ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT AND SPECIAL STUDIES REPORT

2013

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County of Los Angeles Public Health

Acute Communicable Disease Control Program

Annual Morbidity Report

2013

Los Angeles County
Department of Public Health

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MESSAGE FROM THE DIRECTOR

Dear Colleagues:

It is with great pleasure that I present the Acute Communicable Disease Control (ACDC) Program's 2013 Annual Morbidity Report which includes a section on special studies reports. ACDC has a fundamental role within the Los Angeles County (LAC) Department of Public Health (DPH) in disease control and prevention. Our program is responsible for communicable disease surveillance, disease investigation and outbreak response. Safeguarding the public's health is more important than ever. Whatever the infectious disease threat, ACDC works 24 hours a day, 7 days a week to keep Angelenos safe. Disease surveillance serves as the backbone of ACDC's work. ACDC responds to a variety of communicable and infectious diseases involving foodborne, vectorborne, bloodborne, healthcare-associated, antimicrobial-resistant pathogens, and selected vaccine-preventable pathogens. Additionally ACDC is the designated public health program responder for emerging infectious diseases such as pandemic influenza, and bioterrorism agents such as smallpox and anthrax.

The ACDC's Annual Morbidity Report is compiled to summarize morbidity trends of many communicable diseases occurring in LAC, assess the effectiveness of established disease control programs, identify patterns of diseases as a means of directing future disease prevention efforts, identify limitations of the data used for the above purposes and to identify means of improving that data, and serve as a resource for healthcare providers and public health officials at county, state, and national levels. In 2013, despite overall decreasing incidence of most foodborne diseases, they continue to account for considerable morbidity and mortality in LAC. Foodborne diseases were a contributing factor for at least 12 deaths. Also LAC documented the second continuous year of high human case counts of West Nile virus infections. Influenza continues to be a great public health issue. Influenza season 2013-2014 pandemic H1N1 caused significant morbidity and mortality. A total of 101 influenza-associated deaths were confirmed in LAC, with 65% of them occurring in the 18-64 years age group. Multidrug-resistant organisms continue their emergence as public health concern as they frequently cause healthcare-associated infections. In 2013, three hospital outbreaks of carbapenem-resistant *Klebsiella pneumoniae* (CRKP) were reported which is the highest annual number of CRKP outbreaks in LAC.

Also attached is the 2013 ACDC Special Studies Report that includes articles of special data analyses and studies. Some highlights include: multi-state outbreak of hepatitis A associated with Costco berries; coccidioidomycosis outbreak associated with a paleoseismology teaching site, and a *Salmonella* Mbandaka outbreak associated with a popular fast-food restaurant. Of note, both ACDC Annual Morbidity and Special Studies Reports do not include information on tuberculosis, sexually transmitted diseases, or HIV and AIDS. ACDC's work continues to be of significant public health importance. I hope that this report will be a useful resource to you and your organization.

Sincerely,

Laurene Mascola

Laurene Mascola, MD, MPH, FAAP
Director of Acute Communicable Disease Control Program

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● EXECUTIVE SUMMARY ●

In Los Angeles County (LAC), 88 diseases and conditions, as well as unusual disease occurrences and outbreaks, are reportable by law. The Acute Communicable Disease Control Program (ACDC) is the lead program for the surveillance and investigation of most communicable diseases. Other programs have responsibility for tuberculosis, sexually transmitted diseases, HIV/AIDS, and some vaccine-preventable diseases. Surveillance is primarily passive, with reports sent by health facilities and clinicians via facsimile, mail, or telephone. Electronic reporting from hospitals via a secure web-based application has steadily increased since its inception in 2002; nearly every hospital infection preventionist in addition to health providers at correctional facilities and several large clinics are now capable of electronically reporting. Electronic laboratory-based reporting, where defined etiologies are automatically reported to ACDC, has been in place since 2002 and has been expanded to more than twenty-five clinical and reference laboratories that report an estimated 60% of all mandated laboratory reports.

ACDC Mission

To prevent and control infectious disease in Los Angeles County implementing tools for surveillance, outbreak response, education and preparedness activities.

Surveillance is the foundation of ACDC's work providing information on trends and emerging infectious disease threats, and facilitating the detection of disease outbreaks. Disease prevention occurs through investigation and response to outbreaks, collaborative programs to address significant and emerging threats, and development and assessment of policies and guidelines. ACDC also interprets and supports compliance with state and federal laws and regulations, and collaborates with other Department of Public Health (DPH) divisions that have enforcement authority, such as Environmental Health.

Los Angeles County: A Description of Our Community

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

Another challenge is the extensive diversity of our population coupled with a high level of immigration and foreign travel. Nearly half of our residents are Hispanic (49%), around one-third white (29%), and around one in ten are Asian (14%) or black (8%). Residents report over 90 languages as their primary spoken language. There is also substantial economic diversity within our county; the 2010 US census recorded over 1.5 million residents (nearly 16% of LAC's population) living in poverty.

LAC is a major port of entry for immigrants to the US. According to the 2011 Los Angeles County Health Survey, 46% of adult respondents stated they were born outside of the US. According the US Department of Homeland Security Yearbook of Immigration Statistics 2012, California remains to be the leading state of the residence of legal permanent residents/immigrants to the US. The population is also highly mobile. In terms of air travel alone, each year roughly 55 million travelers come through the Los Angeles International airport (over 40 million domestic and 14 million international travelers yearly)—making it the nation's 3rd busiest airport.

Effectiveness in controlling and preventing communicable diseases requires partnership within DPH, and with others in LAC and more widely. Critical DPH collaborations exist with the Public Health Laboratory, the Immunization Program, Veterinary Health, Community Health Services (CHS), Environmental Health, and Public Health Investigations. ACDC also collaborates closely with other local health departments, the California Department of Public Health, and the Centers for Disease Control and Prevention (CDC). With the global spread of infectious such as Ebola and international and interstate spread of foodborne diseases associated with contaminated products, ACDC horizons and collaborations extend well beyond LAC.

Behaviors of healthcare providers and the public contribute significantly to the spread of infectious disease. Infections may spread in healthcare settings during invasive procedures such as placing central lines or simply because a healthcare provider did not wash their hands. ACDC provides education, tools and materials, and works in partnership with others to implement evidence-based interventions that improve adherence to guidelines and promote effective preventive strategies such as immunization. Public education is achieved in collaboration with the Health Education Activity and the Public Information Office through presentations, written materials, media reports and the DPH website

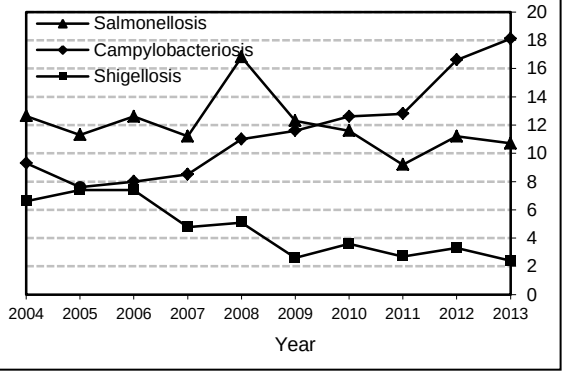
ACDC's focus on specific infectious disease conditions is complemented by activities that target settings where illnesses may spread, resulting in substantial morbidity and mortality, and where the spread of pathogens resistant to antimicrobial agents threatens the ability to effectively treat life-threatening infections. ACDC's Healthcare Outreach Unit works closely with LAC's 99 acute care hospitals while new ACDC teams focus on preventing infections in skilled nursing facilities and ambulatory care settings where a larger proportion of medical procedures and surgeries are now being performed. In surveillance, ACDC conducts "syndromic" surveillance using a number of data sources to monitor trends in conditions such as influenza-like illness, as well as facilitating early detection of conditions that may indicate a bioterrorist attack.

- The 2013 ACDC Annual Morbidity Report describes the current status, trends, and key issues in communicable diseases in LAC and, in special reports, highlights some of the investigations and prevention activities that were implemented

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

Foodborne Diseases

Figure 1
Foodborne Disease Incidence Rates (cases per 100,000) by Year
LAC and US, 2004–2013



Diseases spread by food and food sources lead to many of the investigations and prevention activities conducted by ACDC in collaboration with CHS and Environmental Health. Overall, foodborne diseases have declined since the mid-1990's and have stabilized at lower rates as shown 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 campylobacteriosis rate continued to increase gradually over the past ten years. The majority of campylobacteriosis cases are now being diagnosed by antigen based tests, which are more sensitive compared to traditional culture technology. Incidence of Shiga-toxin producing *E. coli* (STEC) serotypes has changed in the past three years. Serotype O157:H7 decreased while other serotypes are reported more often. The USDA and FDA both have zero tolerance for *E. coli* O157:H7 found in raw meat that is tested at meat processing plants; thus fewer outbreaks are occurring caused by *E. coli* O157:H7. Additionally, detection of STEC has increased through the widespread use of rapid stool tests for Shiga toxins by commercial laboratories; both positive toxin tests and cultures are reportable to Public Health. In addition, the Public Health Laboratory is able to isolate these non-O157 strains that formerly would not have been reported. LAC enteric disease findings are similar to national trends depicting sustained decreases with occasional upsurges among many foodborne illnesses, particularly those of bacterial origin.[1] While the underlying causes for these local and national trends are not known, the implementation of control measures

[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.

at several levels are believed to be important factors in the reduction of foodborne illnesses. On a national level, these measures include the expansion of federal food safety and inspection services as well as increased attention to fresh produce safety. Locally, the restaurant grading system in operation in LAC since 1998 contributes to food safety practices in restaurants.

In 2013, the LAC salmonellosis crude rate was 10.7 per 100,000. Although many food items and both potable and recreational water sources have been implicated in the transmission of *Salmonella*, salmonellosis is most commonly associated with eggs, poultry, and fresh produce. Occasionally, an infected food service worker is the source of a salmonellosis outbreak. Another prominent exposure source is reptiles, either by direct contact or through contaminated surfaces or other people exposed to reptiles. In 2013, 9.7% of reported LAC salmonellosis cases had contact with turtles, lizards or snakes—similar the proportion for 2012. Fifty-six percent of these cases had contact with small turtles demonstrating the ongoing need for continued efforts of the ACDC-led coalition of internal DPH partners and external community stakeholders that engage in community-based reptile associated salmonellosis prevention interventions.

ACDC investigated 14 enteric disease outbreaks in 2013, and 12 of these were determined to be foodborne, in which at least 156 persons were ill and 14 were hospitalized. During 2013 four outbreaks were caused by *Salmonella*, one by *Campylobacter*, five by norovirus, and two were due to bacterial toxins. In addition, LAC assisted state and federal investigators with at least 48 investigations (38 *Salmonella*, 6 STEC, 3 *Shigella* and 1 typhoid cluster) where interviews by LAC DPH ACDC staff contributed to multi-jurisdictional investigations.

While the overall incidence of most foodborne diseases has been decreasing, they continue to account for considerable morbidity and mortality—the large majority of preventable infections that occur yearly go unreported. Most people affected by these illnesses improve without treatment and suffer 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 12 known deaths in 2013. Accordingly, further efforts are needed to improve food quality and to educate the food industry and the public about proper food storage, handling, and preparation.

In LAC, foodborne diseases were a contributing factor for at least 12 deaths in 2013.

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. From 2006 to 2013, surveillance data show a growing proportion of reported amebiasis and giardiasis cases among immigrants and/or refugees. No outbreaks involving treated recreational water occurred in 2013; the last known such outbreak was in 2008, which was a *L.Pneumophila* associated outbreak involving a spa in an assisted living facility.[2]

Vectorborne Diseases

Vectorborne disease surveillance has documented the continued surge of endemic (murine) typhus and West Nile virus (WNV) in LAC. Murine typhus cases continued to increase from nine reports in 2005 to 68 cases in 2013, the highest number reported in decades. Murine typhus cases have been documented from known endemic LAC areas of Los Feliz, South Pasadena, and Pasadena as well as newer

In 2013, LAC documented the second continuous year of high human case counts of WNV infections.

[2] CDC, Surveillance for Waterborne Disease Outbreaks and Other Health Events Associated with Recreational Water --- United States, 2007—2008. 2011; 60(ss12);1-32. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6012a1.htm?s_cid=ss6012a1_w

foci including Santa Monica, downtown Los Angeles, and cities bordering Long Beach. In 2013, LAC documented another year with a high count of human West Nile virus (WNV) infections. The number of WNV infections in 2012, with 174 reported human infections, was the second highest count since it first emerged in the region. In 2013, 164 infections were documented, including 104 cases of neuroinvasive disease (NID), 40 WNV fever cases, and 21 asymptomatic infections in blood donors.

In 2013, Aedes aegypti, the primary mosquito vector for dengue fever, yellow fever, and chikungunya virus, was detected in LAC. There have been no reports of local transmission of these arboviral diseases in CA.

The emergence of chikungunya virus in the Western Hemisphere in late 2013 has highlighted the importance of surveillance for arboviruses transmitted by the *Aedes aegypti* mosquito. in 2013, *A. aegypti*, the primary mosquito vector for dengue fever, yellow fever, and chikungunya virus, was detected in LAC. *Aedes albopictus* mosquito is also capable of transmitting chikungunya and dengue viruses and is well established in the ten mile square area that overlaps the San Gabriel Valley and Greater Los Angeles. Vector control agencies in these areas are finding this mosquito nearly impossible to eradicate and control. To date, there have been no reports of local transmission of these arboviral diseases in CA. ACDC staff work closely with LAC DPH Veterinary Public Health, Environmental Health Vector Management, and the five local vector control agencies to routinely communicate data, control infections, and provide health education to the public concerning these vector-borne diseases.

Invasive Bacterial Diseases

Severe community acquired *Staphylococcus aureus* infection has been a reportable disease in California since 2008. Twenty-six cases of severe community acquired *S. aureus* infection resulted in intensive care unit admission or death in 2013, similar to the 24 cases reported in 2012. Substantial under-reporting of this condition is suspected, since 58% of all cases were reported by only two reporting sources in 2013. Case investigation interviews with patients or surrogates revealed that current liver disease, diabetes, current smoking and intravenous drug use were the most frequently reported risk factors. Contrary to the publicity around the virulence of methicillin-resistant *S. aureus* (MRSA), this only represented 27% of the 2013 cases.

Risk factors for invasive group A streptococcal disease (IGAS) were similar to those for community acquired severe *S. aureus* infections*;* diabetes was the most frequently reported risk factor, followed by a history of blunt trauma. Interestingly, 30% of cases reported having none of the traditional risk factors. The total number of IGAS cases in 2013 (N=195) is the highest over the last five year period (2008-2012). This increase may be attributable to the development and transition to electronic reporting systems. No outbreaks of IGAS were identified during 2013.

Viral Hepatitis

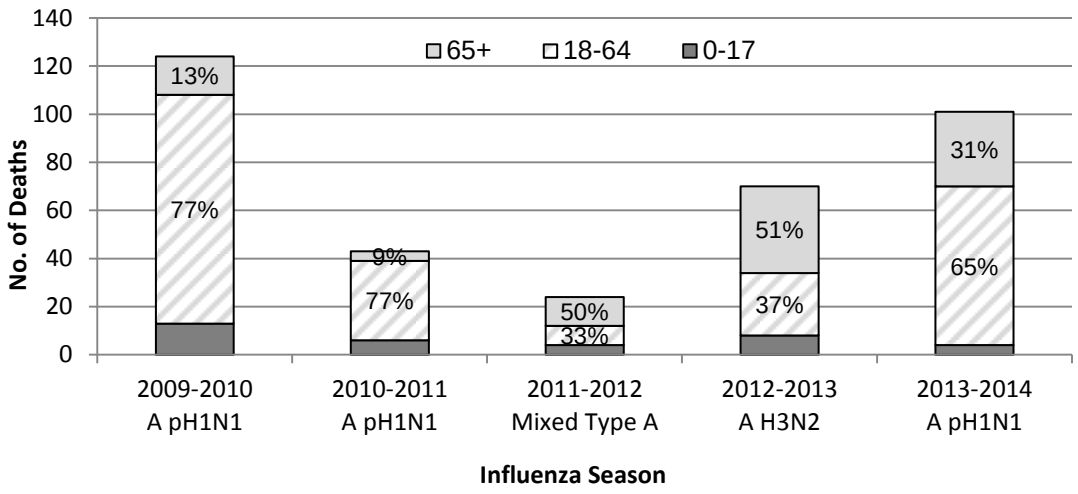
The rate of hepatitis A in LAC (0.64 per 100,000) in 2013 was similar to the national rate (0.57 per 100,000). The rate of acute hepatitis B in LAC (0.58 per 100,000) increased in 2013 compared to the 2012 LAC rate (0.41 per 100,000). For hepatitis C, surveillance identified five new acute cases. When individual cases of acute hepatitis B (non-perinatal) and hepatitis C are identified with possible healthcare associated transmission, detailed case investigations are done to identify suspected sources of nosocomial transmission. There were no outbreaks of acute hepatitis B (non-perinatal), or C identified in 2013. ACDC participated in a multistate outbreak investigation of acute hepatitis A associated with frozen berries (see 2013 ACDC Special Studies Reports).

Influenza

The 2013-2014 influenza season was dominated by influenza A, specifically the pandemic 2009 H1N1 strain (pH1N1), resulting in moderately severe activity both locally and nationally. This season pH1N1 caused the greatest impact on morbidity and mortality since its initial emergence, despite circulating as a seasonal strain and being included in the vaccine each season since the pandemic. A total of 101 influenza-associated deaths

were confirmed in LAC, with the 18-64 years age group accounting for 65% of them (Figure 2). The disproportionate effect on younger adults is similar to what was seen during the 2009 pandemic when pH1N1 first appeared (MMWR Update: Influenza Activity). In addition, 22 of 30 reported ICU hospitalized influenza cases in LAC were in those younger than 65 years old. Overall influenza activity reached peak levels during the last week of January where the highest percent positive visits to emergency departments for influenza-like-illness were reported, the greatest number of influenza tests from sentinel sites were performed, and the greatest number of influenza-associated deaths occurred (community respiratory outbreaks peaked the previous week). For more information on surveillance methods and past seasons visit http://publichealth.lacounty.gov/acd/FluSurveillance.htm.

Figure 2. Influenza-Associated Fatalities by Age Group LAC 2009-2014



*The dominant influenza strain is listed under each season

Vaccine Preventable Diseases

Vaccine coverage levels in LAC continue to be at or above the 80% level associated with community ("herd") immunity for most vaccine-specific antigens. However, the increasing trend of parents signing personal belief waivers allowing their children to opt out of school-mandated vaccinations, together with the continued travel related risk for exposure to vaccine-preventable disease outbreaks in other parts of the world, likely contributed to several large outbreaks in 2013. Over 300 people exposed to chicken pox in an unvaccinated traveler at a high-risk LAC venue required monitoring over an extended period of time and 250 other people were investigated resulting from exposure to two individuals who had acquired measles abroad.

Multiple pertussis outbreaks occurred in LAC in 2013, leading to an overall increase in LAC's VPD annual incidence compared to previous years. Five of the outbreaks occurred in high schools during the late fall whereas in 2012, there were only two school outbreaks for the entire year.

In 2013, Tdap coverage among LAC students in grades 7-12 continued to remain high (97%), likely due to the successful implementation in 2011 of the California middle school law requiring Tdap booster vaccination. Thus, most of the high school pertussis cases occurred in students who had been vaccinated with Tdap a few years earlier. Rapid waning of immunity from the Tdap booster has been documented by investigators, likely explaining why vaccinated students developed pertussis. However, it has also been documented that vaccinated students who get pertussis exhibit less severe symptoms, compared to unvaccinated students.

In 2013, meningococcal conjugate vaccine (MCV) coverage in California teens was estimated at 80.9%. Although recent MCV coverage level data is not available for LAC, it is estimated to be in the same range as

that for California as a whole. Consistent with national trends, the incidence of invasive meningococcal disease (IMD) in LAC has declined across all age and race-ethnic groups since 1995. In 2013, LAC experienced its second lowest IMD case count ever documented: 17 cases which resulted in 4 deaths. Of the 14 cases where serogroup status was determined, 12 were serogroup C, which is vaccine-preventable, and two were serogroup B.

Much work needs to be done locally and nationally to prevent cervical, as well as oral and anal cancers. This can be achieved by increasing HPV vaccination rates among adolescent girls and boys. Although HPV vaccination coverage data for ≥3 doses among girls 13-17 years is not available for LAC in 2013, California had statewide HPV vaccination coverage levels of 45.8% for ≥ 3 doses and 67.6% for ≥1 dose. Interestingly, a national study found that among girls unvaccinated for HPV, 84% had a healthcare visit in 2012 during which they received another vaccine recommended for adolescents (Tdap or a meningococcal vaccine). Using the percentage of other adolescent vaccine receipt as an estimate for 2013, if HPV vaccine had also been administered at the same time, HPV vaccination coverage nationally for ≥1 dose would have been 91.3%.

In summary, LAC VPD morbidity levels continue to be relatively low compared to other large urban areas in the US. By addressing unfounded parental concerns about vaccines, and empowering providers to implement systems that reduce missed opportunities for vaccination, we may see improvement in LAC immunization levels, leading to further decreases in VPD morbidity.

Healthcare Associated Infections and Outbreaks

Healthcare associated infections (HAIs) have generated a great deal of attention in the U.S. in recent years, especially the issue of transparency and public reporting of individual hospital infection rates. California legislation mandated healthcare facility reporting of selected conditions and healthcare practices, and established a statewide HAI program and advisory committee to monitor implementation of these laws to reduce and prevent HAIs. ACDC's Healthcare Outreach Unit (HOU) participates in the state advisory committee and works with the CDPH HAI program and other public health organizations to make recommendations related to the prevention and control of HAIs, including compliance with HAI regulations and public reporting of HAI associated process and outcome measures. The CDPH public reports of healthcare associated bloodstream infections and surgical site infections in California hospitals can be found at http://www.cdph.ca.gov/programs/hai/Pages/default.aspx. The data in the report were collected using the CDC National Healthcare Safety Network (NHSN) as a method of standardizing the data. Of note, Los Angeles County data available from 2010 through 2013 show a 21% reduction in the central-line associated blood stream infections (CLABSI) rate among adult ICU patients, from 1.38 per 1000 patient days to 1.09 per 1000 patient days. This decrease suggests progress towards CLABSI prevention achieved through enhanced awareness and adherence to prevention activities.

Multidrug-resistant organisms are an emerging public health concern given that they frequently are the cause of HAIs. From 2010 through 2012, LAC reported high endemic rates of carbapenem-resistant *Klebsiella pneumoniae* (CRKP). In 2013, there were three reported hospital outbreaks of CRKP, which is the highest annual number of CRKP outbreaks in LAC. Heightened awareness of this problem is needed in all LAC healthcare facilities, as patients access services along the continuum of care.

ACDC investigated several notable healthcare associated outbreaks in 2013, which included an *E. coli* outbreak associated with a neonatal intensive care unit; nosocomial legionellosis in an oncology unit; and a hepatitis B outbreak associated with platelet rich plasma therapy. (See ACDC 2013 Special Studies Report).

The HOU is organized with liaison public health nurses (PHNs) and other healthcare professionals who interface with infection preventionists at all licensed acute care hospitals in LAC to promote disease reporting and implementation of hospital surveillance to enhance detection of potential critical communicable diseases. The team identifies and responds to hospital outbreaks and assists with investigations. Roughly a third of the hospitals in LAC invite HOU staff to their infection control committee meetings, demonstrating integration of public health goals into the hospital setting. The HOU has expanded to include non-hospital healthcare settings, such as psychiatric hospitals, large clinics, correctional medical services, and ambulatory care

settings. Team members continue to work with hospitals on emergency preparedness and participate in disaster resource center meetings.

HAIs in ambulatory care settings (ACSs) continue to be a growing concern especially since healthcare delivery is occurring more often in ACSs rather than acute care hospitals. ACSs are distinct entities, hospital-based or non-hospital-based, that operate exclusively on an outpatient basis for patients who do not require hospitalization and with an expected stay of less than 24 hours. In 2013, ACDC participated in a multi-jurisdictional workgroup that created recommendations to improve patient safety and infection control in ambulatory care settings.

Sub-acute Healthcare Facilities

The total number of outbreaks within sub-acute care facilities decreased by 21% in 2013 compared to 2012 with 98 and 124 outbreaks reported in the respective years. Rash illness outbreaks were the most frequently reported outbreak category. Scabies outbreaks were the most commonly reported rash outbreaks, 27 (67%), and the remaining 13 (33%) were outbreaks of unknown etiology.

Gastroenteritis (GI) outbreaks were the second most frequently reported outbreaks in 2013. Thirty-five outbreaks were documented. The most frequent cause of GI outbreaks was norovirus with 23 outbreaks. The total number of GI outbreak associated cases declined in 2013 compared to 2012 with 743 and 1626 cases, respectively. Although the total number of staff affected by norovirus declined in 2013, the proportion of staff among all those affected remained stable with 158 (21%) and 327 (20%) staff members reporting symptoms in 2013 and 2012, respectively. Of 158 symptomatic staff affected by GI outbreaks in 2013, most staff provided direct patient care, 111 (70%), 43 (27%) were non-direct care staff (e.g., housekeeping), and for four (2%) cases, staffing duties were not available. As in 2012, the GII.4 Sydney strain was the predominant norovirus strain type in LAC sub-acute facilities in 2013.

Twenty-three respiratory outbreaks were investigated causing 533 total cases of respiratory outbreak-associated illness. Of 23 outbreaks, eight (35%) were most likely caused by influenza virus and 15 (65%) were due to unknown etiologies. Influenza outbreaks were associated with 273 cases of respiratory illness of which, 236 (86%) cases were residents and 37 (14%) were staff members of whom 31 (84%) provided direct care staff, four (11%) had non-direct care responsibilities, and two (5%) cases had unknown duties. Laboratory confirmation was available for only 30 (9%) influenza outbreak cases with 25 (83%) cases confirmed as Influenza A and five (17%) as Influenza B. Three influenza A cases were characterized as subtype H3 and the remainder were not subtyped.

In 2013, the Sub-acute Healthcare Facility surveillance unit characterized staff members that were ill during outbreaks by their staffing duties. In total, 327 (18%) staff members were reported ill from 98 sub-acute care facilities involving a total of 1782 cases affected by outbreaks in 2013. Of all affected sub-acute care staff members, most ill staff provided direct patient care, 249 (76%), 66 (20%) were non-direct care staff, and for 12 (4%) staffing duties were not available. The collection of data to better delineate the role of symptomatic sub-acute care staff in the transmission of respiratory infections such as influenza and gastrointestinal viruses such as norovirus will be important in containing and decreasing transmission of these viruses within sub-acute care facilities.

Automated Disease Surveillance

ACDC's automated disease surveillance in 2013 continued integration of early detection system activities into routine public health operations. Emergency department syndromic surveillance can provide early detection of emerging infectious diseases or outbreaks, related to bioterrorism or natural disease.

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.

Syndromic surveillance can also track trends of known outbreaks as well as diseases and exposures of public health importance such as seasonal influenza, heat related illness, and wildfires.

Syndromic Surveillance is a surveillance tool used in detecting patterns of illness and community outbreaks, complementing traditional disease surveillance activities. For example, it is one of the tools used for influenza surveillance and can aid in monitoring heat related illness during the summer months. Current hospital participation represents approximately 70% of all emergency department visits in the county. It is the only near real-time surveillance system monitoring population health.

vCMR (Visual Confidential Morbidity Report) is a web-based electronic reporting system that manages the "life-cycle" of a disease incident investigation from the date of report to the final resolution. The system has been fully operational since May 2000. It features modules for disease incidents, outbreaks, foodborne illness reports, manual reporting via the Internet by hospital infection preventionists, and automated electronic laboratory reporting. vCMR has improved internal communication and collaboration within LACDPH as well as our healthcare partners at the local, state, and national levels.

vCMR is aligned with CDC-sponsored initiatives such as the Public Health Information Network (PHIN) and National Electronic Disease Surveillance System (NEDSS). In January 2013, vCMR was successfully upgraded to a Reference Information Model (RIM) database structure. RIM is a Health Level 7 inspired database design that creates a single unified standard for storing patient data, exchanging medical information (laboratory results, etc.), and delivering a single unified view of a patient's entire medical profile. It continues to be used by the following DPH programs: ACDC, Environmental Health Food and Milk, Immunization Program, Community Health Services' eight Service Planning Areas, Health Assessment and Epidemiology, Injury and Violence Prevention, STD and HIIV (electronic laboratory reports only for both).

ELR (Electronic Laboratory Reporting): ELR is a module within the vCMR application. Automated electronic reporting of communicable diseases from laboratories to DPH has been shown to yield more complete and rapid reporting of disease. Results are sent as soon as they are available rather than days later. LAC implemented ELR in 2002, and has pursued efforts to recruit additional laboratories. Currently, data feeds are received from 25 public and private laboratories throughout LAC. In January 2013, ELR was enhanced to achieve better compatibility with HL7 Meaningful Use Messages.

Bioterrorism, Emergency Preparedness and Response Activities

The ACDC Bioterrorism Preparedness and Response Team continues to actively participate with the Consortium of Technical Responders (CTR), a multi-agency collaborative of agencies that include the Los Angeles Police Department, LAC Sheriff, DPH, Fire, Hazmat, United States Customs and Border Patrol, California Highway Patrol, Federal Bureau of Investigation (FBI), and United States Postal Inspectors. The goal of the CTR is to unify the technical response community in incidents involving the use of chemical, biological and radiological agents.

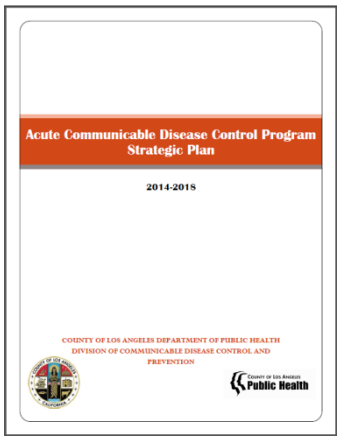
Collaboration and partnership continues at the Joint Regional Intelligence Center (JRIC) with a public health nurse (PHN) detailed to this fusion center. The JRIC is composed of public health, fire services, police, sheriff, and FBI departments working in partnership with other local, state, and federal programs to share and analyze information, disseminate intelligence, and assist with the coordination of resources for a unified response to a terrorism event. The PHNs cutting edge work at the JRIC has resulted in National recognition making the JRIC the 'National Model for Integrating Pubic Health' into a fusion Center. The integration of public health in the JRIC provides support for Weapons of Mass Destruction threat assessment and facilitates Terrorism Liaison Officer Trainings for DPH staff to increase awareness in matters related to terrorism information and intelligence.

In 2013, collaborative efforts continued among numerous DPH Programs and external response agencies and partners in the testing and exercising of plans for response to a positive Biohazard Detection System (BDS) signal at the United States Postal Service Processing and Distribution Centers in LAC. In 2013, LAC DPH participated in two BDS full-scale exercise which provided the opportunity to exercise, test and evaluate readiness of elements such as notification, deployment of public health staff to assume ICS roles and functions, laboratory testing of sample cartridges, and a functional point of dispensing (POD) at the USPS facility. Participation in these types of exercises provide opportunities to continue testing skills capabilities, improve workforce competence, and increase confidence in response to potential public health emergency events and incidents.

The ACDC response unit also contributed in multi-jurisdictional exercises. This includes serving as an evaluator for the Pasadena Health Department's tabletop exercise for SARS; participating in the development of a multi-jurisdictional disease (*E.coli*) outbreak full-scale exercise with the Long Beach Health Department; and the planning for DPH participation in the State Health and Medical Exercise. Yearly training and practicum sessions were provided in 2013 to test competencies with a select group of DPH staff in the collection and transport of clinical samples from a rash suspicious for smallpox.

The Unit provides ongoing subject matter expertise consultation related to biological incidents to other public health programs, first responder agencies, hospitals and the community as needed. The team will respond in the field to quickly assess and evaluate situations reported as unusual or suspected or cases of Category A agents.

Planning and Evaluation



The ACDC Planning and Evaluation Unit's main accomplishment in 2013 was development of the new ACDC Strategic Plan, 2014-2018. It was developed to serve as a functional guide for ACDC staff to work towards the mission to prevent and control infectious disease in LAC by implementing tools for surveillance, outbreak response, education and preparedness activities. The Strategic Plan provides a roadmap for operational activities for the next five years.

The goal of the planning process was to renew the ACDC Strategic Plan through a collaborative and inclusive approach. The process was facilitated by the ACDC Planning and Evaluation Unit with the formation of an interdisciplinary Strategic Planning Committee (SPC) comprised of representatives from each ACDC unit to foster an inclusive approach. Together, SPC members gathered and analyzed data and information to identify strategic priorities, goals, and objectives for the future.

Two different methods were used to gather information from stakeholders. The SPC launched an online survey to obtain anonymous input from all ACDC staff members. The survey asked questions related to ACDC's vision, mission, values, priority areas, public health strategies, strengths, weaknesses, opportunities, and threats (SWOT). The response rate was 63% (n=41) with the majority (78%) reporting working at ACDC ≥6 years. The second method was key informant interviews. ACDC's internal and external (other LAC DPH programs) stakeholders were interviewed with questions on ACDC's vision, SWOT, core functions, programmatic improvements, collaborations, and advice for strategic planning. Total 35 individuals were interviewed on a voluntary or SPC-selected basis. Most interviewees (69%, n=24) were internal ACDC staff. Interviewees consisted of diverse professional disciplines including physicians, nurses, epidemiologists, health educators, information technology specialists, and administrative support personnel. Individual interview responses were kept confidential. Common themes were summarized by the Planning and Evaluation Unit and aggregate results were presented to ACDC.

As a result, ACDC's Strategic Plan 2014-2018 contains five strategies. Each strategy includes several goals and objectives. *Strategy 1* (Enhance Surveillance Capabilities) aims to maintain and improve ACDC's

surveillance activities and support future enhancements and integration of surveillance systems. *Strategy 2* (Enhance Disease Investigation and Outbreak Response Capabilities) focuses on increasing effectiveness of disease investigation and outbreak response by improving communication and partnership. *Strategy 3* (Enhance Communication, Education and Outreach Capacity) sets forth the program's approach for recommending, supporting, and implementing evidence-based public health practice in preventing and controlling infectious diseases. *Strategy 4* (Enhance Public Health Preparedness) supports improving public health emergency preparedness, safety, and biosecurity related to high-consequence infectious diseases and new or emerging pathogens. Lastly, *Strategy 5* (Support the ACDC Workforce) aims to ensure necessary resources, and improve work processes and the work environment to support employees' ability to perform, provide opportunity for advancement, and increase job satisfaction. The full document is available here on the ACDC website.

Acute Communicable Disease Control Program

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LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC HEALTH
ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
2013*

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ACUTE COMMUNICABLE DISEASE CONTROL
2013 ANNUAL MORBIDITY REPORT

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- Encephalitis……..…….....Rachel Civen, MD, MPH
- *Escherichia coli* O157:H7……..Leticia Martinez, RN, PHN, MPA
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- Meningococcal Disease…….. .....Van Ngo, MPH
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- Pertussis (Whooping Cough)…… Emmanuel Mendoza, MPH
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- Salmonellosis……..…… Rita Bagby, RN, PHN, MSN
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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
PUBLICATIONS AND PRESENTATIONS
2013

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Manuel W. Influenza and Respiratory Disease Surveillance in Los Angeles County. West Coast Epidemiology Conference, Olympia, Washington, December 2013. [Oral Presentation]

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Oyong K, Kajita E, Araki P, Luarca M, Hwang B. Validation of Los Angeles County Department of Public Health Respiratory Syndrome using Electronic Health Records. 2013 International Society for Disease Surveillance, New Orleans, LA, Dec 2013 [Poster Presentation]

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OVERVIEW

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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
ANNUAL MORBIDITY REPORT
OVERVIEW
2013

PURPOSE

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

1. summarize annual morbidity from several acute communicable diseases occurring in 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 department programs (see LAC DPH website for more information at http://www.publichealth.lacounty.gov/index.htm).

LOS ANGELES COUNTY DEMOGRAPHIC DATA

LAC population estimates used for this report were created under contract for the County of Los Angeles, Internal Services Department.[1] The base population numbers came from the 2010 Census, extracted and aggregated into age, race-ethnicity, and sex categories. These numbers were updated to July 1, 2010, using city estimates from the California Department of Finance (DOF), Demographics Research Unit. July 1, 2013 population estimates were obtained by applying mortality and migration rates to the July 1, 2010 estimates. These were controlled to age, race-ethnicity, and sex proportions from the Census Bureau's county estimates for July 2012, and to city and county level estimates from the California Department of Finance, Demographic Research Unit. Utilized input datasets included Census Bureau decennial census enumerations and annual population estimates, DOF city and county estimates, and administrative records from the County of Los Angeles on registered voters, housing units, births and deaths.

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. 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.

[1]County of Los Angeles, Internal Services Department, Information Technology Service, Urban Research-GIS Section, *July 1, 2013 Population Estimates for Los Angeles County Tract-City Splits by Age, Sex and Race/Ethnicity*.

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. 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

[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

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 limitations. 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.

6. Place of Acquisition of Infections
   Some cases of diseases reported in LAC may have been acquired outside of the county. Geographical data is presented based on address of case, therefore, some disease rates may not accurately reflect the location where an infection was acquired.

7. Health Districts and Service Planning Areas
   Since 1999, LAC 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 9% 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 as proxy for onset.
   - **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 United States (US) and California**: Incidence rates for the US and California can be found in the CDC'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**: 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 four 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" refers to address of case and do not accurately reflect site of disease acquisition. Age-adjusted rates by location are presented for some diseases.

Los Angeles County Demographic Data
2013

Table A. Los Angles County* population by year, 2008–2013

Year	Population	% change
2008	9,250,152	
2009	9,236,297	-0.15%
2010	9,223,225	-0.14%
2011	9,259,218	0.4%
2012	9,296,158	0.4%
2013	9,404,275	1.16%

* Does not include cities of Pasadena and Long Beach.

Table B. Los Angles County* population by age group, 2013

Age (in years)	Population	%
<1	120,951	1.3%
1–4	486,789	5.2%
5–14	1,206,033	12.8%
15–34	2,830,780	30.1%
35–44	1,332,482	14.2%
45–54	1,292,126	13.7%
55-64	1,026,592	10.9%
65+	1,108,522	11.8%
Total	**9,404,275**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table C. Los Angles County* population by sex, 2013

Sex	Population	%
Male	4,638,732	49.3%
Female	4,765,543	50.7%
Total	**9,404,275**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

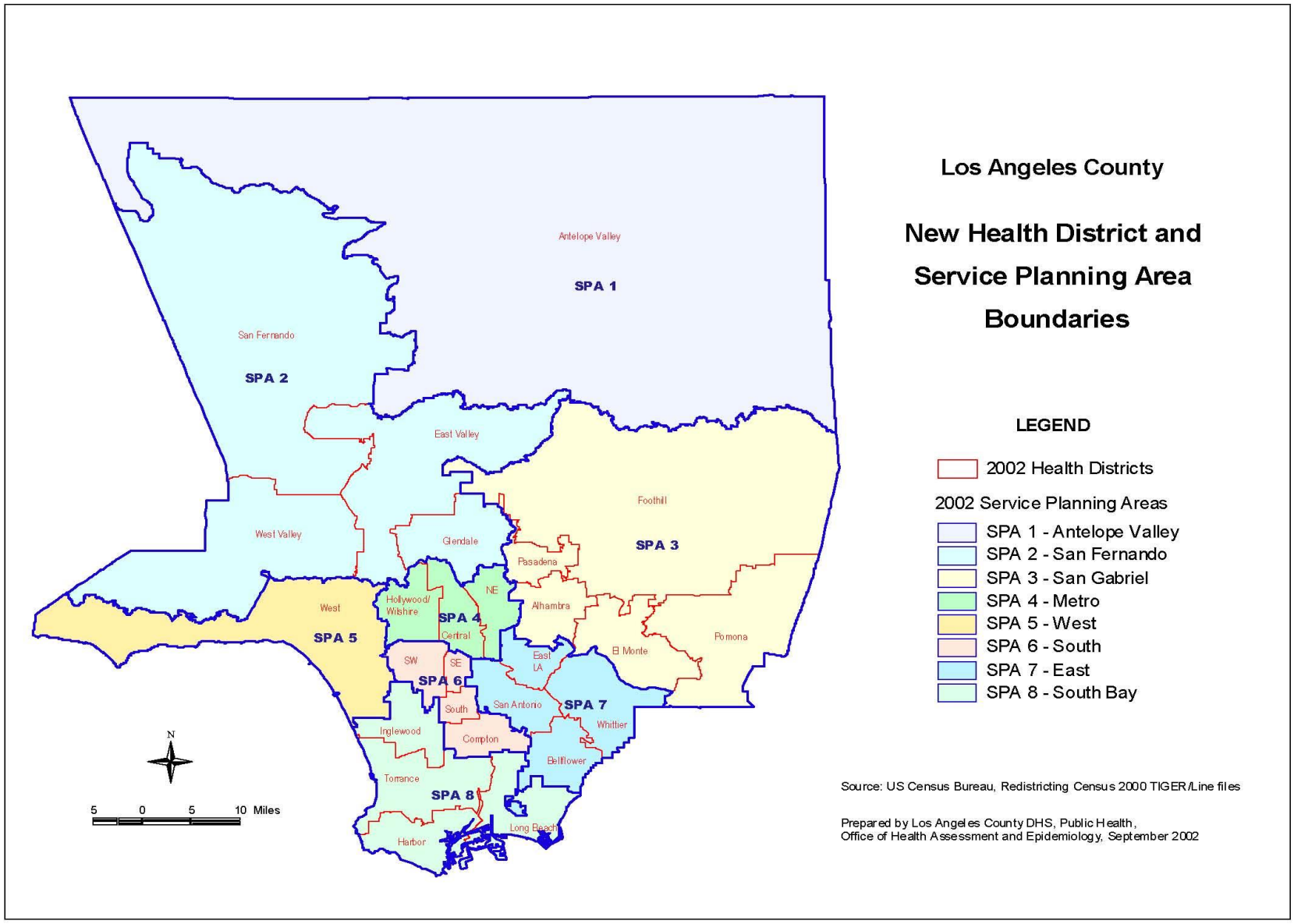
Table D. Los Angles County* population by race, 2013

Race	Population	%
Asian	1,368,634	14.6%
Black	778,703	8.3%
Latino	4,583,477	48.7%
White	2,655,471	28.2%
Other**	17,990	0.2%
Total	**9,404,275**	**100.0%**

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

Table E. Los Angles County* population by health district and SPA, 2013**	
Health District	**Population**
SPA1	**390,938**
Antelope valley	390,938
SPA 2	**2,173,732**
East Valley	450,663
Glendale	340,489
San Fernando	506,329
West Valley	876,251
SPA 3	**1,635,277**
Alhambra	347204
El Monte	438758
Foothill	306463
Pomona	542852
SPA 4	**1,140,742**
Central	343,031
Hollywood Wilshire	489,599
Northeast	308,112
SPA 5	**646,531**
West	646,531
SPA 6	**1,030,078**
Compton	283,685
South	192,482
Southeast	174,003
Southwest	379,908
SPA 7	**1,309,383**
Bellflower	357,745
East Los Angeles	204,921
San Antonio	424,952
Whittier	321,765
SPA 8	**1,077,594**
Inglewood	413,916
Harbor	205,026
Torrance	458,652
Total	**9,404,275**

* 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
Alhambra
West
SPA 5
Central
El Monte
Pomona
East LA
SW
SE
SPA 6
SPA 7
South
San Antonio
Whittier
Inglewood
Compton
Bellflower
Torrance
SPA 8
Long Beach
Harbor
N
5 0 5 10 Miles
Source: US Census Bureau, Redistricting Census 2000 TIGER/Line files
Prepared by Los Angeles County DHS, Public Health,
Office of Health Assessment and Epidemiology, September 2002

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

Table F. List of Acronyms

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

LOS ANGELES COUNTY HEALTH DISTRICTS

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

TABLES OF NOTIFIABLE DISEASES

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Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2008-2013

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2008	2009	2010	2011	2012	2013		
Amebiasis	115	107	119	86	99	57	105	128
Botulism	5	1	1	3	4	4	3	6
Brucellosis[b]	3	4	7	6	4	10	5	8
Campylobacteriosis[b]	1072	1135	1239	1259	1546	1703	1250	1570
Cholera	0	0	0	0	0	0	0	0
Coccidioidomycosis	228	171	235	304	327	362	253	363
Cryptosporidiosis	41	51	61	51	44	48	50	63
Cysticercosis	6	9	3	37	11	1	13	37
Dengue	0	2	1	0	2	2	1	3
E. *coli* O157:H7	16	17	12	21	19	12	17	23
E. *coli* Other Stec	15	23	55	65	78	90	47	95
Encephalitis	89	51	51	59	75	79	65	94
Foodborne Outbreaks	18	16	17	22	21	12	19	23
Giardiasis[b]	355	354	308	292	294	392	321	376
Haemophilus Influenzae Type B	0	2	0	0	0	0	0	2
Hansen's Disease (Leprosy)	1	3	2	2	3	1	2	4
Hepatitis A	80	66	51	45	47	60	58	84
Hepatitis B	66	41	54	60	38	55	52	73
Hepatitis C	5	8	4	10	7	5	7	11
Hepatitis Unspecified	4	19	5	4	0	0	6	19
Legionellosis	59	66	108	116	111	85	92	140
Listeriosis, Nonperinatal	20	15	14	19	26	23	19	27
Listeriosis, Perinatal	2	5	4	6	7	4	5	8
Lyme Disease[b]	9	4	5	6	1	11	5	10
Malaria	30	24	25	22	19	16	24	31
Measles	1	1	8	8	6	3	5	11
Meningitis, Viral	597	399	570	317	303	355	437	681
Meningococcal Infections	30	21	26	37	12	17	25	42
Mumps	7	7	20	3	13	9	10	22
Pertussis	80	156	972	453	154	296	363	1010
Pneumococcal Disease, Invasive[c]	658	785	576	658	504	522	636	820
Psittacosis	0	1	0	0	0	0	0	1
Q-fever	2	0	1	0	3	2	1	3
Relapsing Fever	0	0	0	0	0	0	0	0
Rheumatic Fever, Acute	1	1	1	0	0	0	1	2
Rubella	1	0	0	1	0	0	0	1
Salmonellosis	1638	1194	1142	900	1041	1010	1183	1670
Shigellosis	498	259	355	264	306	227	336	509
Staphylococcus Aureus Infection	25	27	28	44	24	26	30	44
Streptococcus, Group A Invasive	156	129	191	175	168	195	164	204
Strongyloidiasis[b]	0	0	0	0	0	11	0	0
Tetanus	2	0	0	0	0	1	0	2
Trichinosis	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0
Typhoid Fever, Case	14	17	15	15	6	17	13	21
Typhoid Fever, Carrier	4	1	4	3	0	0	2	6
Typhus Fever[b]	18	9	31	38	50	68	29	58
Vibrio	18	26	13	19	29	26	21	32
West Nile Virus	170	25	4	63	174	165	87	228

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

[b] 2013 data over 95% upper limit.

[c] by specimen collection date.

Table H. Annual Incidence Rates of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2008-2013

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2008	2009	2010	2011	2012	2013
Amebiasis	1.24	1.16	1.29	0.93	1.06	0.61
Botulism	0.05	0.01	0.01	0.03	0.04	0.04
Brucellosis	0.03	0.04	0.08	0.06	0.04	0.11
Campylobacteriosis	11.59	12.29	13.43	13.60	16.63	18.11
Cholera	-	-	-	-	-	-
Coccidioidomycosis	2.46	1.85	2.55	3.28	3.52	3.85
Cryptosporidiosis	0.44	0.55	0.66	0.55	0.47	0.51
Cysticercosis	0.06	0.10	0.03	0.40	0.12	0.01
Dengue	-	0.02	0.01	-	0.02	0.02
E. *coli* O157:H7	0.17	0.18	0.13	0.23	0.20	0.13
E. *coli* Other Stec	0.16	0.25	0.60	0.70	0.84	0.96
Encephalitis	0.96	0.55	0.55	0.64	0.81	0.84
Giardiasis	3.84	3.83	3.34	3.15	3.16	4.17
Haemophilus Influenzae Type B	-	0.02	-	-	-	-
Hansen's Disease (Leprosy)	0.01	0.03	0.02	0.02	0.03	0.01
Hepatitis A	0.86	0.71	0.55	0.49	0.51	0.64
Hepatitis B	0.71	0.44	0.59	0.65	0.41	0.58
Hepatitis C	0.05	0.09	0.04	0.11	0.08	0.05
Hepatitis Unspecified	0.04	0.21	0.05	0.04	-	-
Legionellosis	0.64	0.71	1.17	1.25	1.19	0.90
Listeriosis, Nonperinatal	0.22	0.16	0.15	0.21	0.28	0.24
Listeriosis, Perinatal[a]	1.45	4.60	3.23	4.95	5.71	3.34
Lyme Disease	0.10	0.04	0.05	0.06	0.01	0.12
Malaria	0.32	0.26	0.27	0.24	0.20	0.17
Measles	0.01	0.01	0.09	0.09	0.06	0.03
Meningitis, Viral	6.45	4.32	6.18	3.42	3.26	3.77
Meningococcal Infections	0.32	0.23	0.28	0.40	0.13	0.18
Mumps	0.08	0.08	0.22	0.03	0.14	0.10
Pertussis	0.86	1.69	10.54	4.89	1.66	3.15
Pneumococcal Disease, Invasive	7.11	8.50	6.25	7.11	5.42	5.55
Psittacosis	-	0.01	-	-	-	-
Q-fever	0.02	-	0.01	-	0.03	0.02
Relapsing Fever	-	-	-	-	-	-
Rheumatic Fever, Acute	0.01	0.01	0.01	-	-	-
Rubella	0.01	-	-	0.01	-	-
Salmonellosis	17.71	12.93	12.38	9.72	11.2	10.74
Shigellosis	5.38	2.80	3.85	2.85	3.29	2.41
Staphylococcus Aureus Infection	0.27	0.29	0.30	0.48	0.26	0.28
Streptococcus, Group A Invasive	1.69	1.40	2.07	1.89	1.81	2.07
Strongyloidiasis	-	-	-	-	-	0.12
Tetanus	0.02	-	-	-	-	0.01
Trichinosis	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-
Typhoid Fever, Case	0.15	0.18	0.16	0.16	0.06	0.18
Typhoid Fever, Carrier	0.04	0.01	0.04	0.03	-	-
Typhus Fever	0.19	0.10	0.34	0.41	0.54	0.72
Vibrio	0.19	0.28	0.14	0.21	0.31	0.28
West Nile Virus	1.84	0.27	0.04	0.68	1.87	1.75

[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, 2009-2013

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	7.0	6.8	10.6	5.6	7.6	8.4	7.6	7.2	6.6	7.8	7.2	9.2	93.6
Botulism	0.4	-	-	-	0.4	0.2	0.4	-	-	0.2	0.2	0.2	2.0
Brucellosis	0.6	0.2	0.2	0.8	0.6	-	-	0.4	0.2	-	-	0.2	6.2
Campylobacteriosis	58.2	31.0	33.6	42.0	47.2	55.8	66.6	72.2	62.6	60.2	57.8	38.0	1376.0
Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-
Coccidioidomycosis	25.4	21.4	16.8	16.8	25.0	27.0	26.2	26.8	20.8	24.4	25.0	24.2	279.8
Cryptosporidiosis	3.0	3.0	3.4	5.4	3.0	3.8	4.0	7.6	3.0	2.8	2.2	2.6	51.0
Cysticercosis	-	0.4	0.6	0.6	0.2	0.4	0.6	-	-	0.2	-	0.2	3.6
Dengue	-	-	-	-	-	0.4	0.4	-	-	0.4	-	0.2	1.4
E. *coli* O157:H7	0.8	0.4	0.8	1.2	1.0	2.4	3.4	2.0	1.2	1.4	0.6	0.8	16.4
E. *coli* Other Stec[a]	3.0	3.0	4.0	5.0	6.0	6.4	7.8	9.0	6.6	5.2	2.4	1.8	60.4
Encephalitis	2.6	3.2	4.4	1.4	2.4	2.6	5.2	7.4	13.6	5.4	3.8	2.6	63.0
Giardiasis	25.8	21.4	24.6	23.4	28.4	25.0	29.4	32.4	34.2	25.6	22.2	24.2	328.0
Haemophilus Influenzae Type B	0.2	-	-	-	-	-	-	-	-	-	-	0.2	0.4
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	3.6	4.4	3.4	3.2	6.2	5.8	4.6	5.6	5.2	4.6	4.2	3.0	53.8
Hepatitis B	4.8	3.2	4.4	4.4	5.4	3.8	4.0	4.4	4.0	4.0	4.4	2.8	49.6
Hepatitis C	0.6	0.6	0.6	0.6	0.2	1.2	0.2	0.6	0.6	1.4	0.2	-	6.8
Hepatitis Unspecified	0.4	0.2	0.2	-	0.2	0.4	0.2	-	-	-	-	-	5.6
Legionellosis	8.6	7.6	8.0	7.0	5.0	7.8	9.4	5.2	7.0	7.4	8.2	16.0	97.2
Listeriosis, Nonperinatal	1.0	0.8	0.8	0.6	2.2	2.0	1.4	3.4	2.4	1.8	1.6	1.0	19.4
Listeriosis, Perinatal	0.8	0.8	0.0	0.2	0.4	0.2	0.2	0.8	1.0	0.2	0.2	0.4	5.2
Lyme Disease	0.2	-	0.2	0.2	0.6	1.0	1.4	1.4	0.2	0.2	-	-	5.4
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	0.2	-	1.0	1.0	0.6	0.4	0.4	0.8	0.6	-	0.2	-	5.2
Meningitis, Viral	20.4	13.2	19.4	21.2	22.6	25.6	39.2	50.0	54.0	43.0	30.2	21.0	388.8
Meningococcal Infections	1.8	2.6	2.4	2.6	1.8	1.6	1.4	2.0	1.0	0.8	1.8	2.8	22.6
Mumps	0.2	1.0	0.8	1.4	1.6	1.4	1.0	0.4	0.4	0.6	0.4	1.2	10.4
Pertussis	25.6	20.2	21.8	22.6	24.6	34.6	53.6	51.2	44.6	36.4	36.6	34.4	406.2
Pneumococcal Disease, Invasive[b]	94.4	95.2	73.6	50.2	41.4	36.8	23.6	19.0	22.8	30.0	48.8	73.2	609.0
Psittacosis	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
Q-fever	0.2	-	-	0.6	-	-	-	-	-	-	-	-	1.2
Relapsing Fever	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	0.2	-	-	-	-	-	-	-	-	-	0.2	0.4
Rubella	-	-	-	0.2	-	-	-	-	-	-	-	-	0.2
Salmonellosis	60.0	57.4	57.6	73.0	108.4	96.8	119.4	130.6	112.4	90.4	64.8	56.8	1057.4
Shigellosis	16.2	15.8	13.8	14.6	19.6	18.0	28.8	41.4	36.4	28.2	22.6	17.6	282.2
Staphylococcus Aureus Infection	2.8	2.8	2.8	1.6	1.4	1.4	1.0	2.0	2.4	2.0	2.6	1.4	24.4
Streptococcus, Group A Invasive	19.8	14.8	21.4	15.6	14.2	14.6	9.6	8.6	9.2	10.8	11.6	16.6	167.8
Strongyloidiasis	-	-	-	-	-	0.8	-	1.0	-	-	0.2	0.2	2.2
Tetanus	-	-	-	-	0.2	-	-	-	-	-	-	-	0.2
Trichinosis	-	-	-	-	-	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-	-	-	-	-	-
Typhoid Fever, Case	1.4	1.6	0.6	2.0	1.6	1.6	0.4	1.4	0.4	0.8	1.6	0.4	14.0
Typhoid Fever, Carrier	-	0.2	0.2	0.2	0.6	-	0.2	-	-	-	-	-	1.6
Typhus Fever	3.0	0.6	0.2	0.2	3.2	2.8	3.8	6.0	5.6	5.6	5.0	3.2	39.2
Vibrio	0.8	-	0.6	1.6	1.2	1.6	4.2	4.8	4.0	1.2	1.0	0.6	22.6
West Nile Virus	-	-	-	-	0.2	0.4	11.0	22.8	38.6	11.8	1.4	-	86.2

[a] Not applicable.

