Montreal or had visitors from New York within one incubation period prior to the onset of symptoms. Nine of the eleven cases were linked to tradition-observant Hebrew academies.

MUMPS REPORTS WITHIN THE LAC RELIGIOUS COMMUNITY

The first identified LAC mumps case in the tradition-observant Jewish community was an 18 year old male attending school in South Africa and who, after traveling to New York, subsequently became ill while visiting family members in LAC during Passover. He was serologically confirmed and exposed his parents and seven siblings residing in LAC. The mother, followed by a younger brother (the latter had virus identified), developed symptoms and were classified as confirmed cases. Although the family sought routine care from Kaiser Permanente, they chose to be evaluated by a private physician who serves the tradition-observant Jewish community. This provider continued to work closely with LAC health officials to both prevent as well as identify further cases. Soon after, a 25 year old rabbinical student from New York City, who developed symptoms while visiting his family members in LAC during Passover, was confirmed to have mumps.

Over the next several weeks, confirmed cases were identified in three tradition-observant schools located throughout LAC. Three private physicians who primarily serve the tradition-observant Jewish community (one of whom was involved in the mumps evaluation of the above-mentioned family) reported several cases based upon the media attention to the Northeast outbreak as well as LAC's health alerts issued early in 2010. One such case was an 18 year old male who attended an LAC private Jewish tradition-observant boys boarding high school/college. After traveling to Montreal during Passover to visit his family, he developed mumps (serologically confirmed). His 18 year old roommate, also identified by one of the physicians and who had also traveled independently to Montreal during Passover, had been exposed to his sister with mumps, and developed the illness (virus identified) when he returned to school in LAC. Although the exact exposure was unknown, another 17 year old student attending the boarding school developed mumps (both serologically and viral identification confirmed) in June 2010. The last two identified cases (serologically confirmed and epidemiologically linked) in the tradition-observant Jewish community were residing in the same boarding school and were also identified by two of the physicians mentioned earlier. These 21 and 22 year old male cases appear to have been exposed to a roommate who was also sick. The roommate could not be located for an interview.

Two additional mumps cases (virus identified) were identified from two unrelated private tradition-observant Jewish schools in LAC. One was a 56 year old rabbi who taught at the school and had received visitors from New York during Passover within an incubation period of his illness. The other case was a 12 year old male who had no known travel or out-of-town visitors and for whom an exact exposure was not identified. Several additional reports were investigated in three other tradition-observant Jewish schools in LAC; however, all of the cases were either classified as Suspect or False mumps. See Figure 1 for 2010 reported confirmed or probable mumps cases by week of onset.

Of the eleven mumps cases identified in the LAC tradition-observant Jewish community, four self-reported vaccinations as a child, three had two documented MMRs, one had one documented MMR, one was not vaccinated due to family personal beliefs, and two had an unknown vaccination status. One of the eleven cases developed complications. Ten of the eleven cases were among males. The median age was 18 years.

See Table 1 for lab confirmation and vaccination status of reported confirmed or probable 2010 mumps cases.

MUMPS REPORTS OUTSIDE THE LAC RELIGIOUS COMMUNITY

During 2010, nine additional confirmed cases not directly affiliated with the tradition-observant Jewish community were identified. This number of cases is similar to previous years' totals. Four cases were from the same family who mentioned having friends who were Jewish but denied any known exposure to other mumps cases or anyone ill. The family had personal beliefs against vaccination. Two additional cases were elementary students with no established epidemiological linkages, one case had two documented MMRs and the other had one documented MMR. Another case was a graduate school

student who traveled to the United Kingdom and France within an incubation period of illness onset and self-reported vaccination as a child. The two remaining cases were young children and their families could not be reached for interview; however, evidence of two documented MMRs was obtained for each child. The only probable case was a young child visiting from Japan who had been exposed to classmates in Japan with mumps. The child had a personal beliefs vaccination exemption. The median age of the confirmed nine cases was 11 years, younger than previous years' cases. Five of the nine cases were female.

LOS ANGELES COUNTY RESPONSE

At the onset of the increase in mumps reports during the second quarter of 2010, notably in the tradition-observant Jewish community, LAC DPH immediately sought recommendations from New York City and state health officials who were actively investigating the Northeast United States mumps outbreak (Box). The first recommendation, to notify providers, had already been implemented in LAC earlier in the year. In January and March 2010, two health alerts were issued to LAC health care providers and facilities urging heightened surveillance for mumps in light of the outbreak in the Northeast US.

An additional health alert was issued in May 2010 due to the increased number of mumps cases in LAC since the onset of Passover.

The second recommendation, to outreach to camps, was not implemented because there were no summer camps identified in nearby areas of LAC.

As cases were being reported in the tradition-observant Jewish community, LAC DPH staff noticed a reticence of patients, families, and schools to partner and closely communicate with Public Health. However, three key physicians in LAC with ties to this Jewish community were actively identifying, testing, and reporting suspect cases to LAC DPH. Partnerships were immediately developed with these providers to proxy as epidemiologists directly with patients, identifying social networks and exposure sources, and requiring prompt patient isolation with the support of the rabbis/directors at the academies.