[b] Specimen collection date.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2013

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	0	0	0	18	13	21	3	2	57
Botulism	0	0	0	0	0	2	2	0	4
Brucellosis	0	0	1	2	0	1	2	4	10
Campylobacteriosis	45	159	173	495	182	185	177	281	1703
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	1	0	6	67	55	86	73	74	362
Cryptosporidiosis	0	1	2	16	8	14	2	5	48
Cysticercosis	0	0	0	0	0	0	1	0	1
Dengue	0	0	0	2	0	0	0	0	2
E. *coli* O157:H7	0	2	0	7	1	0	0	2	12
E. *coli* Other Stec	5	41	17	17	3	3	1	3	90
Encephalitis	1	4	7	6	1	13	19	28	79
Giardiasis	3	20	41	114	65	72	51	26	392
Haemophilus Influenzae Type B	0	0	0	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	1	0	0	0	1
Hepatitis A	0	0	2	22	12	8	13	3	60
Hepatitis B	0	0	0	20	15	12	5	3	55
Hepatitis C	0	0	0	2	1	1	1	0	5
Hepatitis Unspecified	0	0	0	0	0	0	0	0	0
Legionellosis	0	0	0	3	4	12	19	47	85
Listeriosis, Nonperinatal	0	0	0	0	1	3	3	16	23
Listeriosis, Perinatal[b]	0	0	0	4	0	0	0	0	4
Lyme Disease	0	1	3	5	0	1	1	0	11
Malaria	0	0	2	6	2	3	2	1	16
Measles	0	0	0	1	0	1	1	0	3
Meningitis, Viral	43	9	57	105	27	44	35	31	355
Meningococcal Infections	0	0	1	7	3	2	1	3	17
Mumps	0	1	0	3	1	2	1	1	9
Pertussis	59	33	88	75	15	13	6	7	296
Pneumococcal Disease, Invasive	6	24	23	32	39	62	108	228	522
Psittacosis	0	0	0	0	0	0	0	0	0
Q-fever	0	0	0	0	0	1	0	1	2
Relapsing Fever	0	0	0	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	59	141	185	227	89	82	84	143	1010
Shigellosis	1	26	49	55	31	30	19	15	227
Staphylococcus Aureus Infection	1	0	0	7	2	6	5	5	26
Streptococcus, Group A Invasive	5	4	10	29	20	41	31	54	195
Strongyloidiasis	0	0	0	0	5	3	1	2	11
Tetanus	0	0	0	0	0	0	0	1	1
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	3	7	1	2	1	0	17
Typhoid Fever, Carrier	0	0	0	0	0	0	0	0	0
Typhus Fever	0	1	5	16	12	13	13	8	68
Vibrio	0	0	3	4	7	6	2	4	26
West Nile Virus	0	0	6	19	15	34	46	45	165

[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, 2013

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	-	-	-	0.6	1.0	1.6	0.3	0.2
Botulism	-	-	-	-	-	0.2	0.2	-
Brucellosis	-	-	0.1	0.1	-	0.1	0.2	0.4
Campylobacteriosis	37.2	32.7	14.3	17.5	13.7	14.3	17.2	25.3
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	0.8	-	0.5	2.4	4.1	6.7	7.1	6.7
Cryptosporidiosis	-	0.2	0.2	0.6	0.6	1.1	0.2	0.5
Cysticercosis	-	-	-	-	-	-	0.1	-
Dengue	-	-	-	0.1	-	-	-	-
E. *coli* O157:H7	-	0.4	-	0.2	0.1	-	-	0.2
E. *coli* Other Stec	4.1	8.4	1.4	0.6	0.2	0.2	0.1	0.3
Encephalitis	0.8	0.8	0.6	0.2	0.1	1.0	1.9	2.5
Giardiasis	2.5	4.1	3.4	4.0	4.9	5.6	5.0	2.3
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-	0.1	-	-	-
Hepatitis A	-	-	0.2	0.8	0.9	0.6	1.3	0.3
Hepatitis B	-	-	-	0.7	1.1	0.9	0.5	0.3
Hepatitis C	-	-	-	0.1	0.1	0.1	0.1	-
Hepatitis Unspecified	-	-	-	-	-	-	-	-
Legionellosis	-	-	-	0.1	0.3	0.9	1.9	4.2
Listeriosis, Nonperinatal	-	-	-	-	0.1	0.2	0.3	1.4
Listeriosis, Perinatal[a]	-	-	-	4.3	-	-	-	-
Lyme Disease	-	0.2	0.2	0.2	-	0.1	0.1	-
Malaria	-	-	0.2	0.2	0.2	0.2	0.2	0.1
Measles	-	-	-	-	-	0.1	0.1	-
Meningitis, Viral	35.6	1.8	4.7	3.7	2.0	3.4	3.4	2.8
Meningococcal Infections	-	-	0.1	0.2	0.2	0.2	0.1	0.3
Mumps	-	0.2	-	0.1	0.1	0.2	0.1	0.1
Pertussis	48.8	6.8	7.3	2.6	1.1	1.0	0.6	0.6
Pneumococcal Disease, Invasive	5.0	4.9	1.9	1.1	2.9	4.8	10.5	20.6
Psittacosis	-	-	-	-	-	-	-	-
Q-fever	-	-	-	-	-	0.1	-	0.1
Relapsing Fever	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-	-	-	-	-
Rubella	-	-	-	-	-	-	-	-
Salmonellosis	48.8	29.0	15.3	8.0	6.7	6.3	8.2	12.9
Shigellosis	0.8	5.3	4.1	1.9	2.3	2.3	1.9	1.4
Staphylococcus Aureus Infection	0.8	-	-	0.2	0.2	0.5	0.5	0.5
Streptococcus, Group A Invasive	4.1	0.8	0.8	1.0	1.5	3.2	3.0	4.9
Strongyloidiasis	-	-	-	-	0.4	0.2	0.1	0.2
Tetanus	-	-	-	-	-	-	-	0.1
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	-	0.6	0.2	0.2	0.1	0.2	0.1	-
Typhoid Fever, Carrier	-	-	-	-	-	-	-	-
Typhus Fever	-	0.2	0.4	0.6	0.9	1.0	1.3	0.7
Vibrio	-	-	0.2	0.1	0.5	0.5	0.2	0.4
West Nile Virus	-	-	0.5	0.7	1.1	2.6	4.5	4.1

[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 L. Number of Cases of Selected Notifiable Diseases by Race/Ethnicity
Los Angeles County, 2013

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	3	2	17	34	0	1
Botulism	0	0	2	0	0	2
Brucellosis	1	0	3	2	1	3
Campylobacteriosis	46	46	167	386	32	1025
Cholera	0	0	0	0	0	0
Coccidioidomycosis	30	50	104	132	5	41
Cryptosporidiosis	2	12	7	24	2	1
Cysticercosis	0	0	1	0	0	0
Dengue	1	0	0	1	0	0
E. *coli* O157:H7	0	0	4	8	0	0
E. *coli* Other Stec	2	5	53	28	0	2
Encephalitis	6	2	20	36	3	12
Giardiasis	25	27	124	210	2	4
Haemophilus Influenzae Type B	0	0	0	0	0	0
Hansen's Disease (Leprosy)	1	0	0	0	0	0
Hepatitis A	15	1	18	26	0	0
Hepatitis B	6	12	21	15	0	1
Hepatitis C	0	0	1	4	0	0
Hepatitis Unspecified	0	0	0	0	0	0
Legionellosis	7	16	24	34	1	3
Listeriosis, Nonperinatal	7	1	8	6	0	0
Listeriosis, Perinatal[b]	0	0	3	1	0	0
Lyme Disease	0	0	0	8	1	1
Malaria	4	8	0	0	1	3
Measles	0	0	0	3	0	0
Meningitis, Viral	21	26	158	88	19	43
Meningococcal Infections	0	4	6	6	1	0
Mumps	2	1	2	3	0	1
Pertussis	8	5	146	129	1	7
Pneumococcal Disease, Invasive	32	95	206	171	3	8
Psittacosis	0	0	0	0	0	0
Q-fever	0	0	0	0	0	2
Relapsing Fever	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	0	0	0
Rubella	0	0	0	0	0	0
Salmonellosis	73	69	538	318	5	6
Shigellosis	5	25	107	82	2	6
Staphylococcus Aureus Infection	3	5	10	8	0	0
Streptococcus, Group A Invasive	8	29	29	50	5	74
Strongyloidiasis	1	0	1	0	1	8
Tetanus	0	0	0	1	0	0
Trichinosis	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0
Typhoid Fever, Case	12	0	5	0	0	0
Typhoid Fever, Carrier	0	0	0	0	0	0
Typhus Fever	3	1	24	35	1	4
Vibrio	3	0	6	15	0	2
West Nile Virus	6	3	50	80	2	24

[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, 2013

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.2	0.3	0.4	1.3
Botulism	-	-	-	-
Brucellosis	0.1	-	0.1	0.1
Campylobacteriosis	3.4	5.9	3.6	14.5
Cholera	-	-	-	-
Coccidioidomycosis	2.2	6.4	2.3	5.0
Cryptosporidiosis	0.1	1.5	0.2	0.9
Cysticercosis	-	-	-	-
Dengue	0.1	-	-	-
E. *coli* O157:H7	-	-	0.1	0.3
E. *coli* Other Stec	0.1	0.6	1.2	1.1
Encephalitis	0.4	0.3	0.4	1.4
Giardiasis	1.8	3.5	2.7	7.9
Haemophilus Influenzae Type B	-	-	-	-
Hansen's Disease (Leprosy)	0.1	-	-	-
Hepatitis A	1.1	0.1	0.4	1.0
Hepatitis B	0.4	1.5	0.5	0.6
Hepatitis C	-	-	-	0.2
Hepatitis Unspecified	-	-	-	-
Legionellosis	0.5	2.1	0.5	1.3
Listeriosis, Nonperinatal	0.5	0.1	0.2	0.2
Listeriosis, Perinatal[a]	-	-	4.4	4.5
Lyme Disease	-	-	-	0.3
Malaria	0.3	1.0	-	-
Measles	-	-	-	0.1
Meningitis, Viral	1.5	3.3	3.4	3.3
Meningococcal Infections	-	0.5	0.1	0.2
Mumps	0.1	0.1	-	0.1
Pertussis	0.6	0.6	3.2	4.9
Pneumococcal Disease, Invasive	2.3	12.2	4.5	6.4
Psittacosis	-	-	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-
Rubella	-	-	-	-
Salmonellosis	5.3	8.9	11.7	12.0
Shigellosis	0.4	3.2	2.3	3.1
Staphylococcus Aureus Infection	0.2	0.6	0.2	0.3
Streptococcus, Group A Invasive	0.6	3.7	0.6	1.9
Strongyloidiasis	0.1	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.9	-	0.1	-
Typhoid Fever, Carrier	-	-	-	-
Typhus Fever	0.2	0.1	0.5	1.3
Vibrio	0.2	-	0.1	0.6
West Nile Virus	0.4	0.4	1.1	3.0

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

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

Table N. Number of Cases and Annual Incidence Rate of Selected Notifiable Diseases by Sex
Los Angeles County, 2013

Disease	Male		Female	
	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	47	1.0	10	0.2
Botulism	3	0.1	1	0.0
Brucellosis	4	0.1	5	0.1
Campylobacteriosis	882	19.0	808	17.0
Cholera	0	-	0	-
Coccidioidomycosis	244	5.3	118	2.5
Cryptosporidiosis	38	0.8	10	0.2
Cysticercosis	0	-	1	0.0
Dengue	0	-	2	0.0
E. *coli* O157:H7	5	0.1	7	0.1
E. *coli* Other Stec	46	1.0	44	0.9
Encephalitis	54	1.2	25	0.5
Giardiasis	258	5.6	134	2.8
Haemophilus Influenzae Type B	0	-	0	-
Hansen's Disease (Leprosy)	1	-	0.0	-
Hepatitis A	28	0.6	32	0.7
Hepatitis B	40	0.9	15	0.3
Hepatitis C	2	0.0	3	0.1
Hepatitis Unspecified	0	-	0	-
Legionellosis	57	1.2	28	0.6
Listeriosis, Nonperinatal	10	0.2	13	0.3
Listeriosis, Perinatal[a]	0	-	4	6.9
Lyme Disease	5	0.1	6	0.1
Malaria	7	0.2	9	0.2
Measles	1	0.0	2	0.0
Meningitis, Viral	194	4.2	159	3.3
Meningococcal Infections	14	0.3	3	0.1
Mumps	6	0.1	3	0.1
Pertussis	150	3.2	146	3.1
Pneumococcal Disease, Invasive	288	6.2	234	4.9
Psittacosis	0	-	0	-
Q-fever	2	0.0	0	-
Relapsing Fever	0	-	0	-
Rheumatic Fever, Acute	0	-	0	-
Rubella	0	-	0	-
Salmonellosis	497	10.7	513	10.8
Shigellosis	131	2.8	96	2.0
Staphylococcus Aureus Infection	18	0.4	8	0.2
Streptococcus, Group A Invasive	103	2.2	89	1.9
Strongyloidiasis	7	0.2	4	0.1
Tetanus	0	-	1	0.0
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	8	0.2	8	0.2
Typhoid Fever, Carrier	0	-	0	-
Typhus Fever	31	0.7	37	0.8
Vibrio	21	0.5	5	0.1
West Nile Virus	116	2.5	49	1.0

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

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

Table O-1. Selected Notifiable Diseases
SPA 1. Antelope Valley Area
Los Angeles County, 2013

Disease	Frequency	Rate (Cases per 100,000)[b]
	Antelope	Antelope
Amebiasis	1	0.3
Botulism	0	-
Brucellosis	1	0.3
Campylobacteriosis	41	10.5
Cholera	0	-
Coccidioidomycosis	74	18.9
Cryptosporidiosis	4	1.0
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	0	-
E. *coli* Other Stec	5	1.3
Encephalitis	6	1.5
Giardiasis	9	2.3
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	3	0.8
Hepatitis B	1	0.3
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Legionellosis	2	0.5
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	2	0.5
Measles	0	-
Meningitis, Viral	29	7.4
Meningococcal Infections	0	-
Mumps	1	0.3
Pertussis	14	3.6
Pneumococcal Disease, Invasive	17	4.3
Psittacosis	0	-
Q-fever	1	0.3
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	40	10.2
Shigellosis	4	1.0
Staphylococcus Aureus Infection	1	0.3
Streptococcus, Group A Invasive	4	1.0
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	0	-
West Nile Virus	15	3.8

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

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

Table O-2. Selected Notifiable Diseases
SPA 2. San Fernando Area
Los Angeles County, 2013

Disease	Frequency					Rate (Cases per 100,000)[b]				
	EV	GL	SF	WV	TOTAL	EV	GL	SF	WV	TOTAL
Amebiasis	6	8	1	6	21	1.3	2.3	0.2	0.7	1.0
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	1	1	0	2	-	0.3	0.2	-	0.1
Campylobacteriosis	88	56	97	160	401	19.5	16.4	19.2	18.3	18.4
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	17	6	28	32	83	3.8	1.8	5.5	3.7	3.8
Cryptosporidiosis	4	0	6	5	15	0.9	-	1.2	0.6	0.7
Cysticercosis	0	0	1	0	1	-	-	0.2	-	-
Dengue	0	0	1	0	1	-	-	0.2	-	-
E. *coli* O157:H7	0	1	1	1	3	-	0.3	0.2	0.1	0.1
E. *coli* Other Stec	6	1	6	13	26	1.3	0.3	1.2	1.5	1.2
Encephalitis	7	3	4	13	27	1.6	0.9	0.8	1.5	1.2
Giardiasis	14	18	21	42	95	3.1	5.3	4.1	4.8	4.4
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	1	0	0	1	-	0.3	-	-	0.0
Hepatitis A	3	5	2	7	17	0.7	1.5	0.4	0.8	0.8
Hepatitis B	3	2	2	2	9	0.7	0.6	0.4	0.2	0.4
Hepatitis C	1	0	0	0	1	0.2	-	-	-	0.0
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	5	2	2	18	27	1.1	0.6	0.4	2.1	1.2
Listeriosis, Nonperinatal	2	0	2	3	7	0.4	-	0.4	0.3	0.3
Listeriosis, Perinatal[a]	0	0	0	1	1	-	-	-	0.5	0.2
Lyme Disease	0	1	0	2	3	-	0.3	-	0.2	0.1
Malaria	1	0	0	1	2	0.2	-	-	0.1	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	15	4	13	35	67	3.3	1.2	2.6	4.0	3.1
Meningococcal Infections	1	2	0	2	5	0.2	0.6	-	0.2	0.2
Mumps	0	0	1	0	1	-	-	0.2	-	0.0
Pertussis	13	14	73	21	121	2.9	4.1	14.4	2.4	5.6
Pneumococcal Disease, Invasive	33	17	20	30	100	7.3	5.0	4.0	3.4	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	43	31	60	128	262	9.5	9.1	11.9	14.6	12.1
Shigellosis	12	7	8	12	39	2.7	2.1	1.6	1.4	1.8
Staphylococcus Aureus Infection	1	0	2	3	6	0.2	-	0.4	0.3	0.3
Streptococcus, Group A Invasive	12	7	9	10	38	2.7	2.1	1.8	1.1	1.7
Strongyloidiasis	0	0	1	0	1	-	-	0.2	-	0.0
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	1	0	0	2	0.2	0.3	-	-	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	3	3	0	0	6	0.7	0.9	-	-	0.3
Vibrio	2	1	2	2	7	0.4	0.3	0.4	0.2	0.3
West Nile Virus	22	4	5	31	62	4.9	1.2	1.0	3.5	2.9

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

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

Table O-3. Selected Notifiable Diseases
SPA 3. San Gabriel Area
Los Angeles County, 2013

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**AH**	**EM**	**FH**	**PO**	**TOTAL**	**AH**	**EM**	**FH**	**PO**	**TOTAL**
Amebiasis	0	2	0	3	5	-	0.5	-	0.6	0.3
Botulism	0	2	0	1	3	-	0.5	-	0.2	0.2
Brucellosis	0	0	0	0	0	-	-	-	-	-
Campylobacteriosis	50	54	47	69	220	14.4	12.3	15.3	12.7	13.5
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	6	19	4	9	38	1.7	4.3	1.3	1.7	2.3
Cryptosporidiosis	0	0	1	3	4	-	-	0.3	0.6	0.2
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	1	1	-	-	-	0.2	0.1
E. *coli* Other Stec	0	1	5	5	11	-	0.2	1.6	0.9	0.7
Encephalitis	4	2	1	4	11	1.2	0.5	0.3	0.7	0.7
Giardiasis	12	10	11	17	50	3.5	2.3	3.6	3.1	3.1
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	2	1	2	0	5	0.6	0.2	0.7	-	0.3
Hepatitis B	2	1	2	4	9	0.6	0.2	0.7	0.7	0.6
Hepatitis C	0	0	1	0	1	-	-	0.3	-	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	0	3	0	5	8	-	0.7	-	0.9	0.5
Listeriosis, Nonperinatal	1	0	0	1	2	0.3	-	-	0.2	0.1
Listeriosis, Perinatal[a]	1	0	0	0	1	1.4	-	-	-	0.3
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	1	0	1	-	-	0.3	-	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	9	15	23	17	64	2.6	3.4	7.5	3.1	3.9
Meningococcal Infections	1	0	0	0	1	0.3	-	-	-	0.1
Mumps	0	0	1	1	2	-	-	0.3	0.2	0.1
Pertussis	2	5	8	12	27	0.6	1.1	2.6	2.2	1.7
Pneumococcal Disease, Invasive	12	17	21	24	74	3.5	3.9	6.9	4.4	4.5
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	33	38	28	56	155	9.5	8.7	9.1	10.3	9.5
Shigellosis	7	3	3	3	16	2.0	0.7	1.0	0.6	1.0
Staphylococcus Aureus Infection	0	0	0	1	1	-	-	-	0.2	0.1
Streptococcus, Group A Invasive	4	8	4	7	23	1.2	1.8	1.3	1.3	1.4
Strongyloidiasis	1	0	0	0	1	0.3	-	-	-	0.1
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	1	5	6	-	-	0.3	0.9	0.4
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	8	1	9	2	20	2.3	0.2	2.9	0.4	1.2
Vibrio	1	0	0	2	3	0.3	-	-	0.4	0.2
West Nile Virus	4	2	6	11	23	1.2	0.5	2.0	2.0	1.4

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

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

Table O-4. Selected Notifiable Diseases
SPA 4. Metro Area
Los Angeles County, 2013

Disease	Frequency				Rate (Cases per 100,000)[b]			
	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	6	7	0	13	1.7	1.4	-	1.1
Botulism	0	0	0	0	-	-	-	-
Brucellosis	2	0	0	2	0.6	-	-	0.2
Campylobacteriosis	68	166	58	292	19.8	33.9	18.8	25.6
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	21	13	12	46	6.1	2.7	3.9	4.0
Cryptosporidiosis	0	4	2	6	-	0.8	0.6	0.5
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	1	0	1	-	0.2	-	0.1
E. *coli* Other Stec	4	4	2	10	1.2	0.8	0.6	0.9
Encephalitis	0	2	1	3	-	0.4	0.3	0.3
Giardiasis	21	34	16	71	6.1	6.9	5.2	6.2
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	2	3	3	8	0.6	0.6	1.0	0.7
Hepatitis B	3	3	3	9	0.9	0.6	1.0	0.8
Hepatitis C	0	0	0	0	-	-	-	-
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Legionellosis	1	14	3	18	0.3	2.9	1.0	1.6
Listeriosis, Nonperinatal	0	2	2	4	-	0.4	0.6	0.4
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	1	1	0	2	0.3	0.2	-	0.2
Malaria	0	1	0	1	-	0.2	-	0.1
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	8	10	14	32	2.3	2.0	4.5	2.8
Meningococcal Infections	1	2	1	4	0.3	0.4	0.3	0.4
Mumps	0	0	0	0	-	-	-	-
Pertussis	8	5	6	19	2.3	1.0	1.9	1.7
Pneumococcal Disease, Invasive	32	20	19	71	9.3	4.1	6.2	6.2
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	32	31	43	106	9.3	6.3	14.0	9.3
Shigellosis	6	33	19	58	1.7	6.7	6.2	5.1
Staphylococcus Aureus Infection	1	2	1	4	0.3	0.4	0.3	0.4
Streptococcus, Group A Invasive	14	11	8	33	4.1	2.2	2.6	2.9
Strongyloidiasis	1	0	0	1	0.3	-	-	0.1
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	1	1	1	3	0.3	0.2	0.3	0.3
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	6	4	8	18	1.7	0.8	2.6	1.6
Vibrio	0	5	0	5	-	1.0	-	0.4
West Nile Virus	2	3	1	6	0.6	0.6	0.3	0.5

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

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

Table O-5. Selected Notifiable Diseases
SPA 5. West Area
Los Angeles County, 2013

Disease	Frequency	Rate (Cases per 100,000)[b]
	West	West
Amebiasis	8	1.2
Botulism	0	-
Brucellosis	1	0.2
Campylobacteriosis	218	33.7
Cholera	0	-
Coccidioidomycosis	22	3.4
Cryptosporidiosis	6	0.9
Cysticercosis	0	-
Dengue	1	0.2
E. *coli* O157:H7	5	0.8
E. *coli* Other Stec	7	1.1
Encephalitis	2	0.3
Giardiasis	49	7.6
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	9	1.4
Hepatitis B	7	1.1
Hepatitis C	1	0.2
Hepatitis Unspecified	0	-
Legionellosis	6	0.9
Listeriosis, Nonperinatal	1	0.2
Listeriosis, Perinatal[a]	0	-
Lyme Disease	4	0.6
Malaria	1	0.2
Measles	3	0.5
Meningitis, Viral	7	1.1
Meningococcal Infections	2	0.3
Mumps	2	0.3
Pertussis	19	2.9
Pneumococcal Disease, Invasive	20	3.1
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	74	11.4
Shigellosis	18	2.8
Staphylococcus Aureus Infection	2	0.3
Streptococcus, Group A Invasive	18	2.8
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	2	0.3
Typhoid Fever, Carrier	0	-
Typhus Fever	5	0.8
Vibrio	5	0.8
West Nile Virus	2	0.3

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

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

Table O-6. Selected Notifiable Diseases
SPA 6. South Area
Los Angeles County, 2013

Disease	Frequency					Rate (Cases per 100,000)[b]				
	CN	SO	SE	SW	TOTAL	CN	SO	SE	SW	TOTAL
Amebiasis	1	0	1	1	3	0.4	-	0.6	0.3	0.3
Botulism	0	0	1	0	1	-	-	0.6	-	0.1
Brucellosis	1	0	0	1	2	0.4	-	-	0.3	0.2
Campylobacteriosis	42	33	35	65	175	14.8	17.1	20.1	17.1	17.0
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	4	10	7	17	38	1.4	5.2	4.0	4.5	3.7
Cryptosporidiosis	1	1	1	2	5	0.4	0.5	0.6	0.5	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	5	0	3	5	13	1.8	-	1.7	1.3	1.3
Encephalitis	2	1	0	0	3	0.7	0.5	-	-	0.3
Giardiasis	7	3	15	14	39	2.5	1.6	8.6	3.7	3.8
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	0	0	0	1	1	-	-	-	0.3	0.1
Hepatitis B	3	2	0	5	10	1.1	1.0	-	1.3	1.0
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	2	0	1	6	9	0.7	-	0.6	1.6	0.9
Listeriosis, Nonperinatal	2	0	0	0	2	0.7	-	-	-	0.2
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	1	0	0	0	1	0.4	-	-	-	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	16	11	3	13	43	5.6	5.7	1.7	3.4	4.2
Meningococcal Infections	0	0	1	0	1	-	-	0.6	-	0.1
Mumps	1	0	0	0	1	0.4	-	-	-	0.1
Pertussis	9	8	5	2	24	3.2	4.2	2.9	0.5	2.3
Pneumococcal Disease, Invasive	18	19	15	25	77	6.3	9.9	8.6	6.6	7.5
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	1	0	0	0	1	0.4	-	-	-	0.1
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	39	7	27	36	109	13.7	3.6	15.5	9.5	10.6
Shigellosis	12	5	10	17	44	4.2	2.6	5.7	4.5	4.3
Staphylococcus Aureus Infection	0	1	0	4	5	-	0.5	-	1.1	0.5
Streptococcus, Group A Invasive	6	7	2	8	23	2.1	3.6	1.1	2.1	2.2
Strongyloidiasis	0	0	1	0	1	-	-	0.6	-	0.1
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	0	1	1	-	-	-	0.3	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	2	2	1	2	7	0.7	1.0	0.6	0.5	0.7
Vibrio	1	0	1	0	2	0.4	-	0.6	-	0.2
West Nile Virus	3	1	0	0	4	1.1	0.5	-	-	0.4

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

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

Table O-7. Selected Notifiable Diseases
SPA 7. East Area
Los Angeles County, 2013

Disease	Frequency					Rate (Cases per 100,000)[b]				
	BF	EL	SA	WH	TOTAL	BF	EL	SA	WH	TOTAL
Amebiasis	1	0	0	2	3	0.3	-	-	0.6	0.2
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	1	1	-	-	-	0.3	0.1
Campylobacteriosis	44	35	54	47	180	12.3	17.1	12.7	14.6	13.7
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	4	5	18	2	29	1.1	2.4	4.2	0.6	2.2
Cryptosporidiosis	1	1	1	0	3	0.3	0.5	0.2	-	0.2
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	1	1	-	-	-	0.3	0.1
E. *coli* Other Stec	6	3	2	1	12	1.7	1.5	0.5	0.3	0.9
Encephalitis	6	1	2	2	11	1.7	0.5	0.5	0.6	0.8
Giardiasis	11	7	10	14	42	3.1	3.4	2.4	4.4	3.2
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	4	0	2	6	12	1.1	-	0.5	1.9	0.9
Hepatitis B	2	1	2	1	6	0.6	0.5	0.5	0.3	0.5
Hepatitis C	0	0	1	0	1	-	-	0.2	-	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	0	0	0	3	3	-	-	-	0.9	0.2
Listeriosis, Nonperinatal	2	0	2	1	5	0.6	-	0.5	0.3	0.4
Listeriosis, Perinatal[a]	0	0	1	0	1	-	-	1.0	-	0.3
Lyme Disease	0	0	0	1	1	-	-	-	0.3	0.1
Malaria	0	0	1	1	2	-	-	0.2	0.3	0.2
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	20	3	16	17	56	5.6	1.5	3.8	5.3	4.3
Meningococcal Infections	0	1	1	1	3	-	0.5	0.2	0.3	0.2
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	10	5	16	8	39	2.8	2.4	3.8	2.5	3.0
Pneumococcal Disease, Invasive	16	13	24	17	70	4.5	6.3	5.6	5.3	5.3
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	43	27	50	35	155	12.0	13.2	11.8	10.9	11.8
Shigellosis	5	6	16	6	33	1.4	2.9	3.8	1.9	2.5
Staphylococcus Aureus Infection	0	0	1	2	3	-	-	0.2	0.6	0.2
Streptococcus, Group A Invasive	4	3	4	5	16	1.1	1.5	0.9	1.6	1.2
Strongyloidiasis	0	0	1	0	1	-	-	0.2	-	0.1
Tetanus	1	0	0	0	1	0.3	-	-	-	0.1
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	2	1	0	1	4	0.6	0.5	-	0.3	0.3
Vibrio	0	0	0	0	0	-	-	-	-	-
West Nile Virus	11	2	6	5	24	3.1	1.0	1.4	1.6	1.8

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

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

Table O-8. Selected Notifiable Diseases
SPA 8. South Bay Area
Los Angeles County, 2013

Disease	Frequency				Rate (Cases per 100,000)[b]			
	HB	IW	TO	TOTAL	HB	IW	TO	TOTAL
Amebiasis	1	1	1	3	0.5	0.2	0.2	0.3
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	1	0	1	-	0.2	-	0.1
Campylobacteriosis	38	52	82	172	18.5	12.6	17.9	16.0
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	4	9	12	25	2.0	2.2	2.6	2.3
Cryptosporidiosis	2	2	1	5	1.0	0.5	0.2	0.5
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	1	0	1	-	0.2	-	0.1
E. *coli* Other Stec	1	1	4	6	0.5	0.2	0.9	0.6
Encephalitis	4	3	6	13	2.0	0.7	1.3	1.2
Giardiasis	8	12	17	37	3.9	2.9	3.7	3.4
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	1	1	3	5	0.5	0.2	0.7	0.5
Hepatitis B	0	0	2	2	-	-	0.4	0.2
Hepatitis C	0	1	0	1	-	0.2	-	0.1
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Legionellosis	4	1	7	12	2.0	0.2	1.5	1.1
Listeriosis, Nonperinatal	0	1	1	2	-	0.2	0.2	0.2
Listeriosis, Perinatal[a]	0	0	1	1	-	-	1.1	0.4
Lyme Disease	0	1	0	1	-	0.2	-	0.1
Malaria	0	1	5	6	-	0.2	1.1	0.6
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	11	22	19	52	5.4	5.3	4.1	4.8
Meningococcal Infections	0	1	0	1	-	0.2	-	0.1
Mumps	1	0	1	2	0.5	-	0.2	0.2
Pertussis	11	6	16	33	5.4	1.4	3.5	3.1
Pneumococcal Disease, Invasive	14	35	25	74	6.8	8.5	5.5	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	18	44	47	109	8.8	10.6	10.2	10.1
Shigellosis	3	7	5	15	1.5	1.7	1.1	1.4
Staphylococcus Aureus Infection	1	0	1	2	0.5	-	0.2	0.2
Streptococcus, Group A Invasive	4	10	10	24	2.0	2.4	2.2	2.2
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	2	0	1	3	1.0	-	0.2	0.3
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	1	0	7	8	0.5	-	1.5	0.7
Vibrio	1	1	2	4	0.5	0.2	0.4	0.4
West Nile Virus	10	2	17	29	4.9	0.5	3.7	2.7

[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	57
Annual Incidence[a]	
LA County	0.61
California[b]	0.71
United States[c]	N/A
Age at Diagnosis	
Mean	41
Median	42
Range	21 - 81

[a]Cases per 100,000 population.
[b]http://www.cdph.ca.gov/data/statistics/Documents/ProvisionalIDBCaseCountsbyMonthandLHJ2013.pdf
[c]Not Notifiable

DESCRIPTION

Amebiasis is caused by the protozoan parasite *Entamoeba histolytica*. Cysts shed in human feces may contaminate food or drinking water. It is spread through food or water contaminated with fecal material. It can be spread from person to person, particularly by contact with the mouth or rectal area of an infected person. The incubation period for amebiasis 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.

Visual inspection of stool for ova and parasites in the microbiology laboratory cannot differentiate between pathogenic *E. histolytica* and non-pathogenic *E. dispar*. Many clinicians only obtain visual inspection of ova and parasites testing without pursuing more specific EIA stool antigen testing which can differentiate between *E. histolytica* and *E. dispar*. Many case reports lack complete testing with stool antigens, thus many infections may represent infection with the non-pathogenic *E. dispar*, thus leading to an overestimation of E. histolytica infection.

Cases of amebiasis are reportable at the state and local level and surveillance is enhanced through electronic laboratory reporting which captures EIA, microscopic or serologically confirmed amebiasis cases from selected participating hospital and commercial laboratories.

Clinicians frequently order stool inspection for ova and parasites for persons with enteric symptoms who have been involved in recreational activities (e.g., hiking), travelers, persons with HIV and men who have sex with men (MSM). Within LAC DPH, stool ova and parasite specimens are frequently collected on new refugees as part of established CDC health screening guidelines despite the lack of significant gastrointestinal symptoms..

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. There is no vaccine available for disease prevention.

2013 TRENDS AND HIGHLIGHTS

- In 2013, the LAC DPH's protocol changed to count only laboratory confirmed symptomatic infections as confirmed cases of Entamoeba histolytica.
- From 2012 to 2013, the overall incidence rate of amebiasis decreased from 1.06 to 0.61 cases per 100,000 population. This decrease is most likely due to the change in case definition of amebiasis.
- In 2013, (55, 96%) amebiasis cases were diagnosed by visual inspection of stool for ova and parasites with no EIA testing and (2, 4%) cases were identified by serology testing. Fifty five cases had intestinal amebiasis. Clinical and laboratory findings documented two cases with extraintestinal amebiasis with evidence of amoebic abscesses in the liver and appendix.
- The largest proportion of cases was in the 45 to 54 age group (21, 37%), consistent with previous years (Figure 2).

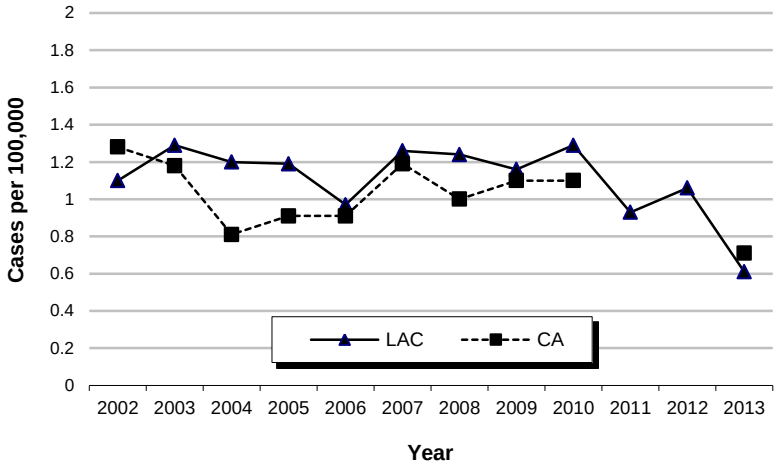
- A greater proportion of cases were reported among whites (34, 60%) and Hispanics (17, 30%). This was consistent with previous years.
- Service Planning Area (SPA) 2 had the largest proportion of reported amebiasis cases (21, 37%) compared to other SPAs. SPA 4 had the second largest proportion of cases (13, 23%) while SPA 5 had the highest incidence rate of amebiasis (1.2 cases per 100,000). About 50% of the reported cases in SPA 5 indicated travel as a risk factor. (Figure 4).
- The number of cases peaked in December (8, 14%) compared to the previous five-year average when cases peaked in March). The spike in numbers may be associatied with increased travel and high risk sexual behaviors that may occur during the holiday season as 50% of cases reported in December were MSM and the other 50% reported travel outside the US. (Figure 5).
- Consistent with previous years, males (47, 82%) comprised the majority of reported cases in 2013. The incidence rate of males was 5 times greater than females, with 1.0 and 0.2 cases per 100,000 for males and females respectively.
- Risk factor information was available for all cases reported in 2013. The most frequently reported risk factor was men who have sex with men (MSM) with (23, 40%) cases reported. This was consistent with 2012 which had (39, 40%) MSM cases reported. Immigration to the US was frequently reported as a risk factor (19, 33%), of which Iraq (4, 21%) and Mexico (3, 16%) were the most frequently reported countries of origin. Twenty (35%) cases were reported as having travelled to another country, of which Mexico was the most frequently reported destination (6, 30%).

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009 - 2013

	2009 (N=107)			2010 (N=119)			2011 (N=86)			2012 (N=99)			2013 (N=57)		
	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	1	1.1	0.	0	0	0.0	0	0	0
1-4	1	0.9	0.2	5	4.2	0.9	1	1.1	0.	1	1.0	0.2	0	0	0
5-14	6	5.6	0.4	8	6.7	0.6	4	4.7	0.	5	5.1	0.4	0	0	0
15-34	3	30.	1.2	38	31.	1.3	26	30.2	0.	33	33.3	1.2	18	31.6	0.6
35-44	2	21.	1.5	25	21	1.7	17	19.8	1.	24	24.2	1.8	13	22.8	1.0
45-54	2	20.	1.6	25	21	1.8	15	17.4	1.	18	18.2	1.4	21	36.8	1.6
55-64	1	13.	1.5	11	9.2	1.1	9	10.4	0.	9	9.1	0.9	3	5.3	0.3
65+	8	7.5	0.8	7	5.9	0.7	13	15.1	1.	9	9.1	0.8	2	3.5	0.2
Race/ Ethnicity															
Asian	7	6.1	0.5	2	1.9	0.2	1	1.1	0.	6	6.1	0.5	3	5.3	0.2
Black	3	2.6	0.4	0	0.0	0.0	7	8.1	0.	4	4.0	0.5	2	3.5	0.3
Hispanic	3	31.	0.8	37	34.	0.8	40	46.5	0.	39	39.	0.9	17	29.	0.4
White	5	48.	1.9	43	40.	1.5	27	31.5	0.	33	33.	1.2	34	59.	1.3
Other	4	3.5	16.2	1	0.9		2	2.3		0	0.0		0	0	
Unknown	9	7.8		24	22.		9	10.5		17	17.		1	1.8	
SPA															
1	1	0.9	0.3	2	1.9	0.5	0	0.0		1	1.0	0.3	1	1.8	0.3
2	5	45.	2.4	49	45.	2.2	25	29.	1.	29	29.	1.4	21	36.8	1.0
3	1	12.	0.8	9	8.4	0.5	7	8.1	0.	4	4.0	0.2	5	8.8	0.3
4	1	14.	1.3	18	16.	1.4	20	23.	1.	25	25.	2.2	13	22.7	1.1
5	6	5.2	0.9	8	7.5	1.2	6	7.0	0.	8	8.1	1.3	8	14.0	1.2
6	1	9.6	1.0	4	3.7	0.4	13	15.	1.	13	13.	1.3	3	5.3	0.3
7	7	6.1	0.5	12	11.	0.9	10	11.	0.	15	15.	1.2	3	5.3	0.2
8	7	6.1	0.6	3	2.8	0.3	4	4.7	0.	4	4.0	0.4	3	5.3	0.3
Unknown	0	0.0		0	0.0		1	1.2	-	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, 2002 - 2013 *



* No data was collected for CA for 2011 and 2012.

Figure 2. Proportion of Amebiasis Cases by Age Group
LAC, 2013, N=57

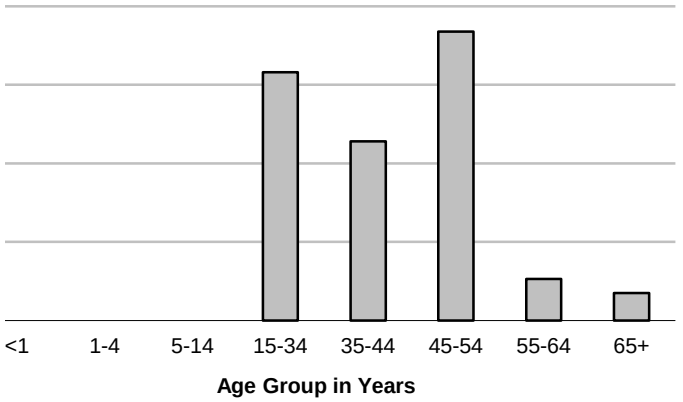


Figure 3. Percent Cases of Amebiasis by Race/Ethnicity
LAC, 2013, N=57

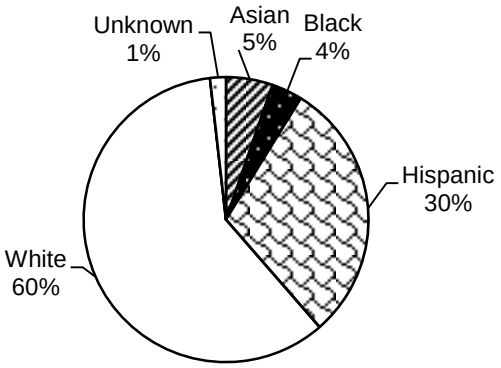
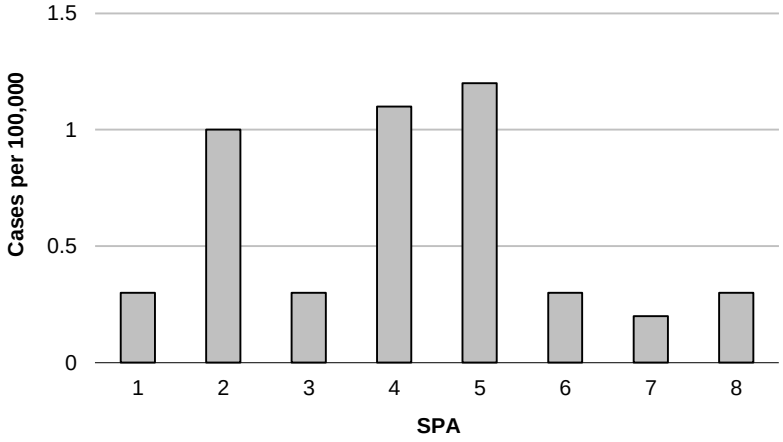


Figure 4. Incidence Rates of Amebiasis by SPA
LAC, 2013, N=57



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

Figure 5. Reported Amebiasis Cases by Month of Onset
LAC, 2013

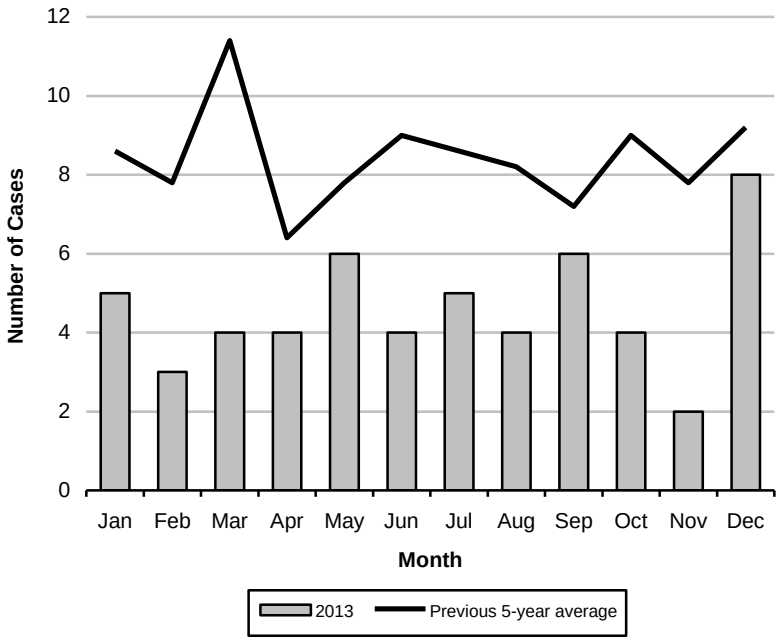
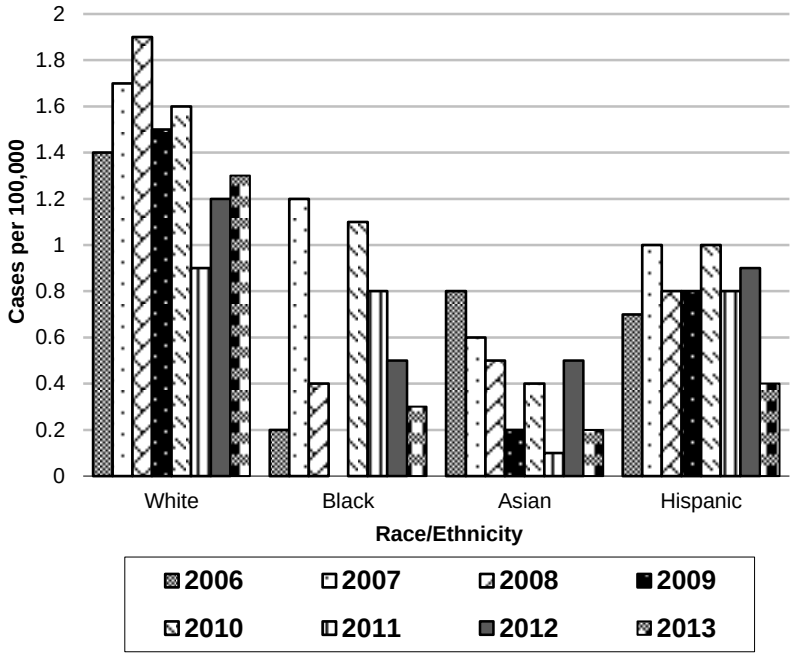
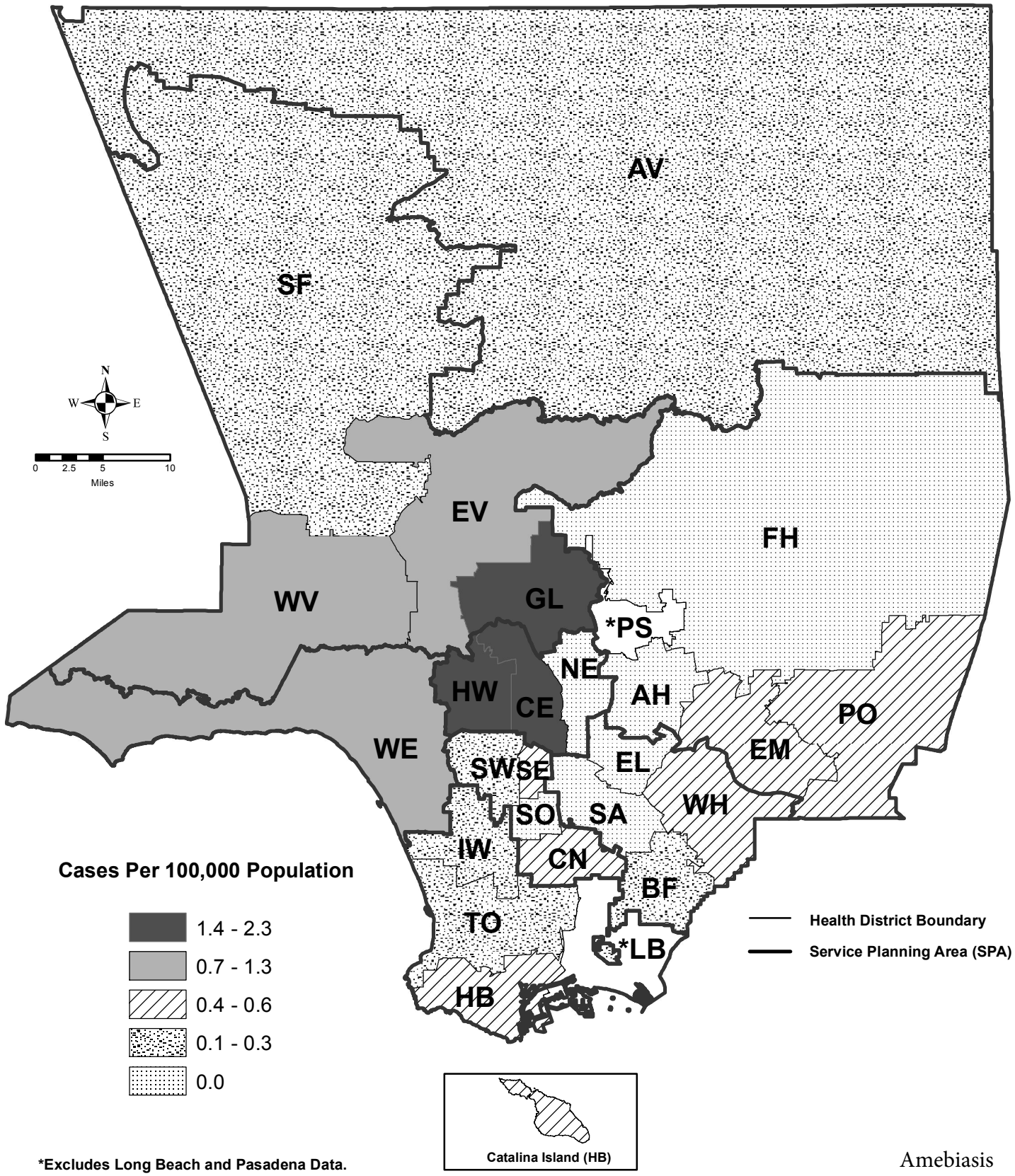


Figure 6. Amebiasis Incidence by Race/Ethnicity
LAC, 2006-2013, N=57



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1703
Annual Incidence[a]	
LA County	18.11
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	36.64
Median	34
Range	0-98

[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 usually transmitted through ingestion of organisms in undercooked poultry or other meat, contaminated food, water or raw milk, or occasionally through 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, particularly poultry, should be thoroughly cooked. 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.

2013 TRENDS AND HIGHLIGHTS

- There was a 10.2% increase in the incidence of campylobacteriosis from the previous year and a 50.1% increase in cases since 2009 (Figure 1).
- The highest rates were among children aged <1 (37.2 per 100,000) followed by persons aged 1 to 4 years (32.7per 100,000) (Figure 2). The largest increase in incidence rates was among persons aged <1 years followed by 65+, since 2009 (Table).
- Service Planning Area (SPA) 5 had the highest rate (33.7 per 100,000) which is consistent with previous years (Figure 3).
- No outbreaks of campylobacteriosis were detected in 2013.
- Routine interviewing of campylobacteriosis cases was discontinued in 2010; however, surveillance continues to monitor for clusters and review of foodborne illness reports that have a diagnosis of campylobacteriosis.
- Most diagnosis is made by use of culture (77%) and 23% is made by antigen-based tests.