Box. Recommendations from Northeast Mumps Outbreak

- Notify providers (via health alert) of the complications of mumps diagnosis (e.g., vaccination does not rule out mumps illness and the interpretation of lab results).
- Send letters to summer camps in the Jewish community to forewarn of possible illness and prevention messages.
- Prevention and reporting messages must be endorsed by trusted providers in the Jewish community. All announcements and vaccination events must be "approved" and advertised to patients by these trusted community providers.
- Arrange a conference call with trusted providers in the community and the health department staff to answer mumps questions and establish a working relationship for community/vaccination events.
- Set up "mass" vaccination clinics in the Jewish community with the support of key Jewish leaders/providers. Observe all Jewish traditions (i.e., male vaccinators) and advertise in Yiddish press.
- Reach out to rabbinical academies (post-highschool) and offer vaccine on-site and disseminate prevention message.
- Possibly translate materials/documents into Yiddish.
- Try to establish more leaders/contacts in the community.
    - Look at trusted newspapers
    - Identify further LAC contacts via Jewish organizations with whom New York State and City worked

In addition, the providers were able to identify one key community leader with whom LACDPH could collaborate to relay messaging and set up mass vaccination clinics in the community. Despite efforts to establish more leaders/contacts in the community with whom to collaborate, it was determined quickly that one leader was consistently mentioned as the key representative of the LAC tradition-observant Jewish community, unlike the experience in the Northeast US outbreak.

Within the first two weeks in May 2010, LAC DPH launched a multi-faceted approach to curb further mumps transmission in both the religious and general communities. Implemented measures included a health alert submitted to LAC health care providers, a mainstream press release issued by LAC DPH, a

general community health alert developed and distributed to a Jewish council in the tradition-observant community, numerous interviews provided to mainstream and Jewish media outlets, and the local Hasidic/Chabad leader identified to deliver prevention messages to the community. With the messaging provided to this community leader, he in turn issued press releases for distribution to all LAC Jewish schools and organizations. Additionally, LAC DPH in partnership with this leader organized three free community vaccination events in August 2010. LAC DPH also established the capability for conference calls with physicians in the tradition-observant Jewish community to answer their questions about vaccine effectiveness, recommendations, and lab confirmation testing.

DISCUSSION

Similar to the outbreak in the Northeast US, 2010 mumps cases in the LAC tradition-observant Jewish community were predominantly among school-aged boys who attended private schools separately from girls (3). Nearly all the cases resided in the dormitories or were at the school for long hours during the days and evenings illustrating a risk factor difference between girls and boys schools in the religious community. The LAC boarding school-college section, in which five confirmed cases were identified, had a total of 70 male students. They all lived in a dormitory on one floor where each room could accommodate two to four students. LAC DPH was advised that there was little to no fraternization among the high school and college students. The attack rate in this school was approximately 7%; comparable to similar attack rates evidenced in the Northeast outbreak, but higher than the attack rates seen at the large colleges in the Midwest 2006 outbreaks (4,5). These varying attack rates among religious congregate settings compared to a general college setting may indicate different matriculation patterns as well as a definite containment of transmission. In the LAC boarding school, cases did not occur in the high school section because of the strict boarding rules, thereby limiting exposure and increasing the number of cases within a confined area. One study conducted of the 2006 Iowa college outbreaks found that college students' social networks reinforced by the close matriculation aspect of college living increased the spread of mumps. Furthermore, counties with smaller networks/campuses of college students were associated with fewer mumps cases (6). Another study of the 2006 Midwest outbreaks also found an increased risk of developing mumps among students aged 18-19 years compared to third and fourth year college students, again linking close matriculation as a risk factor for mumps (5).

Attack rates can also vary due to differences in students' vaccination coverage and immune status. Most of the LAC mumps cases either self-reported or had documented evidence of adequate MMR vaccination similar to the high vaccination coverage in the religious communities in the Northeast and 2006 Midwest outbreaks (3). In 2009 and 2010, over 87% of California and LAC teens aged 13-17 years had received at least ≥2 doses of measles, mumps, and rubella vaccine, respectively (6,7). Although these coverage levels appear high, numerous studies have looked at the limited vaccine effectiveness of the mumps component of the MMR. It is generally agreed that vaccine effectiveness with two doses and uptake in combination have conferred protectiveness in the general population but most likely not yielded immunity high enough to prevent transmission in highly congregated settings such as small colleges/religious communities (8). This may be the reason why continued outbreaks of varying attack rates and sizes have been occurring internationally in young adult educational institutions. Due to the limited contact and transmission between persons within and outside the LAC religious community, the coverage levels in the general community were protective enough to only identify a similar number of cases outside of the religious community in 2010 as compared to previous years.

CONCLUSION

The combination of waning immunity/low vaccine effectiveness and high congregate setting matriculation require a variety of control strategies, including the challenging tasks of decreasing exposure among young adults as well as decreasing the introduction of virus (9). This will require a prompt and tailored approach to each specific resurgence/outbreak as LAC DPH learned when strategies recommended by the Northeast had to be modified to fit a seemingly similar religious community with different practices in LAC. Quickly learning about the specific community's matriculation practices, as well as forming trusting and respectful partnerships within affected communities, were cornerstones in decreasing exposure as well as increasing the use of mumps vaccine in LAC. By locale-specific application of the lessons learned

from all congregate setting outbreaks, prompt action implementing multi-faceted control strategies by public health departments may be able to curb these on-going resurgences of mumps.

Figure1. Number (N=21) of reported confirmed/probable mumps cases by week, LAC 2010.