Reported Campylobacteriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009(N=1135)			2010(N=1239)			2011 (N=1259)			2012 (N=1546)			2013 (N=1703)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	30	2.6	24.5	24	1.9	20.0	16	1.2	11.5	46	2.9	38.7	45	2.6	37.2
1-4	138	12.1	27.9	150	12.1	30.9	158	12.5	27.2	136	8.7	28.6	159	9.3	32.7
5-14	146	12.8	11.6	175	14.1	14.1	146	11.5	11.0	181	11.7	15.1	173	10.1	14.3
15-34	316	27.8	11.3	318	25.6	11.4	366	29.0	12.4	418	27.0	15.1	495	29.0	17.5
35-44	119	10.4	8.8	157	12.6	11.7	133	10.5	9.2	169	10.9	12.8	182	10.6	13.7
45-54	137	12.0	10.8	136	10.9	10.6	142	11.2	10.5	186	12.3	14.5	185	10.8	14.3
55-64	100	8.8	10.8	96	7.7	10.1	114	9.0	11.9	163	10.5	16.0	177	10.3	17.2
65+	143	12.6	14.3	165	13.3	16.4	172	13.6	16.2	238	19.1	21.5	281	16.5	25.3
Unknown	6	0.5	0	18	0	1.4	12	0.9	0	9	0.6	0	6	0.3	0
Race/Ethnicity															
Asian	42	3.7	3.3	35	2.8	2.7	28	2.2	2.1	37	2.3	2.8	46	2.6	3.4
Black	15	1.32	1.9	13	1.0	1.7	21	1.6	2.5	34	2.1	4.4	46	2.6	5.9
Hispanic	156	13.7	3.5	182	14.6	4.1	157	12.4	3.3	161	10.4	3.6	167	9.8	3.6
White	81	7.1	3.0	118	9.5	4.4	119	9.4	4.2	228	14.7	8.6	386	22.6	14.5
Other	9	0.7	0	13	1.0	0	14	1.1	0	11	0.7	0	32	1.8	0
Unknown	832	73.0	0	878	70.8	0	920	73.0	0	1075	69.5	0	1026	60.2	0
SPA															
1	32	2.8	8.5	39	3.1	10.1	46	3.6	12.3	36	2.3	9.3	41	2.4	10.5
2	292	25.7	13.7	346	2.7	16.3	347	27.5	15.7	362	23.4	16.9	401	23.5	18.4
3	157	13.8	9.7	166	13.3	10.3	164	13.0	9.5	200	12.9	12.4	220	12.9	13.5
4	158	13.9	14.1	158	1.2	15.5	156	12.3	12.4	234	15.1	20.8	292	17.1	25.6
5	151	13.3	24.0	130	10.4	20.5	142	11.2	21.5	228	14.7	35.7	218	12.7	33.7
6	114	10.0	11.5	122	9.8	12.2	123	9.7	11.5	140	9.0	13.8	175	10.3	17.0
7	104	8.8	8.0	145	11.7	11.2	136	10.8	9.9	179	11.5	13.8	180	10.5	13.7
8	120	10.0	11.3	127	10.2	12.0	145	11.5	12.9	157	10	14.7	172	10.0	16.0
Unknown	7	0.6	0	4	0.3	0	0	0	0	10	0.6	0	4	0.2	0

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

**Figure 1. Reported Campylobacteriosis Rates by Year
LAC, 2002-2013**

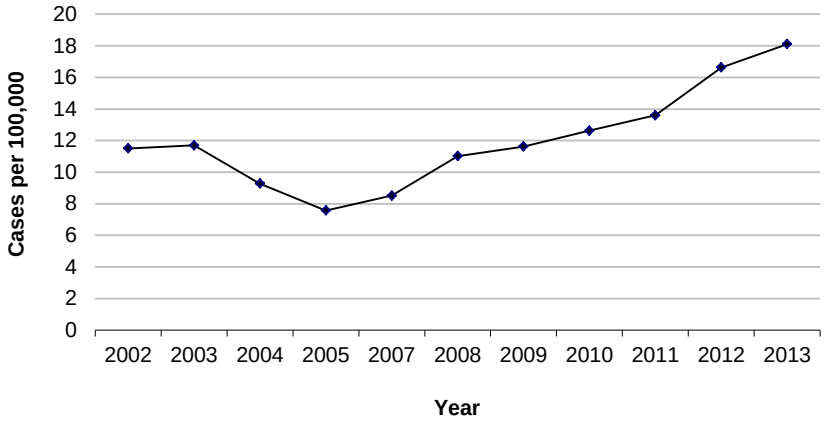


**Figure 2. Reported Campylobacteriosis Rates by Age Group
LAC, 2013 (N=1703)**

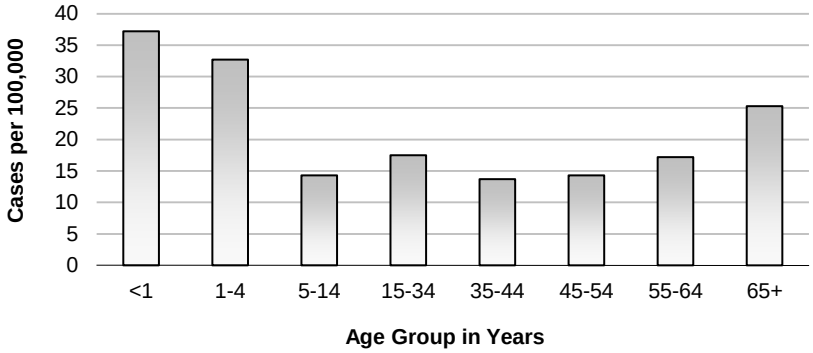
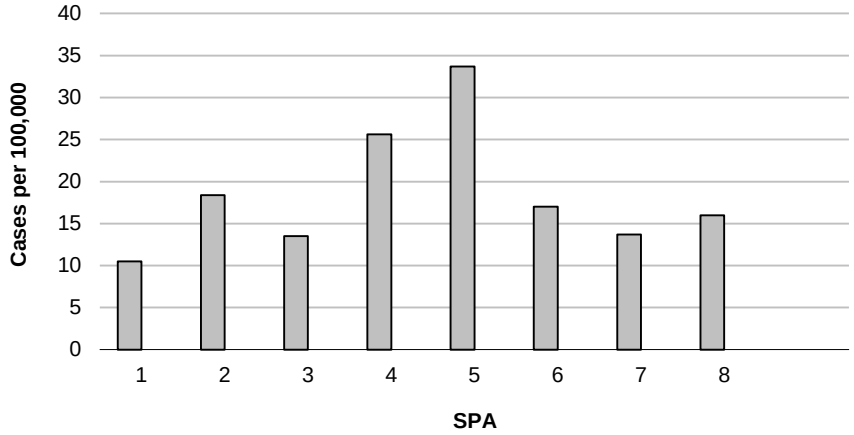
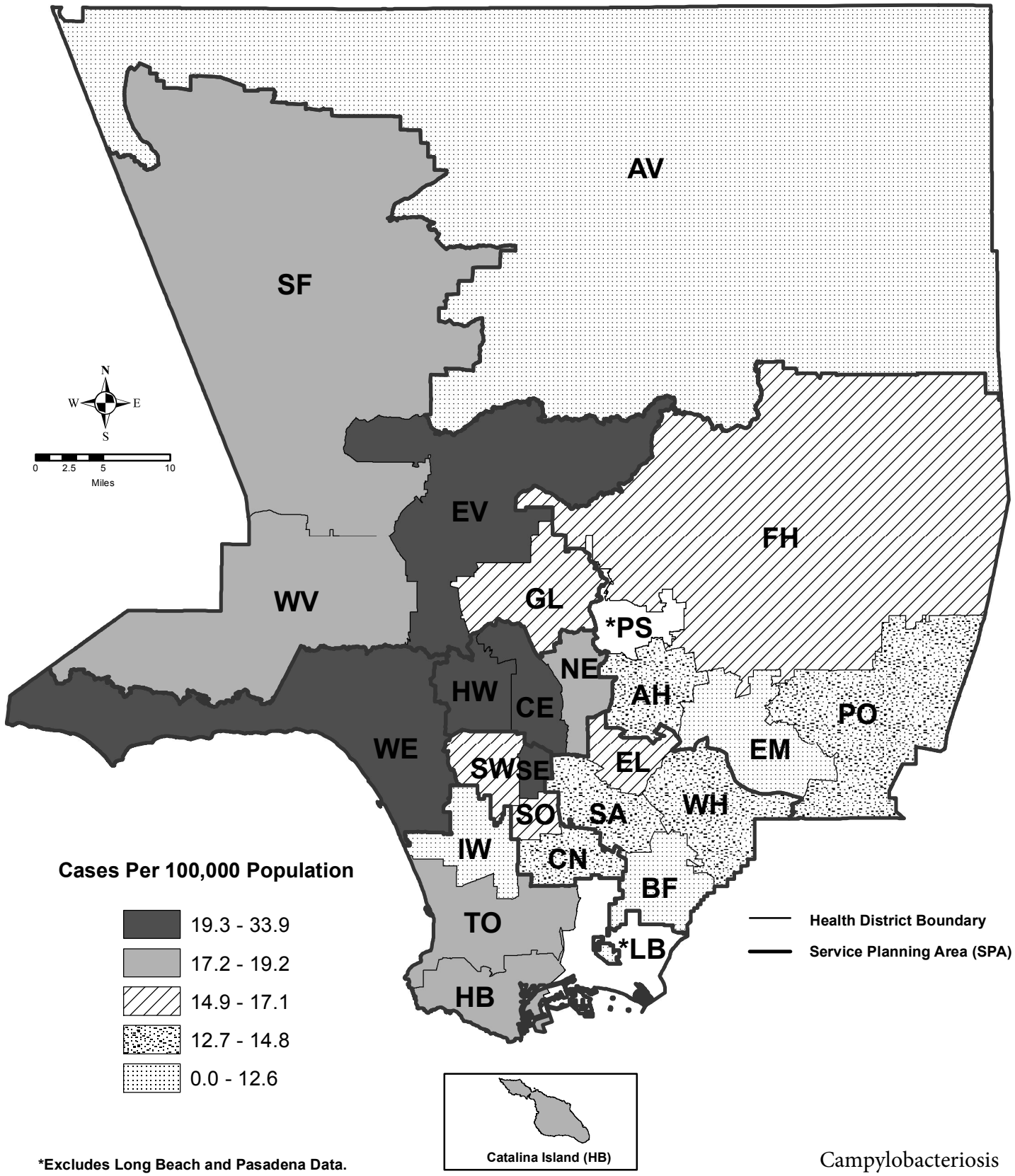


**Figure 3. Reported Campylobacteriosis Rates by SPA
LAC, 2013 (N=1703)**



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	362
Annual Incidence[a]	
LA County	3.85
California[b]	8.61
United States[b]	3.01
Age at Diagnosis	
Mean	50
Median	51
Range	0-95

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

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 people 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 avoidance and control (e.g., planting grass in dusty areas, putting oil on roadways, wetting down soil, air conditioning homes, wearing masks or respirators). Other options may be to warn people at high risk for severe disease not to travel to endemic areas when conditions are most dangerous for exposure. Recovery from the disease confers lifelong immunity to reinfection, providing the rationale for development of a vaccine for prevention of symptomatic or serious forms of the disease.

Increasing construction, a growing naïve population in the endemic area, antifungal treatments that are toxic and not uniformly effective validate the need for prevention efforts.

2013 TRENDS AND HIGHLIGHTS

- Overall, the Los Angeles County incidence rate for coccidioidomycosis has been gradually increasing in the last ten years, doubled in the past 5 years. (Figure 1)
- Cases occurred primarily in the elderly; the greatest number of reported cases was in the 55-64 year age group, which also had the highest incidence rate, 7.1 cases per 100,000 (Figure 2).
- Males represented 67% of cases; females 33%. (Figure 3).
- This year whites had the highest percentage of cases with 36% (n=132) as compared to other racial groups. However, the incidence rate for blacks at 6.4 cases per 100,000 (n=50) was highest among racial groups, consistent with previous years (Figure 4).
- SPA 1 reported the highest incidence rate of coccidioidomycosis in LAC, 18.9 per 100,000 (n=74); though, this represents a slight decrease from the previous year (Figure 5).
- Coccidioidomycosis cases began to increase at the same time but the summer increase is greater this year 2013. (Figure 6).
- There were 23 cases of disseminated coccidioidomycosis reported in LAC.
- Case fatality rate is 2%

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=171)			2010 (N=235)			2011 (N=304)			2012 (N=327)			2013 (N=362)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	1	0.4	0.8	0	0.0	0	0	-	-	1	0.3	0.8
1-4	0	0.0	0.0	0	0.0	0.0	1	0.3	0.2	3	9.2	0.6	0		
5-14	3	1.8	0.2	5	2.1	0.4	3	1.0	0.2	3	9.2	0.3	6	1.6	0.5
15-34	30	17.5	1.1	43	18.3	1.5	62	20.4	2.1	68	20.8	2.5	67	18.5	2.4
35-44	38	22.2	2.8	38	16.2	2.8	35	11.5	2.4	53	16.2	4.0	55	15.2	4.1
45-54	30	17.5	2.4	55	23.4	4.3	67	22.0	5.0	84	25.7	6.5	86	23.8	6.7
55-64	33	19.3	3.6	42	17.9	4.4	54	17.8	5.6	46	14.1	4.5	73	20.2	7.1
65+	37	21.6	3.7	51	21.7	5.1	82	27.0	7.7	70	21.4	6.3	74	20.4	6.7
Unknown	0	0.0		0	0.0		0	0.0		0					
Race/Ethnicity															
Asian	11	6.4	0.9	26	11.1	2.0	23	7.6	1.7	26	8.0	2.0	30	8.3	2.2
Black	27	15.8	3.5	43	18.3	5.6	48	15.8	5.6	46	14.1	5.9	50	13.8	6.4
Hispanic	67	39.2	1.5	71	30.2	1.6	94	30.9	2.0	133	40.7	2.9	104	28.7	2.3
White	56	32.7	2.1	76	32.3	2.9	134	44.1	4.7	121	37.0	4.6	132	36.5	5.0
Other	2	1.2		3	1.3		1	0.3		0	-	-	5	1.4	
Unknown	8	4.7		16	6.8		4	1.3		1	0.3	-	41	11.3	
SPA															
1	45	26.3	11.9	87	37.0	22.6	93	30.6	24.9	74	22.6	19.1	74	20.4	18.9
2	52	30.4	2.4	54	23.0	2.5	86	28.3	3.9	72	22.0	3.4	83	22.9	3.8
3	16	9.4	1.0	17	7.2	1.1	13	4.3	0.7	25	7.6	1.5	38	10.4	2.3
4	13	7.6	1.2	20	8.5	1.8	26	8.6	2.1	53	16.2	4.7	46	12.7	4.0
5	11	6.4	1.7	7	3.0	1.1	17	5.6	2.6	18	5.5	2.8	22	6.1	3.4
6	15	8.8	1.5	19	8.1	1.9	29	9.5	2.7	37	11.3	3.6	38	10.4	3.7
7	9	5.3	0.7	14	6.0	1.1	20	6.6	1.5	34	10.3	2.6	29	8.1	2.2
8	9	5.3	0.8	16	6.8	1.5	18	5.9	1.6	14	4.2	1.3	25	6.9	2.3
Unknown							2	0.7		0	-	-			

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

Figure 1. Incidence Rates of Coccidioidomycosis US, CA and LAC, 2001-2013

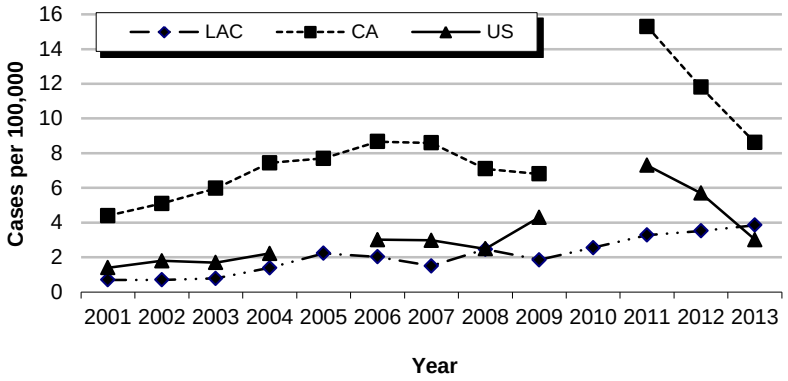


Figure 2. Incidence Rates of Coccidioidomycosis by Age Group LAC, 2013 (N=362)

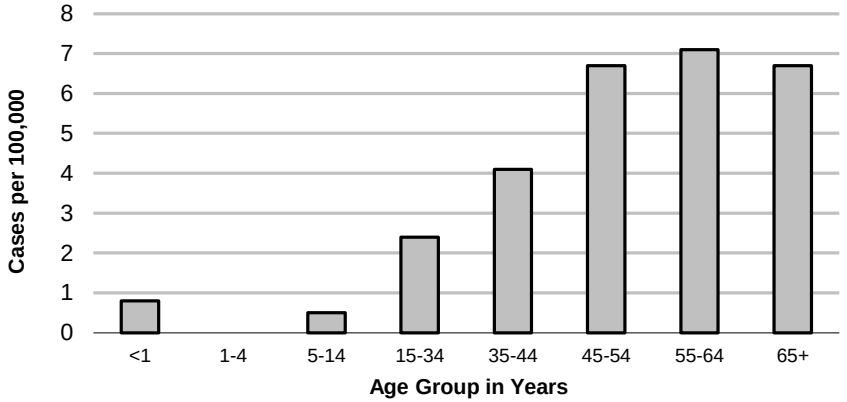


Figure 3. Percent of Reported Coccidioidomycosis Male Cases by SPA LAC, 2013 (N=362)

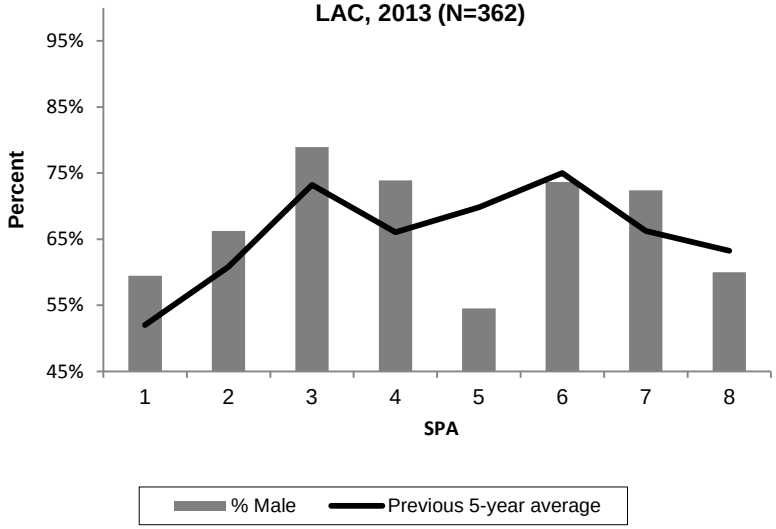


Figure 4. Coccidioidomycosis Incidence Rates by Race/Ethnicity LAC 2009-2013

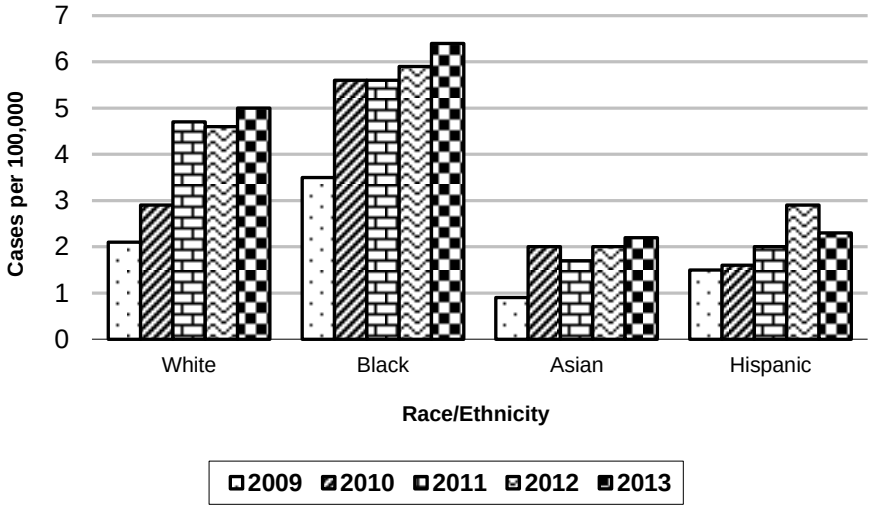


Figure 5. Incidence Rates of Coccidioidomycosis by SPA LAC, 2009-2013

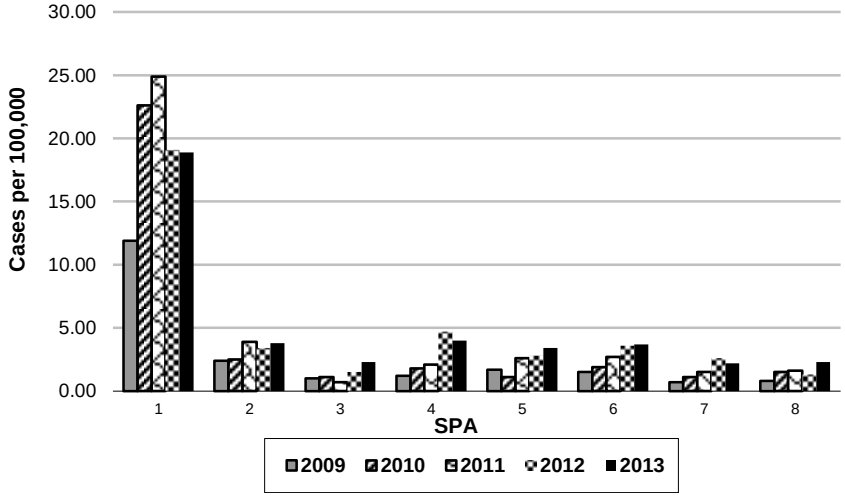
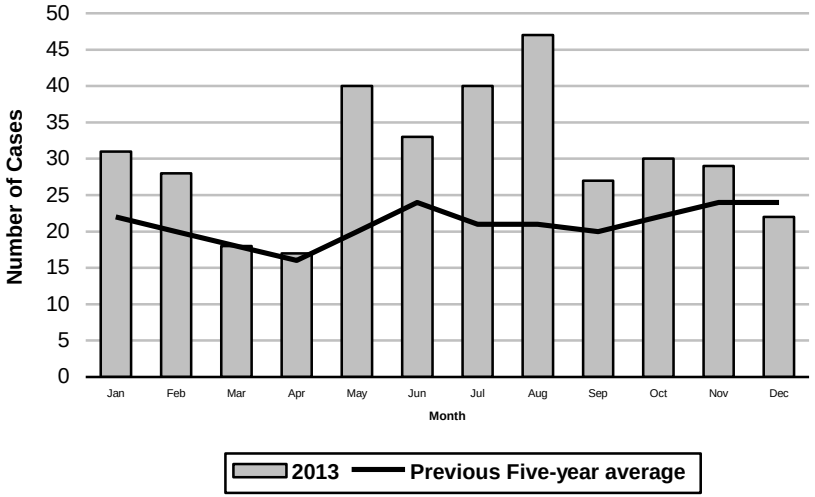
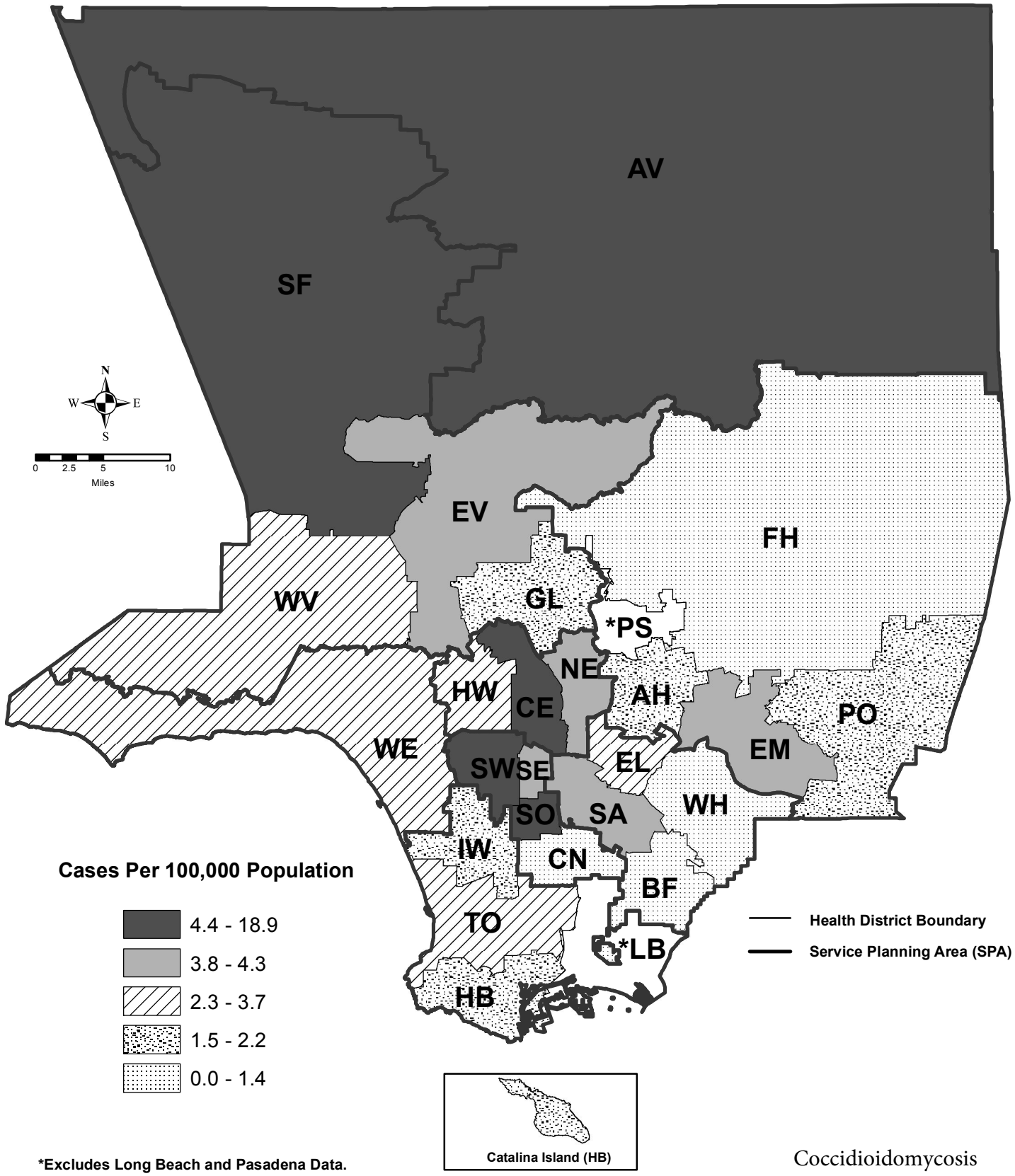


Figure 6. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2013 (N=362)



Map 3. Coccidioidomycosis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases	48
Annual Incidence[a]	
LA County	0.51
California[b]	0.74
United States[b]	1.82
Age at Diagnosis	
Mean	40
Median	43
Range	2-90 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

Cryptosporidiosis is fecal-orally transmitted when cysts of the parasite *Cryptosporidium spp.* are ingested. Common causes include unprotected sexual contact, particularly among men who have sex with men (MSM), and ingestion of contaminated recreational or untreated water. The usual incubation period is 2 to 10 days with typical symptoms of watery diarrhea, abdominal cramps, and low-grade fever; however, asymptomatic infection is also common. Symptoms last up to 2 weeks in healthy individuals. Those who have a weakened immune system may experience prolonged illness. Immunocompromised individuals (e.g., HIV/AIDS patients, cancer patients, transplant patients), young children and pregnant women are at risk for more severe illness.

Proper hand hygiene before meals and after using the restroom is a major way to prevent infection and transmission of cryptosporidiosis. Hand washing is also important for individuals who come in contact with diapered/incontinent children and adults. 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.

2013 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases in Los Angeles County (LAC) increased slightly from 0.47 to 0.51 cases per 1000,000 in 2012 and 2013 respectively (Figure 1).
- The 45-54 year old age group had the highest incidence rates for cryptosporidiosis, with 1.1 cases per 100,000 followed by the 15-34 and 35-44 age-groups both with 0.6 cases per 100,000 each. (Figure 2). The 35-44 year old age group has consistently had the highest incidence rate in previous reporting periods.
- Whites (24, 50%) accounted for the largest proportion of cases in 2013 (Figure 3). Blacks had the highest incidence rate of all the race/ethnicity groups, 1.5 cases per 100,000.
- Service Planning Area (SPA) 2 reported the largest proportion of cases (15, 31%) and SPA 1 had the highest incidence rate, 1.0 cases per 100,000. (Figure 4).
- The number of cases reported peaked in August, which was consistent with the previous 5 years. (Figure 5).
- The male to female ratio for 2013 was almost 4:1 compared with 2012 when the ratio was approximately 2:1. Males have consistently comprised the larger proportion of cases.
- Complete risk factor data were available for all cases. The most frequently reported risk factor was HIV positive status (20, 42%) of which (13, 65%) were among MSM (men who have sex with men). In total, 18 (38%) cryptosporidiosis cases reported MSM activity. Other reported risk factors were contact with animals (14, 29%), of those, the majority had contact with dogs at home (10, 71%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009 - 2013

	2009 (N=51)			2010 (N=61)			2011 (N=51)			2012(N=44)			2013(N=48)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0.0	0	0	0.0	0	0	0.0	0	0.0	0.0	0	--	-
1-4	4	7.8	0.7	2	3.3	0.3	3	5.8	0.5	2	4.6	0.4	1	2.1	0.2
5-14	4	7.8	0.3	5	8.2	0.4	6	11.7	0.5	4	9.1	0.3	2	4.2	0.2
15-34	16	31.4	0.6	15	24.6	0.5	16	31.3	0.5	13	29.5	0.5	16	33.3	0.6
35-44	13	25.5	0.9	14	23	1.0	10	19.6	0.7	8	18.2	0.6	8	16.7	0.6
45-54	4	7.8	0.3	13	21.3	1.0	6	11.7	0.4	8	18.2	0.6	14	29.1	1.1
55-64	6	11.8	0.6	5	8.2	0.5	3	5.8	0.3	4	9.1	0.4	2	4.2	0.2
65+	4	7.8	0.4	7	11.5	0.7	7	13.7	0.7	4	9.1	0.4	5	10.4	0.5
Unknown	0	0.0		0			0			1	2.2				
Race/Ethnicity															
Asian	1	2.0	0.1	2	3.3	0.1	3	5.8	0.2	1	2.3	0.1	2	4.2	0.1
Black	8	15.7	0.9	11	18.0	1.3	6	11.7	0.7	1	2.3	0.1	12	25	1.5
Hispanic	10	9.6	0.2	13	21.3	0.3	11	21.5	0.2	9	20.4	0.2	7	14.5	0.2
White	16	31.4	0.5	22	36.1	0.8	20	39.2	0.7	19	43.2	0.7	24	50	0.9
Other	1	2.0		0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	4.2	
Unknown	15	29.4		13	21.3		11	21.5		14	31.8		1	2.1	
SPA															
1	5	9.8	1.4	3	4.9	0.8	6	11.7	1.6	5	11.4	1.3	4	8.3	1.0
2	12	23.5	0.5	16	26.2	0.7	15	29.4	0.7	12	27.3	0.6	15	31.3	0.7
3	5	9.8	0.3	9	14.8	0.5	4	7.8	0.2	7	15.9	0.4	4	8.3	0.2
4	11	21.6	0.9	10	16.4	0.8	8	15.7	0.7	6	13.6	0.5	6	12.5	0.5
5	4	7.8	0.6	5	8.2	0.8	5	9.8	0.8	6	13.6	0.9	6	12.5	0.9
6	5	9.8	0.5	10	16.4	0.9	4	7.8	0.4	1	2.3	0.1	5	10.4	0.5
7	3	5.9	0.2	1	1.6	0.1	1	2.0	0.5	1	2.3	0.1	3	6.3	0.2
8	4	7.8	0.4	4	6.6	0.4	1	2.0	0.1	3	6.8	0.3	5	10.4	0.5
Unknown				0	0.0		7	13.7		3	6.8		--	--	--

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

Figure 1. Incidence Rates of Cryptosporidiosis US, CA and LAC, 2002 - 2013

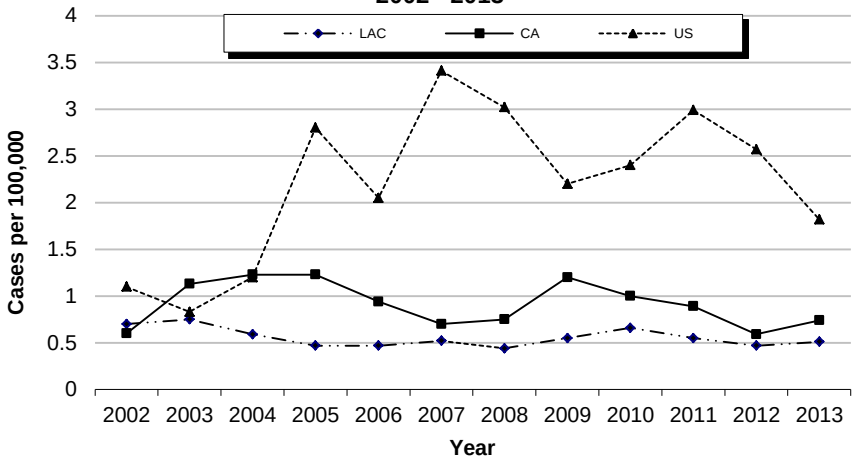


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2013, N=48

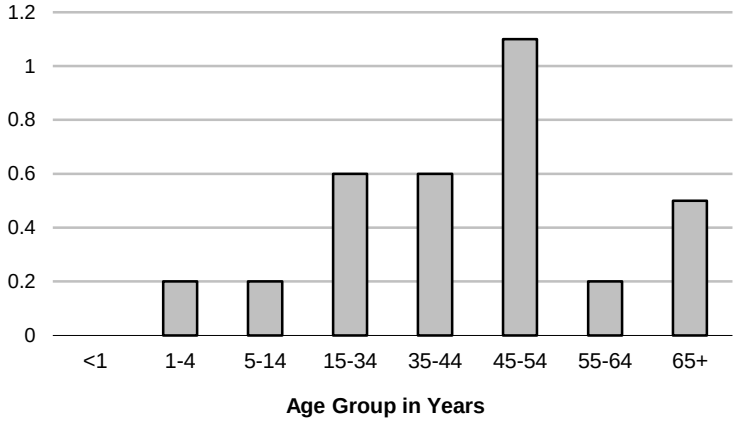


Figure 3. Proportion of Cryptosporidiosis by Race/Ethnicity LAC, 2013, N=48

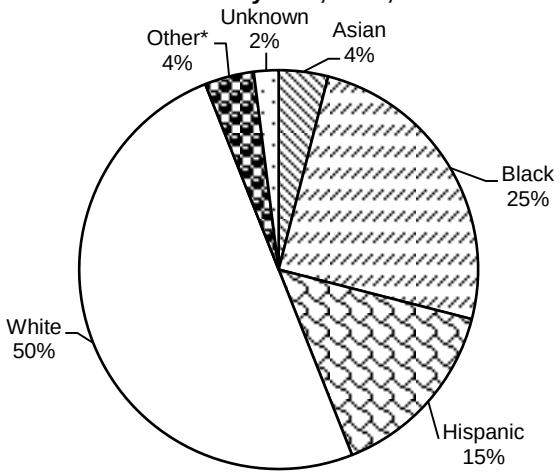
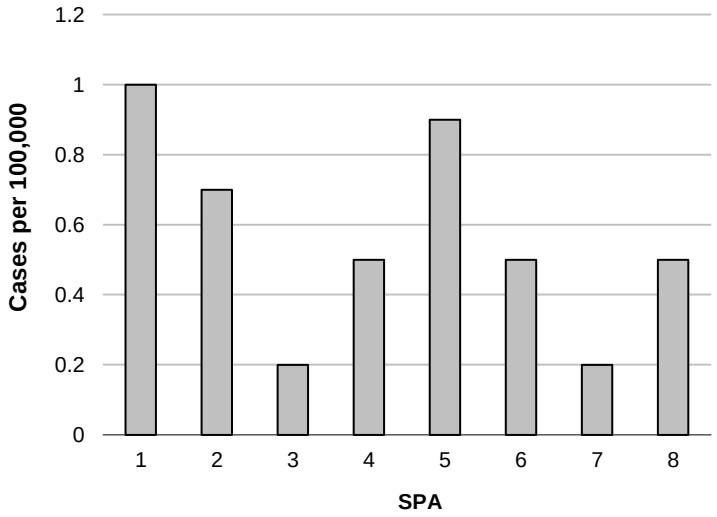


Figure 4. Incidence Rates of Cryptosporidiosis by SPA LAC, 2013, N=48



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

Figure 5. Reported Cryptosporidiosis Cases by Month of Onset, LAC, 2013

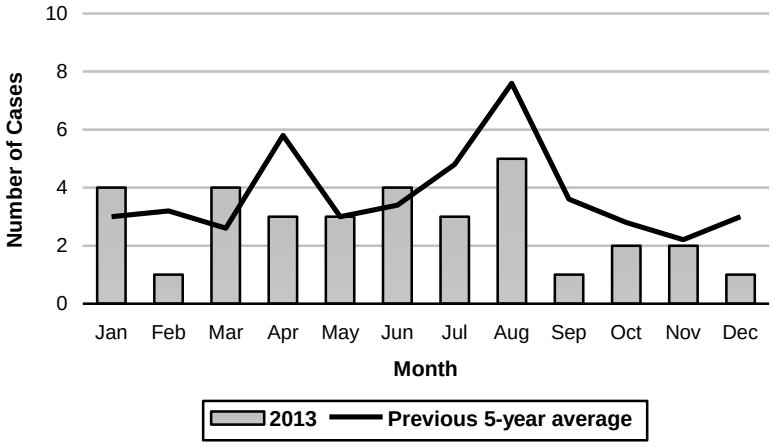
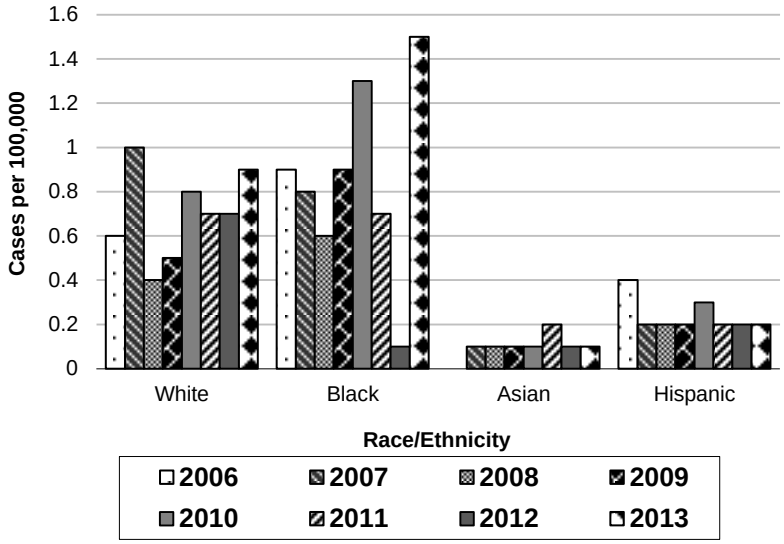


Figure 6. Cryptosporidiosis Incidence by Race/Ethnicity LAC, 2006 - 2013, N=48



ENCEPHALITIS

CRUDE DATA	
Number of Cases	79
Annual Incidence[a]	
LA County	0.84
California	N/A
United States	N/A
Age at Diagnosis	
Mean	53 years
Median	58 years
Range	0-99 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 conducts passive surveillance is limited to cases with suspected or confirmed viral and bacterial etiologies, which includes primary and post-infectious encephalitis but excludes individuals with underlying human immunodeficiency virus (HIV) infection. Of special concern are arthropod-borne viruses (i.e., arboviruses), which are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, ticks, and certain mites and gnats). All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman vertebrate primary host and a primary arthropod vector. Arboviruses have a global distribution. The five main viral agents of encephalitis in the United States are West Nile virus (WNV), eastern equine encephalitis (EEE) virus, western equine encephalitis (WEE) virus, St. Louis encephalitis (SLE) virus and La Crosse (LAC) virus, all of which are transmitted by mosquitoes and thus can be prevented by personal protection and mosquito control (see West Nile virus chapter).

2013 TRENDS AND HIGHLIGHTS

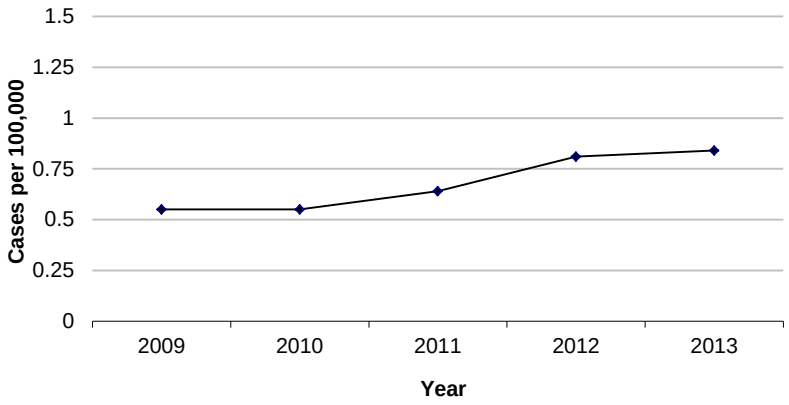
- Seventy-nine cases of encephalitis were confirmed in 2013 compared with 75 cases reported in 2012. The 2013 surveillance year had the third highest number of total WNV infections since 2004 (see WNV chapter).
- Forty-six (58%) cases WNV-encephalitis, the most frequently reported etiology for viral encephalitis, were laboratory confirmed. Cases of WNV encephalitis were reported from early July through late November. The peak month of encephalitis reports, September, coincided with the WNV- infection peak in 2013 (Figure 4).
- Herpes zoster complicated by encephalitis was the third most common etiology for reported encephalitis; 2 (3%) cases were documented.
- Thirty-one (39%) encephalitis cases were assessed to be due to an unknown viral etiology based on review of medical records.
- The greatest incidence of encephalitis was in persons 65 years and older (3.2 cases per 100,000) followed by those 55-64 years of age (1.2 cases per 100,000 population) (data not shown). The peak incidence in persons 65 years and older corresponds to age as a risk factor for WNV- associated neuroinvasive disease.
- The highest encephalitis incidence rates were documented within SPAs 1, 2 and 8. This can be attributed to the increased number of WNV-associated encephalitis cases in these regions of Los Angeles County (Figure 3).

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=51)			2010 (N=51)			2011 (N=59)			2012 (N=75)			2013 (N=79)		
	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	-	1	2.0	0.7	3	5.1	2.5	1	1.3	0.8	1	1.3	0.8
1-4	4	7.8	0.7	4	7.8	0.7	4	6.8	0.8	3	4.0	0.6	4	4.0	0.6
5-14	17	33.4	1.2	21	41.2	1.6	10	16.5	0.8	8	10.7	0.7	7	10.7	0.7
15-34	10	19.6	0.4	11	21.6	0.4	8	13.6	0.3	6	8.0	0.2	6	8.0	0.2
35-44	2	3.9	0.1	1	2.0	0.1	2	3.4	0.2	0	0.0	-	1	0.0	-
45-54	7	13.7	0.5	4	7.8	0.3	9	15.7	0.7	9	12.0	0.7	13	12.0	0.7
55-64	2	3.9	0.2	6	11.8	0.6	8	13.5	0.8	12	16.0	1.2	19	16.0	1.2
65+	8	15.7	0.8	3	5.9	0.3	15	25.4	1.4	36	48.0	3.2	28	48.0	3.2
Unknown	1	2.0	0	0	0.0										
Race/Ethnicity															
Asian	5	9.8	0.4	6	11.8	0.4	0	-	-	8	10.7	0.6	6	10.7	0.4
Black	2	3.9	0.2	3	5.9	0.4	4	6.8	0.5	3	4.0	0.4	2	4.0	0.3
Hispanic	22	43.2	0.5	27	52.9	0.6	33	55.9	0.7	23	30.7	0.5	20	30.7	0.4
White	9	17.6	0.3	7	13.7	0.2	14	23.7	0.5	31	41.3	1.2	36	41.3	1.4
Other	1	2.0	-	1	2.0	-	1	1.7	-	5	6.7	-	3	6.7	-
Unknown	12	23.5	-	7	13.7	-	7	11.9	-	5	6.7	-	12	6.7	-
SPA															
1	3	5.9	0.8	2	3.9	0.5	2	3.4	0.5	6	8.0	1.5	6	8.0	1.5
2	11	21.7	0.5	10	19.6	0.5	20	33.9	0.9	22	29.3	1.0	27	29.3	1.2
3	10	19.6	0.6	7	13.7	0.4	9	15.2	0.6	24	32.0	1.5	11	32.0	0.7
4	7	13.7	0.6	4	7.8	0.3	4	6.8	0.4	10	13.3	0.9	3	13.3	0.3
5	0	0.0	-	2	3.9	0.3	1	1.7	0.2	2	2.7	0.3	2	2.7	0.3
6	7	13.7	0.7	13	25.5	1.2	4	6.8	0.4	4	5.3	0.4	3	5.3	0.3
7	9	17.6	0.7	5	9.8	0.4	8	13.5	0.6	5	6.7	0.4	11	6.7	0.8
8	2	3.9	0.2	4	7.8	0.4	5	8.2	0.5	2	2.7	0.2	13	2.7	1.2
Unknown	2	3.9		4	7.8		6	10.2		-	-		-	-	

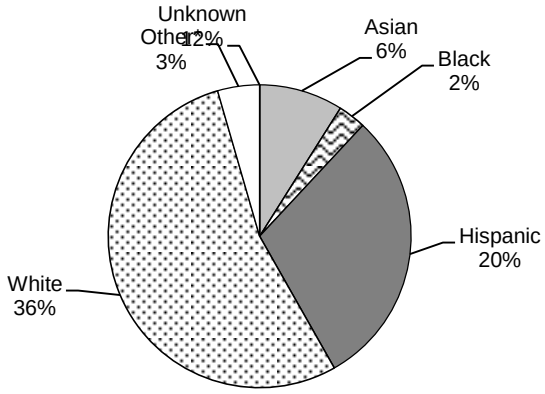
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis LAC, 2009-2013



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity LAC, 2013 (*N=79)



* 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, 2013 (N=79)

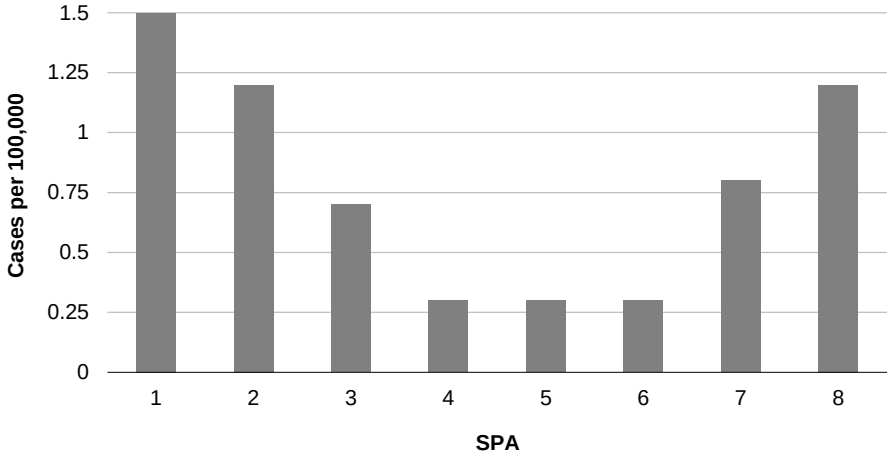


Figure 4. Reported Encephalitis Cases by Month of Onset LAC, 2013 (N=79)

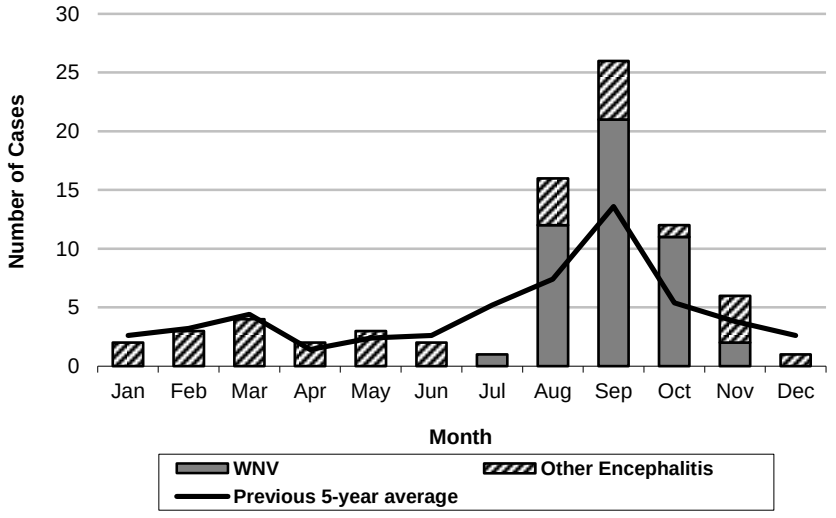
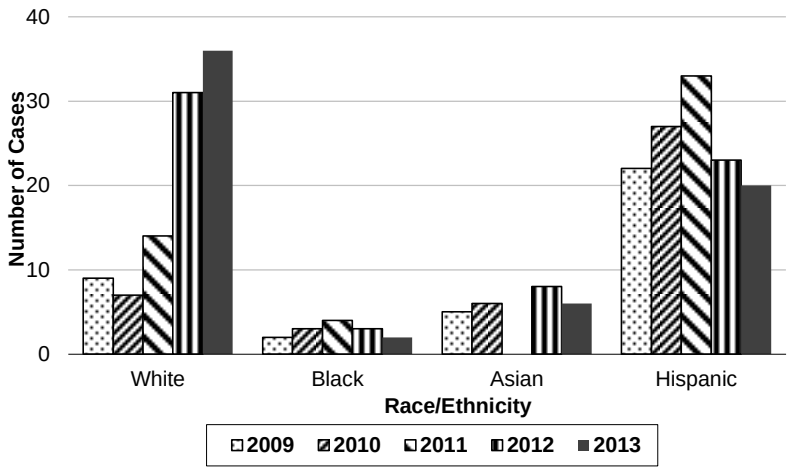
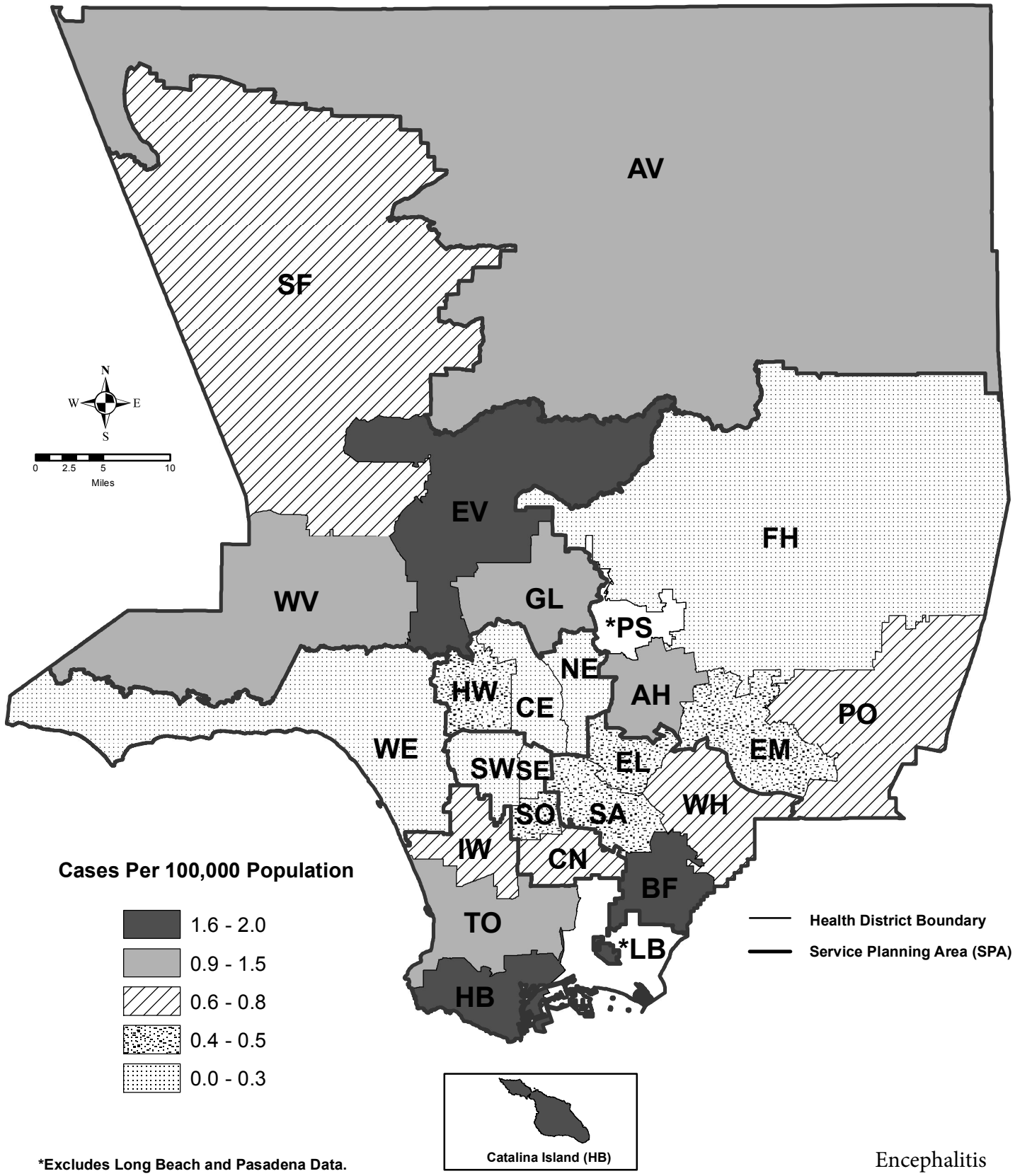


**Figure 5. Reported Encephalitis Cases by Race/Ethnicity
LAC, 2009-2013**



Map 4. Encephalitis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA	O157:H7	Other Serotypes	All Serotypes
Number of Cases	12	90	102
Annual Incidence[a]			
LA County	0.13	0.96	1.09[c]
California[b]	--	--	1.17[c]
United States[b]	--	--	1.72[c]
Age at Diagnosis			
Mean	30	12	
Median	28	4	
Range	2-77	0-80	

[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/preview/mmwrhtml/mm6233a6.htm.
[c] Incudes E.coli O157:H7; shiga toxin-positive, serogroup non-O157: and Shiga toxin-positive, not serogrouped. All cases are now reported as STEC (Shiga toxin producing E.coli) in order to simplify the reporting process.

DESCRIPTION

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

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

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

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

2013 TRENDS AND HIGHLIGHTS

- There was a 37% decrease in the frequency of confirmed *E. coli* O157:H7 cases in 2013 (Figure1).
- Cases of *E. coli* "other serotypes" had a younger mean age than O157:H7 cases (12 vs. 30 years). One possible rationale is that cases with other serotypes are largely Hispanic (58.8%), 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 15% (n=90) compared with 2012. They included ten different serotypes with serotypes O103, O111, O26 being predominant.
- For serotype O157:H7, the highest number of cases reported was among persons ages 15-34 years (n=7) (Figure 2); it continues to

be mainly observed among whites (n=8) (Figures 3, 6). Cases were reported from all SPAs except SPA 1 and 6. (Table 2, Figure 4).