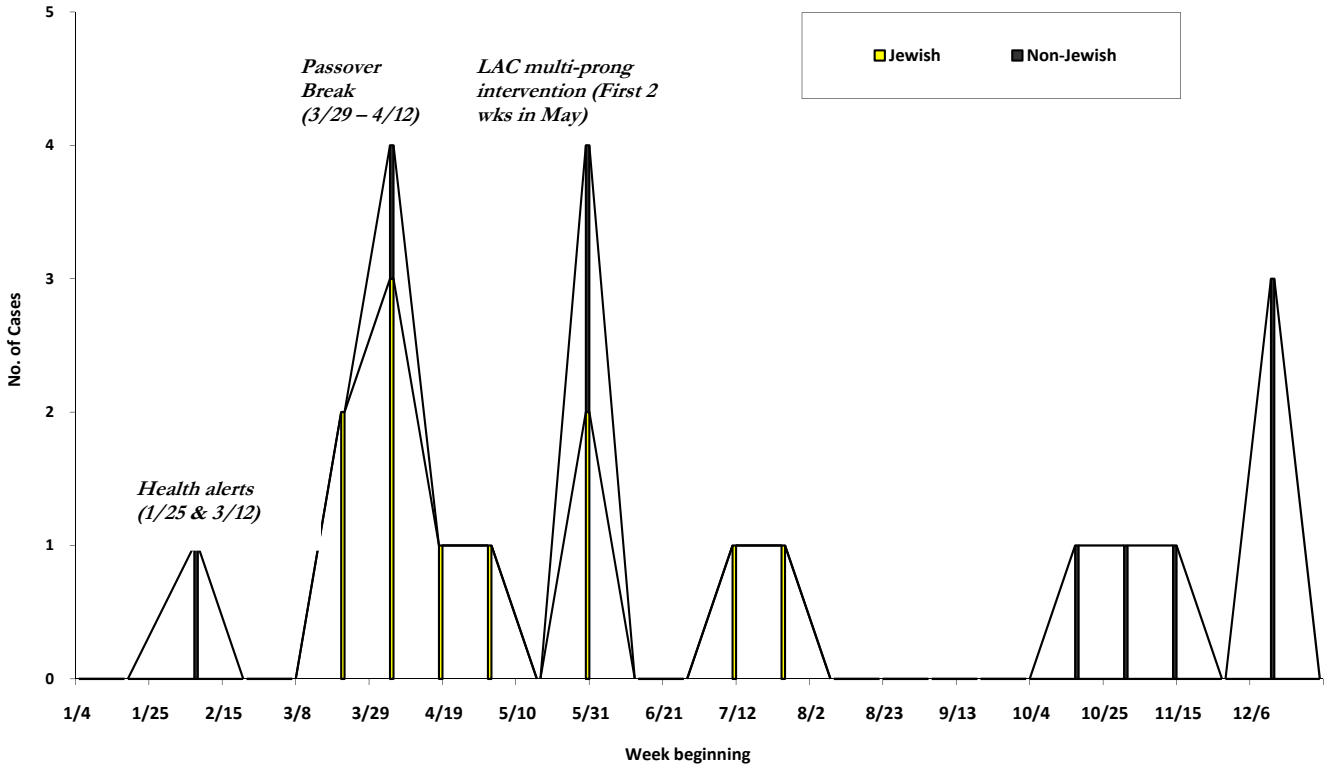

Table 1. Vaccination status and lab confirmation of confirmed or probable mumps cases, by age group and religious affiliation, LAC 2010.

	Age group and Religious Affiliation					
	Jewish < 17	Non-Jewish <17	Jewish 17-24	Non-Jewish 17-24	Jewish ≥25	Non-Jewish ≥25
No of doses						
0		4 (50%)	1 (16.7%)			1 (50%)
1		1 (12.5%)	1 (16.7%)			
2	2 (100%)	3 (37.5%)	1 (16.7%)			
Self-reported received up-to-date MMR doses as child			3 (50%)		1 (33.3%)	1 (50%)
Unknown					2 (66.7%)	
Total	2	8	6	0	3	2
Lab Confirmation						
Serology* only		5 (62.5%)	3 (50%)		1 (33.3%)	1 (50%)
PCR** only	2 (100%)		2 (33.3%)			
Serology and PCR**					1 (33.3%)	
None		3 (37.5%)	1 (16.7%)		1 (33.3%)	1 (50%)
Total	2	8	6	0	3	2

*Mumps IgM positive titer **Polymerase Chain Reaction, urine or buccal swab viral identification

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A UNIQUE COMPARATIVE EXAMINATION OF A 2010 PERTUSSIS EPIDEMIC IN LOS ANGELES COUNTY WITH MORBIDITY PATTERNS IN PREVIOUS YEARS

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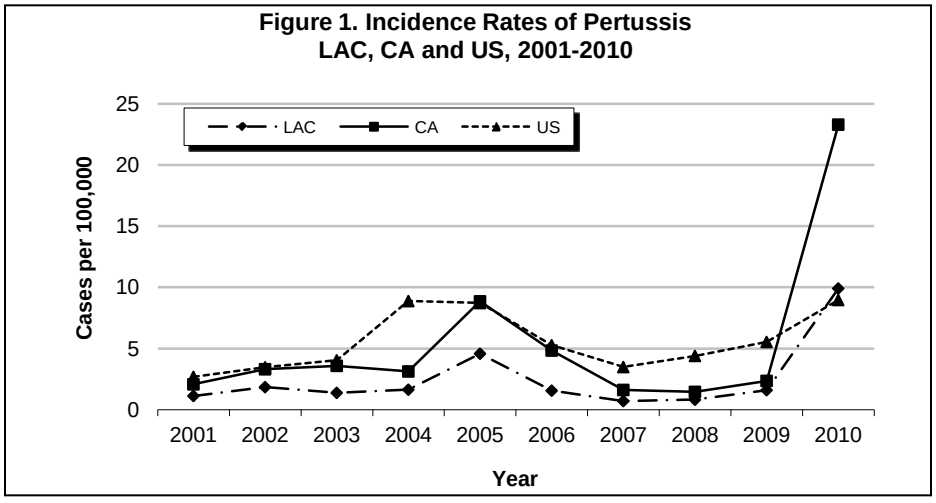
BACKGROUND

In the last decade, understanding the shifting epidemiology of pertussis has become a public health priority. Pertussis still continues to be an endemic infectious disease despite vaccination efforts in the United States (U.S.) and other countries, with cyclical epidemic peaks every 3-5 years and varying patterns of morbidity among susceptible populations and different age groups. [1]

Since the widespread availability of a childhood vaccine for pertussis in the 1940s, case numbers (reliable rates unavailable) in the U.S. dropped from more than 200,000 to several thousand each year, but resurged to over 25,000 in 2004 and 2005 (8.9 and 8.7 per 100,000, respectively). The incidence of reported pertussis declined in the U.S. briefly but is now increasing (3.49 in 2007, 4.40 in 2008, 5.54 in 2009, 8.97 in 2010). [2]

Pertussis epidemiology in Los Angeles County (LAC) over the last decade showed a similar pattern of cyclical peaks (Figure 1). However, in 2005, the morbidity rate rose to 4.6 cases per 100,000, a rate not seen locally since 1970. In 2010, the incidence reached a dramatic level not observed locally since the 1940s, with 9.9 cases per 100,000 population. California reported similar 50 year record-breaking case counts and incidence. When the morbidity in LAC reached a threshold of two standard deviations above a referent ratio (the epidemic years' cumulative weekly case totals during a prescribed period of time to the historical mean) and persisted at or exceeded this level, the definition of a pertussis "epidemic" was met. During the "inter-epidemic" period, 2006-2008, the highest annual LAC incidence reported was 1.60 per 100,000 population, with a low average incidence rate in 2007 and 2008 (0.77 per 100,000) not observed in ten years.

**Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2001-2010**



Studies conducted by the LAC Department of Public Health (DPH) Immunization Program examining previous years' resurgences in cases found that disease morbidity in select age groups increased during the winter season preceding the peak year of incidence (i.e., "pre-epidemic" years).

The current study describes the 2010 pertussis epidemic in LAC and draws comparisons to the last epidemic year, 2005 and the inter-epidemic period in 2007-2008. To better understand why pertussis incidence reached such a high level in 2010, we also describe seasonal and demographic trends in epidemic, pre-epidemic, and inter-epidemic years.

METHODS

Data Collection

The LAC DPH Immunization Program maintains a passive surveillance system to capture reports of pertussis cases. Information on patient demographics (e.g., age, gender, race/ethnicity, home address of patient), clinical data (e.g., symptoms, treatment, hospitalization, complications of infection, immunization history, exposure history), and seasonal data (i.e., date of disease onset) are collected. Age groups were categorized according to national surveillance categories. A select clinical variable (disease severity) is defined as having complications due to the pertussis infection. Complications are considered a hospitalization for any reason, or development of any one of the following sequelae: pneumonia, encephalopathy, seizures, and intubation.

Case Definition

According to the California Department of Public Health the clinical pertussis case definition is having a cough illness lasting at least two weeks with one of the following: paroxysms of coughing, inspiratory "whoop", or post-tussive vomiting, without other apparent cause. A confirmed case can be classified in the following three ways:

1) meets the clinical case definition and is confirmed by positive PCR (PCR test introduced in 1997);
2) meets the clinical case definition and is epidemiologically-linked directly to a case confirmed by either culture, PCR or immunohistochemistry (IHC) (typically used for autopsied tissue only) methods; or
3) has an acute cough illness of any duration with isolation of *B. pertussis* from a clinical specimen or detection of *B. pertussis* antigen by IHC.

Probable cases are defined as those meeting the clinical case definition, without laboratory confirmation by PCR/culture, nor epidemiological linkage to a laboratory-confirmed case.

Study Population

The study population included all confirmed and probable cases reported to LAC with a date of disease onset from January 1, 2004 through December 31, 2010. Cases not meeting the strict clinical criteria as well as out-of-jurisdiction cases were excluded from the analysis. The date of disease onset was defined as the first day of coughing thought to be related to *B. pertussis* infection.

Analysis

The present analysis was limited to probable and confirmed cases in epidemic years (2005 and 2010), pre-epidemic years (2004 and 2009), and inter-epidemic years (2007-2008). The year 2006 is not classified a true inter-epidemic year because the morbidity in this year is part of the declining phase of the 2005 epidemic. This concept will be presented in more detail later. Demographic, clinical, and seasonal differences among cases across years were computed using t-test, chi-square two-tailed, or Fisher's exact tests.

RESULTS

For the epidemic years, the confirmed/probable cases reported in 2010 was 972 and in 2005, 439. During the pre-epidemic years, the count was 156 in both 2009 and 2004. During the inter-epidemic years, the count in 2008 was 80 and in 2007, 69.

Analysis 1. Comparison of Characteristics of Cases with Disease Onset in 2010 with Those in the 2005 Epidemic and the 2007-2008 Inter-Epidemic Period

There were no statistically significant differences by gender, race/ethnicity, and vaccination status between peak years (2010, 2005) and the inter-epidemic period (2007-2008). Dramatic differences were observed with age (Table 1).