- For all other serotypes of STEC, the highest number of cases reported was among children aged 1-4 years (n=41) (Figure 2) and in the Hispanic population (n=53) (Figures 3, 7). The reasons for the differences with O175:H7 are unknown.
- Six cases were reported with HUS and three were laboratory confirmed and serotyped; two were other STEC (non-O157:H7) and one was O157:H7. Three of six cases reported did not have laboratory confirmation however they met case definition. One death occurred.
- There was one Los Angeles County outbreak of STEC in 2013 involving a daycare investigated by the Community Health Services (CHS). Acute Communicable Disease Control Program participated in four multistate cluster investigations.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2009-2013

	2009 (N=18)			2010 (N=12)			2011 (N=21)			2012 (N=19)			2013 (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	0	0	0	0	0
1-4	5	27.7	1.0	3	25.0	0.6	6	28.5	1.0	3	15.7	0.6	2	16.6	0.4
5-14	3	16.6	0.2	2	16.6	0.2	6	28.5	0.5	5	26.3	0.4	0	0	0
15-34	5	27.7	0.2	5	41.6	0.2	3	14.2	0.1	5	26.3	0.2	7	58.3	0.2
35-44	2	11.1	0.1	0	0	0	2	9.5	0.1	1	5.2	0.1	1	8.3	0.1
45-54	0	0	0	1	8.3	0.1	0	0	0	1	5.2	0.1	0	0	0
55-64	1	5.5	0.1	0	0	0	2	9.5	0.2	1	5.2	0.1	0	0	0
65+	2	11.1	0.2	1	8.3	0.1	2	9.5	0.2	3	15.7	0.3	2	16.6	0.2
Unknown	0	0	0	0	0	0	0	0	0						
Race/Ethnicity															
Asian	1	5.5	0.1	3	25.0	0.2	1	4.7	0.1	5	26.3	0.4	0	0	0
Black	0	0	0	1	8.3	0.1	1	4.7	0.1	1	5.2	0.1	0	0	0
Hispanic	4	22.2	0.1	2	16.6	--	8	38.0	0.2	1	5.2	0.0	4	33.3	0.1
White	13	72.2	0.5	6	50.0	0.2	11	52.3	0.4	12	63.1	0.5	8	66.6	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	0	0	0
SPA															
1	1	5.5	0.3	0	0	0	1	4.7	0.3	0	0	0	0	0	0
2	5	27.7	0.2	5	41.6	0.2	4	19.0	0.2	4	21.0	0.2	3	25.0	0.1
3	1	5.5	0.1	0	0	0	3	14.2	0.2	1	5.2	0.1	1	8.3	0.1
4	0	0	0	0	0	0	5	23.8	0.4	3	15.7	0.3	1	8.3	0.1
5	3	16.6	0.5	3	25.0	0.5	1	4.7	0.2	3	15.7	0.5	5	41.6	0.8
6	0	0	0	0	0	0	3	14.2	0.3	1	5.2	0.1	0	0	0
7	4	22.2	03	2	16.1	0.2	1	4.7	0.1	4	21.0	0.3	1	8.3	0.1
8	4	22.2	0.4	2	16.1	0.2	3	14.2	0.2	3	15.7	0.3	1	8.3	0.1
Unknown				0	0	0	0	0	0	0	0	0	0	0	0

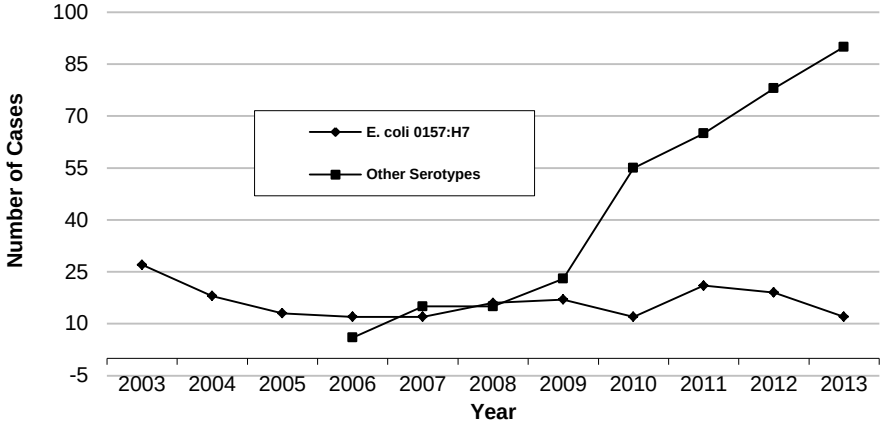
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2009-2013

	2009 (N=22)			2010 (N=45)			2011 (N=67)			2012 (N=78)			2013 (N=90)		
	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	4	8.8	3.3	8	11.9	5.7	6	7.6	5.0	5	5.5	4.1
1-4	10	45.4	2.0	23	51.1	4.7	30	44.7	5.2	39	50.0	8.2	41	45.5	8.4
5-14	1	4.5	0.1	2	4.4	0.2	8	11.9	0.6	10	12.8	0.8	17	18.8	1.4
15-34	6	27.2	0.2	8	17.8	0.3	12	17.9	0.4	11	14.1	0.4	17	18.8	0.6
35-44	1	4.5	0.1	1	2.2	0.1	2	2.9	0.1	3	3.8	0.2	3	3.3	0.2
45-54	1	4.5	0.1	6	13.3	0.5	0	0	0	4	5.1	0.3	3	3.3	0.2
55-64	1	4.2	0.1	1	2.2	0.1	3	4.4	0.3	5	6.4	0.5	1	1.1	0.1
65+	2	9.0	0.2	0	0	0	4	5.9	0.4	0	0	0	3	3.3	0.3
Unknown	0	0	0	0	0	0				0	0	0	0	0	0
Race/Ethnicity															
Asian	2	9.0	0.2	1	2.2	0.1	5	7.4	0.4	1	1.2	0.1	2	2.2	0.1
Black	0	0	0	2	4.4	0.3	2	2.9	0.2	3	3.8	0.4	5	5.5	0.6
Hispanic	7	31.8	0.2	31	68.8	0.7	42	62.6	0.9	49	62.8	1.1	53	58.8	1.2
White	13	59.0	0.5	10	22.2	0.4	17	25.3	0.6	22	28.2	0.8	28	31.1	1.1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	1	2.2	0	1	1.4	0	0	0	0	2	2.2	0
SPA															
1	0	0	0	1	2.2	0.3	2	2.9	0.5	1	1.2	0.3	5	5.5	1.3
2	4	18.1	0.2	14	31.1	0.7	14	20.8	0.6	23	29.4	1.1	26	28.8	1.2
3	3	13.6	0.2	7	15.5	0.4	8	11.9	0.5	11	14.1	0.7	11	12.2	0.7
4	5	22.7	0.4	6	40.0	0.5	4	5.9	0.3	10	12.8	0.9	10	11.1	0.9
5	6	27.5	1.0	3	6.6	0.5	7	10.4	1.1	5	6.4	0.8	7	7.7	10.1
6	0	0	0	4	8.8	0.4	8	11.9	0.7	8	10.2	0.8	13	14.4	1.3
7	2	9.0	0.2	6	13.1	0.5	20	29.8	1.5	11	14.1	0.8	12	13.3	0.9
8	2	9.0	0.2	4	8.8	0.4	4	5.9	0.4	3	3.8	0.3	6	6.6	0.6
Unknown	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, 2003-2013



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli*
by Serotype and Age Group
LAC, 2013

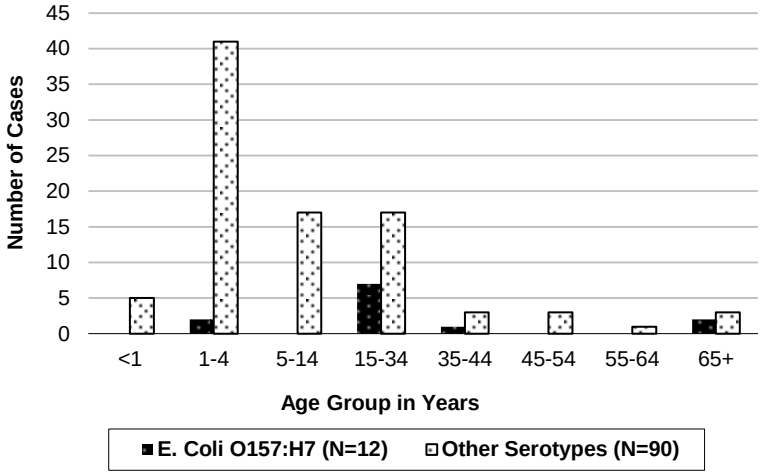


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*,
by Race/Ethnicity, LAC, 2013

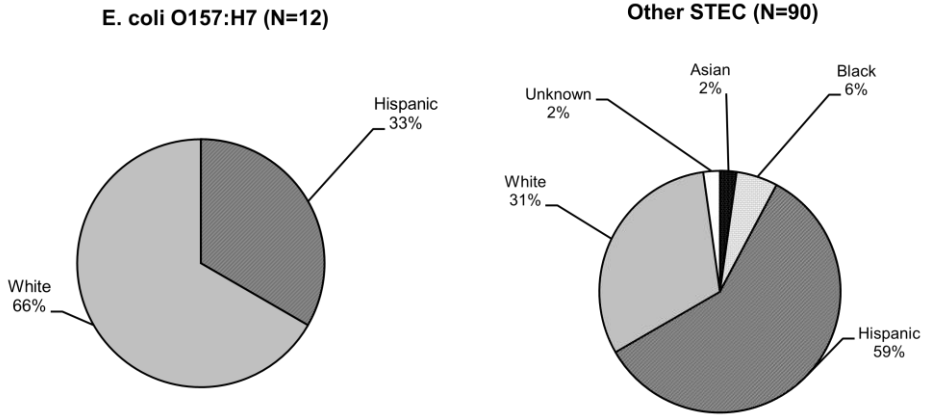


Figure 4. Reported Cases of Shiga Toxin-producing
***E. coli* by Serotype and SPA**
LAC, 2013

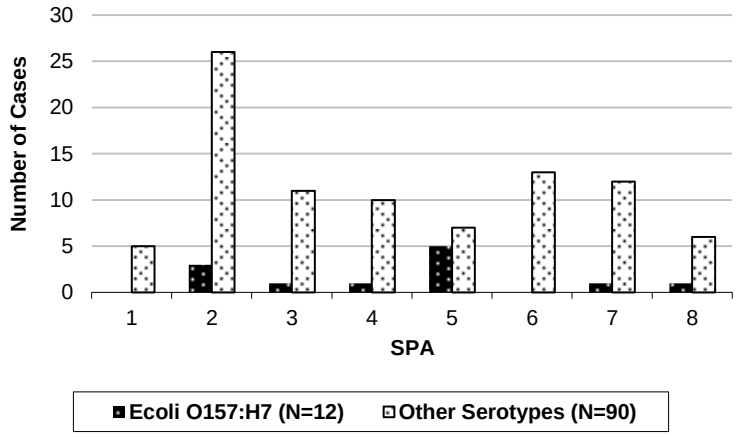
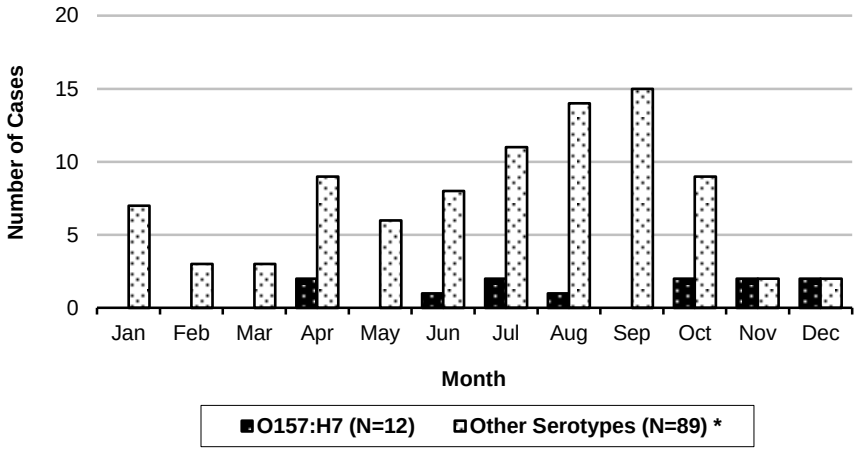


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2013



* One case did not provide an onset date.

Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2008-2013

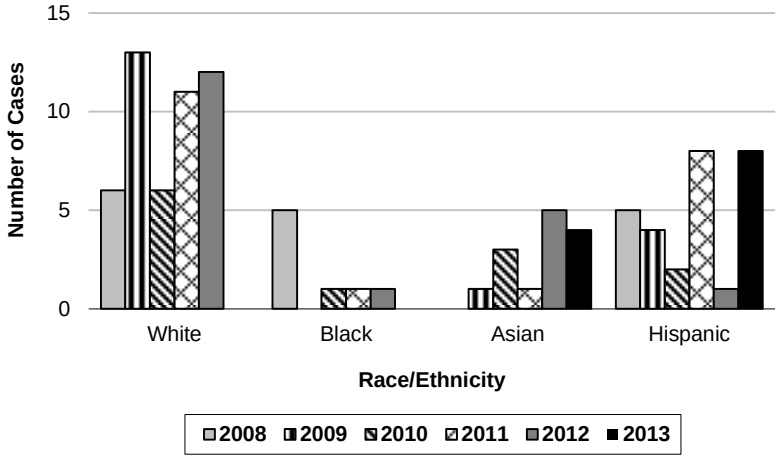
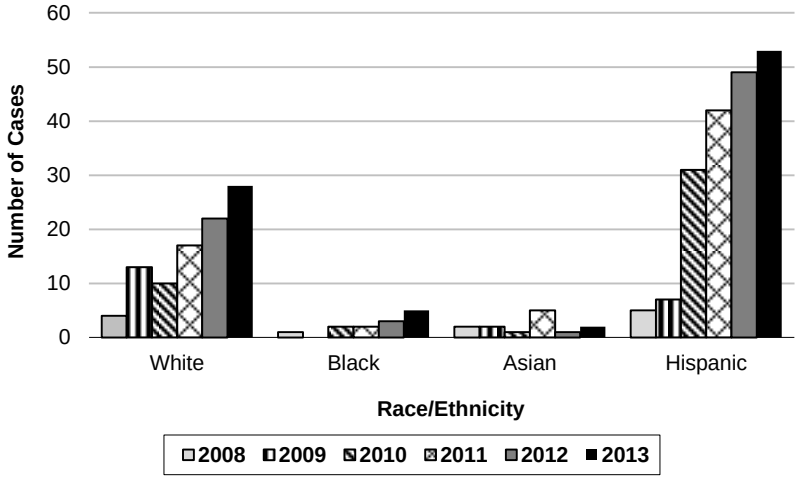
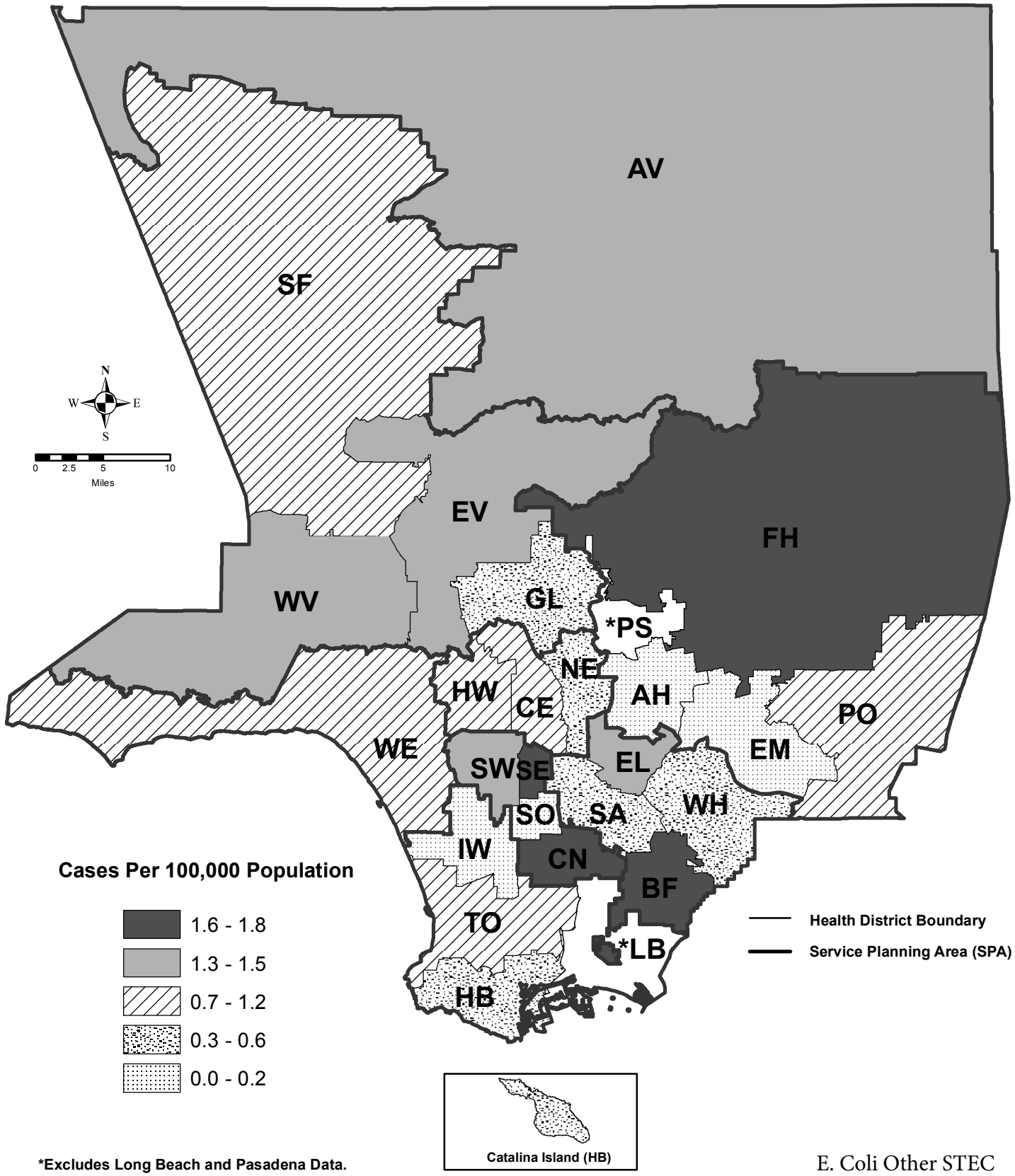


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2008-2013



Map 5. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

GIARDIASIS

CRUDE DATA	
Number of Cases	392
Annual Incidence	
LA County	4.17
California	5.24
United States	4.81
Age at Diagnosis	
Mean	37
Median	37
Range	0 - 85

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

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

To prevent transmission of giardiasis, individuals should wash their hands before eating, after using the toilet, and after changing diapers. Persons ill with diarrhea should avoid swimming. Fecal exposure during sexual activity should also be avoided.

2013 TRENDS AND HIGHLIGHTS

- Giardiasis disease incidence has increased in LAC from 3.16 cases per 100,000 in 2012 to 4.17 cases per 100,000 in 2013. (Figure 1).
- The highest age-specific incidence rate occurred among adults aged 45-54 years with 5.6 cases per 100,000 compared with previous years when the highest incidence had consistently been in the 1-4 age group. The highest total number of cases was reported in the 15-34 year age group (114, 29%) which is consistent with 2012 which had 86 (29%) (Figure 2).
- Whites continue to have highest race/ethnicity-specific incidence rates and proportion of cases compared to other races. Whites accounted for 54% (210) of reported cases in 2013 and 43% (125) in 2012. (Figure 3).
- Within Los Angeles County (LAC), Service Planning Area (SPA) 5 reported the highest incidence rate of giardiasis with 7.6 cases per 100,000 in 2013 compared with 6.1 cases per 100,000 in 2012. The second highest incidence rate was reported from SPA 4 (6.2 per 100,000) in 2013 and 5.1 cases per 100,000 in 2012 (Figure 4).
- The number of cases reported in 2013 peaked from July to September which was consistent with the previous 5 year average (Figure 5).
- Males have consistently accounted for a larger proportion of cases in previous reporting periods. Similarly, in 2013, males accounted for 66% (258) and females 34% (134) of the cases.
- The most frequently reported risk factor was contact with animals (182, 46%), predominantly dogs. Travel to another country was also frequently reported (109, 28%). Of those who traveled, Mexico was the most frequently reported travel destination (32, 29%) followed by India (12, 11%). Immigration to the US (85, 22%) was also cited as a risk factor: approximately a quarter of immigrant cases were from Mexico (21, 25%). In total, 77 (20%) Giardiasis cases were reported among MSM (men who have sex with men). 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, 2009-2013

	2009 (N=354)			2010 (N=308)			2011 (N=292)			2012 (N=294)			2013 (N=392)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.3	0.7	5	0.2	3.6	1	0.3	0.7	0	0.0	0	3	0.7	2.5
1-4	46	13.0	8.2	41	13.3	7.1	22	7.5	3.8	30	10.2	6.3	20	5.1	4.1
5-14	40	11.3	2.9	37	12.0	2.8	39	13.7	2.9	29	9.9	2.4	41	10.5	3.4
15-34	85	24.0	3.0	81	26.3	2.7	84	28.7	2.8	86	29.3	3.1	114	29.1	4.0
35-44	67	19.0	4.5	46	14.9	3.2	49	16.8	3.4	52	17.7	3.9	65	16.6	4.9
45-54	43	12.1	3.1	36	11.7	2.7	44	15.0	3.3	39	13.3	3.0	72	18.4	5.6
55-64	41	11.6	4.3	37	12.0	3.8	29	9.8	3.0	35	11.9	3.4	51	13.0	5.0
65+	30	8.5	2.8	24	7.8	2.3	23	7.9	2.2	22	7.5	2.0	26	6.6	2.3
Unknown	1	0.3		0	0		1	0.3	-	1	0.3				
Race/Ethnicity															
Asian	13	3.7	1.0	23	7.5	1.7	20	6.8	1.5	18	6.1	1.4	25	6.4	1.8
Black	25	7.1	2.9	28	9.1	3.3	18	6.2	2.1	17	5.8	2.2	27	6.9	3.5
Hispanic	102	28.8	2.2	90	29.2	1.9	89	30.5	1.9	84	28.6	1.9	124	31.6	2.7
White	129	36.4	4.4	137	44.5	4.8	146	50.0	5.1	125	42.5	4.7	210	53.6	7.9
Other	4	1.1		8	27.3		2	0.7		1	0.3		2	0.5	
Unknown	81	22.9		22	7.1		17	5.8		49	16.3		4	1.0	
SPA															
1	5	1.4	1.4	11	3.6	2.9	8	2.7	2.1	5	1.7	1.3	9	2.3	2.3
2	138	39.0	6.2	10	3.2	0.5	102	35	4.6	96	32.7	4.5	95	24.2	4.4
3	27	7.6	1.6	27	8.8	1.6	22	7.5	1.3	27	9.2	1.7	50	12.8	3.1
4	46	13.0	3.7	49	15.9	3.9	47	16.1	3.7	57	19.4	5.1	71	18.1	6.2
5	43	12.1	6.6	31	10.0	4.7	37	12.7	5.6	39	13.3	6.1	49	12.5	7.6
6	29	8.2	2.8	21	6.8	2.0	20	6.8	1.9	17	5.8	1.7	39	9.9	3.8
7	26	7.3	1.9	31	10.1	2.3	26	8.9	1.9	25	8.5	1.9	42	10.7	3.2
8	36	10.2	3.2	26	8.4	2.3	28	9.6	2.5	28	9.4	2.6	37	9.5	3.4
Unknown	0	0.0		0	0.0		2	0.7		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, 2002 - 2013**

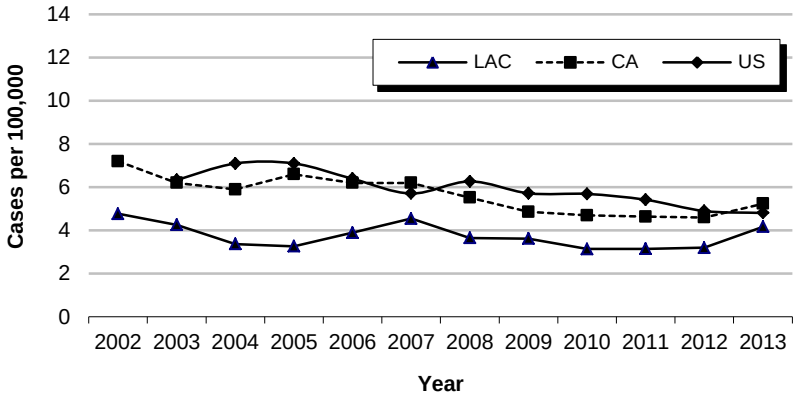


**Figure 2. Cases of Giardiasis by Age Group
LAC, 2013, N=392**

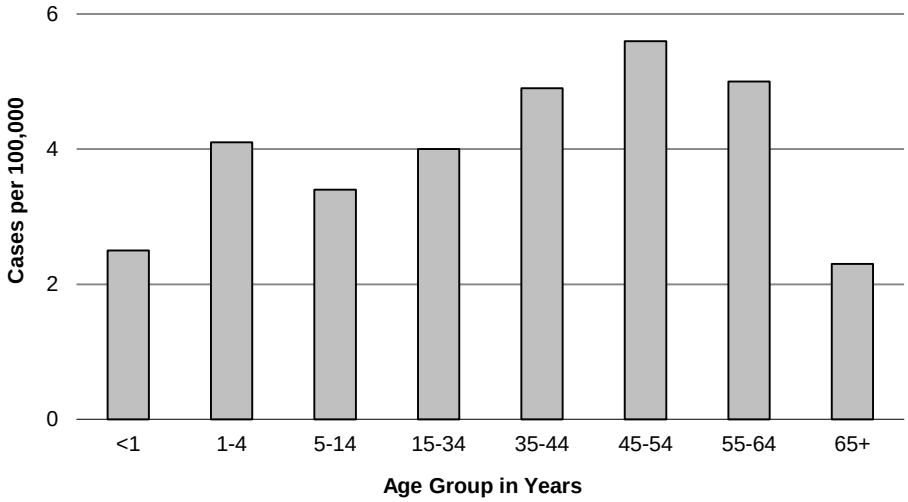


**Figure 3. Proportion of Giardiasis Cases by Race/Ethnicity
LAC, 2013, N=392**

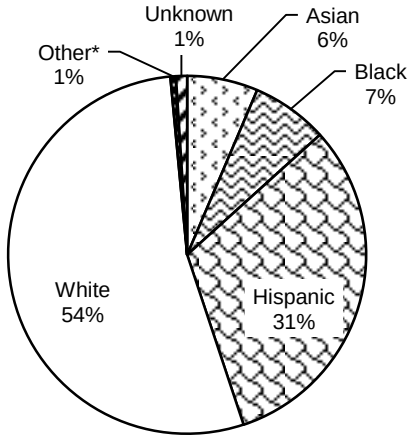
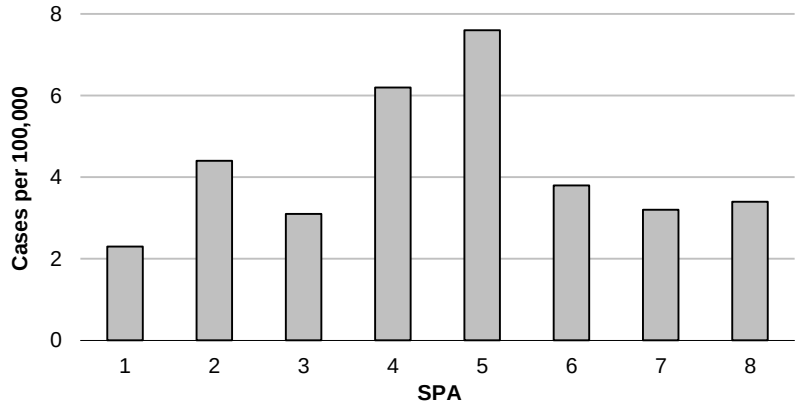


**Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2013, N=392**



* 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, 2013, N=392

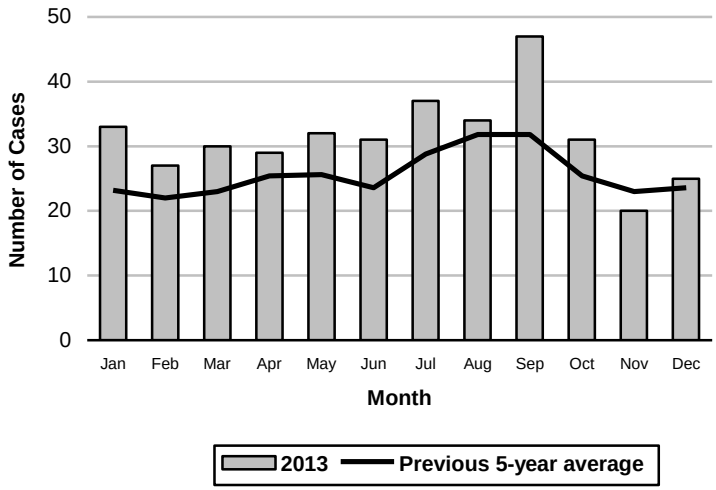
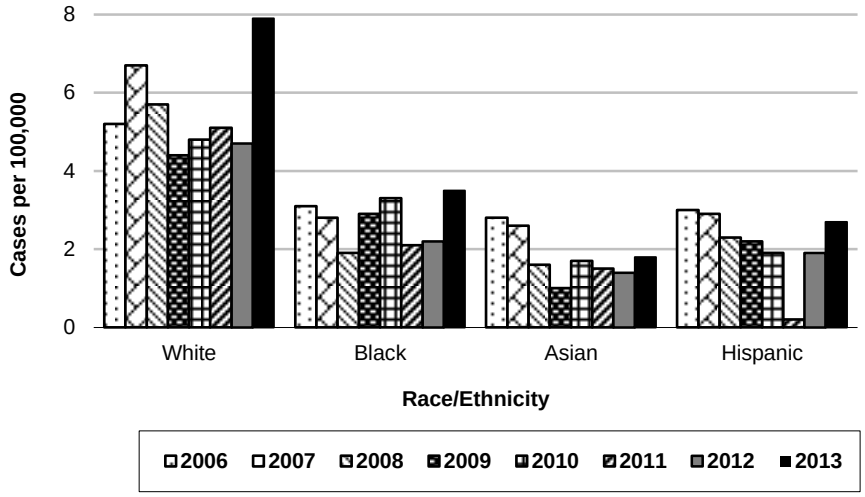
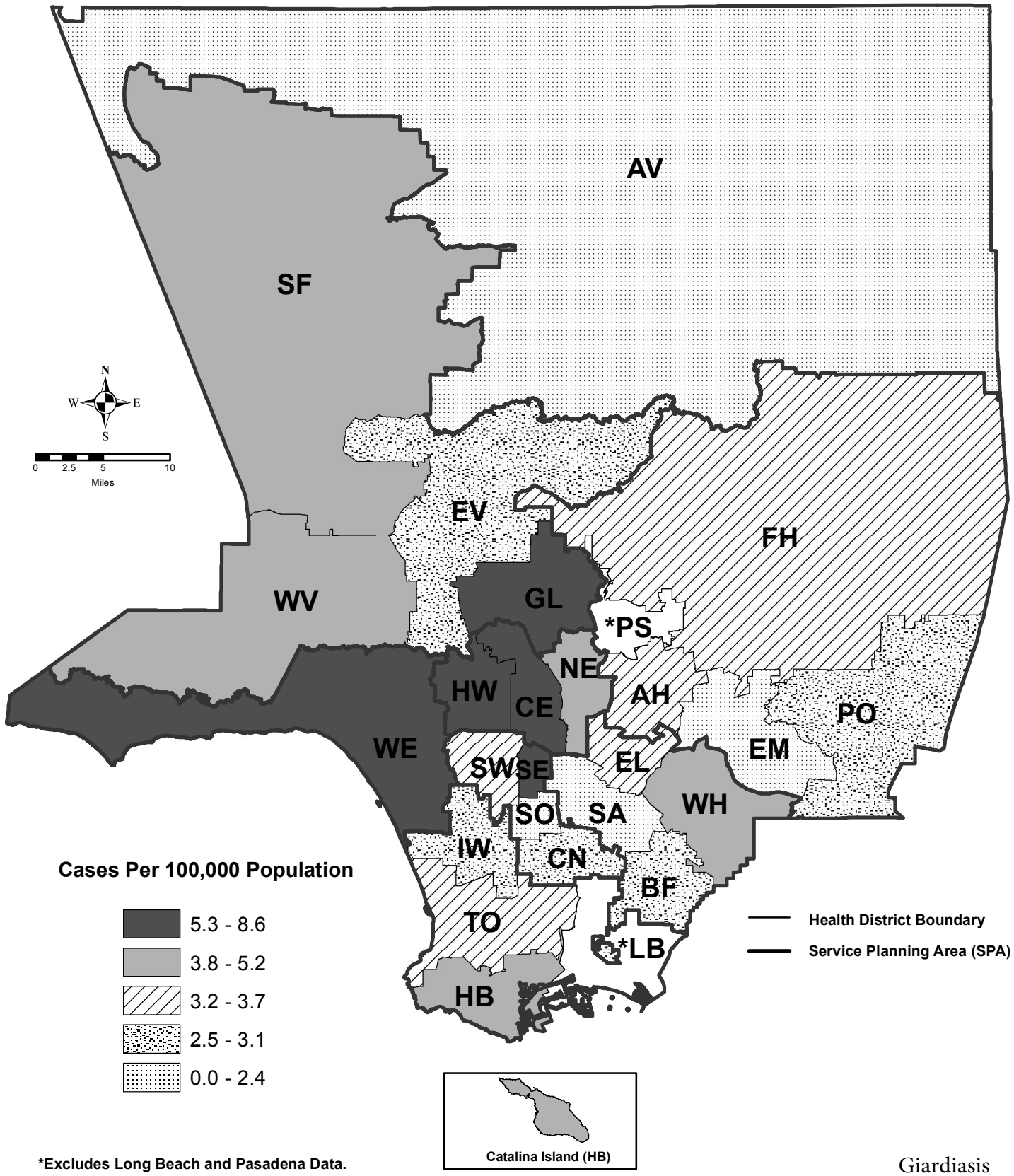


Figure 6. Giardiasis Incidence by Race/Ethnicity
LAC, 2006 - 2013, N=392



Map 6. Giardiasis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	35
Annual Incidence[a]	
LA County	0.37
California[b]	0.10
United States[c]	1.21
Age at Diagnosis	
Mean	41.1 years
Median	36.0 years
Range	Birth – 91 years

[a]Cases per 100,000 population.
[b]The incidence rates for California only include cases age <15 years
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32); 702-716.

DESCRIPTION

Haemophilus influenzae (H. influenzae) is a Gram-negative coccobacillus that can cause both invasive and non-invasive disease. Invasive disease includes meningitis, sepsis, pneumonia, cellulitis, and septic arthritis. Transmission is via respiratory secretions of infected individuals. There are six encapsulated, typeable strains (a–f), as well as unencapsulated, nontypeable strains. *H. influenzae* serotype B (Hib) is the only serotype that is vaccine-preventable and for which chemoprophylaxis is recommended. Thus, determining the serotype on laboratory specimens for all suspect cases is critical. Since June 2007, in accordance with the revised California Department of Public Health guidelines, the only cases of invasive *H. influenzae* investigated in Los Angeles County (LAC) are those in persons less than 15 years of age. The data are not representative of all *H. influenzae* cases in LAC since only cases <15 years of age are mandated to be reported.

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.
- Currently, all infants, including those born prematurely, are recommended to receive a primary series of conjugate Hib vaccine beginning at 2 months of age. The number of primary doses (2 or 3) depends on the brand of vaccine used.
- A booster dose is recommended at 12-15 months regardless of which brand of vaccine is used for the primary series.
- California State law requires that all children, up to age 4 years and 6 months, receive 1 dose of Hib vaccine on or after their first birthday, if they attend child care.
- 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.

2013 TRENDS AND HIGHLIGHTS

- For the fourth year in a row, no serotype B cases were identified; thus, none of the H. influenza cases were vaccine-preventable (Figures 6, 7, 8).
- Since 2010, the annual incidence rate has continued to decline, with 2013 being the lowest reported rate in the last ten years. In comparison, the annual incidence rate in California has remained relatively the same, while the US has seen an overall increase in the annual incidence, during the last ten years (Figure 1).
- The highest incidence rates of *H. influenzae* were in the <1 and ≥65 age groups, a trend that has continued to occur since 2009 (Figure 2).
- None of the cases were linked. SPA 1 and SPA 4 reported the highest incidence rate although the case numbers are small; SPA 5 was the only SPA without any reported cases (Figure 4).

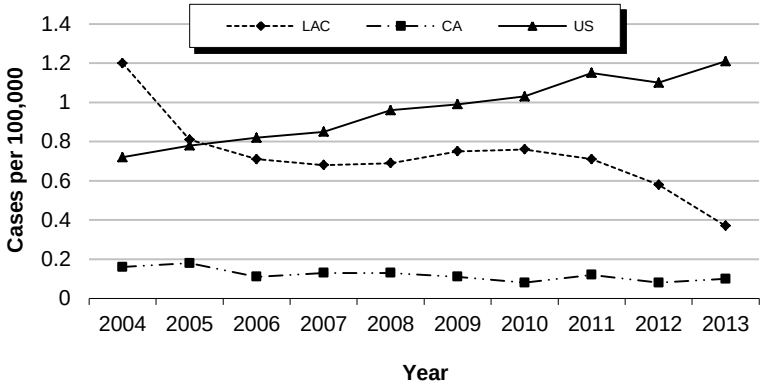
- The highest incidence rates for 2013 occurred in the first half of the year, with a peak in February. This is in contrast to the previous five years, when incidence rates would usually start to increase in February and peak in April (Figure 5).
- Reported cases were either non-B (n=19) or unknown serotypes (n=16) (Figures 6, 7, 8). All of the 16 cases with unknown serotype were ≥15 years of age so serotype testing was not requested. Among all 35 cases, 66% (n=23) were ≥15 years of age and were also not investigated further. Thus, data on race/ethnicity and locations are missing for many of the cases (Figure 3).

Reported *H. Influenzae* Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013**

	2009 (N=69)			2010 (N=70)			2011 (N=66)			2012 (N=54)			2013 (N=35)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	7	10.1	5.7	9	12.8	7.5	3	4.5	2.5	4	7.4	3.4	7	20.0	5.8
1-4	4	5.8	0.8	3	4.3	0.6	4	6.1	0.8	3	5.6	0.6	4	11.4	0.8
5-14	0	0.0	-	4	5.7	0.3	7	10.6	0.6	0	0.0	0.0	1	2.9	0.1
15-34	7	10.1	0.2	3	4.3	0.1	6	9.1	0.2	4	7.4	0.1	5	14.3	0.2
35-44	2	2.9	0.1	6	8.6	0.4	6	9.1	0.5	7	13.0	0.5	1	2.9	0.1
45-54	8	11.6	0.6	9	12.9	0.7	4	6.1	0.3	4	7.4	0.3	1	2.9	0.1
55-64	11	15.9	1.2	8	11.4	0.8	7	10.6	0.7	5	9.3	0.5	3	8.6	0.3
65+	30	43.5	3.0	28	40.0	2.8	29	43.9	2.8	27	50.0	2.4	13	37.1	1.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	3	4.4	0.2	0	0.0	-	3	4.6	0.2	4	7.4	0.3	1	2.9	0.1
Black	6	8.7	0.8	2	2.9	0.3	3	4.6	0.4	3	5.6	0.4	3	8.6	0.4
Hispanic	8	11.6	0.2	15	21.4	0.3	12	18.2	0.3	8	14.8	0.2	5	14.3	0.1
White	10	14.5	0.4	20	28.6	0.8	9	13.6	0.3	10	18.5	0.4	9	25.7	0.3
Other	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	0.0	0	0.0	-
Unknown	42	60.9		33	47.1		39	59.1		29	53.7		17	48.6	
SPA															
1	1	1.5	0.5	0	0.0	-	0	0.0	-	2	3.7	0.5	3	8.6	0.8
2	17	24.6	0.8	28	40.0	1.3	20	30.3	0.9	10	18.5	0.5	8	22.9	0.4
3	7	10.1	0.4	5	7.1	0.3	6	9.1	0.4	6	11.1	0.4	5	14.3	0.3
4	5	7.3	0.4	8	11.4	0.7	5	7.6	0.4	8	14.8	0.7	6	17.1	0.5
5	2	2.9	0.3	2	2.9	0.3	5	7.6	0.8	4	7.4	0.6	0	0.0	-
6	9	13.0	0.9	4	5.7	0.4	4	6.1	0.3	9	16.7	0.9	3	8.6	0.3
7	11	15.9	0.8	6	8.6	0.5	8	12.1	0.5	3	5.6	0.2	5	14.3	0.4
8	6	8.7	0.6	7	10.0	0.7	9	13.6	0.7	8	14.8	0.8	3	8.6	0.3
Unknown	11	15.9		10	14.3		9	13.6		4	7.4		2	5.7	

*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").
**The data are not representative of all *H. influenzae* cases in Los Angeles County since only cases <15 years of age are mandated to be reported.

Figure 1. Incidence Rates of *H. influenzae* Invasive Disease US, CA and LAC, 2004-2013*



*The incidence rates for CA only includes cases aged <30 years (2004-2006) and cases aged <15 years (2007-2013). The incidence rates for the US include cases of all ages. The data are not representative of all *H. influenzae* cases in Los Angeles County since only cases <15 years of age are mandated to be reported.

Figure 2. Incidence Rates of *H. influenzae* Invasive Disease by Age Group LAC, 2013* (N=35)

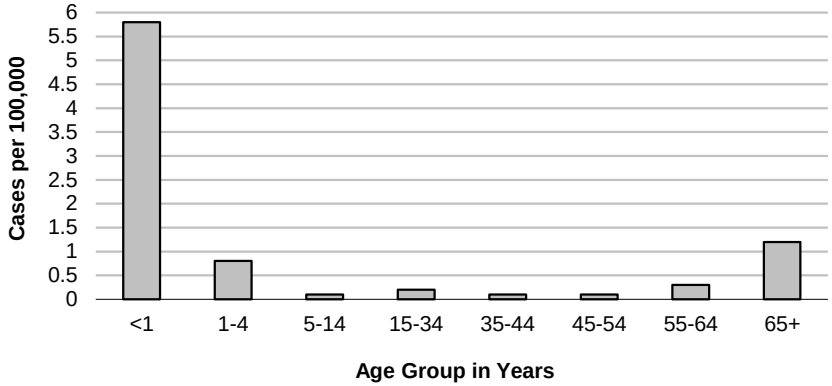


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2013 (N=35)

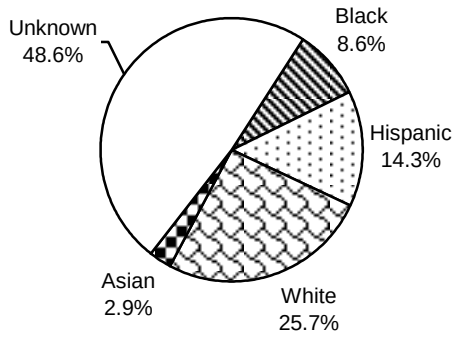
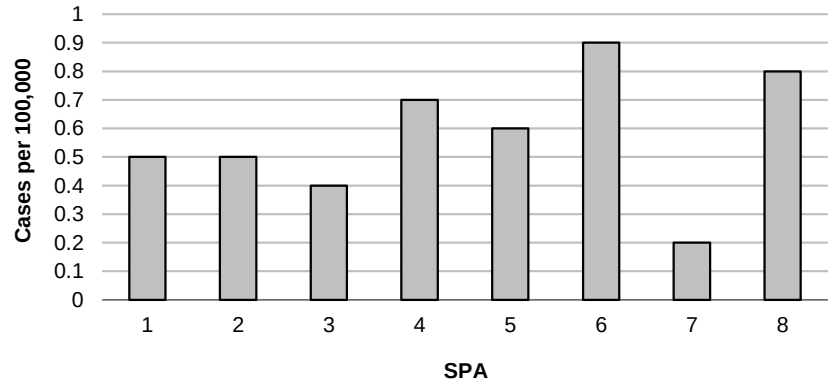


Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2013* (N=35)



* The data are not representative of all *H. influenzae* cases in Los Angeles County since only cases <15 years of age are mandated to be reported.

Figure 5. Reported *H. influenzae* Invasive Disease Cases by Month of Onset, LAC, 2013* (N=35)

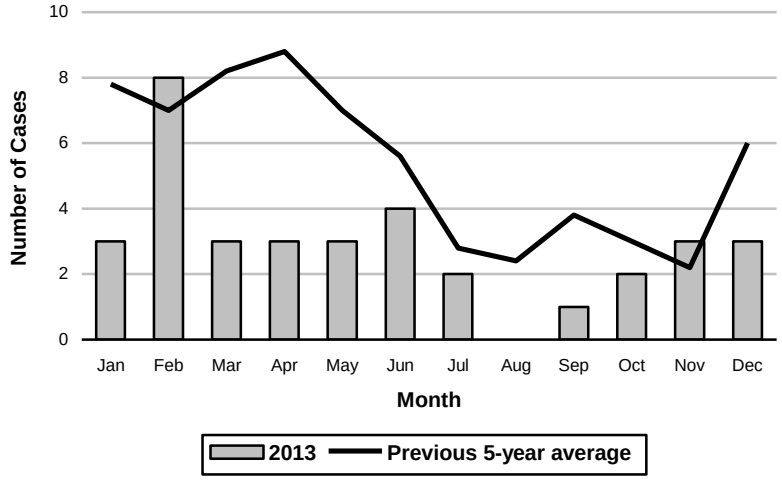


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 2004-2013*

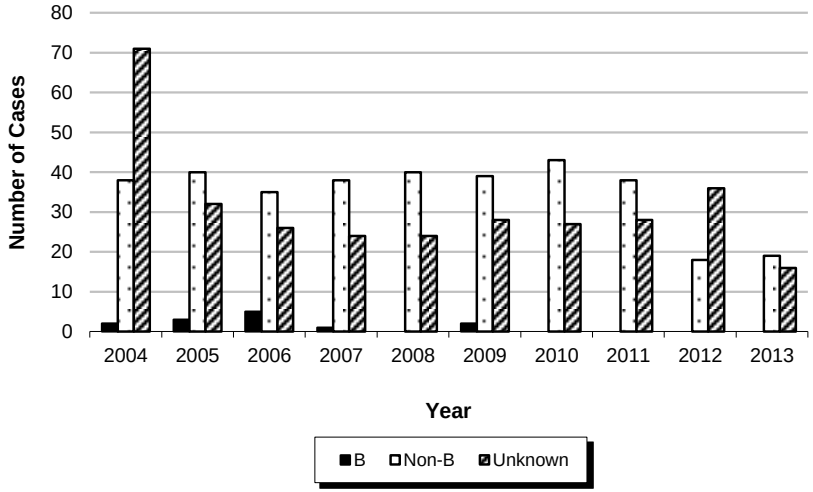
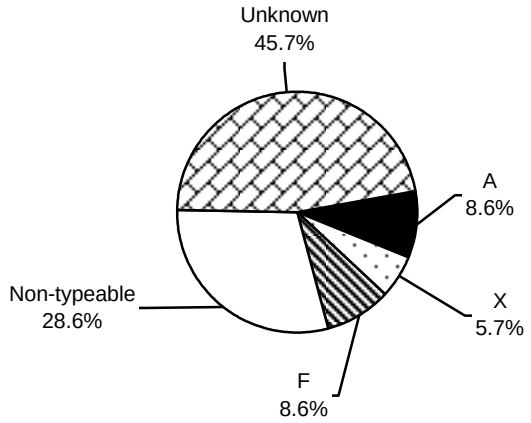


Figure 7.Reported *H. influenzae* Invasive Disease Cases by Serotype, 2013* (N=35) vs. Previous 5-Year Average*

	B		Non-B		Unknown[1]	
	2013	Previous 5-Year Average	2013	Previous 5-Year Average	2013	Previous 5-Year Average
Total Cases	0	0.4	19	35.6	16	28.6
Age at Onset (years)						
Mean	--	52.5	41.1	45.2	58.9	62.0
Median	--	52.5	36.0	52.8	65.0	65.3
Range	--	48 – 57	<1 – 91	<1 – 99	17 – 91	<1 –99
Case Fatality	--	0.0%	0.0%	2.8%	0.0%	4.9%

[1]All of the unknown serotype cases are >15 years of age so no further serotype testing is requested.

Figure 8. Percent Cases of *H. influenzae* Invasive Disease by Serotype LAC, 2013* (N=35)



* The data are not representative of all *H. influenzae* cases in Los Angeles County since only cases <15 years of age are mandated to be reported.

HEPATITIS A

CRUDE DATA	
Number of Cases	60
Annual Incidence[a]	
LA County	0.64
California[b]	0.67
United States[b]	0.57
Age at Diagnosis	
Mean	41
Median	40
Range	6-83 years

[a]Cases per 100,000 population

[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

Hepatitis A virus (HAV), a RNA virus, is a vaccine-preventable disease transmitted fecal-orally, person-to-person, or through vehicles such as food. In the United States (US), among adults with identified risk factors, the majority of cases are among men who have sex with other men, persons who use illegal drugs, and international travelers. Sexual and household contacts of HAV-infected persons are also at increased risk for getting the disease.

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

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

Los Angeles County (LAC) Department of Public Health uses the Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists 2012 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.

2013 TRENDS AND HIGHLIGHTS

- ACDC participated in a multistate outbreak investigation associated with frozen berries. For more information see 2013 ACDC Special Studies Reports.
- The 2013 incidence rate of acute hepatitis A was higher than 2012, 0.64 per 100,000 versus 0.51 per 100,000, respectively. Without the outbreak cases the 2013 rate would have been lower. For instance, the incidence rate for the 55-64 age group in 2013 was 1.3 due to the outbreak compared with the 2012 rate which was 0.5 when there had been no outbreak within this age group. (Figure 1).
- The rate was highest among those between the ages of 55-64 years (1.3 per 100,000), unlike 2012 where the rate was highest among those in the 15-34 age group (0.9 per 100, 000) (Figure 2).
- Similar to previous years, in 2013 the highest incidence rate was seen in Asians (1.1 per 100,000) (Figure 3).
- Five Service Planning Areas (SPAs) had incidence rates greater than the overall county incidence rate of 0.64 per 100,000: SPA 1 (0.8 per 100,000), SPA 2 (0.8 per 100,000), SPA 4 (0.7 per 100,000), SPA 5 (1.4 per 100,000) and SPA 7 (0.9 per 100,000). The incidence rates were higher in these SPAs as they are more highly populated by Asian and Hispanic immigrants who travel abroad more frequently to visit relatives. The most frequently reported travel destinations for 2013 were South/Central America and Asia/South Pacific. SPA 6 and 8 reported lower incidence rates as they are predominantly populated by African American populations that are less likely to travel internationally (Figure 4).
- Forty-seven percent (n=28) of acute hepatitis A cases were hospitalized, and the remainder were managed as outpatients.

- Risk factors were identified in 72% (n=43) of the 60 confirmed cases (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=20, 47%) was the most frequently reported risk factor, followed by being part of a common source outbreak (n=14, 33%), having a household member who traveled outside of the US in 3 months prior to onset of illness (n=10, 23%), eating raw shellfish (n=9, 21%), contact with a suspected or confirmed hepatitis A (n=5, 12%), close contact of child/employee at daycare center (n=1, 2%), using street drugs but not injecting (n=1, 2%) (Figure 5).

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2008-2013

	2009 (N=66)			2010 (N=51)			2011 (N=45)			2012 (N=47)			2013 (N=60)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
1-4	0	0	0.0	2	3.9	0.4	1	2.2	0.2	0	0	0	0	0	0
5-14	1	1.5	0.1	3	5.9	0.2	3	6.7	0.2	3	6.4	0.3	2	3.3	0.2
15-34	34	51.5	1.2	27	52.9	1.0	18	40.0	0.6	24	51.0	0.9	22	36.7	0.8
35-44	10	15.1	0.7	6	11.8	0.4	11	24.4	0.8	9	19.1	0.7	12	20.0	0.9
45-54	6	9.1	0.5	3	5.9	0.2	5	11.1	0.4	3	6.4	0.2	8	13.3	0.6
55-64	5	7.6	0.5	3	5.9	0.3	3	6.7	0.3	5	10.6	0.5	13	21.7	1.3
65+	10	15.1	1.0	7	13.7	0.7	4	8.9	0.4	3	6.4	0.3	3	5.0	0.3
Unknown	0	0		0	0	0	0	0	0	0	0	0	0	0	0
Race/Ethnicity															
Asian	18	27.3	1.4	12	23.5	0.9	13	28.9	1.0	8	17.0	0.6	15	25.0	1.1
Black	2	3.0	0.3	3	5.9	0.4	2	4.4	0.3	0	0	0	1	1.7	0.1
Hispanic	21	31.8	0.5	22	43.1	0.5	8	17.8	0.2	20	42.6	0.4	18	30.0	0.4
White	24	36.4	0.9	14	27.4	0.5	22	48.9	0.8	14	29.8	0.5	26	43.3	1.0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	1	1.5		0	0		0			5	10.6		0	0	0
SPA															
1	2	3.0	0.5	3	5.9	0.8	2	4.4	0.5	2	4.3	0.5	3	5.0	0.8
2	22	33.3	1.0	18	35.3	0.8	17	37.8	0.8	17	36.1	0.8	17	28.3	0.8
3	8	12.1	0.5	3	5.9	0.2	10	22.2	0.6	4	8.5	0.2	5	8.3	0.3
4	6	9.1	0.5	9	17.6	0.8	6	13.3	0.5	8	17.0	0.7	8	13.3	0.7
5	8	12.1	1.3	6	11.8	0.9	2	4.4	0.3	4	8.5	0.6	9	15.0	1.4
6	8	12.1	0.8	4	7.8	0.4	3	6.7	0.3	0	0	0	1	1.7	0.1
7	6	9.1	0.5	6	11.8	0.5	1	2.2	0.1	7	14.9	0.5	12	20.0	0.9
8	6	9.1	0.6	1	2.0	0.1	4	8.9	0.4	5	10.6	0.5	5	8.3	0.5
Unknown	0			1	2.0		0			0			0	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, 2009-2013**

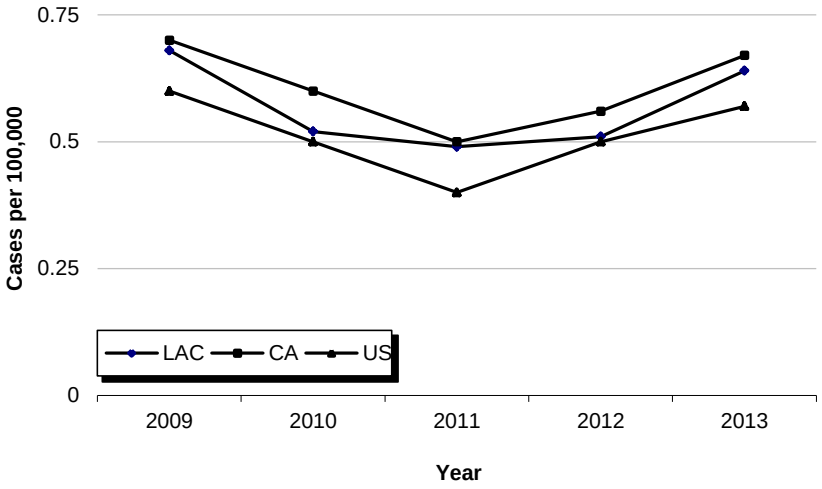


**Figure 2. Incidence Rates* of Hepatitis A by Age Group
LAC, 2011-2013**

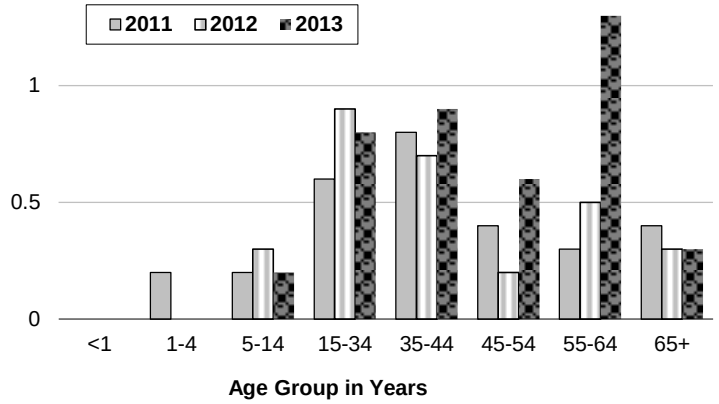


**Figure 3. Hepatitis A Incidence Rates* by Race/Ethnicity
LAC, 2011-2013**

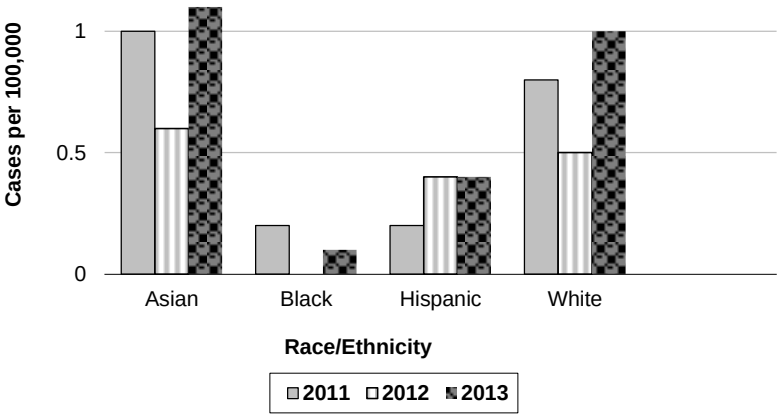
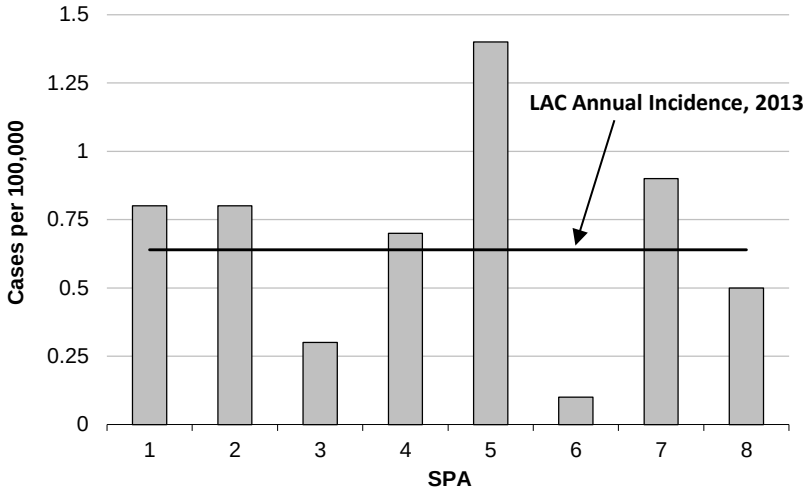
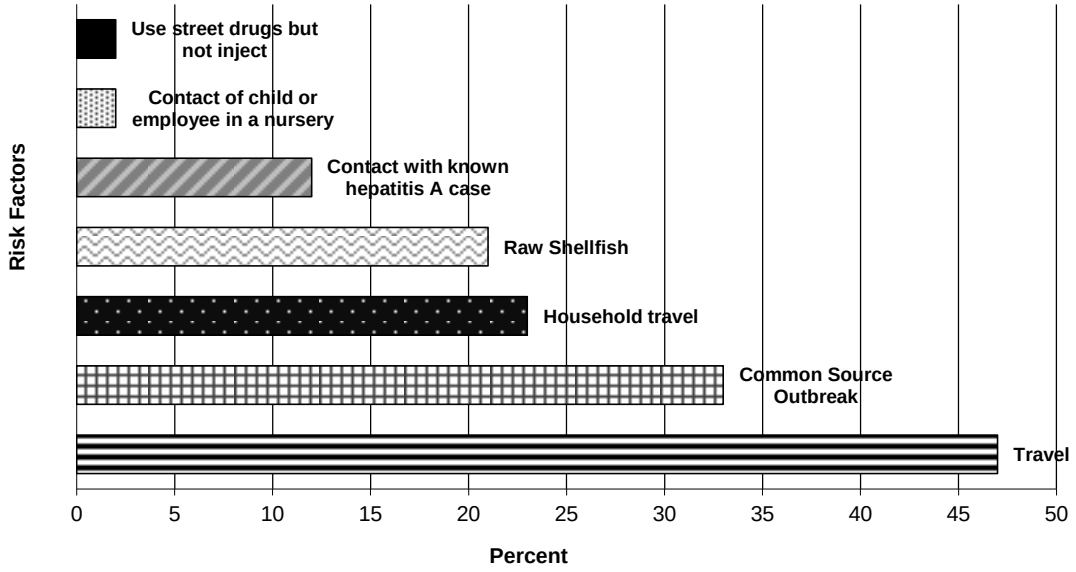


**Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 2013 (N=60)**



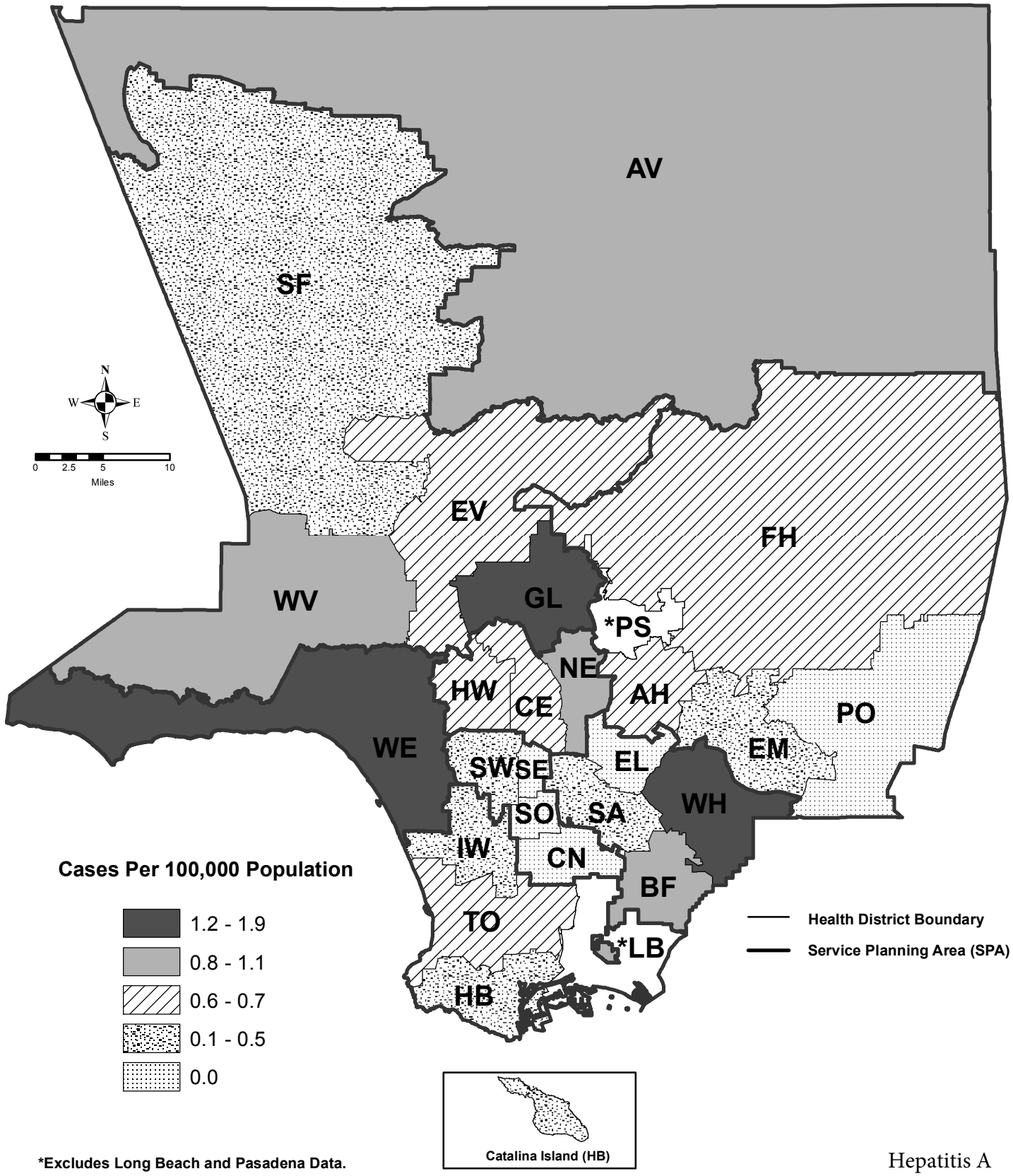
* Rates based on fewer than 19 cases are unreliable

Figure 5. Hepatitis A Reported Risk Factors*
LAC, 2013 (N=60)



*Includes cases with multiple risk factors

Map 7. Hepatitis A
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	55
Annual Incidence[a]	
LA County	0.58
California[b]	0.36
United States[b]	0.97
Age at Diagnosis	
Mean	42
Median	42
Range	19-77 years

[a]Cases per 100,000 population

[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

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

Symptoms, which occur in less than half of those acutely infected, begin an average of 90 days (range: 60–150 days) after exposure and can include: fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored bowel movements, joint pain, and jaundice. Approximately 2-10% of adults infected with hepatitis B virus (HBV) are unable to clear the virus within six months and become chronic carriers. Death from cirrhosis or liver cancer is estimated to occur in 15–25% of those with chronic infection. Overall, hepatitis B is more prevalent and infectious than HIV.

The absence of acute hepatitis B in persons under age 19 in the US is evidence of the successful immunization strategy to eliminate HBV transmission. This strategy includes: screening all pregnant women and providing immunoprophylaxis to infants of HBV-infected women, routine immunization of all infants, and catch-up vaccination of all previously unvaccinated children aged < 19 years.

Adult vaccination is recommended for those in high risk groups including; men who have sex with men (MSM), history of multiple sex partners, injection drug users, persons seeking treatment for sexually transmitted disease; household and sex contacts of persons with chronic HBV infections, healthcare workers, persons with chronic liver disease, persons with HIV, hemodialysis patients and unvaccinated adults with diabetes mellitus aged 19 through 59.

For the purpose of surveillance, Los Angeles County (LAC) Department of Public Health uses the 2012 Centers for Disease Control and Prevention (CDC)/Council of State and Territorial Epidemiologists (CSTE) criteria for acute hepatitis B. The criteria include: 1) discrete onset of symptoms and 2) jaundice *or* elevated aminotransferase (ALT) levels >100 IU/L, and 3) HBsAg positive and anti-HBc IgM positive, (if done). In 2012, the CDC/CSTE modified the acute hepatitis B case definition to include documented seroconversion cases (documented negative HBV test result within 6 months prior to HBV diagnosis) without the acute clinical presentation.

2013 TRENDS AND HIGHLIGHTS

- One 2013 acute hepatitis B case was a documented seroconversion and the remainder of the cases met the 2012 CDC/CSTE acute Hepatitis B case criteria.
- The 2013 incidence rate increased from the previous year (0.58 per 100,000 versus 0.51 per 100,000) (Figure 1).
- As in 2012, the 2013 incidence rate (1.1 per 100,000) was highest in persons between the ages of 35-44 years (Figure 2).
- The male-to-female ratio was 1:0.38.
- Blacks had the highest incidence rate in 2013 (1.5 per 100,000) which is consistent with previous years (Figure 3).
- Four Service Planning Areas (SPA) had rates greater than the overall county mean rate of 0.58 per 100,000)—SPA 5 (1.1 per 100,000), SPA 6 (1.0 per 100,000), SPA 4 (0.8 per 100,000), and SPA 3 (0.6 per 100,000) (Figure 4).
- Risk factors were identified in 75% (n=41) of the 55 confirmed cases (including some cases with multiple risk factors). Of those with identified risk factors, the most frequently reported risk factor was MSM (n=15, 42% of males), followed by having multiple sexual partners (n=17, 41%), non-injection street drugs (n=7, 17%), IV/IM injections (n=6, 15%), dental work (n=4, 10%), IVDU (n=4, 10%), fingersticks (n=3, 7%), having a diagnostic medical

procedure (n=3, 7%), tattoo (2 at commercial shop, 1 other) (n=3, 7%), accidental exposure to blood (n=3, 7%), acupuncture (n=2, 5%), accidental needle stick (n=2, 5%), incarceration (n=2, 5%), contact with a confirmed or suspected case of hepatitis B (n=1, 3%),hemodialysis (n=1, 2%) and LTF (n=1, 2%) (Figure 5).

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=41)			2010 (N=54)			2011 (N=60)			2012 (N=38)			2013 (N=55)		
	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	12	29.3	0.4	18	33.3	0.6	12	20.0	0.4	10	26.3	0.4	20	36.3	0.7
35-44	7	17.1	0.5	13	24.1	1.0	10	16.7	0.8	13	34.2	1.0	15	27.3	1.1
45-54	16	39.0	1.3	11	20.4	0.9	21	35.0	1.6	10	26.3	0.8	12	21.8	0.9
55-64	4	9.7	0.4	7	13.0	0.7	12	20.0	1.2	3	7.9	0.3	5	9.1	0.5
65+	2	4.9	0.2	5	9.2	0.5	5	8.3	0.5	2	5.3	0.2	3	5.4	0.3
Unknown	0	0		0	0		0	0		0			0	0	
Race/Ethnicity															
Asian	5	12.2	0.4	11	20.4	0.8	3	5.0	0.2	1	2.6	0.1	6	10.9	0.4
Black	11	26.8	1.4	14	25.9	1.8	13	21.7	1.7	5	13.2	0.6	12	21.8	1.5
Hispanic	12	29.3	0.3	14	25.9	0.3	19	31.7	0.4	13	34.2	0.3	21	38.2	0.5
White	11	26.8	0.4	14	25.9	0.5	23	38.3	0.9	14	36.8	0.5	15	27.3	0.6
Other	0	0		1	1.8		0	0		0	0		0	0	0
Unknown	2	4.9		0	0		2	3.3		5	13.2		1	1.8	
SPA															
1	0	0	0	2	3.7	0.5	0	0	0.0	2	5.3	0.5	1	1.8	0.3
2	4	9.8	0.2	5	9.3	0.2	13	21.7	0.6	5	13.2	0.2	9	16.4	0.4
3	6	14.6	0.4	10	18.5	0.6	8	13.3	0.5	8	21.0	0.5	9	16.4	0.6
4	13	31.7	1.2	8	14.8	0.7	15	25.0	1.3	9	23.7	0.8	9	16.4	0.8
5	1	2.4	0.2	4	7.4	0.6	1	1.7	0.2	3	7.9	0.5	7	12.7	1.1
6	10	24.4	1.0	8	14.8	0.8	10	16.7	1.0	2	5.3	0.2	10	18.1	1.0
7	2	4.9	0.2	7	13.0	0.5	3	5.0	0.2	6	15.8	0.5	6	10.9	0.5
8	4	9.8	0.4	10	18.5	0.9	8	13.3	0.8	3	7.9	0.3	2	3.6	0.2
Unknown	1	2.4		0	0		2	3.3		0	0		2	3.6	

*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, 2009-2013**

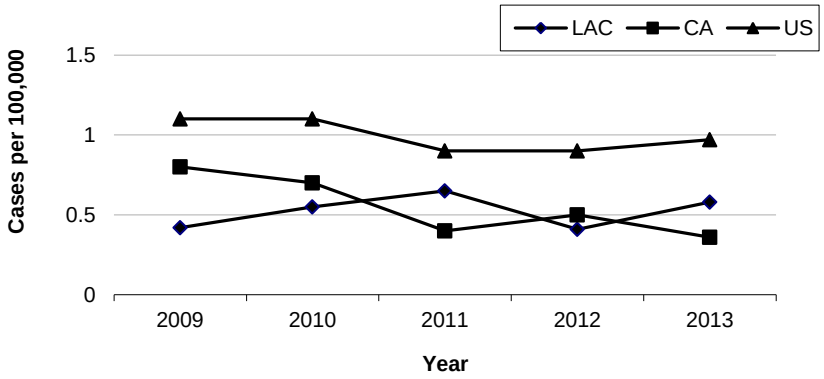
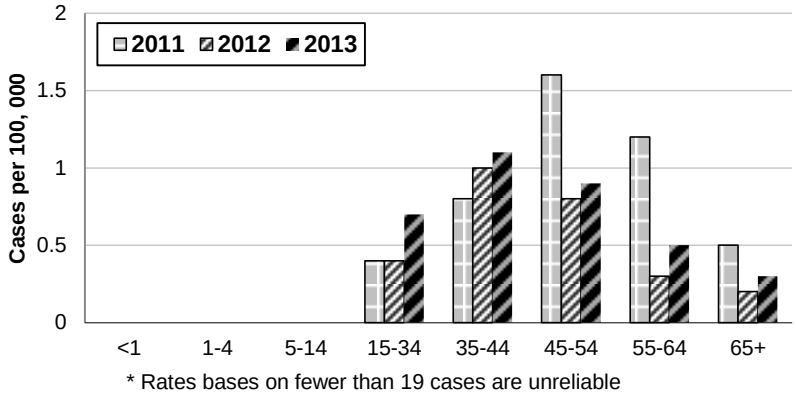
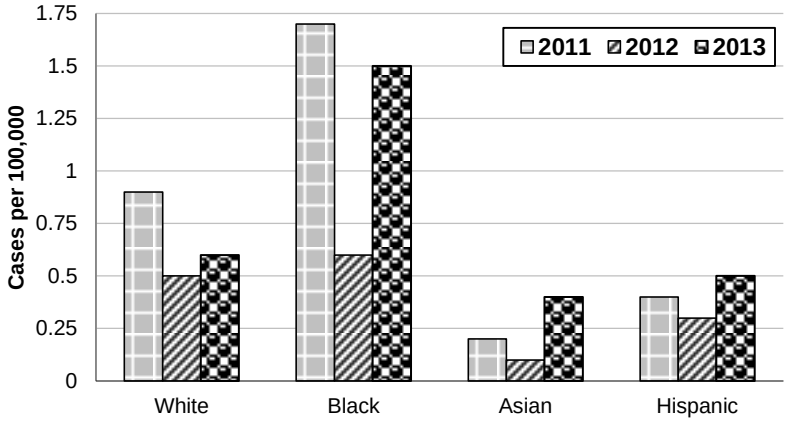


**Figure 2. Incidence Rates* of Acute Hepatitis B by Age Group
LAC, 2011-2013**



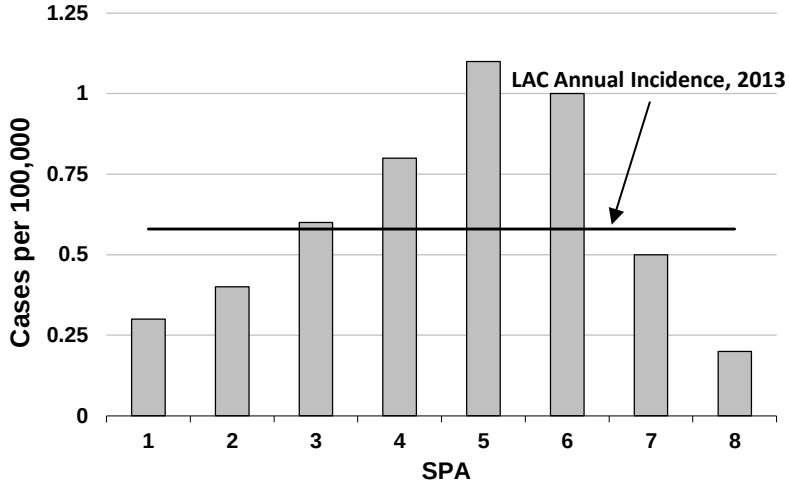
* Rates bases on fewer than 19 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence Rates* by Race/Ethnicity
LAC, 2011-2013**



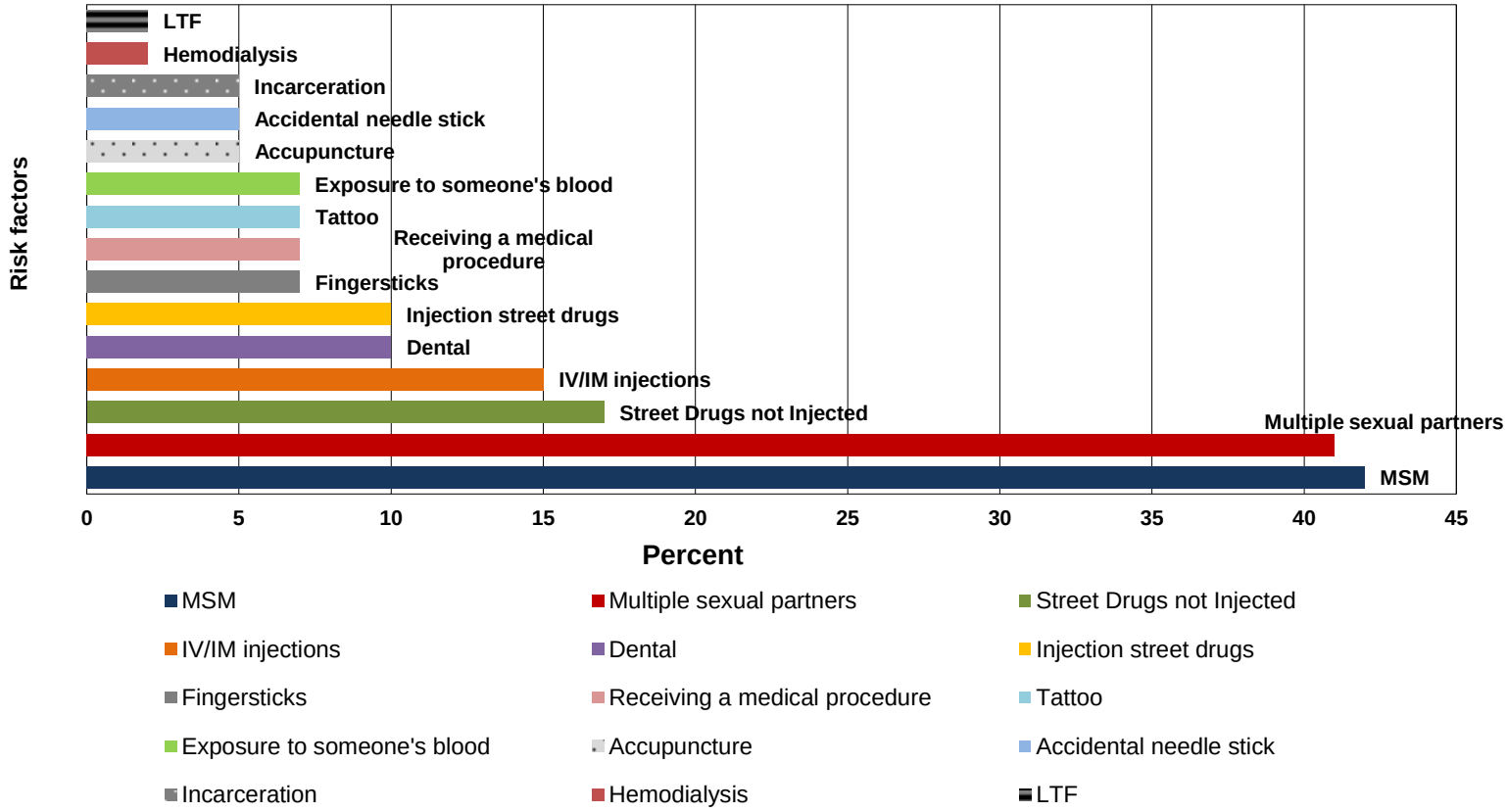
* Rates based on fewer than 19 cases are unreliable

**Figure 4. Incidence Rates* of Hepatitis B by SPA
LAC, 2013 (N=55)**



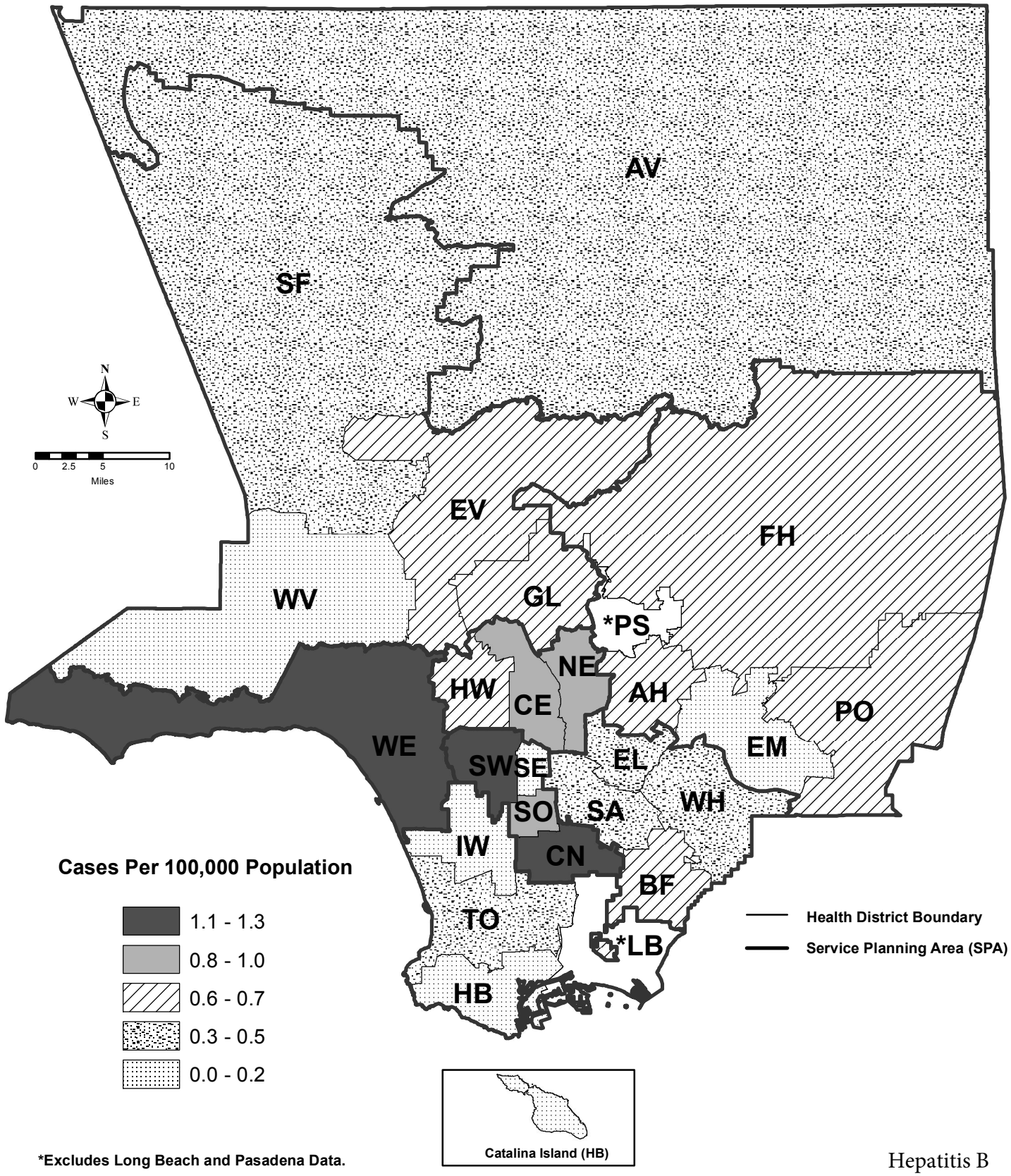
* Rates based on fewer than 19 cases are unreliable

Fig. 5. Hepatitis B Reported Risk Factors*
LAC, 2013 (n=55)



*Includes cases with multiple risk factors

Map 8. Hepatitis B
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, PERINATAL

CRUDE DATA	
Infants Born to HBsAg+ Mothers	915
Incidence of Exposure[a] LA County	6.7
HBsAg+ Infant[b]	1
Maternal Age at Diagnosis	38 years
Infant Age at Diagnosis	9 months

[a]Number of infants born to HBsAg-positive mothers per 1000 live births in 2013.
[b]Based on number of infants that had post vaccine serology testing.

DESCRIPTION

Hepatitis B is a vaccine-preventable disease transmitted through parenteral or mucous membrane exposure to blood and other body fluids of individuals infected with the hepatitis B virus (HBV). A woman can transmit the HBV to her 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 would 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 (PEP) with hepatitis B vaccine and hepatitis B immune globulin (HBIG) administered 12 to 24 hours after birth, followed by completion of a three-dose vaccine series, has demonstrated 85%-95% effectiveness in preventing acute and chronic HBV infection in infants born to mothers who are positive for both HBsAg and hepatitis B e-antigen. However, efficacy is enhanced if administered within 12 hours of birth. Post-vaccination serologic (PVS) testing is recommended at age 9-18 months after completing PEP 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 to the HBsAg-positive mother for greater than one year (often limited to nuclear family).

2013 TRENDS AND HIGHLIGHTS

- Nine hundred and fifteen infants (includes twelve sets of twins) were born to 891 HBsAg+ women.
- The incidence of exposure increased by 3% from 6.5 to 6.7 per 1000 infants born in 2013 compared to 2012 (Figure 1).
- Sixty-one percent (n=544) of women screened for HBsAg were 15-34 years of age (Figure 7).
- Eighty-eight percent (n=782) of HBsAg+ women were born outside of the United States.
- Eighty percent (n=712) of HBsAg+ women were Asian followed by 5% (n=51) unknown, 5% (n=44) Hispanic, 4% (n=32) black, 3% (n= 28) other and 3% (n=24) white (Figures 2 and 3).
- Sixty-five percent (n=580) of the HBsAg+ women reside in Service Planning Area (SPA) 3, which has a large Asian population (Figure 4).
- Ninety-five percent (n=867) of infants received the first dose of Hepatitis B vaccine and HBIG within 12 hours of birth (Figure 5).
- Eleven percent (n=105) of infants born to HBsAg+ women received PVS testing to determine immunity to hepatitis B after receipt of one dose of HBIG and completion of the three dose hepatitis B vaccination series. Infants born in the later part of 2013 are too young for PVS testing. One infant was HBsAg+, indicating infection (Figure 6).
- Among the HHCs, 37% (n=452) were 0-10 years of age and 30% (n=370) were 31-40 years of age (Figure 7).
- Hepatitis B virus marker status of HHCs (n=315) is as follows: Fifty-one percent (n=160) had positive antibodies to HBsAg (anti-HBs), 26% (n=82) were HBsAg negative, 6% (n=18) were susceptible (anti-HBs negative), 15% (n=46) were infected (HBsAg+) and 2% (n=9) had positive hepatitis B core antibodies, which indicates a previous or ongoing infection. The PHBPU recommends the Hepatitis B vaccine series for those who are susceptible (Figure 8).

Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Maternal Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=760)			2010 (N=653)			2011 (N=700)			2012 (N=854)			2013 (N=891)		
	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	0.00	0	0.0	0.00
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.00	0	0.0	0.00
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.00	0	0.0	0.00
15-34	520	58.4	18.4	448	68.6	15.2	476	68	16.1	589	69.0	20	544	61.1	19.2
35-44	237	31.2	10.7	204	31.2	14.2	219	31.3	15.2	263	31.0	18.3	339	38.0	25.4
45-54	3	0.4	0.2	0	0	0	2	0.3	0.1	1	0.1	0.1	8	0.9	0.6
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0%
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0%
Unknown	0	0.0		1	0.2		3	0.4		1	0.1		0	0.0	--
Race/Ethnicity															
Asian	570	75.0	43.8	491	75.2	37.4	555	79.3	42.3	678	79.0	51.7	712	79.9	52.7
Black	33	4.0	3.9	22	3.4	2.6	25	3.6	2.9	30	4.0	3.5	32	3.6	4.1
Hispanic	76	10.0	1.6	50	7.7	1.1	55	7.9	1.2	46	5.0	1.0	44	4.9	1
White	40	5.0	1.4	38	5.8	1.3	33	4.7	1.2	41	5.0	1.4	24	2.7	0.9
*Other	41	5.0	1.6	19	2.9	40.4	13	1.9	34.9	20	2.3	82.4	28	3.1	155
Unknown	0	0.0		33	5.1		19	2.7		39	5.0		51	5.7	--
SPA															
1	6	0.8	1.6	9	1.4	2.4	10	1.4	2.7	15	1.8	4.0	8	0.9	2.0
2	117	15.4	5.3	85	13	3.8	78	11.1	3.5	93	10.9	4.2	76	8.5	3.5
3	355	46.7	20.5	329	50.4	19.0	369	52.7	21.3	491	57.5	28.3	580	65.1	35.5
4	83	10.9	6.7	83	12.7	6.6	74	10.6	5.9	82	9.6	6.5	64	7.2	5.6
5	32	4.2	4.9	19	2.9	2.9	30	4.3	4.5	34	4.0	5.2	36	4.0	5.6
6	38	5.0	3.6	19	2.9	1.8	29	4.1	2.7	24	2.8	2.2	19	2.1	1.8
7	50	6.6	3.6	42	6.4	3.0	46	6.6	3.3	34	4.0	2.5	47	5.3	3.6
8	75	9.9	6.7	58	8.9	5.2	47	6.7	4.2	69	8.1	6.1	60	6.7	5.6
Unknown	4	0.5		9	1.4		17	2.4		12	1.4		1	0.1	--

*Rates calculated based on less than 19 cases or events are considered unreliable * Other includes Pacific Islanders.

**Figure 1. Perinatal Hepatitis B Incidence of Exposure
LAC, 2003-2013**

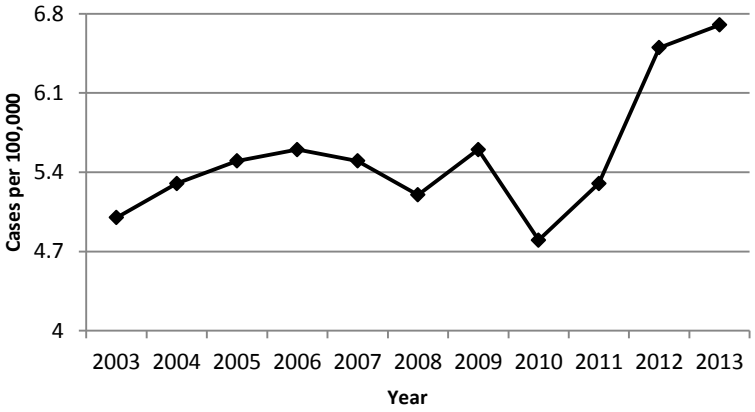
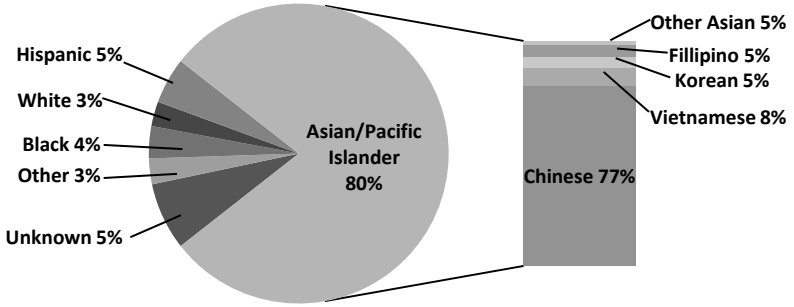


**Figure 2. Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2013 (N=891)**



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

**Figure 3. Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2009-2013 (N= 3858)**

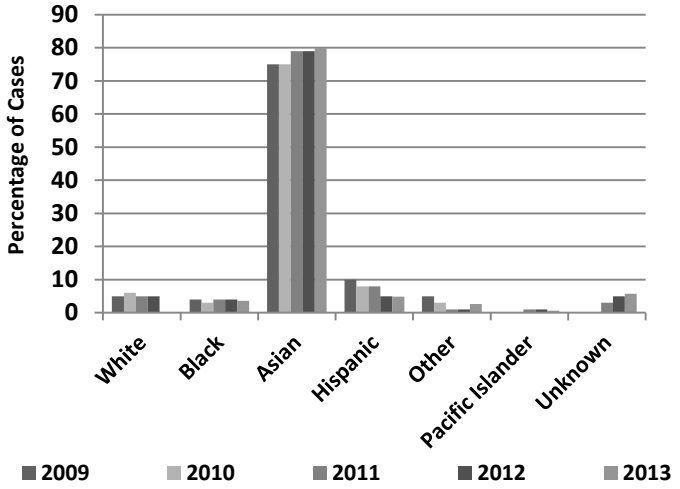


**Figure 4. Perinatal Hepatitis B Maternal by SPA
LAC, 2013 (N=891)**

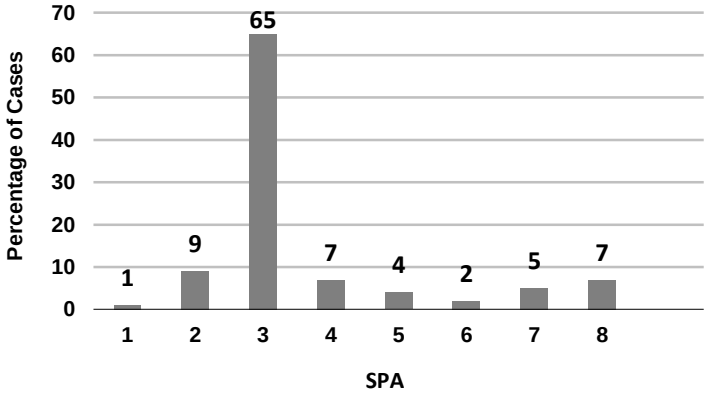
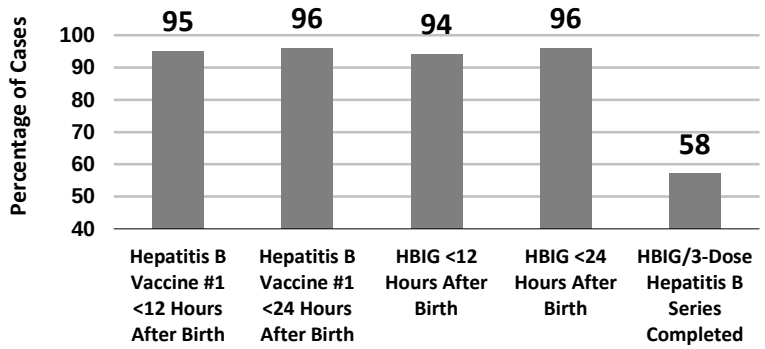
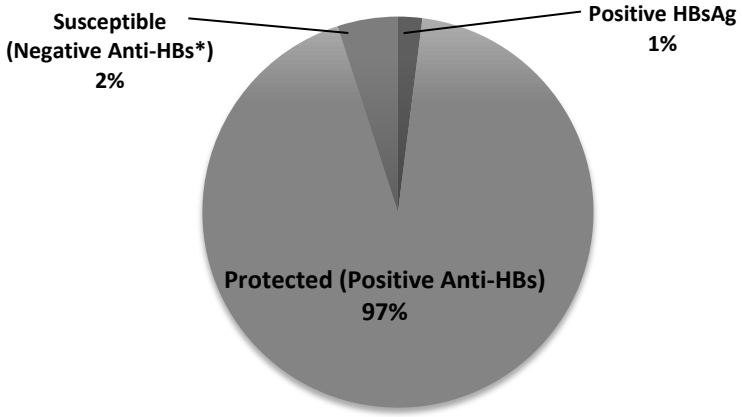


Figure 5. Perinatal Hepatitis B Summary of Infant Hepatitis B Immunoprophylaxis, LAC, 2013 (N=915)



Note: As of the date of this report, many infants born in the later part of 2012 are not due to receive the 3rd dose hepatitis B vaccine.

Figure 6. Perinatal Hepatitis B Infant Post Vaccination Serology (PVS) Results LAC, 2013 (N=105)



***Antibody to Hepatitis B Surface Antigen**
Note: As of the date of this report, many infants born in the later part of 2013 are not eligible for PVS testing which 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, 2013 (N=1232)

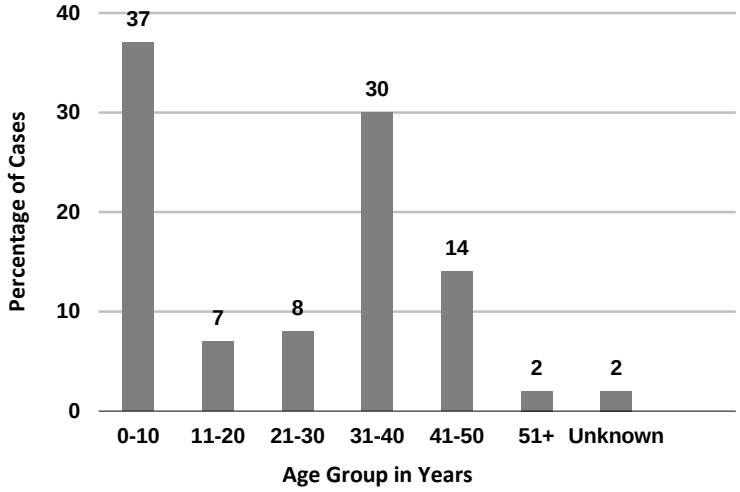
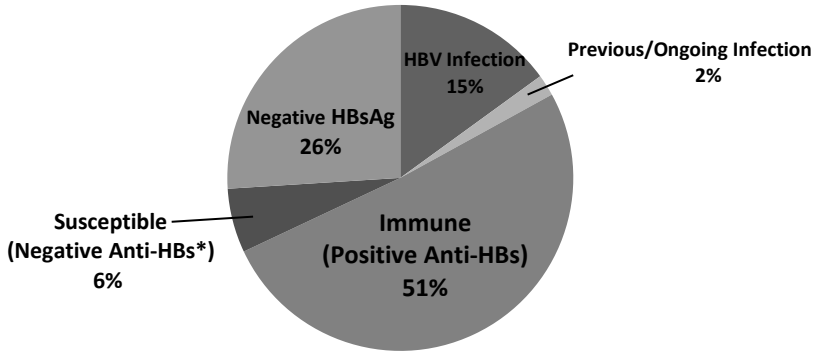


Figure 8. Hepatitis B Status of Household Contacts LAC, 2013 (N=315)



***Antibody to Hepatitis B Surface Antigen**

HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	5
Annual Incidence	
LA County	0.05[a]
California[b]	0.19
United States[b]	0.68
Age at Diagnosis	
Mean	38
Median	40
Range	22-56 years

[a]Rates calculated based on less than 19 cases or events are considered unreliable.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

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

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

Primary prevention activities are recommended for prevention and control of HCV infection including; screening and testing of blood donors and persons born during 1945 through 1965, viral inactivation of plasma-derived products, risk-reduction counseling and screening of persons at risk for HCV infection, and routine practice of injection safety in healthcare settings. There is no vaccine or post-exposure prophylaxis for HCV and vaccines for hepatitis A and B do not provide immunity against hepatitis C.

For the purpose of surveillance, Los Angeles County Department of Public Health uses the 2012 Centers for Disease Control (CDC)/Council of State and Territorial Epidemiologists (CSTE) criteria for acute hepatitis C: 1) discrete onset of symptoms and 2) jaundice or alanine aminotransferase (ALT) levels > 400IU/L, and 3) (a) anti-HCV screening test positive with signal to cut-off ratio predictive of true positive or (b) HCV RIBA positive or (c) Nucleic Acid Test (NAT) for HCV RNA positive 4) no evidence of either acute hepatitis A or B disease.

In 2012, the CDC/CSTE acute hepatitis C case definition also included documented seroconversion cases as acute hepatitis C cases (documented negative HCV test result within 6 months prior to HCV diagnosis).

2013 TRENDS AND HIGHLIGHTS

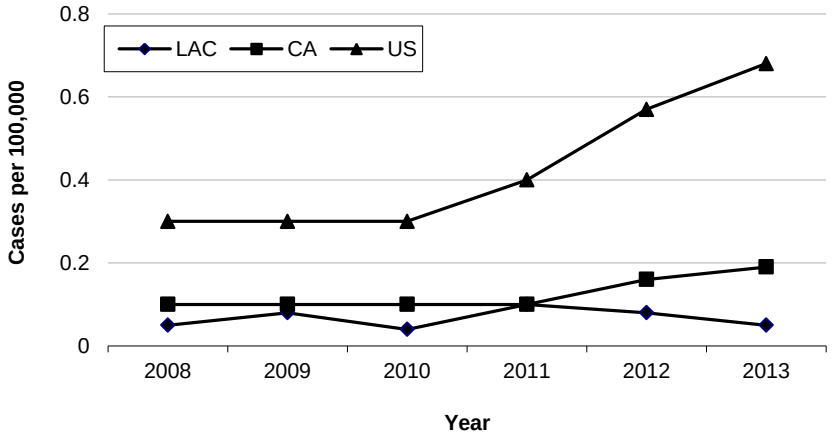
- As in previous years, the majority of cases in 2013 were in the 15-34 year age group (n=2, 40%) (Figure 2).
- The majority of cases in 2013 were white (n=4, 80%), there were no Asian or Black cases (Figure 3).
- The male to female ratio was 1:1.5.
- Risk factors were identified in 100% (n=5) of the confirmed cases interviewed (including having multiple risk factors). Exposure to someone's blood (n=4, 80%), was the most common risk factor reported, followed by using non-injection street drugs (n=2, 40%), IDU (n=2, 40%), incarceration (n=2 [jail], 40%), IV/IM injection (n=2, 40%), sexual contact with a suspected case (n=1, 20%), accidental needle stick (n=1, 20%), having multiple sexual partners (n=1, 20%), body piercing (n=1, 20%), acupuncture (n=1, 20%), and dental procedure (n=1, 20%) (Figure 4).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009(N=8)			2010 (N=4)			2011 (N=10)			2012 (N=7)			2013 (N=5)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0	0	0.0	0	0	0.0		0	0		0	0	0
1-4	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
15-34	1	12.5	0.0	1	25.0	0	4	40.0	0.1	4	57.1	0.1	2	40	0.1
35-44	2	25.0	0.1	2	50.0	0.1	2	20.0	0.1	1	14.3	0.1	1	20	0.1
45-54	3	37.5	0.2	1	25.0	0.1	1	10.0	0.1	2	28.6	0.2	1	20	0.1
55-64	1	12.5	0.1	0	0.0	0	1	10.0	0.1	0	0		1	20	0.1
65+	1	12.5	0.1	0	0.0	0	2	20.0	0.2	0	0		0	0	0
Unknown	0	0.0		0	0.0		0			0			0	0	
Race/Ethnicity															
Asian	1	12.5	0.1	0	0	0	1	10.0	0.1	0	0	0	0	0	0
Black	0	0.0	0	0	0	0	0	0.0	0.0	1	14.3	0.1	0	0	0
Hispanic	1	12.5	0	1	25.0	0	6	60.0	0.1	3	42.9	0.1	1	20	0
White	6	75	0.2	3	75.0	0.1	2	20.0	0.1	2	28.6	0.1	4	80	0.2
Other	0	0.0	0	0	0	0	0	0.0	0.0	1	14.3		0	0	0
Unknown	0			0			1	10.0		0	0	0	0	0	0
SPA															
1	1	12.5	0.3	0	0	0	0	0.0	0.0	2	28.6	0.5	0	0	0
2	0	0	0	3	75.0	0.1	1	10.0	0.0	1	14.3	0.0	1	20	0
3	0	0	0	0	0	0	2	20.0	0.1	0	0	0	1	20	0.1
4	2	25.0	0.2	0	0	0	3	30.0	0.2	1	14.3	0.1	0	0	0
5	2	25.0	0.3	0	0	0	1	10.0	0.2	1	14.3	0.2	1	20	0.2
6	0	0	0	0	0	0	0	0.0	0.0	1	14.3	0.1	0	0	0
7	1	12.5	0.1	0	0	0	2	20.0	0.1	0	0	0	1	20	0.1
8	2	25.0	0.2	1	25.0	0.1	1	10.0	0.1	1	14.3	0.1	1	20	0.1
Unknown	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, 2009-2013**



*Rates based on fewer than 19 cases are unreliable

**Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2011-2013**

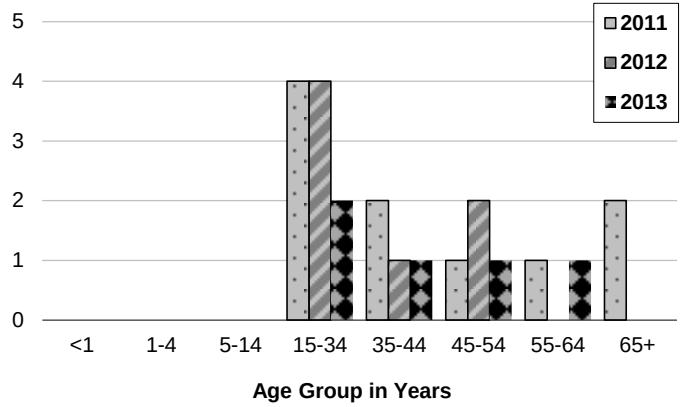


**Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2013 (N=5)**

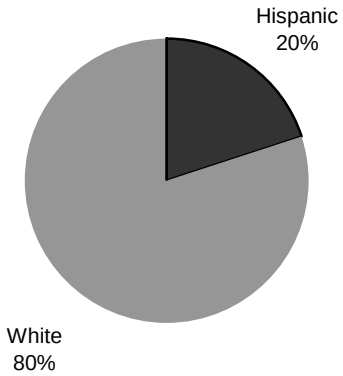
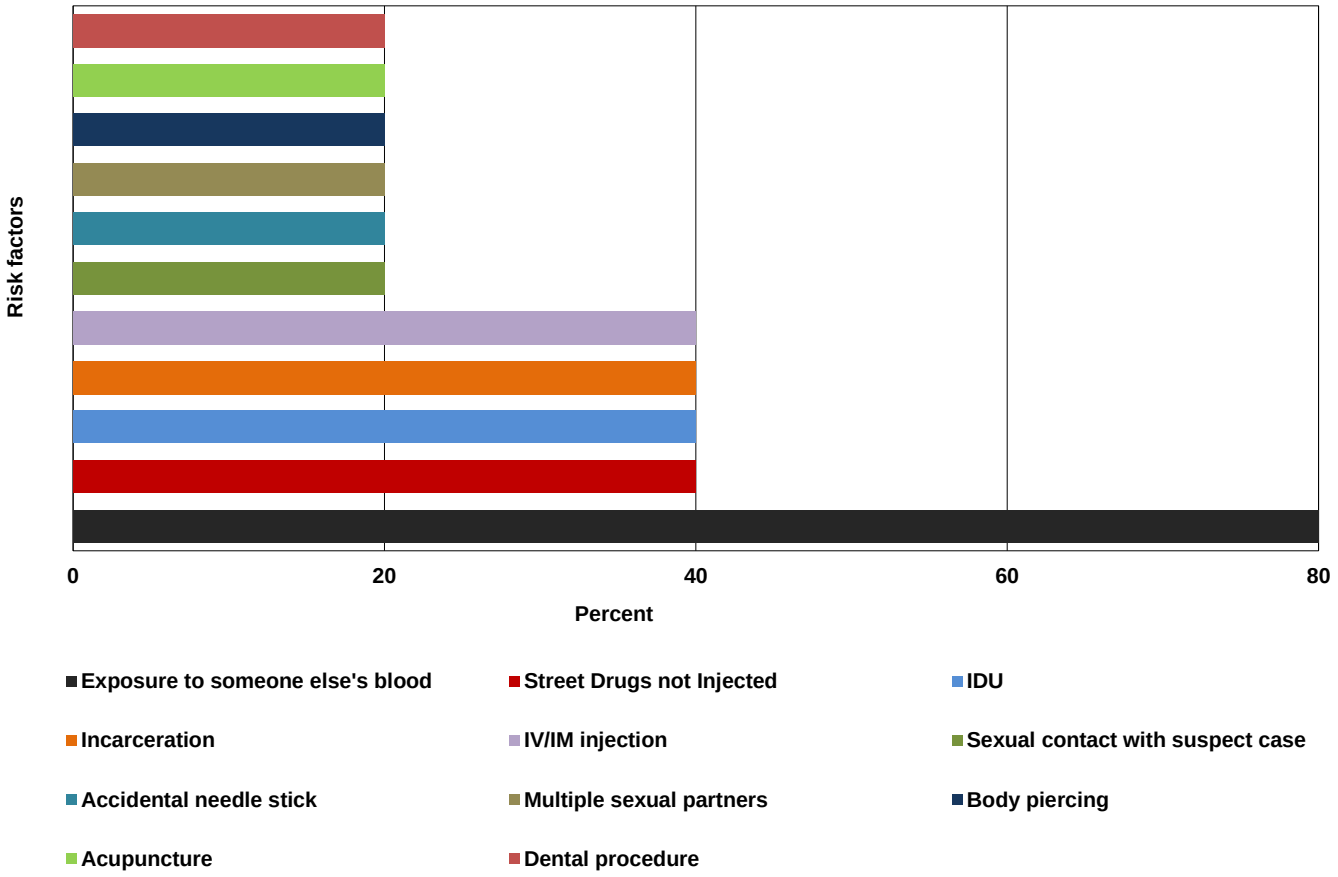


Figure 4. Hepatitis C Reported Risk Factors*
LAC, 2013 (N=5)



LEGIONELLOSIS

CRUDE DATA	
Number of Cases	85
Number of Deaths	7
Annual Incidence[a]	
LA County	0.90
California[b]	0.53
United States[b]	1.58
Age at Diagnosis	
Mean	64.1
Median	67
Range	18-94

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

Legionellosis is a bacterial infection with two distinct clinical forms: 1) Legionnaires' disease (LD), the more severe form characterized by pneumonia, and 2) Pontiac fever, an acute, self-limited influenza-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 (LP1),* although at least 46 *Legionella* species and 70 serogroups have been identified. Transmission occurs through inhalation of aerosolized water 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 older persons, particularly those who are heavy smokers, have chronic underlying diseases such as diabetes mellitus, congestive heart failure, lung disease, or whose immune systems are suppressed by illness or medication.

The implementation of water safety plans to control the risk of transmission of *Legionella* to susceptible hosts in hospitals, hotels, and public places with water related amenities remains the primary means of reducing LD. Plans include periodic inspection of water sources, distribution systems, heat exchangers, and cooling towers. Prevention strategies include appropriate disinfection, monitoring, and maintenance of both cold and hot water systems, and setting the hot water temperature to 50 degrees Celsius or higher to limit bacterial growth. All healthcare-acquired LD case reports are investigated to identify potential outbreak situations. Early recognition and investigation is crucial for timely implementation of control measures.

2013 TRENDS AND HIGHLIGHTS

- In 2013, there were 85 cases reported (incidence 0.9/100,000) which is slightly less than 2012 (Figure 1).
- No Pontiac fever was reported.
- The case fatality rate decreased from 12.6% in 2012 to 8.2% in 2013.
- The most affected age group in Los Angeles county (LAC) was persons 65 years of age and older (Figure 2).
- Service Planning Area (SPA) 4 had the highest incidence this year followed by SPA 2 (Figure 3).
- The number of cases reported in July was high as compared to all other months. This seasonality has been seen in previous years, but not consistently (Figure 4).
- The highest incidence rate occurred among blacks (2.1 per 100,000) followed by whites (1.3 per 100,000) (Figure 5).
- People staying overnight in hotels during the incubation period accounted for 12.9% of confirmed cases, more than doubled from 6.3% in 2012. According to the CDC, more than 20% of all LD cases reported are associated with recent travel. One LAC resident was linked to a CDC report of legionellosis linked to a hotel in Mexico.
- Healthcare-acquired legionellosis associated with skilled nursing facilities decreased from 3.4% to 2.3% with no fatalities and from 4.5% in retirement/assisted living facilities to 0%.
- One outbreak investigation involving two cases in an acute care hospital oncology unit was conducted. This investigation combined epidemiologic surveillance and extensive environmental studies to determine the source. Both cases had positive urine antigen results indicating infection with LP1. Numerous environmental cultures were notable for *Legionella* species or *Legionella*-like organisms including LP1 and LP 2-14. Based on the

investigation, both cases were epidemiologically linked and likely exposed to *Legionella* from an environmental source at the facility.