Table 1. Comparison of Confirmed and Probable Case Characteristics 2005 Epidemic, 2010 Epidemic, and 2007-2008 Inter-Epidemic Period

Characteristics	2005 (N=439) 4.6 cases per 100,000 pop	2010 (N=972) 9.9 cases per 100,000 pop	Average 2007-2008 (N=74.5) 0.8 cases per 100,000 pop
Age	% (rate per 100,000)	% (rate per 100,000)	Avg. % (avg. rate per 100,000)
<6 months	38.3% (N/A)	22.3% (N/A)	47.5% (N/A)
6-11 months	2.7% (N/A)	5.8% (N/A)	1.3% (N/A)
1-4 years	6.2% (4.7)	16.3% (27.2)	7.3% (1.0)
5-9 years	5.9% (3.7)	15.3% (22.3)	10.2% (1.1)
10-14 years	14.1% (8.1)	15.7% (23.4)	7.4% (0.8)
15-19 years	11.9% (7.4)	6.0% (8.1)	6.1% (0.6)
20-24 years	2.3% (1.5)	1.9% (2.6)	4.9% (0.5)
25-34 years	4.8% (1.5)	4.7% (3.0)	6.7% (0.4)
35-44 years	7.3% (2.1)	4.1% (2.8)	3.5% (0.2)
45-54 years	3.6% (1.3)	2.9% (2.1)	2.0% (0.1)
55-64 years	1.8% (0.6)	2.5% (2.5)	2.7% (0.2)
65 years and older	1.1%) (0.4)	2.4% (2.2)	0.6% (0.1)
Median age in years	8.0	7.0	2.0
Gender	% (rate per 100,000)	% (rate per 100,000)	Avg. % (avg. rate per 100,000)
Male	46.0% (4.3)	47.5% (9.5)	44.1% (0.7)
Female	54.0% (4.9)	52.5% (10.3)	55.9% (0.9)
M:F case ratio	1:1.2	1:1.1	1:1.4
Race	% (rate per 100,000)	% (rate per 100,000)	Avg. % (avg. rate per 100,000)
Asian/PI	3.2% (1.1)	3.3% (2.4)	8.3% (0.5)
Black	7.1% (3.6)	5.1% (5.9)	3.2% (0.3)
Hispanic	55.8% (5.4)	67.4% (13.8)	62.9% (1.0)
Native American	0.2% (3.5)	0.2% (7.7)	0
White	33.7% (5.1)	22.2% (7.5)	24.3% (0.6)
Unknown	0	1.8% (-)	1.3% (-)
Disease Severity**	%	%	Avg. %
Complications*	68.8%	1.5%	39.4%
Epidemiological Link to a Case	%	%	Avg. %
Yes*	0%	11.4%	10.8%
Not up-to date with vaccinations (if eligible)	%	%	Avg. %
Yes	56%	54%	61.7%

*****Statistically significant difference at p<.05

******Disease Severity includes hospitalization for any reason, or development of any one of the following sequelae: pneumonia, encephalopathy, seizures, and intubation.

In 2010, infants <6 months of age contributed a lower proportion of cases compared to the last peak in 2005. However, this age group overall did not account for a high proportion of cumulative cases in peak/epidemic years, compared to the inter-epidemic period.

The combined age group 1-14 years accounted for over half of the cases in the 2010 epidemic. However, in 2010 and the inter-epidemic years, the adolescent age group (10-19 years) comprised a lower number of cases compared to the 2005 epidemic.

In addition, the median age of disease onset in 2010 was 7 years and in 2005, 8 years. In pre-epidemic years (2004 and 2009), the median age at onset was under one year: 3.5 months in 2004 and 10.5 months in 2009 (data not shown). The median age of cases in the inter-epidemic years 2007-2008 (2.0 years) was slightly older compared to the pre-epidemic years (2004, 2009), and much younger than that during the peak years (8.0 and 7.0 years).

More epidemiologically linked cases were reported in the inter-epidemic period (2007-2008) and the 2010 epidemic year compared to the 2005 epidemic year. Epidemiological linkages most likely occurred in 2005; however, none were reported by the cases. There appears to be no pattern observed across years with regard to case disease severity. There were no statistical significant differences in the gender, race/ethnicity, and vaccination population profile across peak years and inter-epidemic periods.

Analysis 2. Classification of Epidemic Phases by Seasonal Disease Onset and Age Group Case Distribution

An analysis of the disease onset of cases in the epidemic and pre-epidemic years (Figures 2 and 3) revealed seasonal phases with a characteristic pattern of epidemic start, rise, peak, and decline.

Beginning in the pre-epidemic 2009 year leading up to April 2010 (Figure 2), only a baseline overall number of cases is identified (range: 7 to 15 reports per month of disease onset). The onset of the epidemic began in April 2010 with an over 300% increase in cases compared to the previous month, and the counts continued to rise rapidly through June. The 2010 epidemic peaked in July 2010 with 169 cases, and then started gradually receding, with a sharp drop after October until the end of 2010. By December 2010, the epidemic still had not reached pre-epidemic or inter-epidemic levels, but was gradually declining. Similar phases were also identified in the 2005 epidemic (Figure 3).

The differences in the distribution of cases by age group and month of disease onset can also be observed in the epidemic years of 2005 and 2010 compared to the non-epidemic years. To better illustrate these differences, the epidemics in 2010 and 2005 have been divided into four distinct phases as follows.

"Leading" Epidemic Phase

The 2010 epidemic started showing a distinct age distribution in November 2009, when the adult age group ≥20 years contributed 29% of all cases in November and 63% of all cases in December; this age group accounted for a larger proportion of cases throughout the pre-epidemic year of 2009 compared to the pre-epidemic year of 2004. In inter-epidemic years (2007-2008), this age group did not contribute any cases in the same months (data not shown).