- One fatal healthcare associated legionellosis was reported from a facility with transplant and immune-suppressed services. There is an existing comprehensive *Legionella* prevention strategy including periodic culturing of water systems in the facility. Quarterly reports of environmental cultures from a private laboratory found no detectable *Legionella* bacteria. Active surveillance of clinically suspicious healthcare-acquired pneumonia is continuously in effect to identify cases for early intervention and prevention of an outbreak. Clinical cultures were obtained, but the laboratory was unable to serotype due to non-viable isolates. No additional cases were identified.
- One case of a healthy teenager was linked to a cluster at a gym with water amenities that was investigated in 2012. ACDC and Environmental Health investigated the gym, which resulted in recommendations for minor violations. It was not determined if the gym was the source of transmission.
- Two cases of LD who both attended the same spa were confirmed by urine antigen to be infected with LP1. Environmental culture reports found growth of *Legionella* species and LP serogroups 2-14. As a result of the combined investigation with environmental health, remedial actions were recommended to ensure public health safety. Environmental Health and laboratory findings could not establish a potential source of LP1 bacteria the source of this outbreak remains unknown.

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=66)			2010 (N=108)			2011 (N=116)			2012 (N=111)			2013 (N=85)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.9	0.1	0	0.0	0.0
15-34	2	3.0	0.1	3	2.8	0.1	5	4.0	0.2	4	3.6	0.1	3	3.5	0.1
35-44	3	4.5	0.2	9	8.4	0.7	7	6.0	0.5	6	5.4	0.5	4	4.7	0.3
45-54	11	16.7	0.9	25	23.1	1.9	21	18	1.6	21	18.9	1.6	12	14.1	0.9
55-64	14	21.2	1.5	27	25.0	2.8	22	19	2.3	18	16.2	1.8	19	22.4	1.9
65+	36	54.5	3.6	44	40.7	4.4	61	53	5.8	61	55.0	5.5	47	55.3	4.2
Unknown	0	0.0	0.0	0	0.0	0.0	0			0	0.0	0.0	0	0.0	0.0
Race/Ethnicity															
Asian	7	10.6	0.5	15	13.9	1.1	8	7.0	0.6	7	6.3	0.5	7	8.2	0.5
Black	14	21.2	1.8	25	23.1	3.2	20	17.2	2.3	16	14.4	2.1	16	18.8	2.1
Hispanic	13	19.7	0.3	25	23.1	0.6	37	32	0.8	32	28.8	0.7	24	28.2	0.5
White	32	48.5	1.2	41	38.0	1.5	47	40.5	1.6	49	44.1	1.8	34	40.0	1.3
Other	0	0.0	0.0	2	1.9	--	2	1.7	--	5	4.5	--	1	1.2	-
Unknown	0	0.0	0.0	0	0.0	0.0	2	1.7	--	2	1.8	--	3	3.5	-
SPA															
1	0	0	0	2	1.9	0.5	2	1.7	0.5	3	2.7	0.8	2	2.4	0.5
2	14	21.2	0.7	22	20.4	1.0	19	16.3	0.9	21	18.9	1.0	27	31.8	1.2
3	7	10.6	0.4	13	12.0	0.8	15	13	0.9	17	15.3	1.1	8	9.4	0.5
4	9	13.6	0.8	15	13.9	1.3	13	11.2	1.0	13	11.7	1.2	18	21.2	1.6
5	13	19.7	2.1	12	11.1	1.9	8	7.0	1.2	10	9.0	1.6	6	7.1	0.9
6	10	15.2	1.0	12	11.1	1.2	23	19.8	2.2	17	15.3	1.7	9	10.6	0.9
7	8	12.1	0.6	13	12.0	1.0	15	13	1.1	14	12.6	1.1	3	3.5	0.2
8	5	7.6	0.5	16	14.8	1.5	19	16.3	1.7	14	12.6	1.3	12	14.1	1.1
Unknown	0	0.0	0.0	3	2.7	-	2	1.7	0.5	2	1.8	---	0	0.0	0.0

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

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 2004-2013

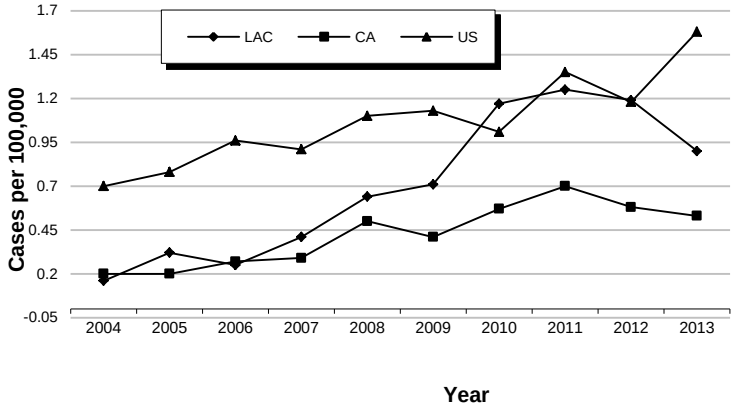


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2009 - 2013

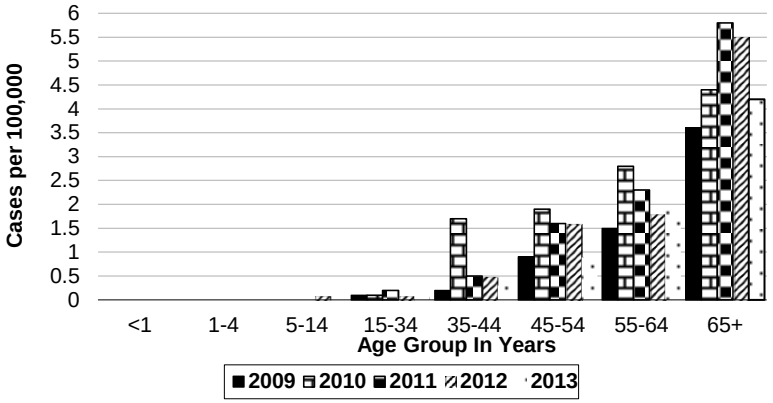


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2009-2013

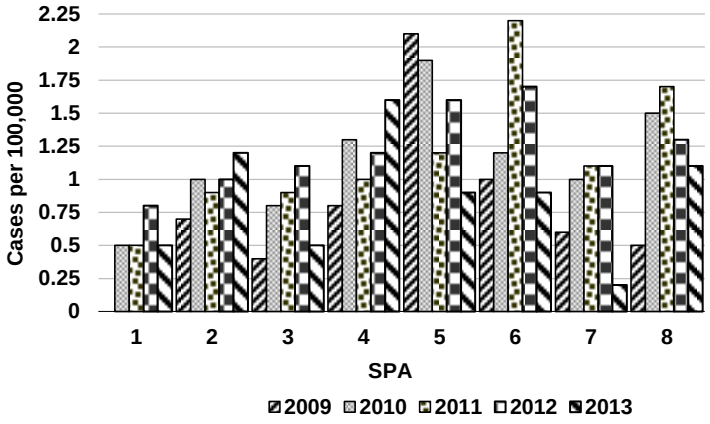


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2013 (N=85)

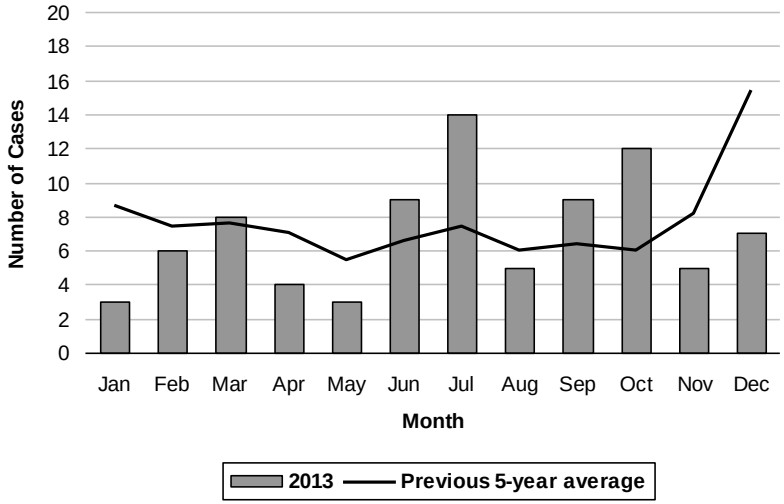
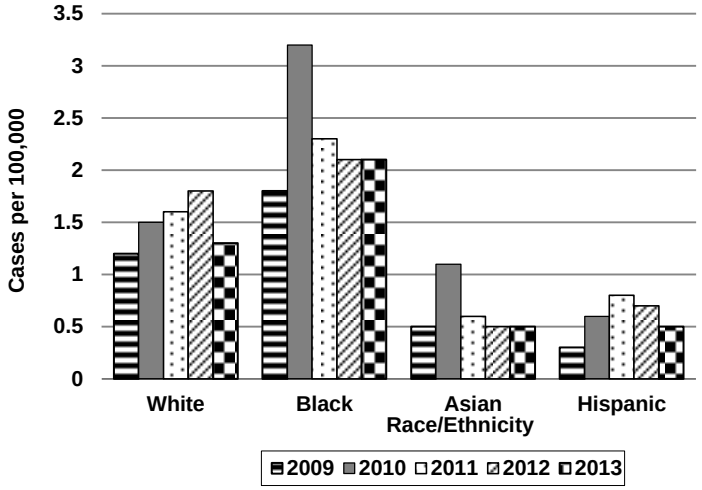
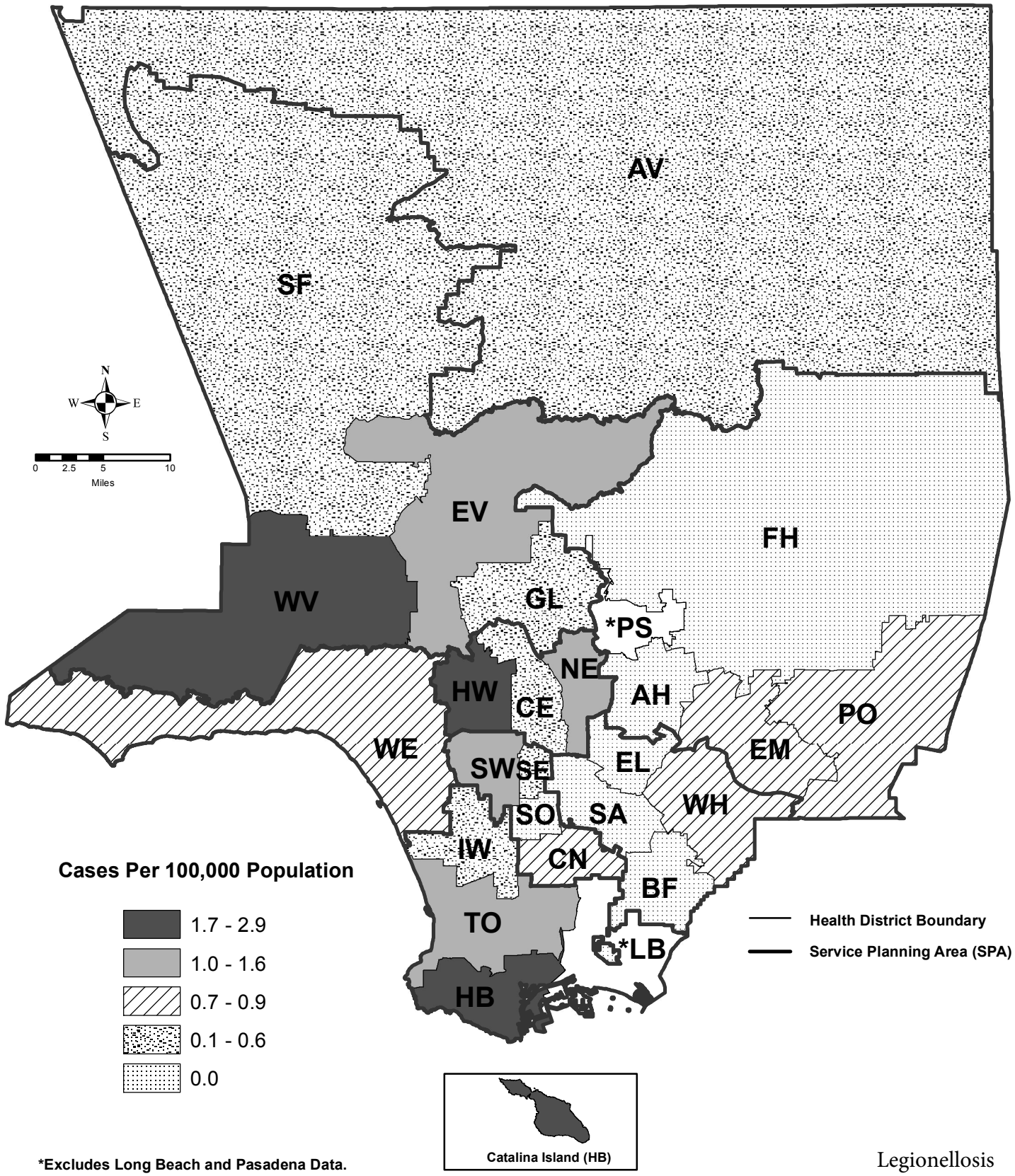


**Figure 5. Legionellosis Rates by Race/Ethnicity
LAC, 2009- 2013**



Map 9. Legionellosis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	23
Annual Incidence[a]	
LA County[b]	0.24
California	N/A
United States	N/A
Age at Diagnosis	
Mean	73
Median	77
Range	43 - 94

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

DESCRIPTION

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

2013 TRENDS AND HIGHLIGHTS

- Hispanics comprised 36% of all non-perinatal listeriosis cases followed by Asians 31%, and whites 26% (Figure 3). In 2013, the Asian population increased by 11% when compared to 2012, however over the last five years the numbers of cases have steadily been increasing. Despite increased prevalence of conditions such as diabetes, that predispose to listeriosis, blacks consistently make up a smaller than expected proportion of cases.
- In 2013, there was a nationwide cluster of non-perinatal listeriosis associated with deli meats. One LAC non-perinatal listeriosis case had an organism that matched the cluster. The case reported consuming deli meats purchased from a local membership warehouse club. This case was also among those that died.
- Regionally there continues to be a greater incidence of listeriosis in Service Planning Area (SPA) 2 compared to other SPAs in LAC (Figure 4). However SPAs 4 and 5 have the highest incidence rate, 0.4 per 100,000.
- Historically the occurrence of listeriosis cases peaks in August and September (Figure 5). However in 2013, cases peaked in May, September, and October. Most cases still occurred during warm-weather months.

- Nonperinatal listeriosis disproportionately affects the elderly and immunocompromised. The mean age of cases in 2013 was 73 years, with a median of 77 years, ranging from 43-94 years.
- There were four deaths due to nonperinatal listeriosis, at a case-fatality rate of 17.3%. All four cases had underlying diseases including cancer, congestive heart failure, diabetes, and kidney disease.

Reported Listeriosis, nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=15)			2010 (N=14)			2011 (N=19)			2012 (N=26)			2013 (N=23)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	1	6.7	0.1	1	7.1	0.1	0	0.0	0.0	1	3.8	0.1	0	0.0	0.0
15-34	1	6.7	0.0	2	14.1	0.1	0	0.0	0.0	1	3.8	0.0	0	0.0	0.0
35-44	0	0.0	0.0	2	14.1	0.1	0	0.0	0.0	0	0.0	0.0	1	4.3	0.1
45-54	2	13.3	0.2	2	14.1	0.2	4	21.1	0.3	8	30.8	0.6	3	13.0	0.2
55-64	1	6.7	0.1	2	14.1	0.2	5	26.3	0.5	1	3.8	0.1	3	13.0	0.3
65+	10	66.7	1.0	5	35.7	0.5	10	52.6	0.9	15	57.7	1.4	16	69.5	1.4
Unknown	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
Race/Ethnicity															
Asian	0	0.0	0.0	1	7.1	0.1	2	10.5	0.1	5	19.2	0.4	7	30.4	0.5
Black	1	6.7	0.1	1	7.1	0.1	0	0.0	0.0	1	3.8	0.1	1	4.3	0.1
Hispanic	7	46.7	0.2	7	50.0	0.2	4	21.1	0.2	8	30.8	0.2	8	34.7	0.2
White	7	46.7	0.3	5	35.7	0.2	13	68.4	4.5	11	42.3	0.4	6	26.0	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	3.8		1	4.3	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	3.8	0.3	0	0.0	0.0
2	4	26.7	0.2	5	35.7	0.2	5	26.3	0.2	9	34.6	0.4	7	30.4	0.3
3	2	13.3	0.1	1	7.1	0.1	4	21.1	0.2	2	7.7	0.1	2	8.7	0.2
4	3	20.0	0.3	4	28.6	0.4	1	5.3	0.1	3	11.5	0.3	4	17.4	0.4
5	0	0.0	0.0	0	0.0	0.0	4	21.1	0.6	5	19.2	0.8	1	4.3	0.2
6	2	13.3	0.2	1	7.1	0.1	0	0.0	0.0	3	11.5	0.3	2	8.6	0.2
7	2	13.3	0.2	1	7.1	0.1	2	10.5	0.2	0	0.0	0.0	5	21.7	0.4
8	2	13.3	0.2	2	14.1	0.2	3	15.8	0.3	3	11.5	0.3	1	4.3	0.3
Unknown	0	0.0		0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	4.3	

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

Figure 1. Reported Cases of Nonperinatal Listeriosis LAC, 2004-2013

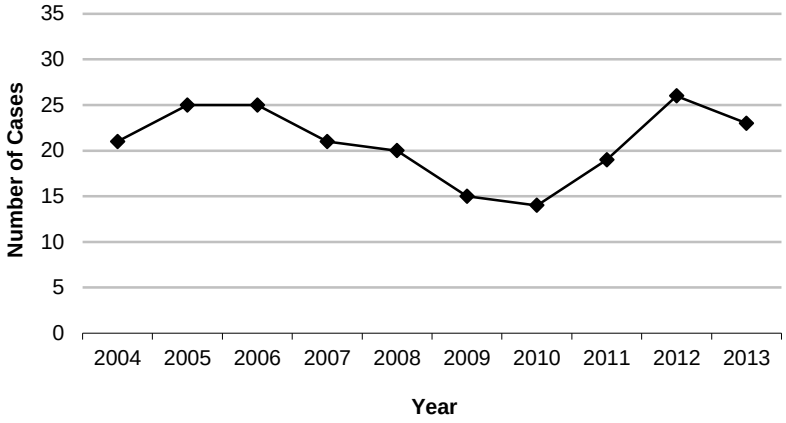


Figure 2. Reported Cases of Nonperinatal Listeriosis by Age Group, LAC, 2013 (N=23)

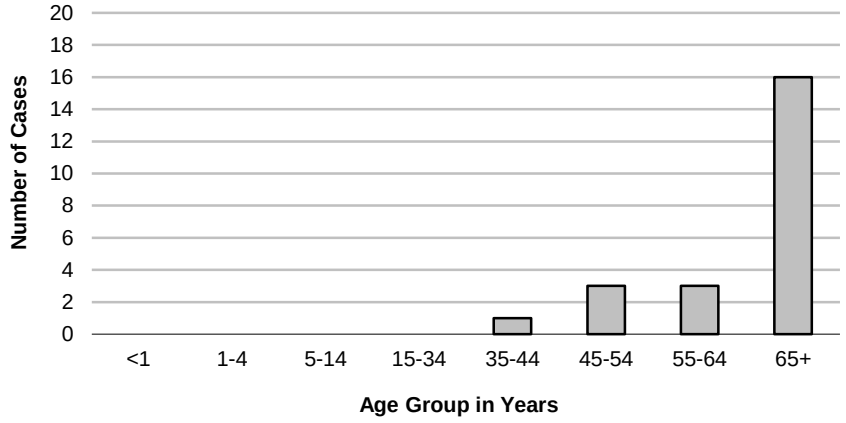


Figure 3. Percent Cases of Nonperinatal Listeriosis by Race/Ethnicity, LAC, 2013 (N=23)

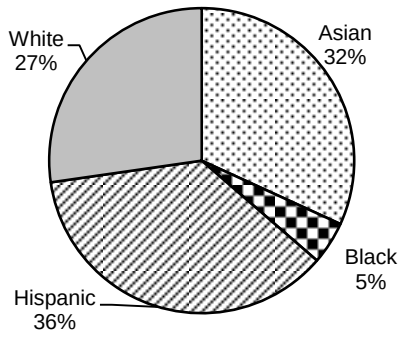


Figure 4. Reported Cases of Nonperinatal Listeriosis by SPA LAC, 2013 (N=23)

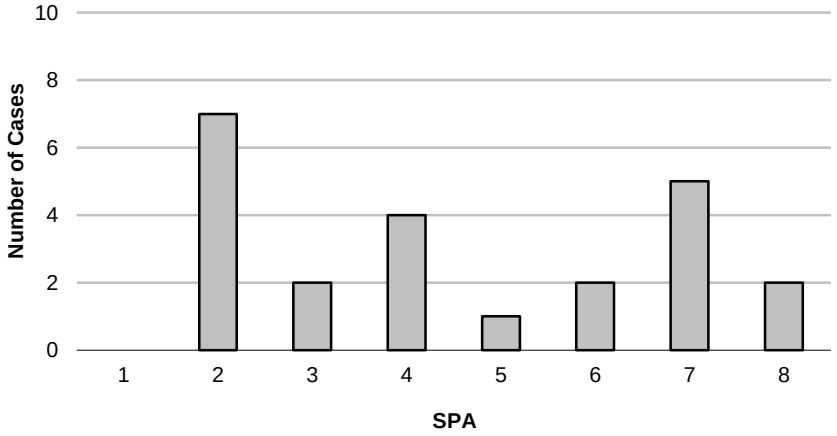
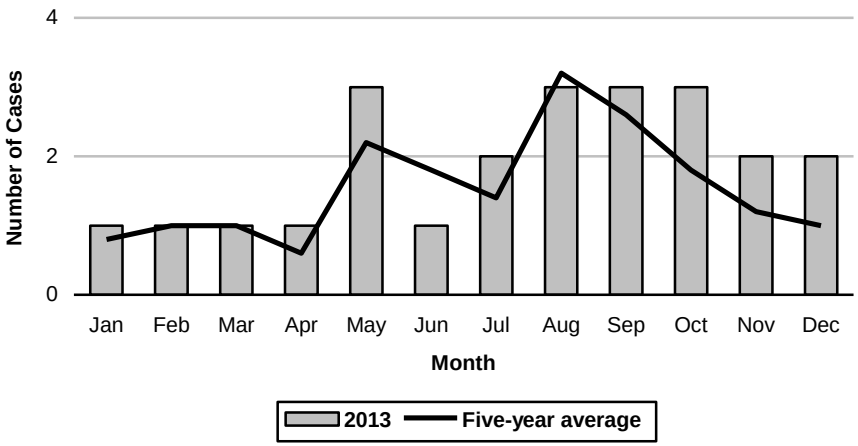


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset LAC, 2013 (N=23)



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	4
Annual Incidence[a]	
LA County[b]	3.34
California	N/A
United States	N/A
Age at Diagnosis	
Mean	26
Median	28
Range	15-32

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

DESCRIPTION

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

Pregnant women are susceptible because pregnancy causes a suppression of the immune system. The pregnant mother may only experience a mild febrile illness, but can transmit the infection to the fetus. 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. Infections during pregnancy can lead to miscarriage, stillbirth, premature delivery, or infection of the newborn. Often *Listeria* can be isolated from both the mother and the infant.

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 Latino communities, and food safety notices at food and deli markets.

2013 TRENDS AND HIGHLIGHTS

- In 2013, there were four cases of perinatal listeriosis. Three cases were Hispanic expectant mothers; one case was white non-Hispanic. All of the cases were single gestations. Three of the babies were born with signs of sepsis and were blood culture positive, with one neonatal fatality.
- Maternal ages ranged from 15 to 32 years.
- The number of perinatal listeriosis cases in 2013 is consistent with the range of incidence of listeriosis over the past ten years, excluding an increase in 2006 (Figure 1).
- Hispanic women had the highest number of cases of perinatal listeriosis unlike previous years; non-Hispanic white mothers comprised the majority of cases in 2012, exceeding numbers seen in the past 5 years (Figure 2). Incidence of perinatal listeriosis remains consistent among Hispanic mothers. There have been no cases of perinatal listeriosis in black expectant mothers since 2006.
- None of the mothers reported eating fresh raw milk (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, 2009-2013

	2009 (N=5)			2010 (N=4)			2011 (N=6)			2012 (N=7)			2013 (N=4)		
	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	00.	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	4	80.0	0.1	3	75.0	0.1	3	50.0		4	57.0		4	100.0	4.3
35-44	1	20.0	0.1	1	25.0	0.1	3	50.0		3	42.9		0	0.0	0.0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Race/Ethnicity															
Asian	2	40.0	0.2	1	25.0	0.1	2	33.3		0	14.3		0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	3	60.0	0.1	2	50.0	0.0	5	50.0		2	28.6		3	75.0	4.4
White	0	0.0	0.0	1	25.0	0.0	1	16.7		4	57.1		1	25.1	4.5
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	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
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	2	50.0	0.1	0	0.0	0.0	2	28.6		1	25.0	0.2
3	0	0.0	0.0	0	0.0	0.0	3	50.0		2	28.6		1	25.0	0.3
4	2	40.0	0.2	0	0.0	0.0	0	0.0	0.0	1	14.3		0	0.0	0.0
5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	1	20.0	0.1	1	25.0	0.1	1	16.7		0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	1	14.3		1	25.0	0.3
8	2	40.0	0.2	0	0.0	0.0	2	33.3		1	14.3		1	25.0	0.4
Unknown	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

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

**Figure 1. Reported Cases of Perinatal Listeriosis
LAC, 2003-2013**

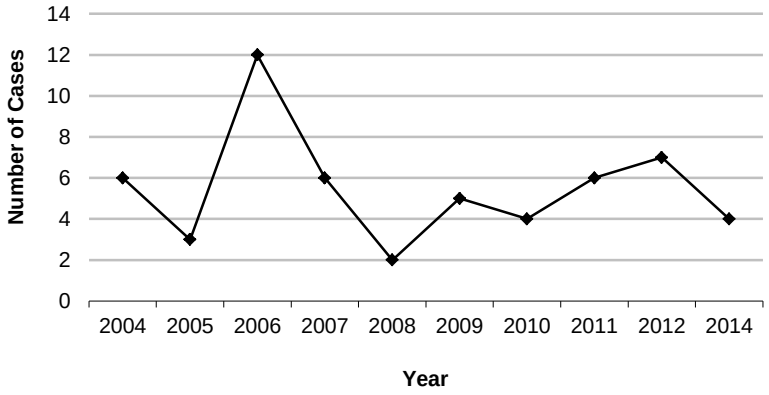


**Figure 2. Perinatal Listeriosis Cases by Race/Ethnicity
LAC, 2009-2013**

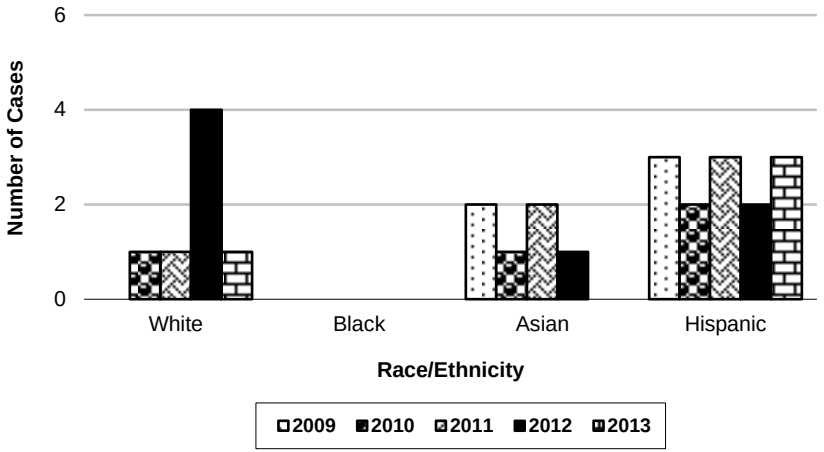
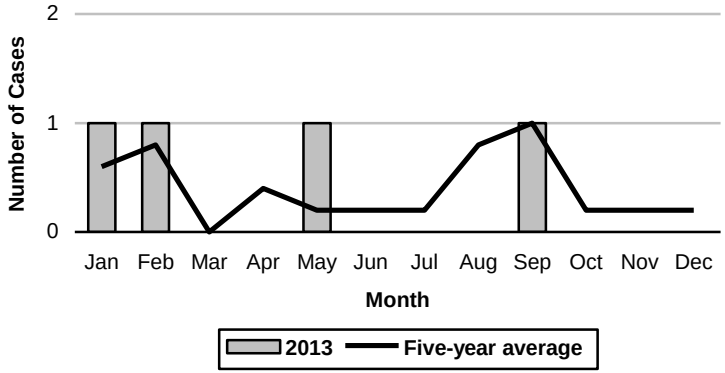


**Figure 3. Reported Perinatal Listeriosis Cases
by Month of Onset, LAC, 2013 (N=4)**



LYME DISEASE

CRUDE DATA	
Number of Cases	11
Annual Incidence [a]	
LA County [b]	0.12
California	0.24
United States	8.67
Age at Diagnosis	
Mean	26.7
Median	28
Range	2-61

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

Lyme disease (LD) is caused by the spirochete *Borrelia burgdorferi*, which is transmitted to humans by the bite of *Ixodes* ticks; the vector in the Pacific coast states is the western blacklegged tick (*Ixodes pacificus*). This disease is rarely acquired in Los Angeles County (LAC); most reported cases have been acquired in known endemic regions in the United States (US). The most common clinical presentation is a distinctive circular rash called erythema migrans (EM). When EM is not present, other early symptoms such as fever, body aches, headaches, and fatigue are often unrecognized as indicators of LD. If untreated, patients may develop late stage symptoms such as aseptic meningitis, cranial neuritis, cardiac conduction abnormalities and arthritis of the large joints. Early disease is treated with a short course of oral antibiotics, while late symptom manifestations may require longer treatment with oral or intravenous antibiotics. Currently, there is no vaccine.

For purposes of surveillance, the Centers for Disease Control and Prevention (CDC) require a confirmed case of LD to have:

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

Laboratory criteria for case confirmation include a positive culture for *B. burgdorferi* or demonstration of diagnostic IgM or IgG to *B.* burgdorferi in serum or cerebral spinal fluid. A coalition of several public health and medical organizations recommends a two-step serologic testing procedure for LD: an initial enzyme immunoassay or immunofluorescent antibody screening test, and if positive or equivocal, followed by IgM and IgG Western immunoblotting.[1]

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

2013 TRENDS AND HIGHLIGHTS

- The national incidence rose as high as 13.4 cases per 100,000 in 2009 and dropped to 7.1 cases per 100,000 by 2012. Though LAC documented the highest number of cases this year since 2006 (N=16) with 11 confirmed cases, the incidence in LAC in 2013 was 0.12 per 100,000 and remains well below the national and state rates (Figure 1).
- The peak number of cases occurred in August (n=5). Most cases occurred during the late spring and summer months, following the seasonal trend from the previous 5 years (Figure 2).
- Most cases reported an outdoor exposure outside of LAC (n=8, 73%) including several in the New England area, two cases in the

[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.

Midwest and one case in Europe (Figure 3). Only one case recalled a tick bite, which occurred in LAC. The patient reports a tick bite on his property, located in the Hollywood-Wilshire Health District. The remaining two cases with LAC outdoor exposure reported activity in West and West Valley HDs, but did not recall insect bites.

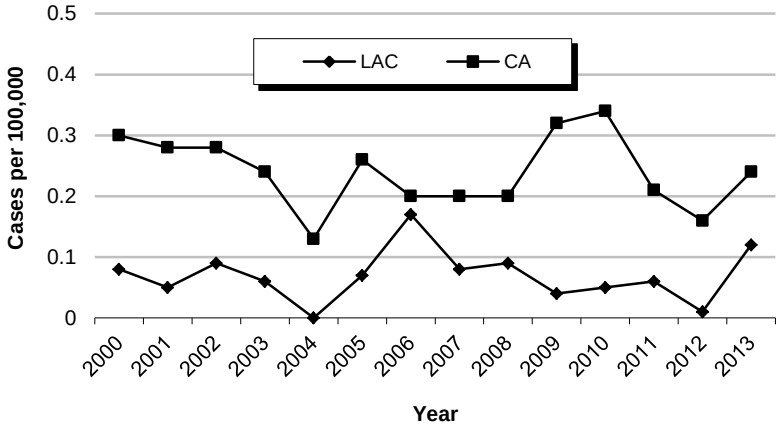
- There were 564 suspected cases of Lyme disease reported to LAC DPH in 2013. The large majority of these were reported as a result of positive laboratory results. Only 2% of these reports met the CDC case definition for a confirmed case. The number of suspected cases of Lyme reported has increased since Lyme became laboratory reportable in 2006. However, the number of cases confirmed has remained relatively stable (Figure 1 and Figure 3). It is highly recommended that testing for Lyme occur within the context of appropriate clinical symptoms and outdoor exposure in areas with known endemicity.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=4)			2010 (N=5)			2011 (N=6)			2012 (N=1)			2013 (N=11)		
	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		1	9.1	
5-14	1	25.0		1	20.0		0	0.0		0	0.0		3	27	
15-34	0	0.0		2	40.0		1	16.7		0	0.0		5	45.5	
35-44	2	50.0		1	20.0		0	0.0		0	0.0		0	0.0	
45-54	0	0.0		0	0.0		3	50		0	0.0		1	9.1	
55-64	1	25.0		1	20.0		1	16.7		0	0.0		1	9.1	
65+	0	0.0		0	0.0		1	16.7		1	100		0	0.0	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0				
Race/Ethnicity															
Asian	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Black	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Hispanic	0	0.0		1	20.0		0	0.0		0	0.0		0	0.0	
White	4	100		4	80.0		6	100		1	100		8	72.7	
Other	0	0.0		0	0.0		0	0.0		0	0.0		1	9.1	
Unknown	0	0.0		0	0.0		0	0.0		0			1	9.1	
SPA															
1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
2	1	25.0		0	0.0		2	33.3		1	100		3	27.3	
3	0	0.0		0	0.0		1	16.7		0	0.0		0	0.0	
4	0	0.0		2	40.0		0	0.0		0	0.0		2	18.2	
5	1	25.0		2	40.0		3	50.0		0	0.0		4	36.4	
6	1	25.0		1	20.0		0	0.0		0	0.0		0	0.0	
7	0	0.0		0	0.0		0	0.0		0	0.0		1	9.1	
8	1	25.0		0	0.0		0	0.0		0	0.0		1	9.1	
Unknown	0	0.0		0	0.0		0	0.0		0			0	0.0	

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

Figure 1. Incidence Rates of Lyme Disease LAC* and CA, 2000-2013



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

Figure 2. Reported Lyme Disease Cases by Month of Onset LAC, 2013

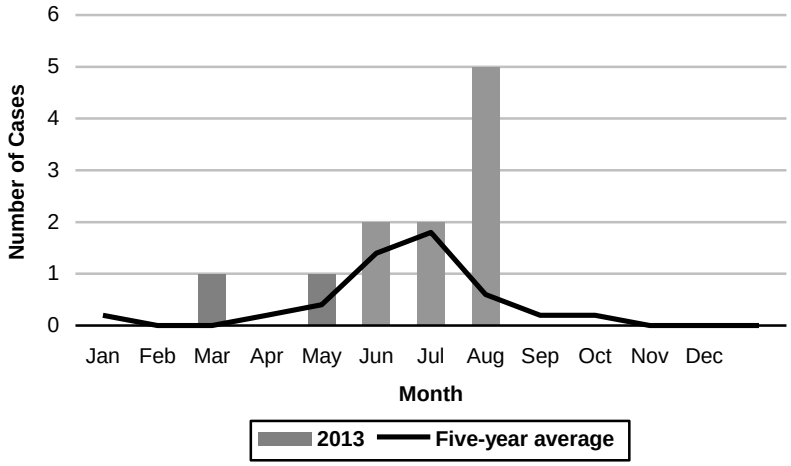
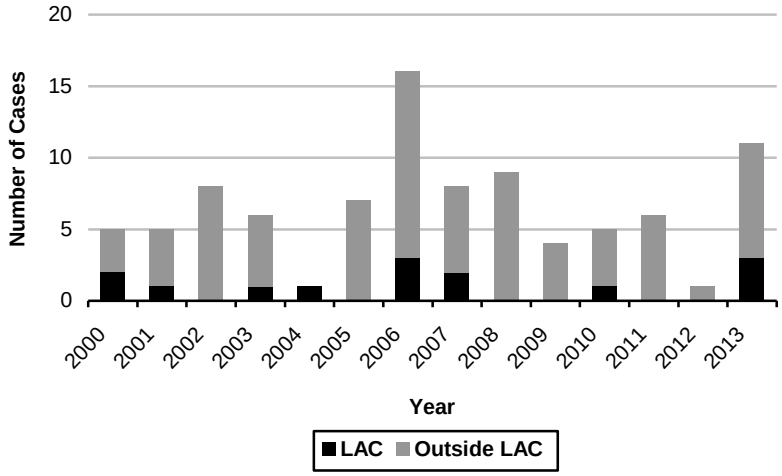


Figure 3. Locations of Tick and Outdoor Exposure in Lyme Disease Cases LAC, 2000-2013



MALARIA

CRUDE DATA	
Number of Cases	16
Annual Incidence[a]	
LA County	0.17
California[b]	0.27
United States[b]	0.51
Age at Diagnosis	
Mean	36.8
Median	32
Range	5-68

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

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

For the purpose of surveillance, confirmation of malaria requires the demonstration of parasites in thick or thin blood smears, the detection of *Plasmodium* sp. by a polymerase chain reaction (PCR) test, or detection of malaria antibodies using rapid diagnostic test (RDT), regardless of whether the person experienced previous episodes of malaria.

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

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

2013 TRENDS AND HIGHLIGHTS

- The number of reported cases continues to decline in Los Angeles County (LAC) from a peak of 60 cases in 2003 to only 16 cases in 2013 (Figure 1), of which all were confirmed by blood smear. Nationally, the number of reported cases remains relatively stable.
- Nearly half of all cases (n=7, 44%) were caused by *P. falciparum* and about a third (n=5, 31%) were caused by *P. vivax* (Figure 5). No other species were identified. Nineteen percent of cases could not be speciated (n=3).
- All cases reported a travel history to a country with endemic malaria (Table 1). This year all cases were either travelers to/from countries in Africa (n=13, 81%) or to/from India (n=3, 19%). The limited diversity in travel destinations coincides with the limited diversity of malaria species identified. Of note, most cases with travel-associated arboviral infections reported travel to Latin America and Southeast Asia, which were not documented as destinations by malaria cases this year.
- Eight cases were residents of the US for at least 12 months. Three (25%) were immigrants from Africa and India. The remaining had unknown lengths of residency. Among the eight US residents, three (38%) used prophylaxis during their travels none of whom reported completing their regimen. All three traveled for pleasure (Table 2).

Reported Malaria Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=24)			2010 (N=25)			2011 (N=22)			2012 (N=19)			2013 (N=16)		
	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	3	12.5		1	4.0		0	0.0		1	5.3		0	0.0	
5-14	0	0.0		1	4.0		5	22.7		2	10.5		2	12.5	
15-34	6	25.0		12	48.0		3	13.6		7	36.8		6	37.5	
35-44	2	8.3		4	16.0		2	9.1		2	10.5		2	12.5	
45-54	5	20.8		4	16.0		8	36.4		3	15.8		3	18.8	
55-64	7	29.2		3	12.0		3	13.6		3	15.8		2	12.5	
65+	1	4.2		0	0.0		1	4.5		1	5.3		1	6.3	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	3	12.5		8	32.0		2	9.1		5	26.3		4	25.0	
Black	8	33.3		10	40.0		12	54.5		10	52.6		8	50.0	
Hispanic	9	37.5		1	4.0		1	4.5		2	10.5		0	0.0	
White	2	8.3		2	8.0		2	9.1		1	5.3		0	0.0	
Other	0	0.0		0	0.0		0	0.0		0	0.0		1	6.3	
Unknown	2	8.3		4	16.0		5	22.7		1	5.3		3	18.8	
SPA															
1	1	4.2		2	8.0		2	9.1		1	5.3		2	12.5	
2	6	25.0		3	12.0		6	27.3		5	26.3		2	12.5	
3	1	4.2		4	16.0		3	13.6		0	0.0		1	6.3	
4	0	0.0		2	8.0		2	9.1		1	5.3		1	6.3	
5	4	16.7		5	20.0		1	4.5		2	10.5		1	6.3	
6	4	16.7		5	20.0		2	9.1		1	5.3		1	6.3	
7	1	4.2		1	4.0		1	4.5		1	5.3		2	12.5	
8	7	29.2		3	12.0		5	22.7		8	42.1		6	37.5	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

**Figure 1. Number of Malaria Cases
LAC and US, 2000-2013**

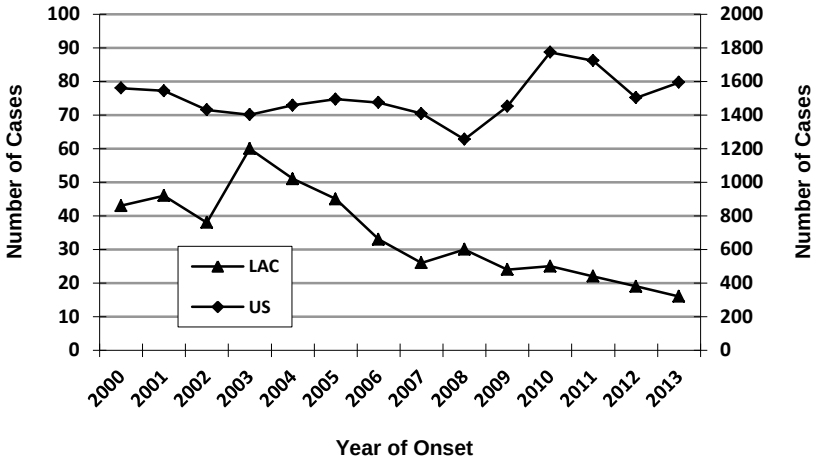


**Figure 2. Malaria Cases by Age Group
LAC, 2013 (N=16)**

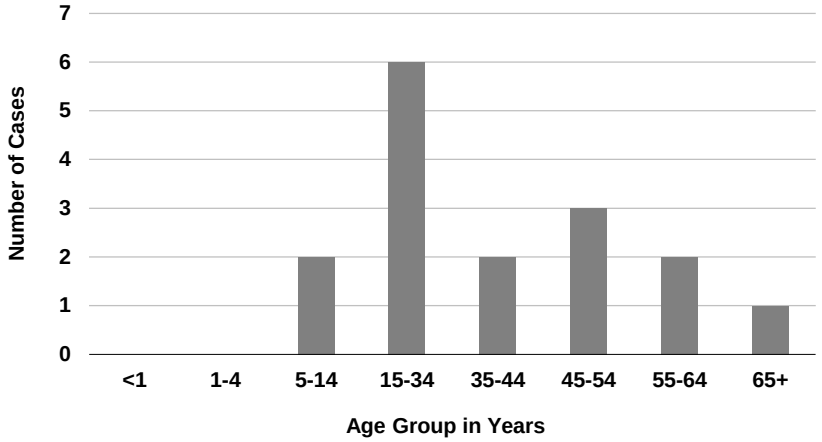


**Figure 3. Percent of Malaria Cases by Race/Ethnicity
LAC, 2013 (N=16)**

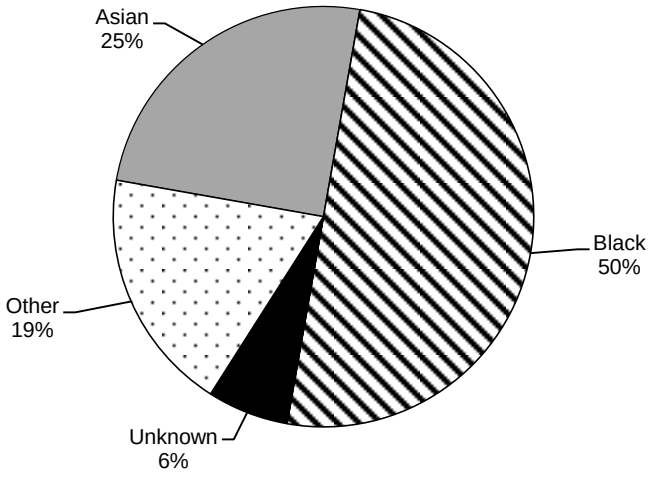


**Figure 4. Number of Reported Malaria Cases by Race/Ethnicity
LAC, 2009-2013**

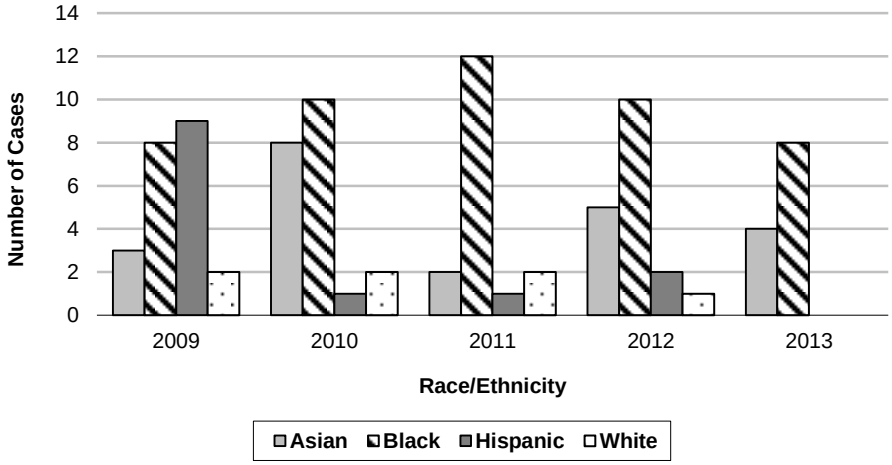


Figure 5. Percent Cases of Malaria by Species LAC, 2013 (N=16)

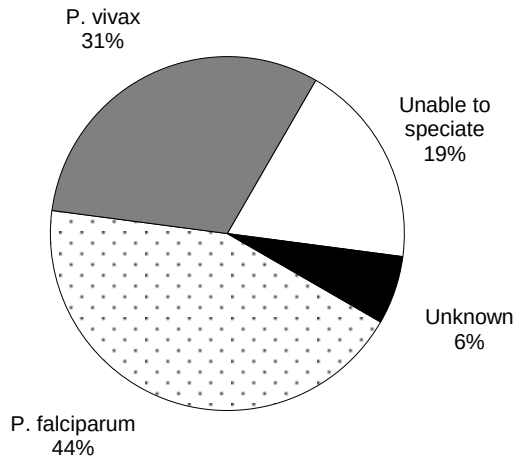


Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* Species, 2013 (N=16)

Country of Acquisition	*P. falciparum*	*P. vivax*	Unable to speciate	Unknown*	Total
Africa	**7**	**2**	**3**	**1**	**13**
Ethiopia	0	1	0	0	1
Gabon	1	0	0	0	1
Ghana	1	0	0	0	1
Mauritania	0	1	0	0	1
Nigeria	2	0	2	1	5
Sierra Leone	1	0	0	0	1
Sudan	0	0	1	0	1
Uganda	2	0	0	0	2
Asia/Oceania	**0**	**3**	**0**	**0**	**3**
India	0	3	0	0	3
Latin America	**0**	**0**	**0**	**0**	**0**
Total	**7**	**5**	**3**	**1**	**16**

* Reported as positive malaria smear but no species identification available.

Table 2. Prophylaxis Use Among US Residents* with Malaria, LAC 2013, N=8

Reason for Travel	Total Cases	Prophylaxis Use	
	(n)	(n)	(%)
Pleasure	6	3	50
Work	2	0	0
Other	0	0	0
Unknown	0	0	0
Total	8	3	38

*Residing in US ≥12 months. The remaining were immigrants (n=3 25%) or had unknown lengths of residency.

MEASLES

CRUDE DATA	
Number of Cases	3
Annual Incidence[a]	
LA County	0.03[b]
California[c]	0.04
United States[c]	0.06
Age at Diagnosis	
Mean	46.7 years
Median	48.0 years
Range	31 – 61 years

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32);702-716.

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. Complications 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.
  Note: MMRV is only licensed for persons 12 months through 12 years of age.
- Usually, two doses of measles-containing vaccine are given via MMR/MMRV vaccine. The first dose is recommended at 12 months of age. The second dose can be given as early as four weeks after the first dose, but is usually given at ages 4 to 6 years. When MMRV vaccine is used, the minimum interval between doses is 3 months.
- 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 or serologic evidence of immunity is recommended for healthcare workers, persons attending post-high school educational institutions, as well as others who work or live in high-risk settings.
- Women should not become pregnant within 4 weeks of vaccination.
- Individuals who are severely immunocompromised for any reason should not be given MMR or MMRV.
- Measles is common in most regions of the world outside of North and South America. Large outbreaks have been reported in Europe, Africa, and Asia. All international travelers who are not immune to measles should be vaccinated, ideally 2 weeks prior to travel. Unvaccinated infants age ≥6 months should be vaccinated if they are traveling out of the country. Infants who are vaccinated before age 12 months should receive two more doses at the recommended schedule.

2013 TRENDS AND HIGHLIGHTS

- Three cases were reported in LAC in 2013, the lowest annual count since 2009 (Figure 2). In contrast, incidence in CA and the US increased again in 2013 (Figure 1).
- In previous years, most, if not all, the cases in LAC were associated with travel. Similar findings were observed in 2013. An index case traveled to/from Israel and infected another individual at an outpatient health care facility. A third and separate case was a visitor from Germany who was infectious during the airline flight to the United States. At the time, a measles outbreak was occurring in the city of Berlin, Germany. Three spread cases were identified in neighboring jurisdictions. For the first time since 2009, cases in children under 15 years of age were not reported. All the cases were over 30 years of age (Figure 3).
- All of the cases were eligible for vaccination but were not up-to-date. One case reported having received one documented dose of the measles vaccine, while another case born before 1957 never had previous history of disease or had received the vaccine. This case was born in Asia, in an area most likely where measles had not occurred during the individual's lifetime. The visitor from Germany had an unknown history of vaccination/disease (Figure 6).
- Unlike previous years when cases occurred throughout the year, no cases were reported between April and June or after July (Figure 5).

- All the cases in 2013 were white (n=3) and resided in SPA 5 (Figure 4). The case from Germany stayed in a hotel located in SPA 5.

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=1)			2010 (N=8)			2011 (N=8)			2012 (N=6)			2013 (N=3)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	-	1	12.5	0.8	0	0.0	-	0	0.0	-	0	0.0	-
1-4	0	0.0	-	1	12.5	0.2	3	37.5	0.6	0	0.0	-	0	0.0	-
5-14	0	0.0	-	2	25.0	0.2	0	0.0	-	3	50.0	0.3	0	0.0	-
15-34	0	0.0	-	2	25.0	0.1	5	62.5	0.2	1	16.7	-	1	33.3	-
35-44	1	100	0.1	2	25.0	0.1	0	0.0	-	1	16.7	0.1	0	0.0	-
45-54	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	1	33.3	0.1
55-64	0	0.0	-	0	0.0	-	0	0.0	-	1	16.7	0.1	1	33.3	0.1
65+	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	0	0.0	-	0	0.0	-	4	50.0	0.3	0	0.0	-	0	0.0	-
Black	0	0.0	-	2	25.0	0.3	0	0.0	-	0	0.0	-	0	0.0	-
Hispanic	0	0.0	-	4	50.0	0.1	2	25.0	-	0	0.0	-	0	0.0	-
White	1	100	-	2	25.0	0.1	1	12.5	-	6	100	0.2	3	100	0.1
Other	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
Unknown	0	0.0		0	0.0		1	12.5		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	-	4	50.0	0.2	1	12.5	-	5	83.3	0.2	0	0.0	-
3	0	0.0	-	0	0.0	-	2	25.0	0.1	0	0.0	-	0	0.0	-
4	0	0.0	-	0	0.0	-	2	25.0	0.2	1	16.7	0.1	0	0.0	-
5	0	0.0	-	1	12.5	0.2	2	25.0	0.3	0	0.0	-	3	100	0.5
6	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
7	0	0.0	-	3	37.5	0.2	0	0.0	-	0	0.0	-	0	0.0	-
8	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
Unknown	0	0.0		0	0.0		1	12.5		0	0.0		0	0.0	

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

**Figure 1. Incidence Rates of Measles
LAC, CA and US, 2004-2013**

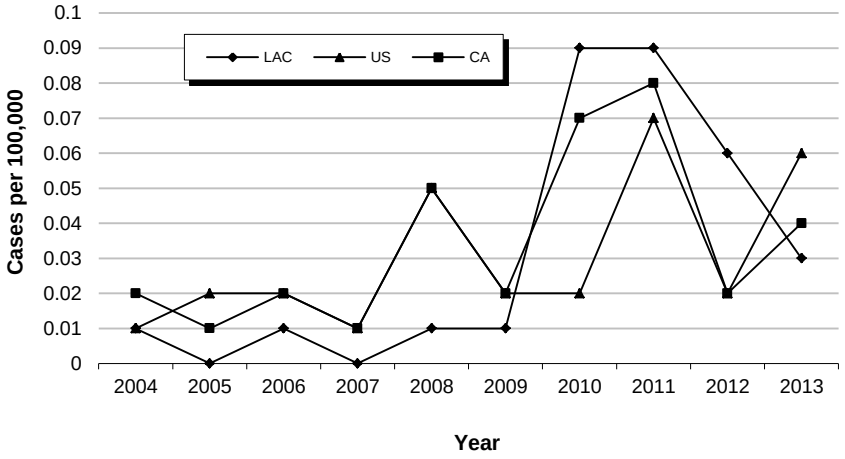


**Figure 2. Reported Measles Cases
LAC, 2004-2013**

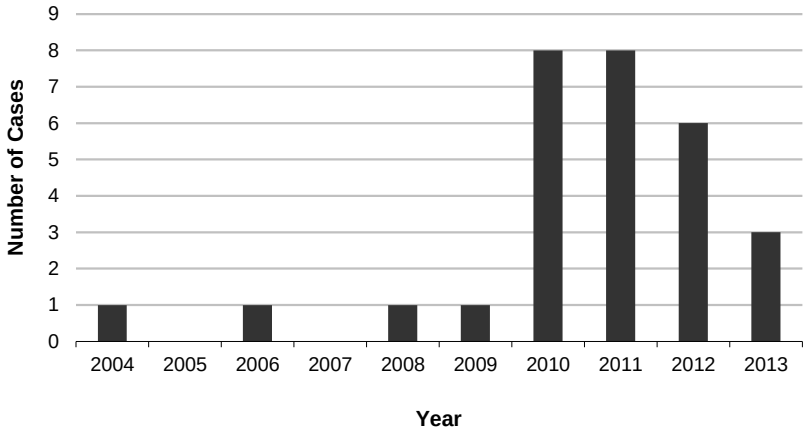


**Figure 3. Reported Confirmed Measles Cases by Age Group
LAC, 2013 (N=3)**

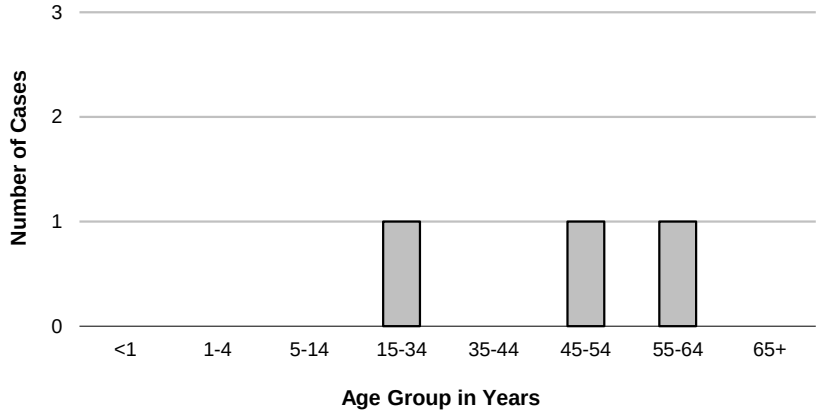


**Figure 4. Reported Confirmed Measles Cases by SPA
LAC, 2013 (N=3)**

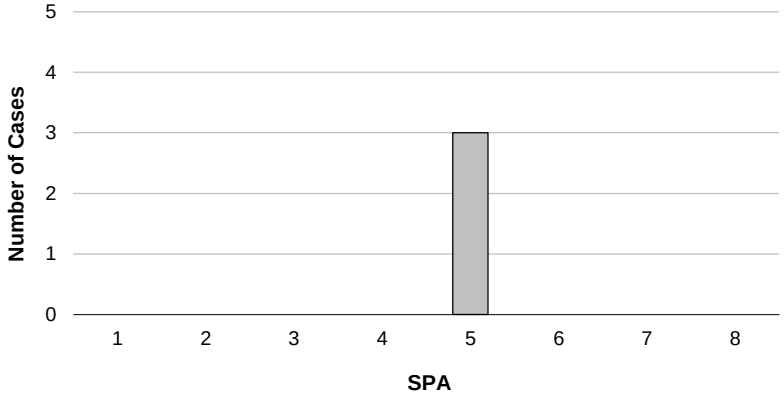


Figure 5. Reported Confirmed Measles Cases by Month of Onset LAC, 2013 (N=3) vs. Previous Five-Year Average

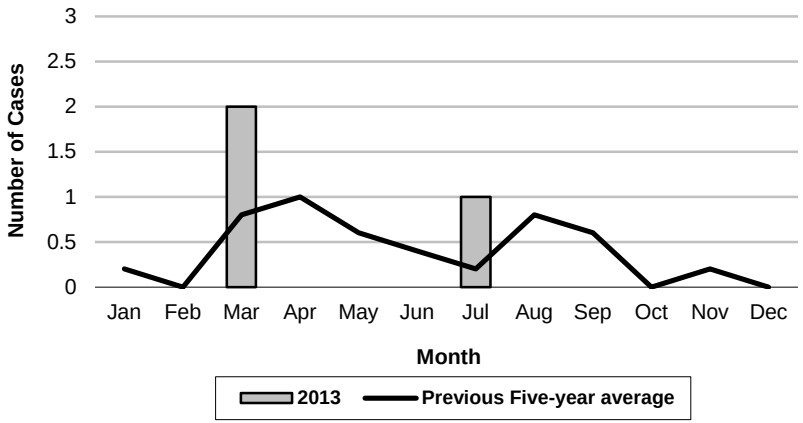


Figure 6. Vaccination Status of Reported Measles Cases LAC, 2013

	Reported Cases	Cases Too Young to Be Vaccinated[1]	Cases Eligible for Vaccination and Up-to-Date[2]	Cases Eligible for Vaccination and Not Up-To-Date[3]	Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=0)
No.	3	0	0	3	0
%	100%	0.0%	0.0%	100%	100%

[1]Cases less than 12 months of age

[2]Cases 12 months of age and older and who are up-to-date with the measles immunization recommendations for their age

[3]Cases 12 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	355
Annual Incidence[a]	
LA County	3.77
Age at Diagnosis	
Mean	30.8
Median	29
Range	0-90

[a]Cases per 100,000 population.

DESCRIPTION

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

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

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

2013 TRENDS AND HIGHLIGHTS

- In 2013, viral/aseptic meningitis incidence was 3.77 cases per 100,000, similar to the prior year. The incidence was as high as 9.6 per 100,000 in 2002 and has been declining since then (Figure 1).
- SPA 1 (Antelope Valley) continued to report the highest rate of viral meningitis in LAC, increasing from 4.6 cases per 100,000 in 2012 to 7.4 per 100,000 in 2013. However, SPA 1 documented its lowest rate since 2001 last year. From 2002 through 2011, SPA 1 recorded rates consistently over 10 cases per 100,000, much higher than the overall rate for LAC. The Varicella Active Surveillance Project, a study conducted since 1997 in the Antelope Valley and ended September 2012, likely contributed by enhancing reporting to LAC DPH. The rate may have risen again in 2013 due to a surge of West Nile Virus (WNV) associated meningitis in the SPA 1 region.
- The distribution of viral/aseptic meningitis by age groups remains similar to previous years with the <1 year old age group documenting the highest age-specific incidence rate at 35.6 per 100,000 (Figure 3).
- The etiologies of 115 cases were identified (32%). Of those, 52 (45%) were caused by WNV, 41 (36%) by an enterovirus, and 15 (13%) by HSV (Figure 6).
- One death (<1%) was reported; the etiology was not determined.

Reported Viral Meningitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=399)			2010 (N=570)			2011 (N=317)			2012 (N=303)			2013 (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	53	13.3	38.6	89	15.6	63.8	33	10.4	23.6	28	9.2	23.5	43	12.1	35.6
1-4	14	3.5	2.5	33	5.8	5.7	6	1.9	1.0	4	1.3	0.8	9	2.5	1.8
5-14	71	17.8	5.2	138	24.2	10.4	53	16.7	4.0	24	7.9	2.0	57	16.1	4.7
15-34	148	37.1	5.2	164	28.8	5.6	102	32.2	3.5	93	30.7	3.4	105	29.6	3.7
35-44	42	10.5	2.8	56	9.8	3.9	39	12.3	2.7	45	14.9	3.4	27	7.6	2.0
45-54	34	8.5	2.5	39	6.8	2.9	41	12.9	3.0	40	13.2	3.1	44	12.4	3.4
55-64	18	4.5	1.9	17	3.0	1.8	24	7.6	2.5	32	10.6	3.1	35	9.9	3.4
65+	19	4.8	1.8	33	5.8	3.1	18	5.7	1.7	37	12.2	3.3	31	8.7	2.8
Unknown	0	0.0		1	0.2					0	0.0		4	1.1	
Race/Ethnicity															
Asian	21	5.3	1.6	36	6.3	2.7	21	6.6	1.6	23	7.6	1.7	21	5.9	1.5
Black	23	5.8	2.7	64	11.2	7.5	37	11.7	4.3	36	11.9	4.7	26	7.3	3.3
Hispanic	208	52.1	4.4	259	45.4	5.5	147	46.4	3.1	131	43.2	2.9	158	44.5	3.4
White	80	12.5	2.7	112	19.6	3.9	78	24.6	2.7	86	28.4	3.2	88	24.8	3.3
Other	4	1.0		13	2.3		7	2.2		10	3.3		19	5.4	
Unknown	63	15.8		86	15.1		27	8.5		17	5.6		43	12.1	
SPA															
1	46	11.5	12.5	45	7.9	12.1	33	10.4	8.8	18	5.9	4.6	29	8.2	7.4
2	88	22.1	4.0	86	15.1	3.9	67	21.1	3.0	63	20.8	2.9	67	18.9	3.1
3	63	15.8	3.6	98	17.2	5.6	75	23.7	4.3	68	22.4	4.2	64	18.0	3.9
4	18	4.5	1.4	29	5.1	2.3	14	4.4	1.1	16	5.3	1.4	32	9.0	2.8
5	22	5.5	3.4	13	2.3	2.0	15	4.7	2.3	10	3.3	1.6	7	2.0	1.1
6	45	11.3	4.3	76	13.3	7.1	26	8.2	2.4	29	9.6	2.9	43	12.1	4.2
7	62	15.5	4.5	92	16.1	6.7	48	15.1	3.5	57	18.8	4.4	56	15.8	4.3
8	53	13.3	4.7	121	21.2	10.8	35	11.0	3.1	36	11.9	3.4	52	14.7	4.8
Unknown	2	0.5		10	1.8		4	1.3		6	2.0		5	1.4	

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

**Figure 1. Incidence Rates of Viral Meningitis
LAC, 2000-2013**

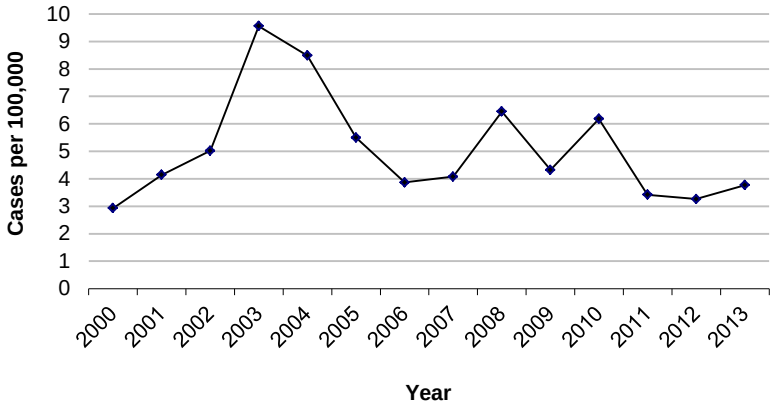


**Figure 2. Incidence Rates of Viral Meningitis by SPA
LAC, 2013 (N=355)**

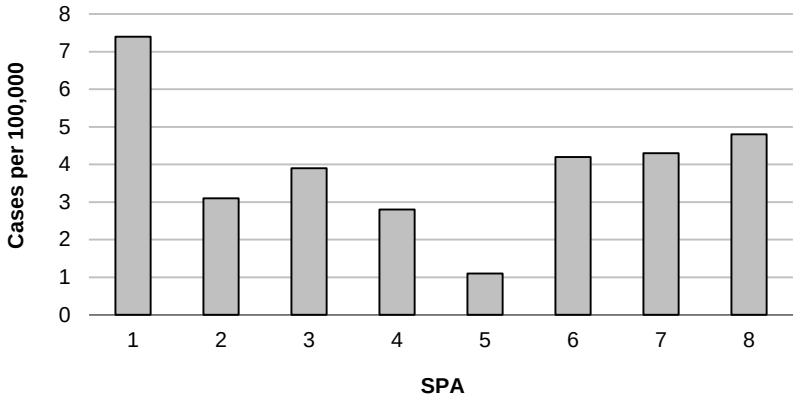


**Figure 3. Incidence Rates of Viral Meningitis by Age Group
LAC, 2013 (N=355)**

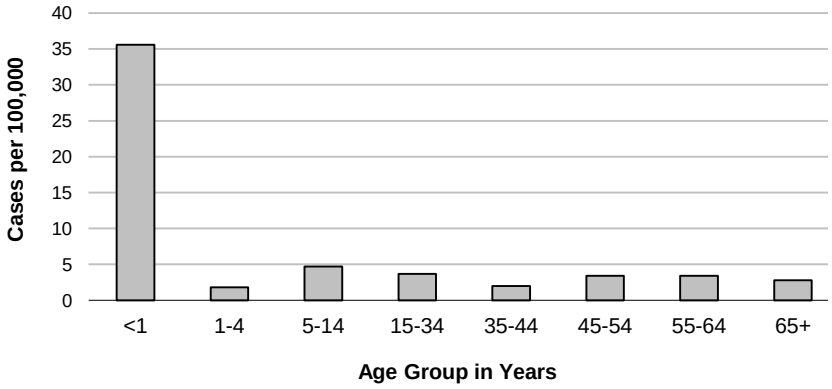


**Figure 4. Reported Viral Meningitis Cases by Month of Onset
LAC, 2013 (N=355)**

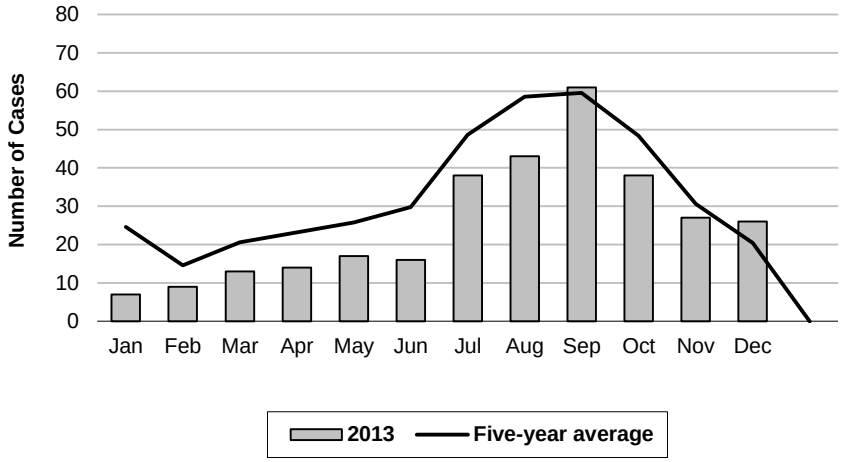


Figure 5. Incidence Rates of Viral Meningitis by Race/Ethnicity LAC, 2009-2013

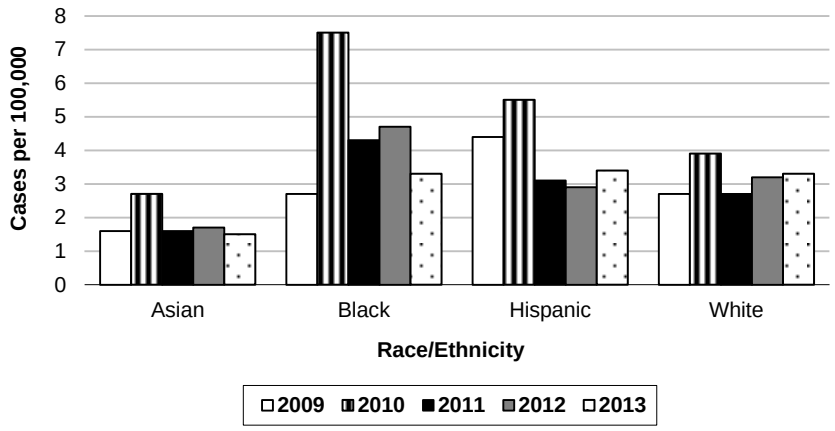
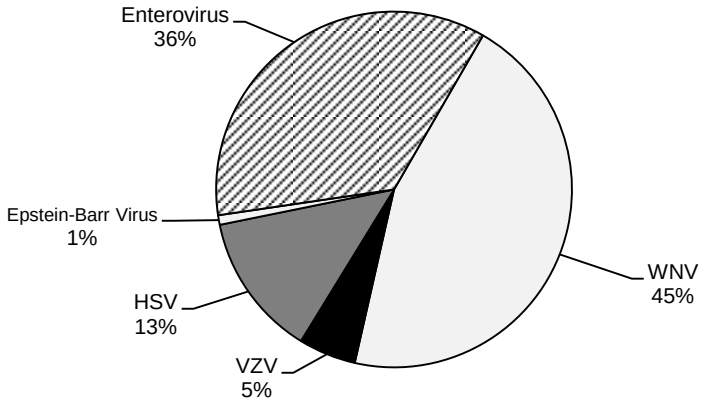
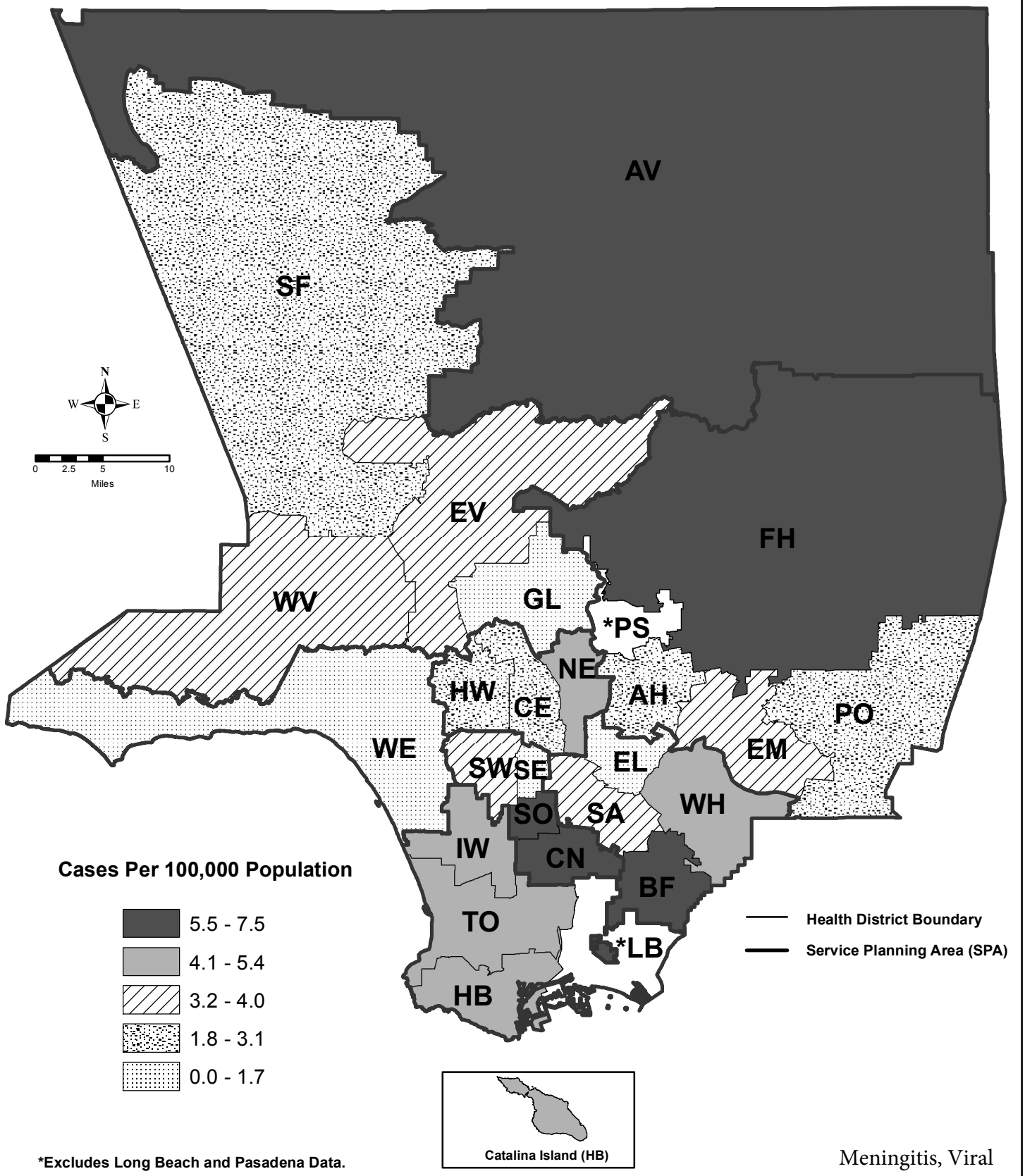


Figure 6. Percent Cases of Viral Meningitis by Etiology, LAC, 2013 (N=355)



Map 10. Meningitis, Viral
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	17
Annual Incidence[a]	
LA County	0.18
California[b]	0.30
United States[b]	0.18
Age at Diagnosis	
Mean	42.5
Median	38
Range	14-94

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32); 702-716.

DESCRIPTION

Meningococcal disease (MD) 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% and 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, A, B, C, Y, and W-135 are responsible for causing nearly all cases of meningococcal disease.

For the purpose of surveillance, the Los Angeles County (LAC) Department of Public Health (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 if there is evidence of the bacteria in a normally sterile site by polymerase chain reaction (PCR) analysis or CSF antigen test. Reports are classified as suspected cases when they present with clinical diagnosis of purpura fulminans or demonstrate gram-negative diplococci by gram staining.[1]

Both suspected clinical cases of MD and laboratory findings consistent with MD are immediately reportable to the public health department. All cases are investigated by public health nurses within the district corresponding to home of residence. A standardized case report is completed. In December 2012, in addition to the standardized case report form a supplemental form documenting additional risk factors was included in the investigation. Additional risk factors such as sexual history (men who have sex with men [MSM]) and travel history were documented due to the ongoing outbreak of MD among MSM in New York City in 2011-2012[2].

Three vaccines are available in the US that protect against serogroups A, C, Y, and W-135 but not B. A quadrivalent unconjugated polysaccharide meningococcal vaccine (Menomune®) is licensed for persons >55 years and for those ≥2 years old when quadrivalent conjugated-polysacharide vaccine is not available. 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 and 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. An additional conjugate vaccine, Hib-MenCY-TT (MenHibrix®), has been licensed for infants 6 weeks to 18 months old, but only protects against serogroups C and Y disease.[3]

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

1. Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (Neisseria meningitidis), 2010 Case Definition. http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=774&DatePub=1/1/2010 12:00:00 AM. Accessed: May 29, 2013.
2. Centers for Disease Control and Prevention. Notes from the field: serogroupo C invasive meningococcal disease among men who have sex with men – New York City, 2010-2012. Morbidity and Mortality Weekly Report. 4 Jan 2013; 61(51): 1048.

probably of limited or no value. Prophylactic treatment and follow-up of close contacts are routinely handled by the LAC DPH Community Health Services.

2013 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease increased slightly from 0.13 cases per 100,000 in 2012 to 0.18 cases per 100,000 in 2013. LAC documented its lowest case count in 2012, only 12 cases. The incidence rate in 2013 remains low (under 0.20 per 100,000). This continues a decline since 2001 when there was a peak of 0.64 cases per 100,000 (Figure 1).
- There were no cases reported among persons less than 14 years old (Figure 2). The highest number of cases occurred among those 15 to 34 years old and 65 years and older. In a typical distribution curve depicting incidence for meningococcal disease the peak incidence occurs among infants <1 year old. There have been no cases of meningococcal disease in children <1 year old since 2010.
- The monthly onset of disease did not follow the typical seasonal trend of peaks in the winter season. The highest numbers of cases usually occur in January and February. In 2013, cases occurred throughout the year (Figure 4).
- Fifteen (88%) of seventeen MD cases were culture-confirmed: 11 (73%) were cultured from blood, three from (18%) from cerebrospinal fluid (CSF), and one from synovial fluid (7%). The two cases not culture-confirmed were diagnosed by PCR and were classified as probable MD. All cases, including those diagnosed by PCR, had serogroup identified; 12 (71%) were serogroup C, 2 (12%) were serogroup B, 2 (12%) were serogroup Y, and one (6%) was serogroup W-135 (Figure 6). One of the serogroup B and one of the serogroup C isolates was identified by PCR.
- The case fatality rate, 24% (n=4), is much higher than what has been usually recorded for LAC. All fatalities were due to serogroup C disease.
- A cluster of four cases beginning October 2012 and extending through 2013, occurred among cases who reported travel to Tijuana or high risk contact with travelers to Tijuana. They were all serogroup C, non-MSM males aged 30 to 69 years. Three were fatal (75%). Molecular analysis showed that the strains affecting three of the four Tijuana-associated cases matched each other as well as other cases in California associated with travel to Tijuana. However, none of the cases had direct social links to each other. Tijuana was experiencing a local outbreak at the time. Public health officials from Mexico and the Centers for Disease Control and Prevention determined the increase in cases was localized to Tijuana.
- A second cluster of seven cases beginning December 2012 and extending through 2013 occurred among MSM. They were aged 21 to 49 years. All but one were serogroup C (86%); there was a single serogoup B case. Only one was HIV positive (14%). None had a travel history to NYC. Two were fatal (29%). Molecular analysis by pulsed field gel electrophoresis (PFGE) showed that the strains affecting two MSM, the first two reported December 2012-January 2013 were related to each other and to strain involved in the concurrent NYC outbreak. However, none of the MSM, including the two with a PFGE match, had direct social links to each other (see 2013 ACDC Special Studies report).[3]

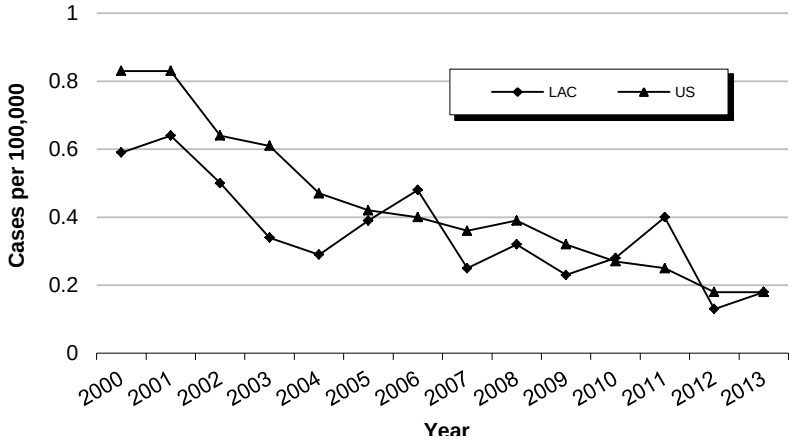
3. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Prevention and Control of Meningococcal Disease, Recommendations of the Advisory Committee on Immunization Practices (ACIP). 22 Mar 2013, 62 (2): 1-28.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=21)			2010 (N=26)			2011 (N=37)			2012 (N=12)			2013 (N=17)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	4.8		2	7.7		0	0.0		0	0.0		0	0.0	
1-4	1	4.8		2	7.7		1	2.7		0	0.0		0	0.0	
5-14	1	4.8		1	3.8		1	2.7		0	0.0		1	5.9	
15-34	10	47.6		8	30.8		12	32.4		4	33.3		7	41.2	
35-44	0	0.0		4	15.3		10	27.0		0	0.0		3	17.9	
45-54	4	19.0		5	19.2		3	8.1		2	16.7		2	11.8	
55-64	4	19.0		1	3.8		5	13.5		2	16.7		1	5.9	
65+	0	0.0		3	11.5		5	13.5		4	33.3		3	17.6	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	0	0.0		1	3.8		4	10.8		2	16.7		0	0.0	
Black	4	19.0		7	26.9		12	32.4		2	16.7		4	23.5	
Hispanic	9	42.9		11	42.3		11	29.7		5	41.7		6	35.3	
White	7	33.3		7	26.9		10	27.0		3	25.0		6	35.3	
Other	0	0.0		0	0.0		0	0.0		0	0.0		1	5.9	
Unknown	1	4.8		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	1	4.8		1	3.8		1	2.7		0	0.0		0	0.0	
2	5	23.8		3	11.5		9	24.3		2	16.7		5	29.4	
3	1	4.8		3	11.5		2	5.4		0	0.0		1	5.9	
4	2	9.5		2	7.7		5	13.5		5	41.7		4	23.5	
5	2	9.5		2	7.7		1	2.7		2	16.7		2	11.8	
6	5	23.8		6	23.1		9	24.3		3	25.0		1	5.9	
7	2	9.5		3	11.5		4	10.8		0	0.0		3	17.9	
8	3	14.3		6	23.1		6	16.2		0	0.0		1	5.9	
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2013



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

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2013 (N=17)

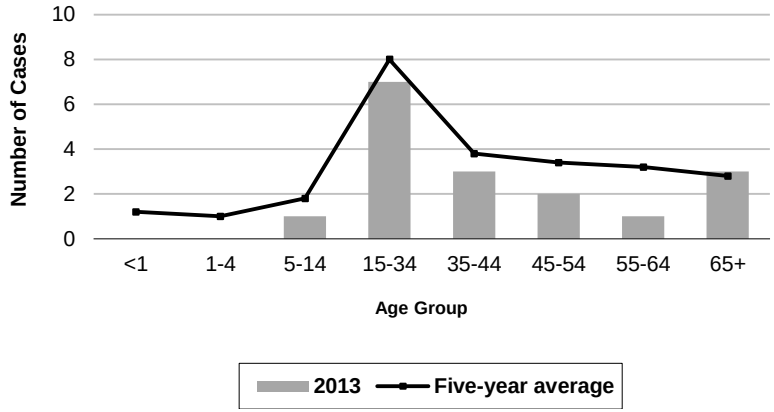


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2009-2013

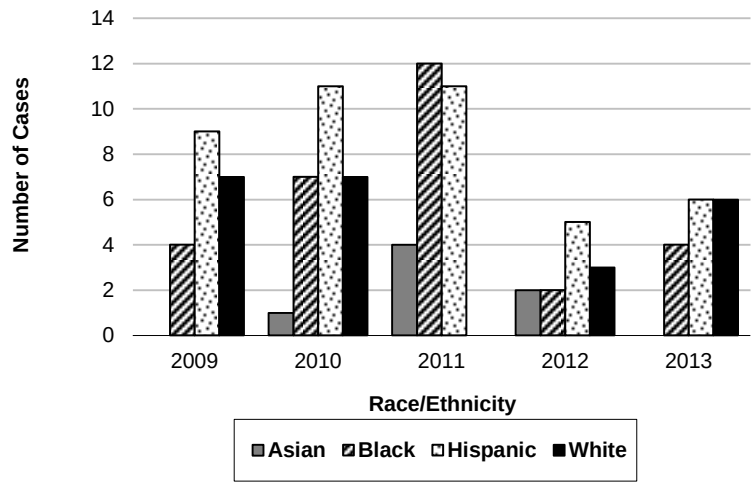
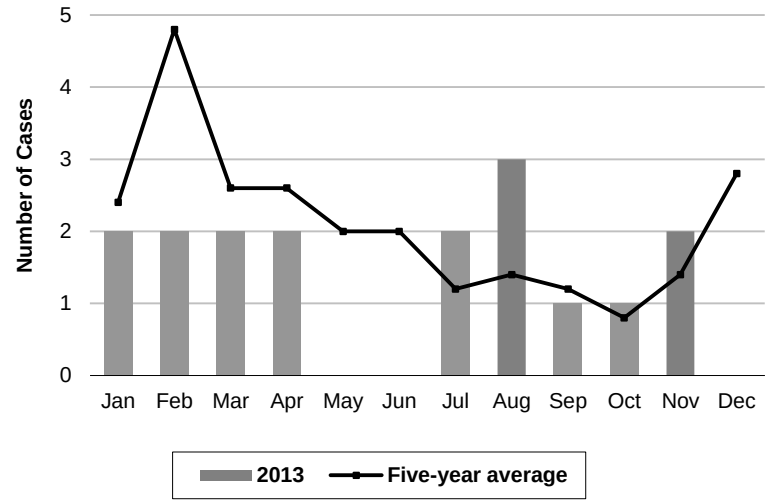


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2013 (N=17)



3. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Prevention and Control of Meningococcal Disease, Recommendations of the Advisory Committee on Immunization Practices (ACIP). 22 Mar 2013, 62 (2): 1-28.

**Figure 5. Meningococcal Disease Cases by SPA
LAC, 2013 (N=17)**

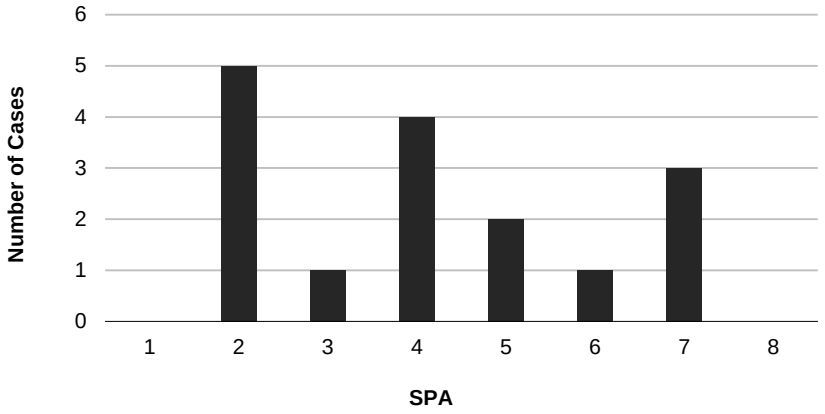
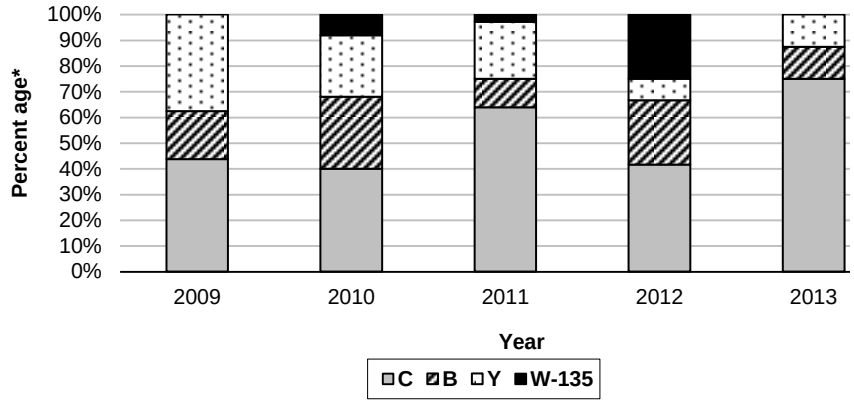


**Figure 6. Meningococcal Disease by Serogroup
LAC, 2009–2013**



*Among cases with known serogroup.

MUMPS

CRUDE DATA	
Number of Cases	9
Annual Incidence[a]	
LA County	0.10[b]
California[c]	0.08
United States[c]	0.19
Age at Diagnosis	
Mean	37.8 years
Median	36.0 years
Range	1.0 – 65.0 years

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

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 isolation of mumps virus or detection of viral RNA (RT-PCR).

Parotid or other salivary gland swelling can be caused by other viruses, bacteria, or other medical conditions and is often falsely attributed to mumps infection.

Immunization Recommendations:

- Mumps disease can be prevented by Measles-Mumps-Rubella (MMR) or Measles-Mumps-Rubella-Varicella (MMRV) vaccine. Note: MMRV is only licensed for persons 12 months through 12 years of age.
- Usually, two doses of mumps-containing vaccine are given via MMR or MMRV vaccine. Vaccine effectiveness for the mumps component is about 88% after two doses. The first dose is recommended at 12 months of age. The second dose can be given as early as four weeks after the first dose, but is usually given at ages 4 to 6 years. When MMRV vaccine is used, the minimum interval between doses is three months.
- 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 or serologic evidence of immunity is recommended for health care workers, persons attending post-high school educational institutions, international travelers as well as others who work or live in high-risk settings (e.g., healthcare facility, daycare, college/university, or correctional facility).
- Pregnant women and individuals who are severely immunocompromised for any reason are contraindicated to receive MMR.

2013 TRENDS AND HIGHLIGHTS

- In 2012, the laboratory criteria for classification of a confirmed and probable case of mumps were revised. A case can now only be classified as confirmed through the following diagnostic tests: isolation of mumps virus, detection of viral RNA (RT-PCR), or a significant increase in acute and convalescent IgG titers. Cases previously classified as confirmed by a positive IgM titer or epidemiologic linkage to a confirmed case are now classified as probable. Thus, probable cases in 2012 and 2013 are included in the analysis to be comparable to previous years.
- Of the nine reported mumps cases in 2013, one (11.1%) was confirmed and eight (88.9%) were probable. All of the probable cases were laboratory confirmed by a positive IgM titer. The case classified as confirmed was laboratory confirmed based on a four-fold increase between the acute and convalescent IgG titers. The number of reported mumps cases in 2013 is similar to the average number reported since 2004 (Figure 2) and the previous five year average of ten cases.
- None of the cases reported in 2013 were epidemiologically linked.
- Of those eligible for vaccination, 77.8% were not up-to-date according to the immunization recommendation for their age (Figure 7). This is consistent with the percentage of unvaccinated cases eligible for immunization (76%) reported in past five years.
- The mean age of cases in 2013 (mean=37.8 years) remained similar compared to 2012

(mean=35.5). However, the mean age of cases in 2013 increased when compared to the previous three year average (mean=30.5), (Figure 8). The lower mean age for the previous three years can be attributed to a cluster of cases in the 5-14 and 15-34 age groups during the 2010 outbreak.

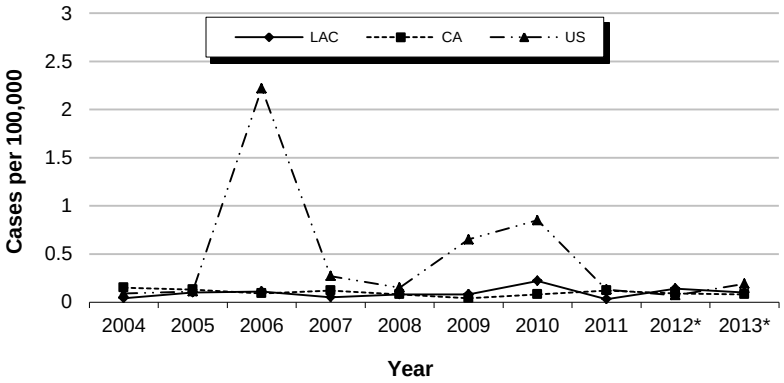
- Although persons born prior to 1957 are generally considered to be immune to mumps, two of the cases were in the 55-64 and ≥65 age groups (Figure 3). Both of the cases were at least 60 years of age. From 2009-2012, at least one mumps case born before 1957 was reported each year.
- Compared to previous years, whites comprised only 33% of the reported cases in 2013. From 2010-2012, almost half of the reported cases were white and from outbreaks linked to the Jewish community, which helps explain the difference in race composition in 2013 versus the previous years.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=7)			2010 (N=20)			2011 (N=3)			2012 (N=13)**			2013 (N=9)**		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
1-4	2	28.6	0.4	1	5.0	0.2	0	0.0	-	3	23.1	0.6	1	11.1	0.2
5-14	0	0.0	-	8	40.0	0.6	0	0.0	-	1	7.7	0.1	0	0.0	-
15-34	4	57.1	0.1	8	40.0	0.3	2	66.7	0.1	2	15.4	0.1	3	33.3	0.1
35-44	0	0.0	-	0	0.0	-	0	0.0	-	2	15.4	0.2	1	11.1	0.1
45-54	0	0.0	-	2	10.0	0.2	0	0.0	-	1	0.0	0.1	2	22.2	0.2
55-64	0	0.0	-	1	5.0	0.1	0	0.0	-	2	15.4	0.2	1	11.1	0.1
65+	1	14.3	0.1	0	0.0	-	1	33.3	0.1	2	15.4	0.2	1	11.1	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	3	42.8	0.2	0	0.0	-	0	0.0	-	2	15.4	0.2	2	22.2	0.1
Black	1	14.3	0.1	1	5.0	0.1	0	0.0	-	0	0.0	-	1	11.1	0.1
Hispanic	2	28.6	-	3	15.0	0.1	0	0.0	-	1	7.7	-	2	22.2	-
White	1	14.3	-	16	80.0	0.6	3	100	0.1	10	76.9	0.4	3	33.3	0.1
Other	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		1	11.1	
SPA															
1	1	14.3	0.3	0	0.0	-	0	0.0	-	0	0.0	-	1	11.1	0.3
2	1	14.3	-	4	20.0	0.2	0	0.0	-	4	30.8	0.2	1	11.1	-
3	1	14.3	0.1	1	5.0	0.1	1	33.3	0.1	1	7.7	0.1	2	22.2	0.1
4	0	0.0	-	7	35.0	0.6	0	0.0	-	0	0.0	-	0	0.0	-
5	2	28.6	0.3	2	10.0	0.3	1	33.3	0.2	5	38.5	0.8	2	22.2	0.3
6	1	14.3	0.1	0	0.0	-	0	0.0	-	0	0.0	-	1	11.1	0.1
7	0	0.0	-	0	0.0	-	0	0.0	-	1	7.7	0.1	0	0.0	-
8	1	14.3	0.1	6	30.0	0.6	1	33.3	0.1	2	15.4	0.2	2	22.2	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

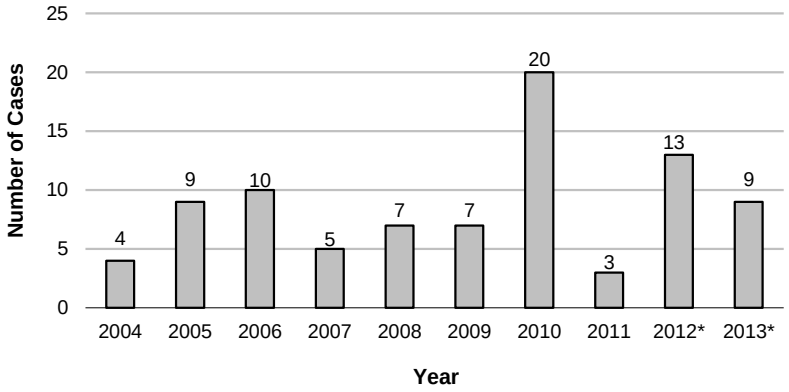
*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").
**Includes newly defined probable cases.

**Figure 1. Incidence Rates of Confirmed Mumps
LAC, CA and US, 2004-2013***



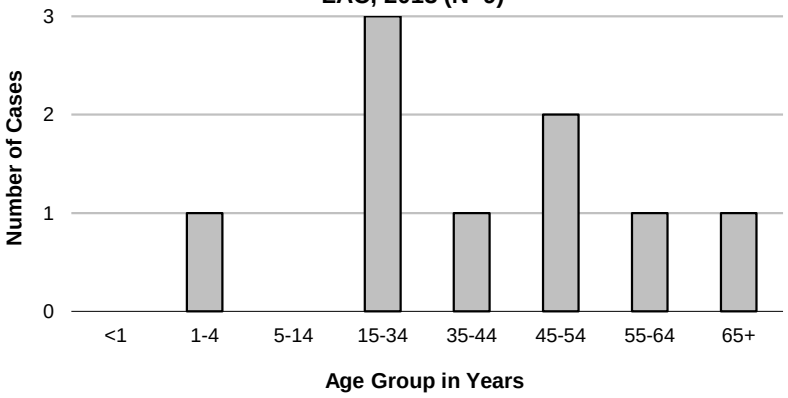
*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

**Figure 2. Reported Confirmed Mumps Cases
LAC, 2004-2013***



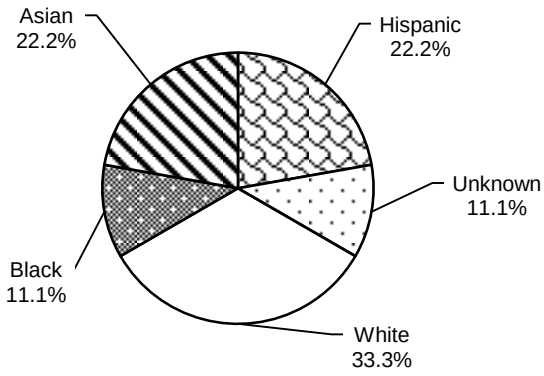
*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

**Figure 3. Reported Confirmed* Mumps Cases by Age Group
LAC, 2013 (N=9)**



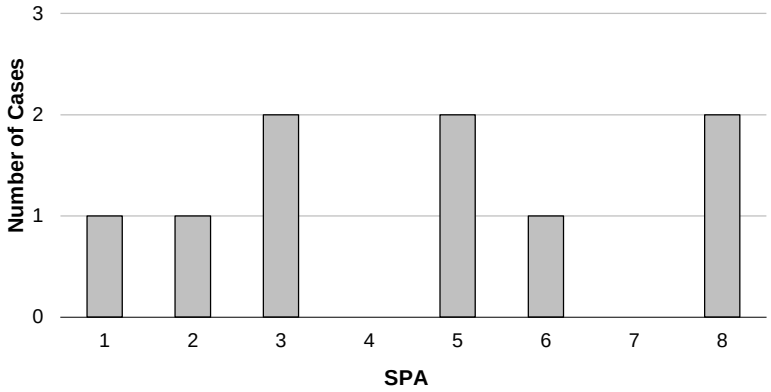
*Includes newly probable cases.

Figure 4. Percent Cases of Confirmed* Mumps by Race/Ethnicity LAC, 2013 (N=9)



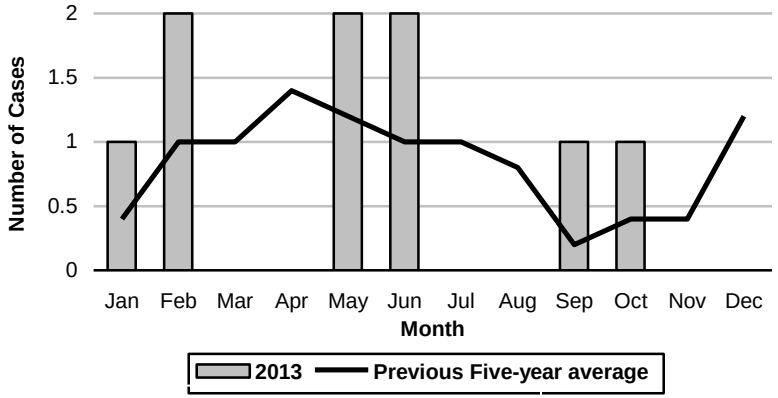
*Includes newly defined probable cases.

Figure 5. Reported Confirmed* Mumps Cases by SPA LAC, 2013 (N=9)



*Includes newly defined probable cases.

Figure 6. Reported Confirmed* Mumps Cases by Month of Onset LAC, 2013 (N=9) vs. Previous Five-Year Average



*Includes newly defined probable cases.

Figure 7. Vaccination Status of Reported Confirmed* Mumps Cases, LAC, 2013

	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.	9	0	2	7	0
%	100%	0%	22.2%	77.8%	0%

*Includes probable cases.
[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, 2013 vs. Previous Three-Year Average

	Confirmed*	Confirmed
	2013	2010-2012 Average
Total Cases	9	12.0
Age at Onset (years)		
Mean	37.8	30.5
Median	36.0	25.8
Range	1.0 – 65.0	3.0 – 73.0

*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

PERTUSSIS (WHOOPING COUGH)

CRUDE DATA	
Number of Cases	296
Annual Incidence[a]	
LA County	3.15
California[b]	5.29
United States[b]	9.12
Age at Diagnosis	
Mean	15.1 years
Median	11.0 years
Range	Birth – 83 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32);702-716.

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, a 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 (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 DTaP vaccine decreases over time, with some vaccinated individuals becoming susceptible to pertussis 5 to 10 years following their last dose. Two Tdap vaccines are licensed and are recommended for use in adolescents and adults.
- Since July 2011, the California school immunization law requires that all students entering the 7th grade be vaccinated with Tdap.

2013 TRENDS AND HIGHLIGHTS

- In 2013, a total of 296 pertussis cases (236 confirmed, 60 probable) (3.14 cases per 100,000) were reported to Los Angeles County (LAC), an increase of more than 90% from 2012 (Figures 1 and 2).
- Unlike previous years, the incidence trend peaking in the summer was not observed. Instead, the peak was observed from November to December, where over one-third of the cases in 2013 were reported. The number of cases reported from November to December was significantly higher compared to the previous five year average for those two months (Figure 7). The increase in cases is attributable to the school outbreaks that occurred from November to December, and marks the second year in a row in which school outbreaks occurred in the same time period. No deaths were reported.
- Similar to previous years, infants less than one year of age had the highest incidence rate (48.8 cases per 100,000) (Figure 3). However, infants continued to account for a smaller proportion of reported cases (19.9%) compared to a previous five year average of 36.3%. The highest proportion of cases was reported in the 5-14 and 15-34 year age groups, accounting in total for over half (55%) of all cases reported in 2013 and underscoring the importance of Tdap immunizations among adolescents and adults.
- Similar to previous years, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5). Amongst all race/ethnicity groups, only whites had an age-adjusted incidence rate in 2013 that was greater than the previous five year average. The increase in age-adjusted incidence rates for whites is due to the increase in proportion of school age cases.
- In 2013 and for the fourth year in a row, SPA 2 had the highest proportion of reported cases (40.9%). In addition, SPA 2 also had the highest incidence rate amongst all SPAs (5.6 cases per 100,000) (Figure 6). From November to December, a total of five school outbreaks serving grade levels from middle to high school occurred in SPA 2. The increase in incidence may be attributable to the school outbreaks, which accounted for almost one-third of the cases reported in SPA 2 for the entire year and

reflects the morbidity that occurred during the fall and winter months in this region.

- Among the 57 cases that had epidemiological linkages to other cases, over three-fourths resided in SPA 2 (n=36, 63.2%) and SPA 8 (n=11, 19.3%). The proportion of epidemiologically linked cases residing in SPA 2 increased over two-fold in comparison to 2012 (25.9%). In SPA 2, the vast majority of epidemiologically linked cases were attributable to the school outbreaks observed in the region.
- Of the total 296 cases, 52% (n=154) were either too young to be vaccinated (5.4%) or were not up-to-date with the immunization recommendations for their age (46.6%). Additionally, 9.1% (n=21) of the cases less than 18 years of age had personal belief exemption school vaccine waivers which is similar to the percentage reported in 2012 (8.8%) and 2011 (8.0%), but is more than twice the percentage reported in 2010 (4.2%) (Figure 8). The increasing proportion in the last three years is due in part to the rise of personal belief exemption rates throughout LAC.