In January through March 2010, the infant age group (<6 months) accounted for many of the cases (range 29-67% of cases) followed by the 10-14 years and 1-4 year age groups. The proportion of cases in the <6 months age group started to decline dramatically after February, immediately before the epidemic overall rise of cases began in April.

For the purposes of this study, the months from November 2009 through March 2010 are defined the "leading" phase of the 2010 epidemic since this time period preceded the onset of the epidemic and was the first time varying age group distributions were observed, compared to previous months in the pre-epidemic and inter-epidemic years.

A similar leading phase occurred in the 2005 epidemic (November 2004 through March 2005); however, the adolescent age group 10-19 years predominated rather than the adult age group, accounting for at least 41% of cases beginning in November 2004 through the first three months of 2005, an increase of over 600% from October 2004. This age group did not account for many cases during the same months of the 2010 epidemic and inter-epidemic period (Table 2). At the time, it was hypothesized that this adolescent age group may be the primary age group to play a role in the epidemic onset.

"Rising" Epidemic Phase

From April through June 2010, the number of cases started to rise dramatically, increasing 55% from April to May and 82% from May to June. This is classified the "rising" phase of the epidemic. Although the increase was not as dramatic in the 2005 epidemic, a distinct "rising phase" did occur in the same months (April through June 2005). This increase in cases was not noted in the same months in the pre-epidemic or inter-epidemic years. In the 2010 rising phase, preschool and elementary school age groups contributed a higher percentage of cases in 2010 versus 2005: 11.3% in the 1-4 year age group in 2010 compared to 5.6% in 2005, and 15.3% in the 5-9 year age group in 2010 compared to 4.7% in 2005. In addition, the adult group≥20 years and infant group < 6 months accounted for an equal percentage of cases in the 2010 rising phase. The predominant age group in the 2005 rising phase was the <1 year age group.

"Peak" Epidemic Phase

From July through September 2010, the largest number of cases per month of disease onset was reported, with an average of 162 cases per month. This is classified the "peak" phase of the epidemic. This peak also occurred in 2005 with an average of 53.7 cases per month (Table 2). Historically, pertussis case counts increase in the summer months every year, primarily only in the <6 month age group. During the 2010 epidemic phase, however, all age groups contributed an equal proportion of cases. In the 2005 peak, infants <6 months predominated, followed by the ≥20 year age group.

"Decline" Epidemic Phase

From October through December 2010 (and into the first three months of 2011), the number of cases identified per month declined remarkably by an average of 21% every month, although it never reached the low levels seen in the inter-epidemic period. This last epidemic phase is classified the "decline" phase. A similar phase also occurred in 2005 (October through December 2005). The age distribution of cases in both 2010 and 2005 "decline" phases were similar to their respective rising phases with the exception of the 10-19 age group, which contributed more in 2005 to the decline phase compared to its peak phase. However, in both epidemic years, the 10-19 age group accounts for a larger proportion of cases at the end of the year compared to the inter-epidemic years. The adult age group did not contribute to the 2010 decline phase but accounted for more cases during this phase in both the 2005 epidemic and inter-epidemic years (Table 2).

Analysis 3. Multivariate Analysis by Epidemic Phase (data not shown)

The next stage of analysis involved detecting demographic and other case characteristic differences across epidemic phases.

Demographic and other characteristics:

Race
Although Hispanics comprise almost half of the LAC population (48%), they represented the largest racial/ethnic group in all epidemic phases of 2010, accounting for over 63% of all cases in each epidemic phase. In 2005, Hispanics accounted for at least 57% of cases in the rising, peak, and decline phases. However, whites who constitute 29% of the LAC population, contributed 16.1% of cases in the 2010 leading phase but 47.3% in the 2005 leading phase. This finding seemed to indicate that whites contributed to the 2005 epidemic onset, but in 2010, this was no longer apparent.

Service Planning Area (SPA)
In 2010, there was a significant difference in the geographic distribution of cases by epidemic phase. In the leading phase, 50% of the cases resided in the South and South Bay areas, but these SPAs accounted for fewer cases in the remaining phases. However, there were no significant differences in the distribution of 2005 cases by the SPA of residence.

Figure 2. Pertussis Age Groups Distribution and Cases per Month of Onset. 2009-2010

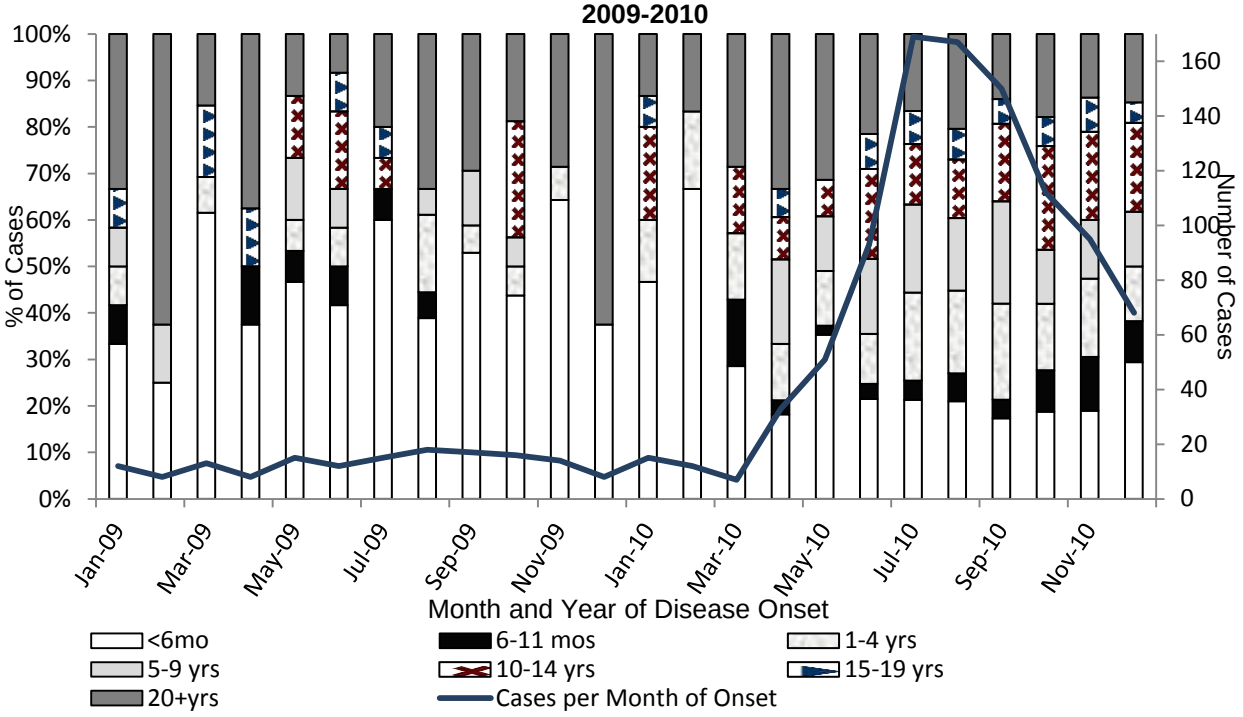
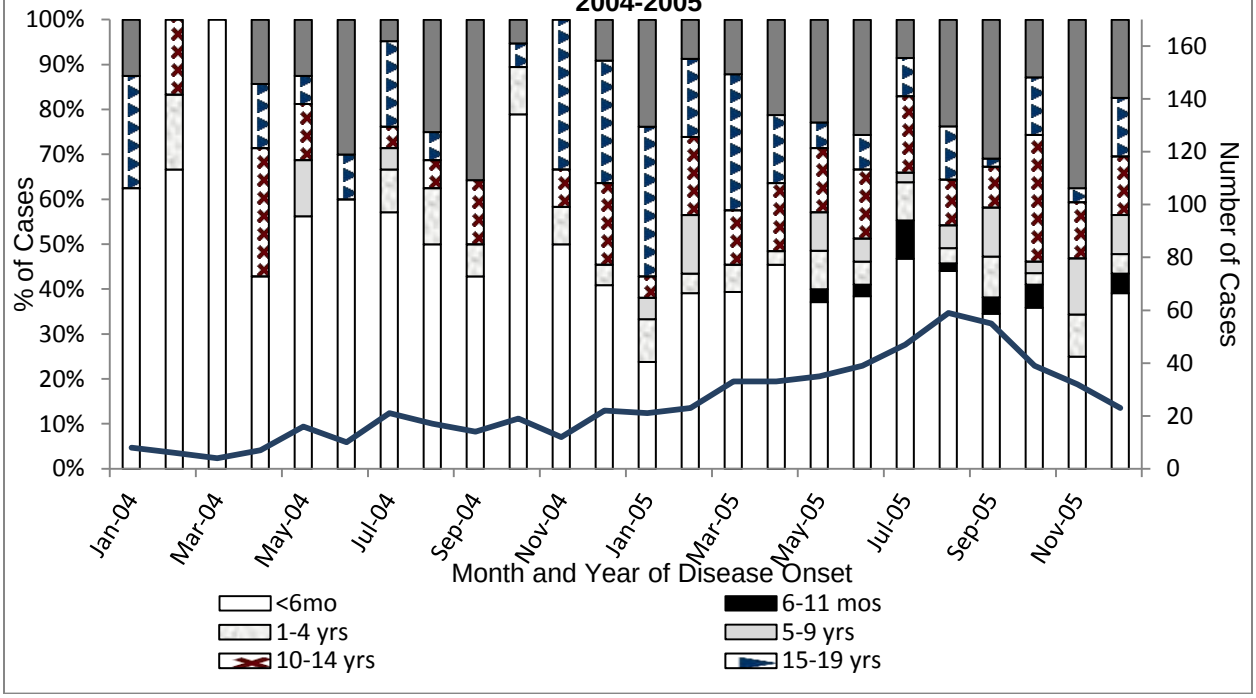


Figure 3. Pertussis Age Groups Distribution and Cases per Month of Onset. 2004-2005



Gender

There was no statistically significant gender difference across epidemic phases in both 2010 and 2005. Females account for slightly more than half of the cases across all phases in both years.

Table 2. Epidemic Phases

Phase	2005 N Average number of cases per month (Range) % of cases by age group	2010 N Average number of cases per month (Range) % of cases by age group	Average 2007-2008 N Average number of cases per month (Range) Avg % of cases by age group
Leading Phase / Winter (*Pre-epidemic year November through epidemic year March)*	111 22.2 (12-33)	56 11.2 (7-15)	34 6.8 (2.5-12)
<6 months	37.8%	51.8%	45.9%
6 months-4 years	6.3%	12.5%	6.1%
5-9 years	3.6%	0%	8.7%
10-19 years	40.5%	8.9%	14.4%
20+ years	11.7%	26.8%	25.0%
Rising Phase / Spring *(April through June epidemic year)*	107 35.7 (33-39)	177 59.0 (33-93)	12.5 4.2 (3-5.5)
<6 months	40.2%	24.9%	53.9%
6 months-4 years	7.5%	14.1%	12.7%
5-9 years	4.7%	15.3%	0%
10-19 years	24.3%	19.2%	17.2%
20+ years	23.4%	26.6%	16.3%
Peak Phase / Summer *(July through September epidemic year)*	161 53.7 (47-59)	486 162.0 (150-169)	19.5 6.5 (4-8.5)
<6 months	41.0%	20.0%	44.2%
6 months-4 years	11.2%	23.9%	8.4%
5-9 years	6.2%	18.7%	14.2%
10-19 years	19.3%	20.4%	18.4%
20+ years	22.4%	17.1%	15%
Decline Phase / Fall-Winter *(October through December epidemic year)*	94 31.3 (23-39)	275 91.7 (68-112)	22.5 7.5 (3.5-12)
<6 months	33.0%	21.5%	42.5%
6 months-4 years	8.5%	24.4%	11.0%
5-9 years	7.5%	12.0%	15.0%
10-19 years	28.7%	26.6%	8.5%
20+ years	22.3%	15.6%	23.0%

Pertussis Vaccination Status (DTaP and Tdap)

Statistically significant vaccination differences were seen across phases in both 2010 and 2005. In the 2010 leading phase, 74% of the cases with known vaccination status were up-to-date by age with their vaccinations and during the peak phase, 60% were up-to-date. The other phases in 2010 had a more even distribution between the up-to-date and not up-to-date cases. However, in the 2005 leading phase, only 43% of cases with known vaccination status were up-to-date by age. Similarly to 2010, the peak phase showed 69% of cases up-to-date and the other phases had an equal distribution. Only 26 of

adolescent and adults cases in 2010 had received the Tdap vaccine and 33 of all cases had documented evidence of a personal belief against vaccinations.

Disease Severity
There were no differences in disease severity by phase in 2010 and 2005. Only 16 cases with severe disease (including 4 deaths) were identified in 2010.

Epidemiological linkages to cases
In 2010, 104 cases had links to cases, however, no notable differences were observed across phases. There were no epidemiologically linked cases reported in 2005. Linkages most likely would have occurred in 2005; however, none were reported by the cases.

DISCUSSION

Multiple studies have shown that older individuals (e.g., parents, siblings, other adult/teen contacts) are often times the first to be ill with pertussis-like symptoms in a household or other setting, and therefore, are usually considered the source of infection to the childhood cases. [3, 4, 5, 6, 7]. It is difficult to identify the exact person who transmitted illness because most cases do not recollect contact to a known case or person(s) with a significant coughing illness outside of the home. In part this is due to a less severe disease course or delays in treatment encountered with older individuals. Cherry noted that asymptomatic infections in adults and adolescents are 4-22 times more common than symptomatic infections. [5]
It has also been widely recognized that despite the success of LAC vaccination coverage levels as high as 87% for four doses of DTaP in 2010 and above 80% since 1999 among children 19-35 months as well as an increasing Tdap coverage level among teenagers, periodic epidemics of reported pertussis do occur. Although the toddler coverage level may seem high, it does not prevent the accumulation of a pool of susceptible individuals who do not receive booster vaccinations, particularly adolescents and adults, and who quickly drive the transmission of pertussis to epidemic levels every few years. [8] Some studies have shown that the13-18 years age group is responsible for peaks of pertussis that occur in November before outbreaks or epidemics with a sub-clinical adult age group also fueling these epidemics. [1,9] Ultimately, the cyclical nature of pertussis epidemics in highly vaccinated populations is likely being driven by a community susceptibility threshold that is reached due to waning vaccine-induced immunity and the lack of boosting either via vaccination or circulating infection. [1,7,10]

The last two recent LAC pertussis epidemics seem to support these findings. The 2010 epidemic was significantly different by age compared to the 2005 epidemic. The 10-19 age group did not contribute to the 2010 epidemic but spurred or played a “leading” role in the 2005 epidemic. Instead, the adult age group played a more dominant role in the onset of the 2010 epidemic as this age group contributed to a substantial number of cases in the entire pre-epidemic 2009 year. This may in part be due to the Tdap vaccine, which was first introduced in 2005, having been administered more to adolescents, thereby leaving a larger group of susceptible adults; there are no data available yet to support this hypothesis. Even during inter-epidemic years, the adult age group contributed a higher number of cases in the Fall/Winter compared to other months, adding to the evidence of a growing pool of susceptible adults.

In 2010 infants shared the epidemic burden with other age groups who may all been equally exposed to the adult age group driving the epidemic but infants were the overall prevalent group in 2005. However, the disease severity for infants is incomparable to the other age groups with ten infant deaths reported throughout California and LAC accounting for four of them. All of these fatal infant cases were too young to have received pertussis-containing vaccines. The teenage group in both the 2010 and 2005 epidemics, compared to inter-epidemic years, contributed to more cases in the decline phase suggesting that they were the last susceptible group to be impacted by the resurgence.

The vaccination status of cases in both epidemics illustrates the fact that immunity may be influenced by date since last dose. [9]

The dynamic interplay of age, the administration of newly introduced pertussis vaccines to select age groups, as well as the increased attention in the media and medical community to pertussis in all age

groups, all may have the potential to further modify the epidemiology of pertussis epidemics. However, the adult age group will continue to play an influential role in future pertussis epidemics. This will require the medical and public health communities to develop and implement innovative interventions and tailored activities to promote adult immunizations, a challenging task with this population. As the morbidity patterns of pertussis continue to evolve, a better understanding of the social network patterns of all the age groups is the critical missing piece to the puzzle of truly understanding the epidemiology of pertussis and thereby preventing future morbidity and mortality. [11]

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