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=156)			2010 (N=972)			2011 (N=453)			2012 (N=154)			2013 (N=296)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	79	50.7	64.6	273	28.1	227.2	139	30.7	117.	30	19.5	25.2	59	19.9	48.8
1-4	10	6.4	2.0	158	16.2	32.6	73	16.1	15.1	22	14.3	4.6	33	11.2	6.8
5-14	18	11.5	1.4	304	31.3	24.6	133	29.4	11.0	53	34.4	4.4	88	29.7	7.3
15-34	20	12.8	0.7	122	12.5	4.4	48	10.6	1.7	23	14.9	0.8	75	25.3	2.6
35-44	9	5.8	0.7	40	4.1	3.0	26	5.7	2.0	8	5.2	0.6	15	5.1	1.1
45-54	12	7.7	0.9	28	2.9	2.2	14	3.1	1.1	6	3.9	0.5	13	4.4	1.0
55-64	5	3.2	0.5	24	2.5	2.5	9	2.0	0.9	6	3.9	0.6	6	2.0	0.6
65+	3	1.9	0.3	23	2.4	2.3	11	2.4	1.0	6	3.9	0.5	7	2.4	0.6
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	10	6.4	0.8	32	3.3	2.4	17	3.8	1.3	8	5.2	0.6	8	2.7	0.6
Black	6	3.9	0.8	50	5.1	6.5	24	5.3	3.1	10	6.5	1.3	5	1.7	0.6
Hispanic	100	64.1	2.3	655	67.4	14.7	286	63.1	6.4	71	46.1	1.6	146	49.3	3.2
White	39	25.0	1.4	216	22.2	8.1	110	24.3	4.1	54	35.1	2.0	129	43.7	4.9
Other	1	0.6	5.5	2	0.2	11.4	0	0.0	-	1	0.6	5.6	1	0.3	5.6
Unknown	0	0.0		17	1.8		16	3.5		10	6.5		7	2.4	
SPA															
1	9	5.8	2.4	19	1.9	4.9	19	4.2	4.9	7	4.5	1.8	14	4.7	3.6
2	21	13.5	1.0	209	21.5	9.8	99	21.8	4.6	43	27.9	2.0	121	40.9	5.6
3	24	15.4	1.5	147	15.1	9.2	86	19.0	5.3	25	16.2	1.5	27	9.1	1.7
4	18	11.5	1.6	162	16.7	14.5	51	11.3	4.6	18	11.7	1.6	19	6.4	1.7
5	17	10.9	2.7	57	5.8	9.0	27	6.0	4.2	22	14.3	3.4	19	6.4	2.9
6	24	15.4	2.4	158	16.3	15.8	63	13.9	6.2	10	6.5	1.0	24	8.1	2.3
7	22	14.1	1.7	129	13.3	10.0	60	13.2	4.6	16	10.4	1.2	39	13.2	3.0
8	21	13.5	2.0	90	9.3	8.5	48	10.6	4.5	13	8.4	1.2	33	11.2	3.1
Unknown	0	0.0		1	0.1		0	0.0		0	0.0		0	0.0	

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

**Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2009-2013**

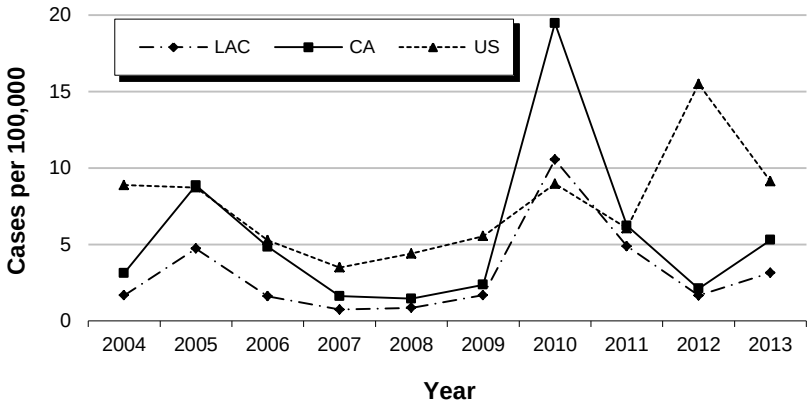


**Figure 2. Reported Cases of Pertussis
LAC, 2004-2013**

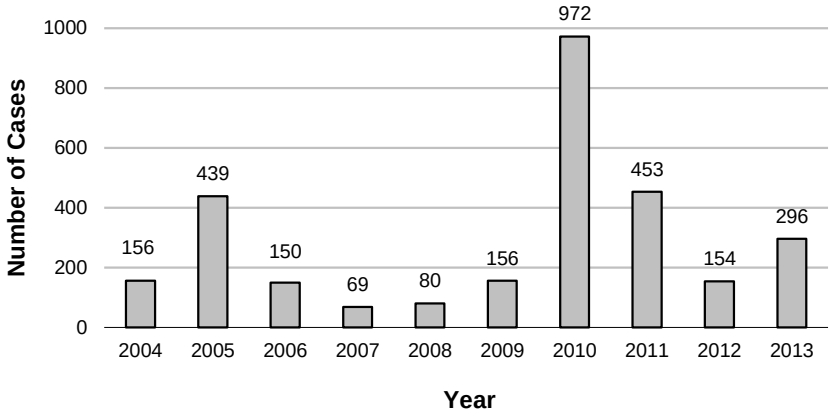


**Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2013 (N=296)**

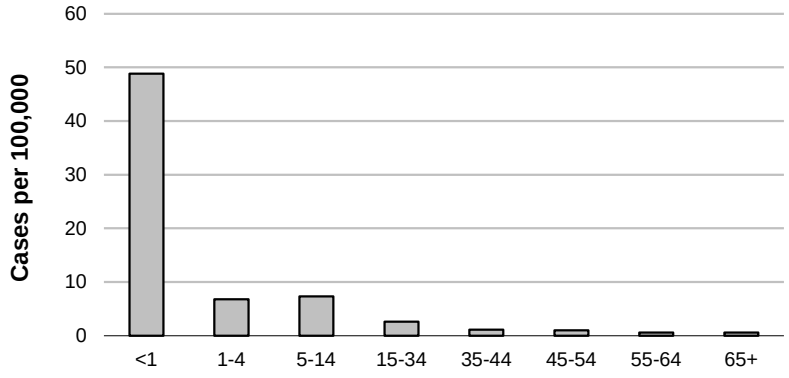
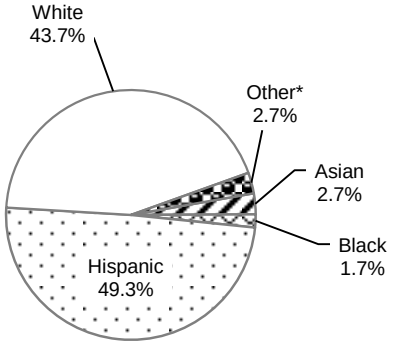
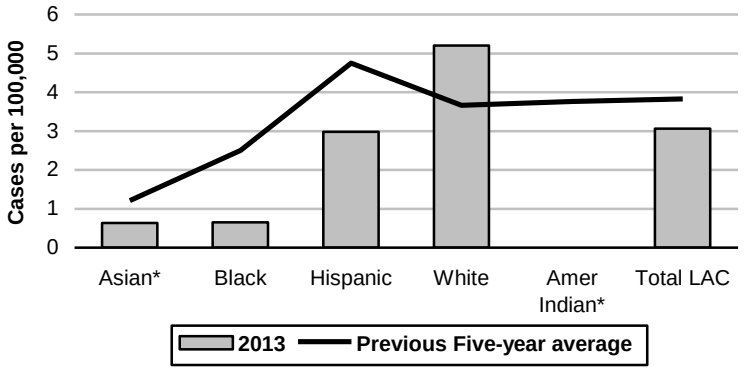


**Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2013 (N=296)**



*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, 2013 (N=296) vs. Previous Five-Year Average



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

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2013 (N=296)

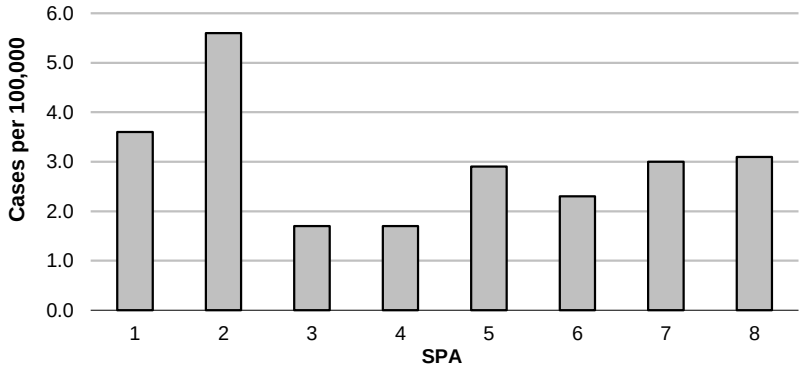


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2013 (N=296) vs. Previous Five-year Average

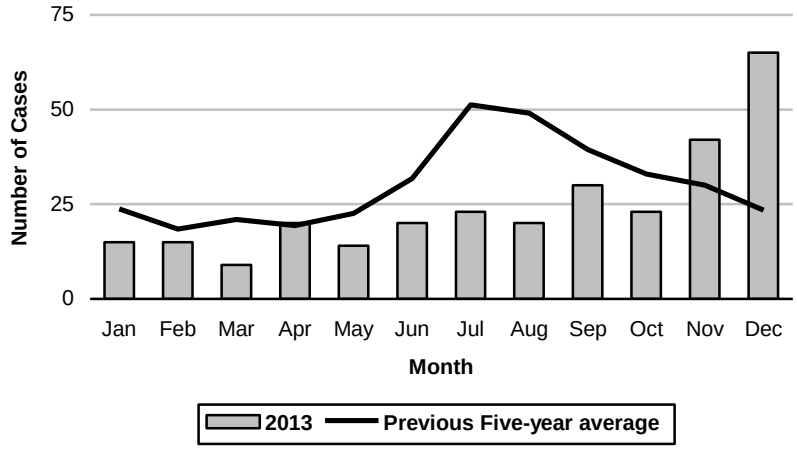
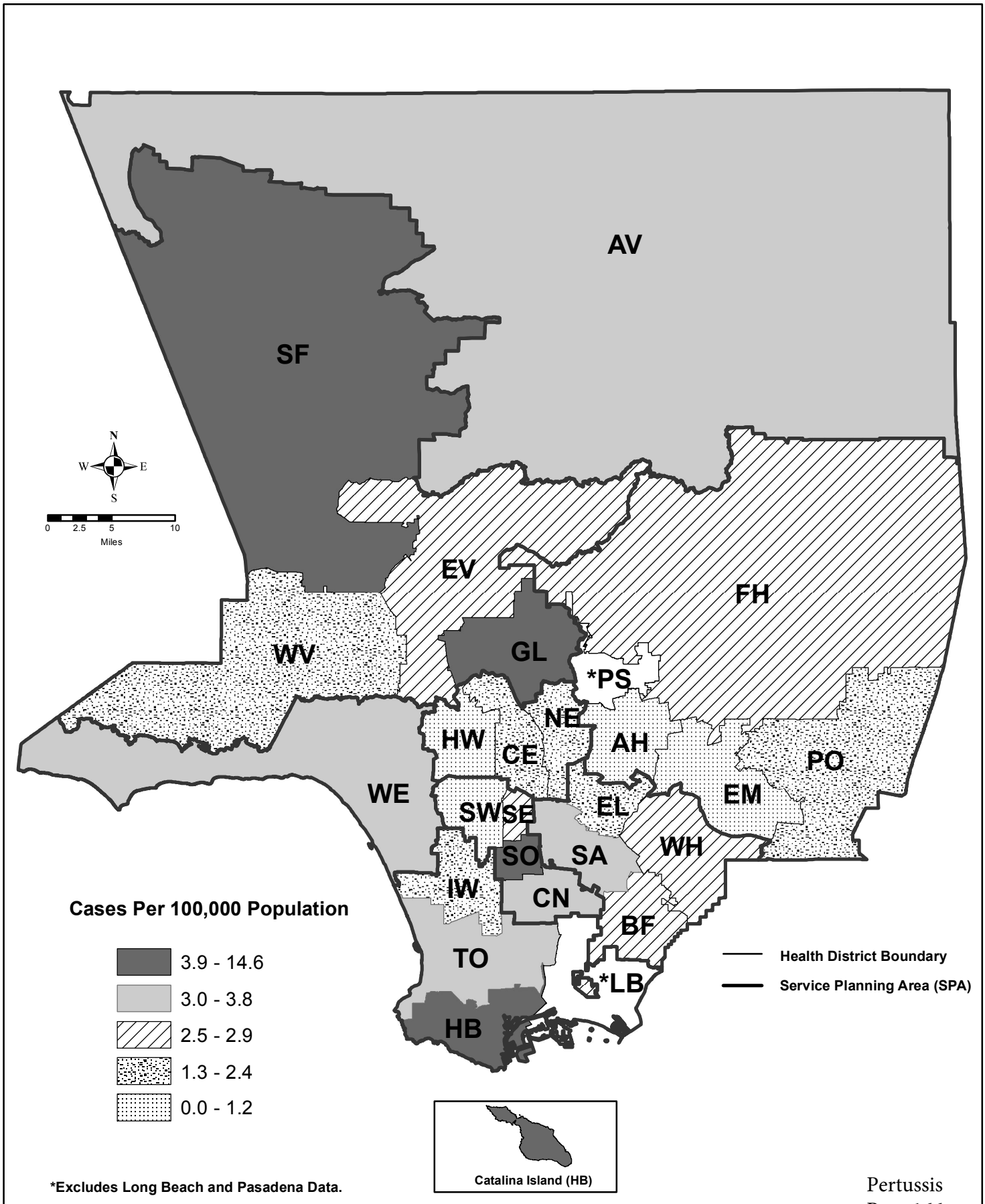


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2013

	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=231)
No.	296	16	142	138	21
%	100%	5.4%	47.9%	46.6%	9.1%

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

Map 11. Pertussis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	522
Annual Incidence[a]	
LA County	5.54
California[b]	N/A
United States[b]	10.6
Age at Diagnosis	
Mean	58
Median	62
Range	0 mos – 105 yrs

[a]Cases per 100,000 population.
[b]Not notifiable. United States incidence rate estimate from Active Bacterial Core Surveillance Report, 2013.
Note: LA County utilizes passive surveillance in all age groups >5. Passive surveillance in age groups > 5 is not comparable to U.S. rates due to difference in surveillance methodology.

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 secretions and can cause pneumonia, bacteremia, meningitis, and death. *S. pneumoniae* is one of the most common bacterial causes of community acquired pneumonia and otitis media (ear infections). However, these non-invasive forms of infection are not counted in LA County (LAC) surveillance. Therefore, the data presented in this report underestimate all disease caused by *S. pneumoniae* in LAC.

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

In the context of successful ongoing surveillance of IPD, ACDC was awarded a grant from the Centers for Disease Control and Prevention (CDC) to evaluate the effectiveness of the 13-valent pneumococcal conjugate vaccine (Prevnar13®) amongst children aged 2-59 months. Starting in 2010, the ongoing grant significantly enhanced epidemiologic capacity for surveillance across all age groups. This is evidenced by improvements in IPD

surveillance data quality and completeness since 2010 (Table).

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

Two effective vaccines are available to prevent pneumococcal disease: Prevnar13® is recommended for all children aged 2-59 months, and for children aged 60-71 months at high risk of invasive pneumococcal infections. The 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults ≥65 years and those >2 years at high risk of IPD. Since the release of these vaccines in 2010, there has been a decrease in IPD incidence rate.

2013 TRENDS AND HIGHLIGHTS

- The incidence rate and number of cases identified this year (5.54 cases per 100,000, N=522) was lower than the average annual incidence of 6.7 cases per 100,000 people of the past five years (range 5.4-8.0 cases per 100,000) (Figure 1). This year's incidence rate was slightly higher (4%) than last year's rate (5.4 cases per 100,000, N=503).
- Mortality in 2013 (17.8%, N=93 deaths) was the highest compared to the past three years (15%, 12.8%, 16.5% consecutively). Despite higher mortality in 2013 than recent years, no clear trend exists.
- In 2013, 95% (n=495) of cases were reported hospitalized, which is slightly higher than 2010-2012 (92%, mean=533).
- Incidence rates decreased amongst all age groups, except cases aged 5 to 14 years old, compared to the previous five-year average (Figure 2). The 2013 incidence rate

among cases aged 5 to 14 years old was similar to the previous five-year average (from 1.8 to 1.9 cases per 100,000). Amongst cases <1 year old, the incidence rate decreased 53% (from 10.6 to 5 cases per 100,000). Amongst cases aged 1 to 4 years old, the incidence rate was 42% lower (from 8.5 to 4.9 cases per 100,000. These age groups are part of the target population for the new 13-valent pneumococcal conjugate vaccine released in the spring of 2010. The decrease in incidence (Table) in these two age groups is indicative of vaccine effectiveness.

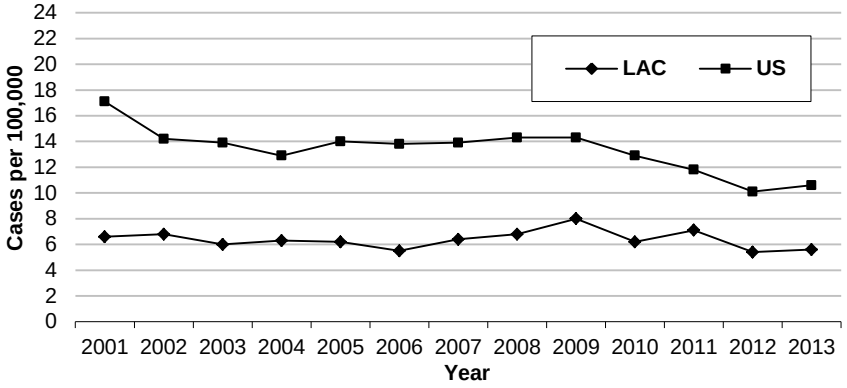
- For all other age groups, incidence rates decreased by 10% (55-64 year olds and 65 years and older) to 36% (45-54 year olds), compared to the previous five-year average.
- Cases aged 65 years and older and 55-64 years had the highest incidence rates (20.5 and 10.5 cases per 100,000, respectively) (Table, Figure 2).
- Incidence rates decreased across all race/ethnic groups from 7% (Hispanics) to 29% (Asians) (Table, Figure 3), compared to 2010-2012.
- Similar to previous years, the 2013 incidence rate in blacks was the highest compared to rates of the other race/ethnic groups (Table, Figure 3).
- Valid comparisons cannot be made across five-year averages as race information was missing for 32% of cases in 2009. Percent of cases missing race/ethnicity information for 2010-2013 was 0% to 4%.
- As in previous years, Service Planning Area (SPA) 6 had the highest incidence rate of IPD (7.2 cases per 100,000; Table, Figure 4).
- Compared to the previous five-year average, the incidence rate and number of cases in SPA 1 increased by 15% (from 5.6 to 6.4 cases per 100,000) (Table).
- For all other SPAs, the incidence rate decreased compared to the previous five-year average. Notably in SPA 5, the incidence rate decreased by 55% (from 6.9 to 3.1 cases per 100,000) compared to the previous five-year average (Table).
- The percentage of isolates susceptible to penicillin increased 5% compared to the previous five years (Figure 6).
- Susceptibility to erythromycin, cefotaxime, ceftriaxone, levofloxacin and TMP-SMZ was similar to the previous five years (Figure 6).

Reported Invasive Pneumococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=785)			2010 (N=576)			2011 (N=658)			2012 (N=504)			2013 (N=522)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	20	2.5	14.6	12	2.1	10	7	1.1	5.9	13	2.6	10.9	6	1.1	5
1-4	56	7.1	10	48	8.3	9.9	36	5.5	7.5	24	4.8	5.1	24	4.6	4.9
5-14	33	4.2	2.4	21	3.6	1.7	31	4.7	2.6	17	3.4	1.4	23	4.4	1.9
15-34	64	8.2	2.3	38	6.6	1.4	64	9.7	2.3	32	6.3	1.2	32	6.1	1.1
35-44	75	9.6	5.0	47	8.2	3.5	57	8.7	4.3	38	7.5	2.9	39	7.5	2.9
45-54	136	17.3	9.9	84	14.6	6.5	107	16.3	8.3	82	16.3	6.4	63	12.1	4.9
55-64	123	15.7	12.9	108	18.8	11.3	128	19.5	12.9	89	17.7	8.7	108	20.7	10.5
65+	277	35.3	26.1	218	37.8	21.7	227	34.5	21.5	209	41.5	18.8	227	43.5	20.5
Unknown	1	0.1		0	0.0		1	0.2		0	0.0		0	0.0	
Race/Ethnicity															
Asian	50	6.4	3.8	46	8.0	3.5	49	7.4	3.7	36	7.1	2.7	32	6.1	2.3
Black	86	11.0	10.1	83	14.4	10.7	130	19.8	16.8	96	19.0	12.4	95	18.2	12.2
Hispanic	197	25.1	4.2	213	37.0	4.8	244	37.1	5.4	192	38.1	4.2	206	39.5	4.5
White	192	24.5	6.6	209	36.3	7.8	234	35.6	8.8	172	34.1	6.5	172	33.0	6.5
Other	9	1.1	35.4	2	0.3	11.4	0	0.0	0	0	0	0.0	0	0.0	0
Unknown	252	32.1		23	4.0		1	0.2		8	1.6		17	3.3	
SPA															
1	25	3.2	6.8	13	2.3	3.4	31	4.7	8.0	18	3.6	4.6	25	4.8	6.4
2	156	19.9	7	130	22.6	6.1	117	17.8	5.5	111	22.0	5.2	97	18.6	4.5
3	116	14.8	6.7	80	13.9	5	85	12.9	5.3	79	15.7	4.9	74	14.2	4.6
4	103	13.1	8.3	70	12.2	6.3	87	13.2	7.8	72	14.3	6.4	66	12.6	5.8
5	54	6.9	8.3	44	7.6	6.9	49	7.4	7.7	28	5.6	4.4	20	3.8	3.1
6	111	14.1	10.6	79	13.7	7.9	86	13.1	8.5	72	14.3	7.1	73	14.0	7.2
7	102	13	7.4	69	12.0	5.3	81	12.3	6.3	54	10.7	4.1	72	13.8	5.5
8	89	11.3	7.9	77	13.4	7.3	94	14.3	8.9	57	11.3	5.3	74	14.2	6.9
Unknown	29	3.7		14	2.4		28	4.3		13	2.6		21	4.0	

*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, 2000-2013



* United States incidence rate estimate from Active Bacterial Core Surveillance [1]

Figure 2. Annual Incidence Rates of Invasive Pneumococcal Disease 2008-2013

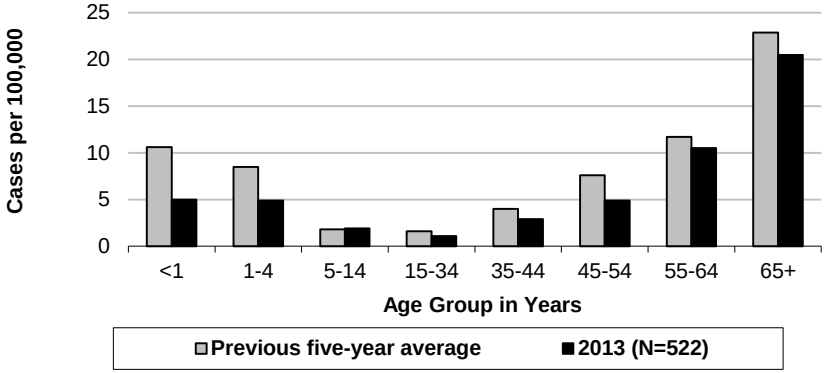
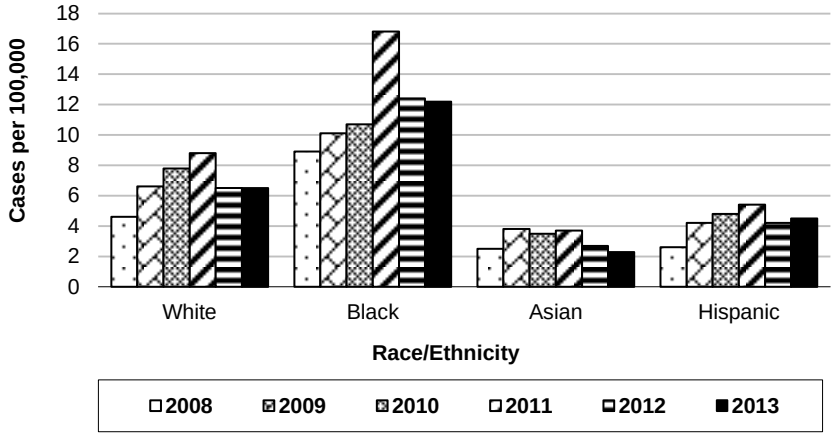


Figure 3. Annual Incidence Rates of Invasive Pneumococcal Disease by Race/Ethnicity, LAC, 2008-2013*



* For 2008, 2009, 2010, 2011, 2012, and 2013 total numbers of cases (and percent with race-ethnicity missing) were 662 (45%), 785 (33%), 576(4%), 658 (0%), 504 (2%), and 522 (3%), respectively.

Figure 4. Annual Incidence Rates of Invasive Pneumococcal Disease by SPA, LAC, 2008-2013

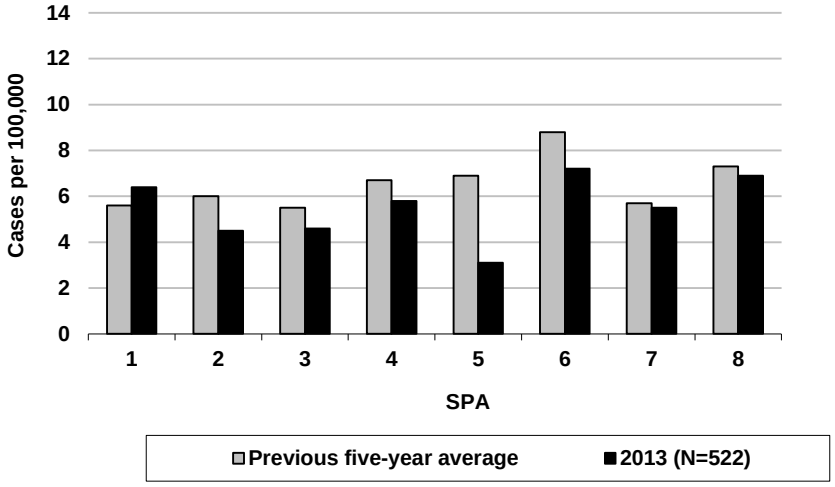


Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2008-2013

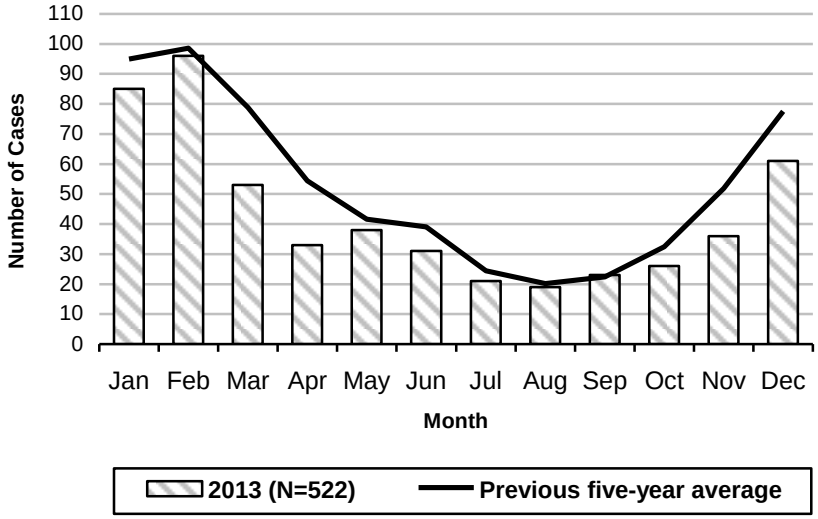
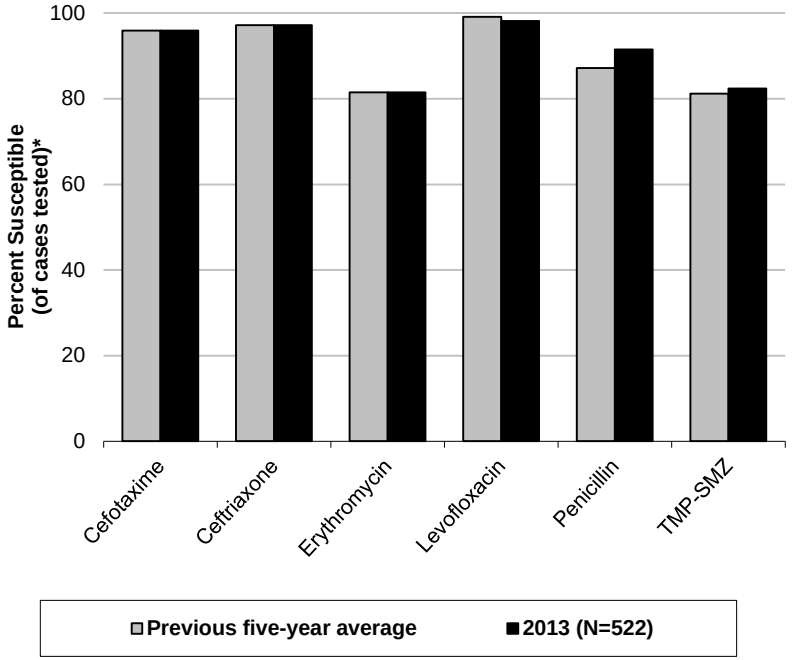


Figure 6. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2008-2013

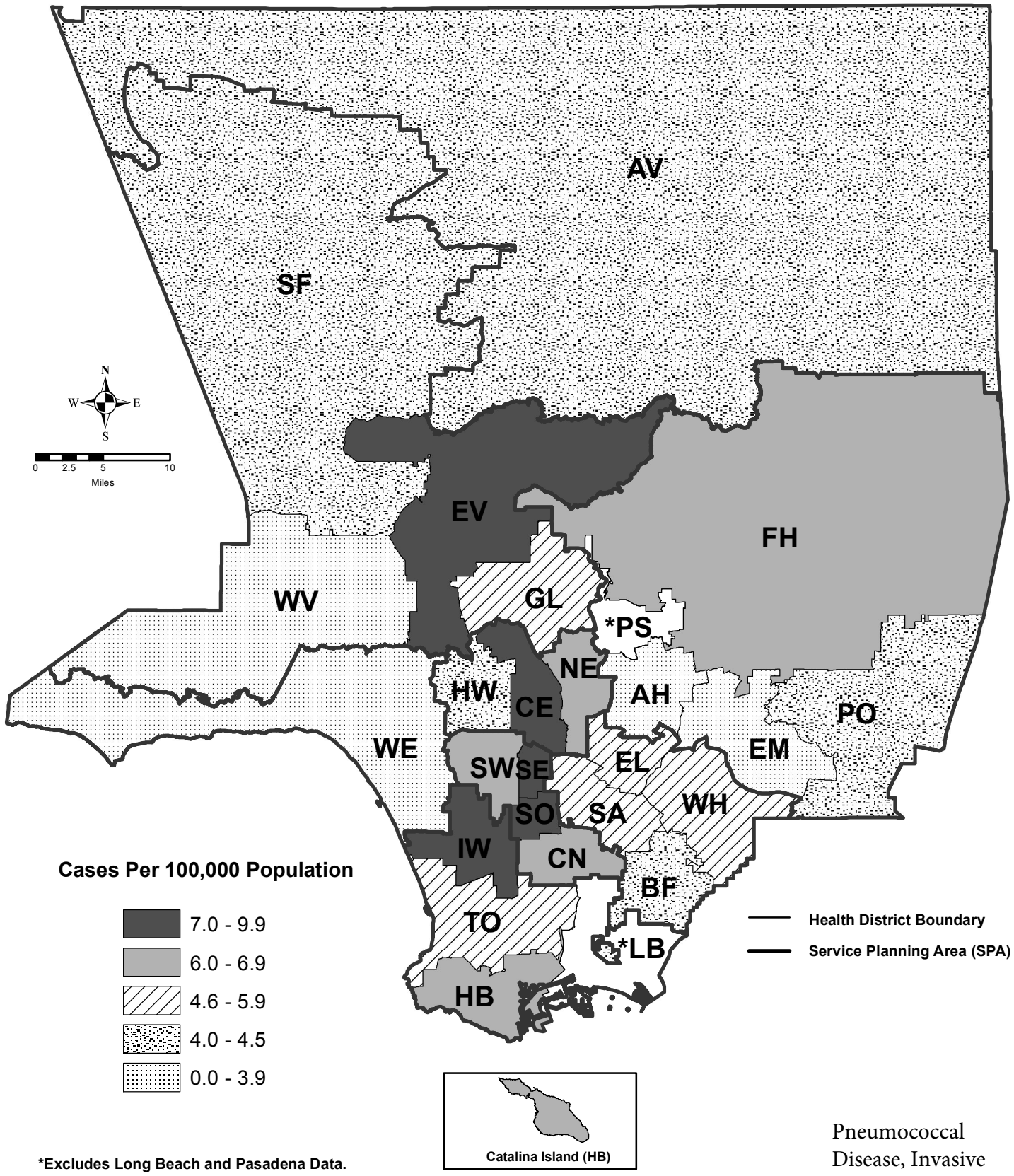


*Range of number of isolates tested 2008-2013: Cefotaxime (244-389), Ceftriaxone (345-485), Erythromycin (302-455), Levofloxacin (288-394), Penicillin (460-667), and TMP-SMZ (226-330).

Reference:

1. Active Bacterial Core Surveillance Reports from 2000 to 2013 from the Centers for Disease Control and Prevention's Division of Bacterial Diseases. Report available at: http://www.cdc.gov/abcs/reports-findings/surv-reports.html

Map 12. Pneumococcal Disease, Invasive Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

SALMONELLOSIS

CRUDE DATA	
Number of Cases	1010
Annual Incidence[a]	
LA County	10.74
California[b]	13.27
United States[b]	16.13
Age at Diagnosis	
Mean	30.4
Median	25
Range	<0-97

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

Salmonellosis is caused by the Gram-negative bacillus *Salmonella enterica*, of which there are more than 2,500 serotypes. This disease is transmitted by the fecal-oral route, from animal or human, with or without intermediary contamination of foodstuffs. The most common symptoms include diarrhea, fever, headache, abdominal pain, nausea and sometimes vomiting. Occasionally, the clinical course is that of enteric fever or septicemia. Asymptomatic infections may occur. The incubation period is usually 12 to 36 hours for gastroenteritis, and 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, who 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; use of raw eggs; not washing hands and/or cutting boards after handling raw poultry or meat; and having contact with reptiles. Travel is also a risk factor for salmonellosis with cases reporting domestic, national, or international travel.

2013 TRENDS AND HIGHLIGHTS

- There were a total of five LAC salmonellosis outbreaks investigated in 2013; four were probable foodborne outbreaks investigated by ACDC, and one person-to-person outbreak investigated by Antelope Valley Health District. For more information see the Foodborne Outbreak summary in this ACDC Annual Morbidity Report 2013.
- Rates by SPA ranged from 9.3 in SPA 4 to 12.1 in SPA 2 (Figure 4). SPAs 1, 2, 5 and 7 showed an increase in rates in 2013. SPA 4 had seven family clusters of two or more cases. There were no outbreaks or large clusters identified in that SPA.
- Reptile-associated salmonellosis (RAS) increased from 9.3 % (n=99) of non-outbreak related cases in 2012 to 9.7 % (n=98) in 2013. Among RAS cases, turtle related cases decreased from 73% (n=72) to 56% (n=55). Three LAC residents were part of a national outbreak related to small turtles.
- Twenty-three percent of cases (n=239) were hospitalized for two or more days.
- There were five deaths in persons diagnosed with salmonellosis. Ages ranged from 45 to 88 years with a mean of 68 and median of 81 years. All five cases had comorbidities; three had renal disease, two had diabetes, one had liver disease, and one case had congestive heart failure.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=1194)			2010 (N=1142)			2011 (N=900)			2012 (N=1041)			2013 (N=1010)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	89	7.5	72.8	56	4.9	46.6	61	6.8	43.7	73	7.0	61.4	59	5.8	48.8
1-4	229	19.2	46.3	186	16.2	38.3	134	14.9	22.9	153	14.7	32.2	141	14.0	29.0
5-14	195	16.3	15.4	174	15.2	14.1	148	16.4	11.1	158	15.2	13.2	185	18.3	15.3
15-34	271	22.7	9.7	262	22.9	9.4	186	20.7	6.3	224	21.5	8.1	227	22.5	8.0
35-44	110	9.2	8.1	131	11.5	9.8	93	10.3	6.5	95	9.1	7.2	89	8.8	6.7
45-54	101	8.5	7.9	87	7.6	6.8	86	9.5	6.4	108	10.4	8.4	82	8.1	6.3
55-64	76	6.4	8.2	100	8.8	10.5	86	9.5	8.9	88	8.5	8.6	84	8.3	8.2
65+	123	10.3	12.3	146	12.8	14.5	106	11.8	10.0	142	13.6	12.8	143	14.2	12.9
Unknown	0			0			0			0			0		
Race/Ethnicity															
Asian	103	8.6	8.0	115	10.0	8.8	64	7.1	4.8	92	8.8	7.0	73	7.2	5.3
Black	75	6.3	9.6	50	4.4	6.5	53	5.9	6.2	56	5.4	7.2	69	6.8	8.9
Hispanic	620	52.0	14.0	570	50.1	12.8	465	51.7	9.8	503	48.3	11.1	538	53.3	11.7
White	367	30.7	13.5	387	33.9	14.5	279	31.0	9.7	247	23.7	9.3	318	31.5	12.0
Other	10	0.8		3	0.3		8	0.9		11	1.1		5	0.5	
Unknown	19	1.6		17	1.5		132	12.6		132	12.6		7	0.7	
SPA															
1	40	3.4	10.6	36	3.2	9.4	24	2.7	6.4	38	3.7	9.8	40	4.0	10.2
2	316	26.5	14.8	303	26.5	14.3	215	23.9	9.7	228	21.9	10.6	262	26.0	12.1
3	179	15.0	11.1	221	19.4	13.8	162	18.0	9.3	164	15.8	10.1	155	15.3	9.5
4	138	11.6	12.3	156	13.7	14.0	80	8.9	6.4	162	15.6	14.4	106	10.5	9.3
5	107	9.0	17.0	86	7.5	13.5	70	7.8	10.6	71	6.8	11.1	74	7.3	11.4
6	134	11.2	13.5	86	7.5	8.6	107	11.9	10.0	109	10.5	10.7	109	10.8	10.6
7	152	12.7	11.6	140	12.3	10.8	122	13.5	8.9	145	13.9	11.2	155	15.3	11.8
8	128	10.7	12.0	114	10.0	10.8	117	13.0	10.4	123	11.8	11.5	109	10.8	10.1
Unknown	0			0			3	0.33		1	0.09		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, 2004-2013**

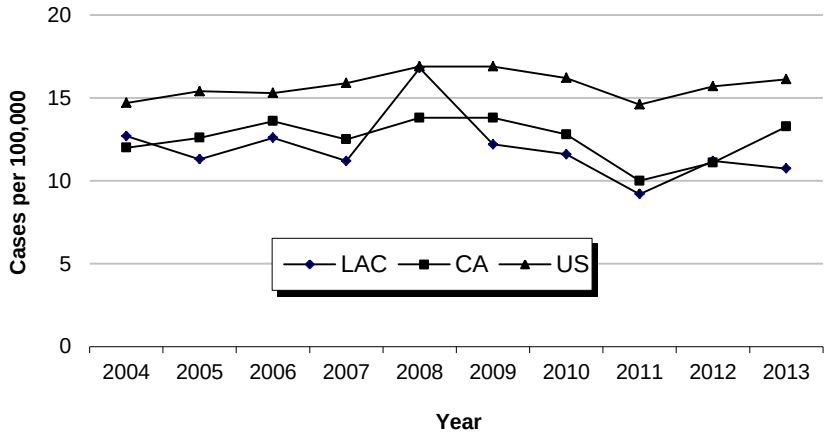


**Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2013 (N=1010)**

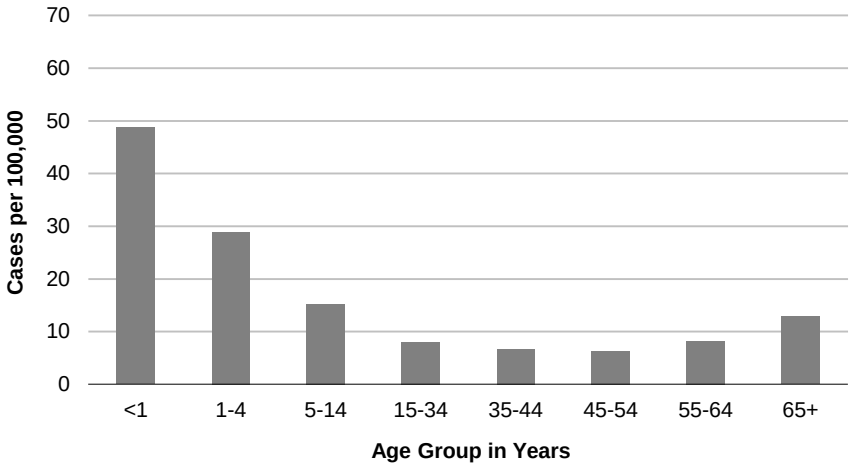
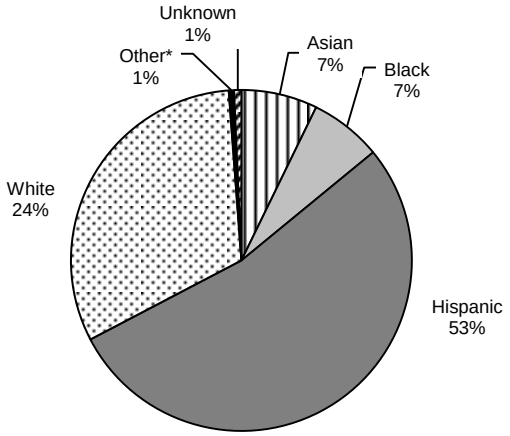


**Figure 3. Reported Cases of Salmonellosis by Race/Ethnicity
LAC, 2013 (N=1010)**



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

**Figure 4. Reported Salmonellosis Rates by SPA
LAC, 2013 (N=1010)**

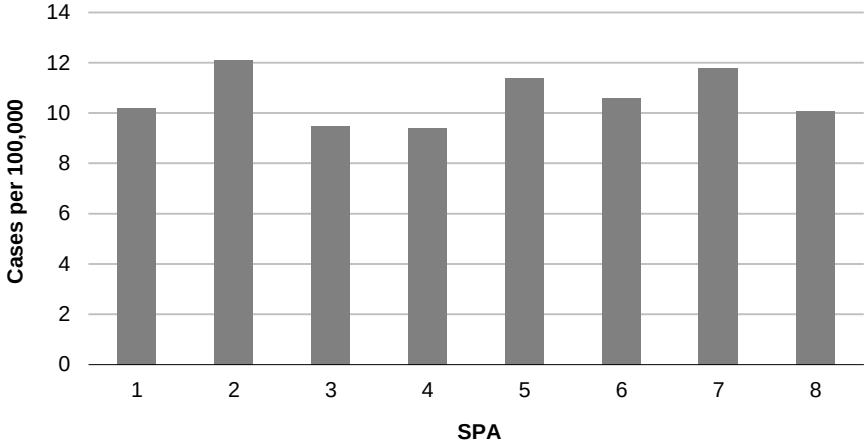
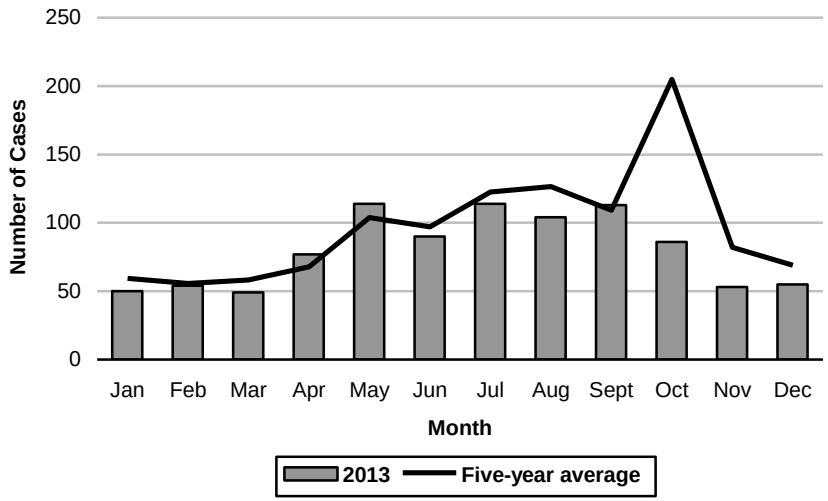
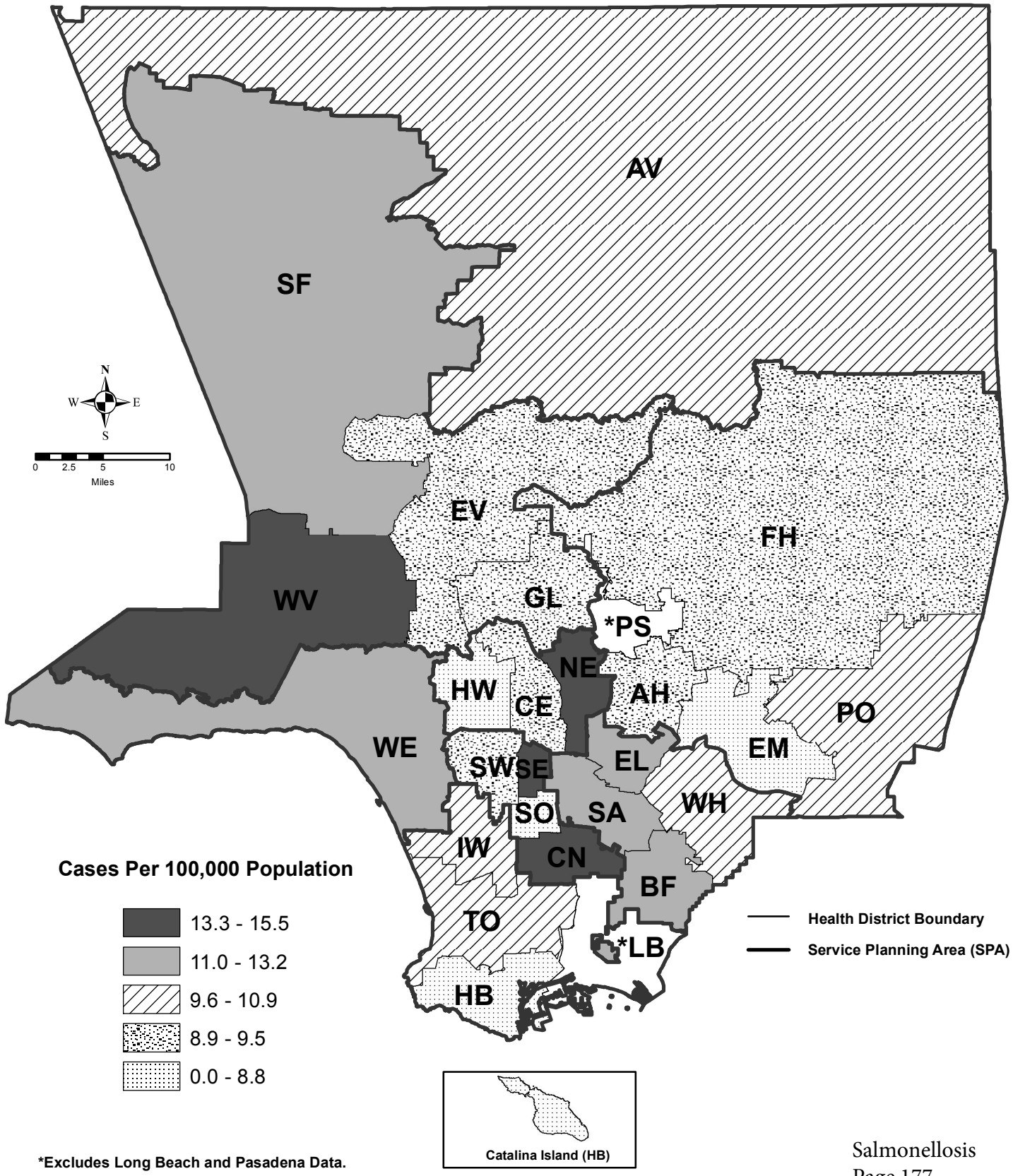


Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2013 (N=1010)



Map 13. Salmonellosis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	227
Annual Incidence[a]	
LA County	2.41
California[b]	2.81
United States[b]	4.06
Age at Diagnosis	
Mean	30.5
Median	31
Range	0-87

[a]Cases per 100,000 population.
[b]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

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). The incubation period is 1 to 3 days. Humans are the definitive host; fecal-oral transmission occurs when individuals fail to thoroughly wash their hands after defecation and spread infective particles to others, either directly by physical contact, including sexual behaviors, or indirectly by contaminating food. Infection may occur with ingestion of as few as ten organisms. Common symptoms include diarrhea, fever, nausea, vomiting, and tenesmus. Stool may contain blood or mucous. In general, the elderly, the immunocompromised, and the malnourished are more susceptible to severe disease outcomes.

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

2013 TRENDS AND HIGHLIGHTS

- There was a 26% decrease in reported cases in 2013 after a 16% increase in cases during 2012 (Figure 1). There was a decrease observed among all races except Asians among whom the rate increased (Figure 6).
- The highest incidence rate by age was observed in the 1 to 4 years age group (5.3 per 100,000) as observed in previous years (Figure 2) (not adjusted for race/ethnicity). The shigellosis rate among all age groups except for age 45-54 in LAC this year has decreased when compared to the last five years.
- In 2013, the incidence of shigellosis among the Hispanic population (47% of cases, 2.3 per 100,000) was the highest, consistent with previous five years (Figures 3, 6). Service Planning Area (SPA) 4 sustained the highest rate (5.1 per 100,000), followed by SPA 6 (4.3 per 100,000) (Figure 4). There was a 4.7% decrease in reported cases in SPA 5 when compared to previous year.
- In 2013, the percentage of shigellosis cases hospitalized for at least two days increased to 16.3% (n=37) from 8.1% (n=25) in 2012. The number of cases of men who have sex with men (MSM) in 2013 increased to 10.1% (n=23) from 8.8% (n=27) in 2012. No deaths were reported among diagnosed shigellosis cases.
- No outbreaks were identified in 2013.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=259)			2010(N=355)			2011(N=264)			2012 (N=306)			2013 (N=227)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	1.5	3.3	1	1.1	0.8	4	1.5	2.9	4	1.3	3.4	1	0.4	0.8
1-4	34	13.1	6.9	79	22.2	16.3	30	11.3	5.2	32	10.5	6.7	26	11.4	5.3
5-14	47	18.1	3.7	68	19.1	5.5	37	14.0	2.8	54	17.6	4.5	49	21.5	4.1
15-34	67	25.9	2.4	75	21.1	2.7	80	30.3	2.7	68	22.2	2.5	55	24.2	1.9
35-44	51	19.7	3.8	63	17.7	4.7	41	15.5	2.8	39	12.7	2.9	31	13.6	2.3
45-54	33	12.7	2.6	36	10.1	2.8	44	16.6	3.3	31	10.1	2.0	30	13.2	2.3
55-64	12	4.6	1.3	17	4.7	1.8	15	5.6	1.6	25	8.2	2.5	19	8.3	1.9
65+	11	4.2	1.1	15	4.2	1.5	12	4.5	1.1	52	17.0	4.7	15	6.6	1.4
Unknown	0	0		1	0.2		0	0		1	0.3		1	0.4	
Race/Ethnicity															
Asian	6	2.3	0.5	15	4.2	1.1	4	1.5	0.3	2	0.6	0.2	5	2.2	0.4
Black	17	6.6	2.2	31	8.7	4.0	24	9.0	2.8	29	9.4	3.7	25	11.0	3.2
Hispanic	154	59.5	3.5	203	57.1	4.6	149	56.4	3.1	153	50.0	3.4	107	47.1	2.3
White	69	26.6	2.4	94	26.4	3.5	78	29.5	2.7	104	33.9	3.9	82	36.1	3.1
Other	0	0	0	0	0	0	0	0	0	0	0	0	2	0.88	
Unknown	13	5.0		12	3.3		9	3.4		18	5.9		6	2.6	
SPA															
1	5	1.9	1.3	3	0.8	0.8	7	2.6	1.9	3	0.9	0.8	4	1.7	1.0
2	46	17.7	2.2	61	17.2	2.9	40	15.1	1.8	52	1.6	2.4	39	17.1	1.8
3	23	8.9	1.4	33	9.2	2.1	32	12.1	1.8	26	8.4	1.6	16	7.0	1.0
4	74	28.6	6.6	91	25.6	8.1	82	31.0	6.5	85	27.7	7.6	58	25.5	5.1
5	22	8.5	3.5	30	8.4	4.7	14	5.3	2.1	48	15.6	7.5	18	7.9	2.8
6	41	15.8	4.1	58	16.3	5.8	38	14.3	3.6	37	12.0	3.6	44	19.3	4.3
7	33	12.7	2.5	54	15.2	4.2	24	9.1	1.7	33	10.7	2.5	33	54.1	2.5
8	14	5.4	1.3	25	7.0	2.4	26	9.8	2.3	22	7.1	2.1	15	6.6	1.4
Unknown	1	0.3		0	0		1	0.3		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, 2003-2013

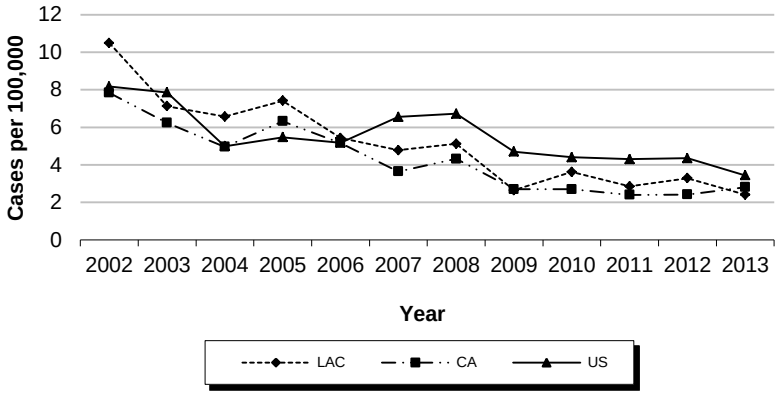


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2013 (N=227)

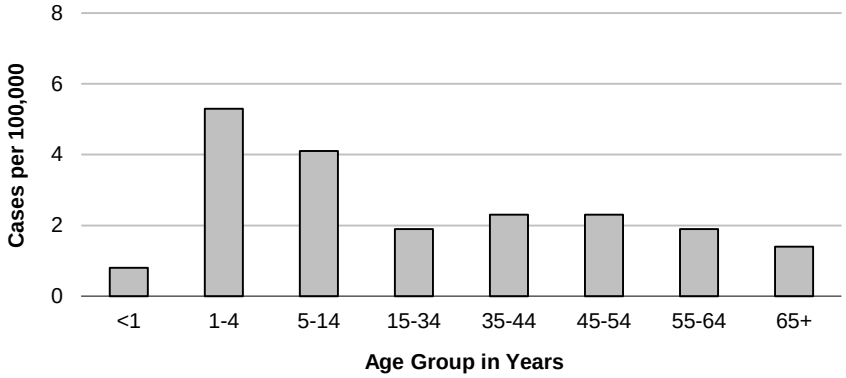


Figure 3. Percent Cases of Shigellosis by Race/Ethnicity
LAC, 2013 (N=227)

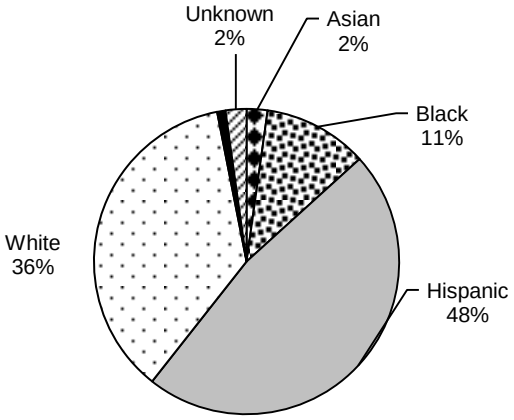


Figure 4. Reported Shigellosis Rates by SPA
LAC, 2013 (N=227)

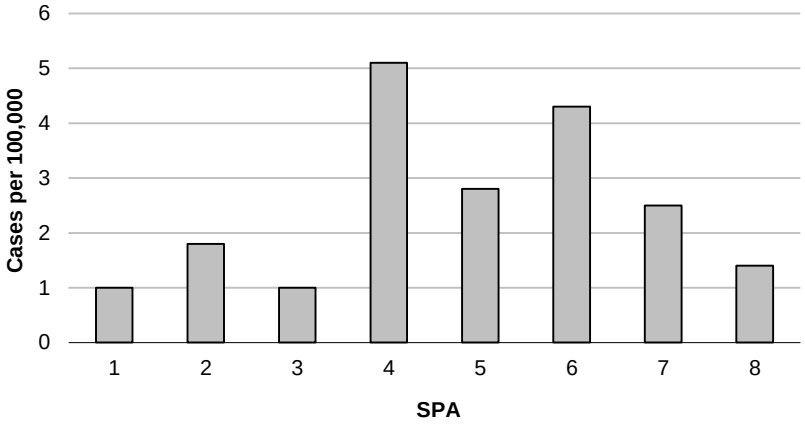


**Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2013 (N=227)**

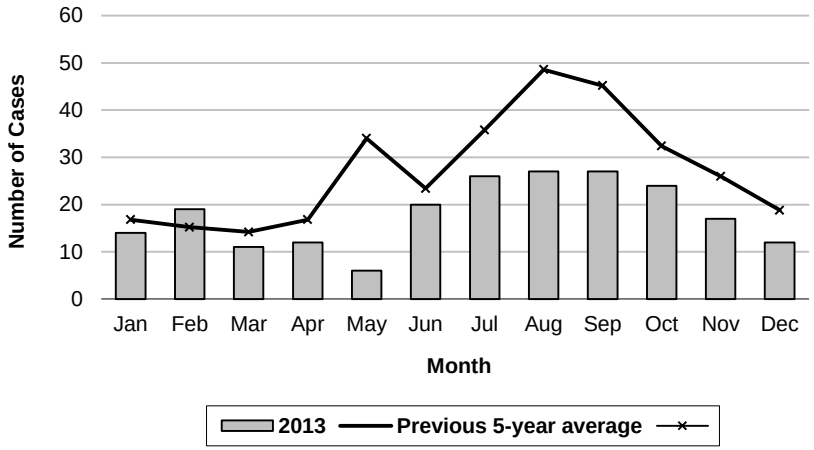
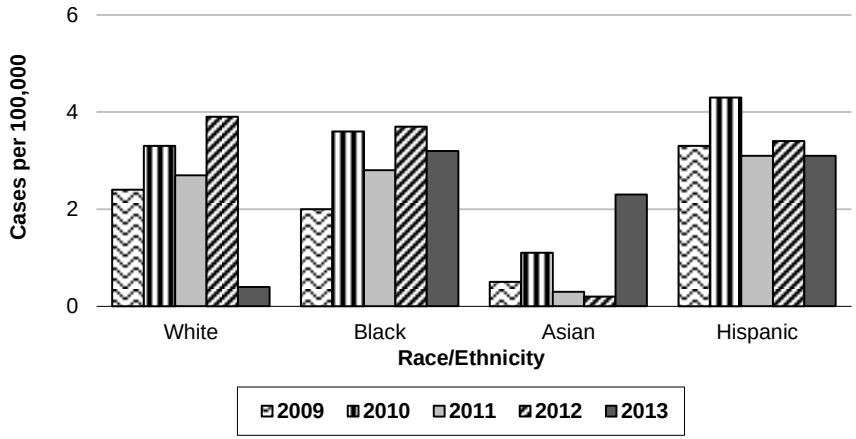
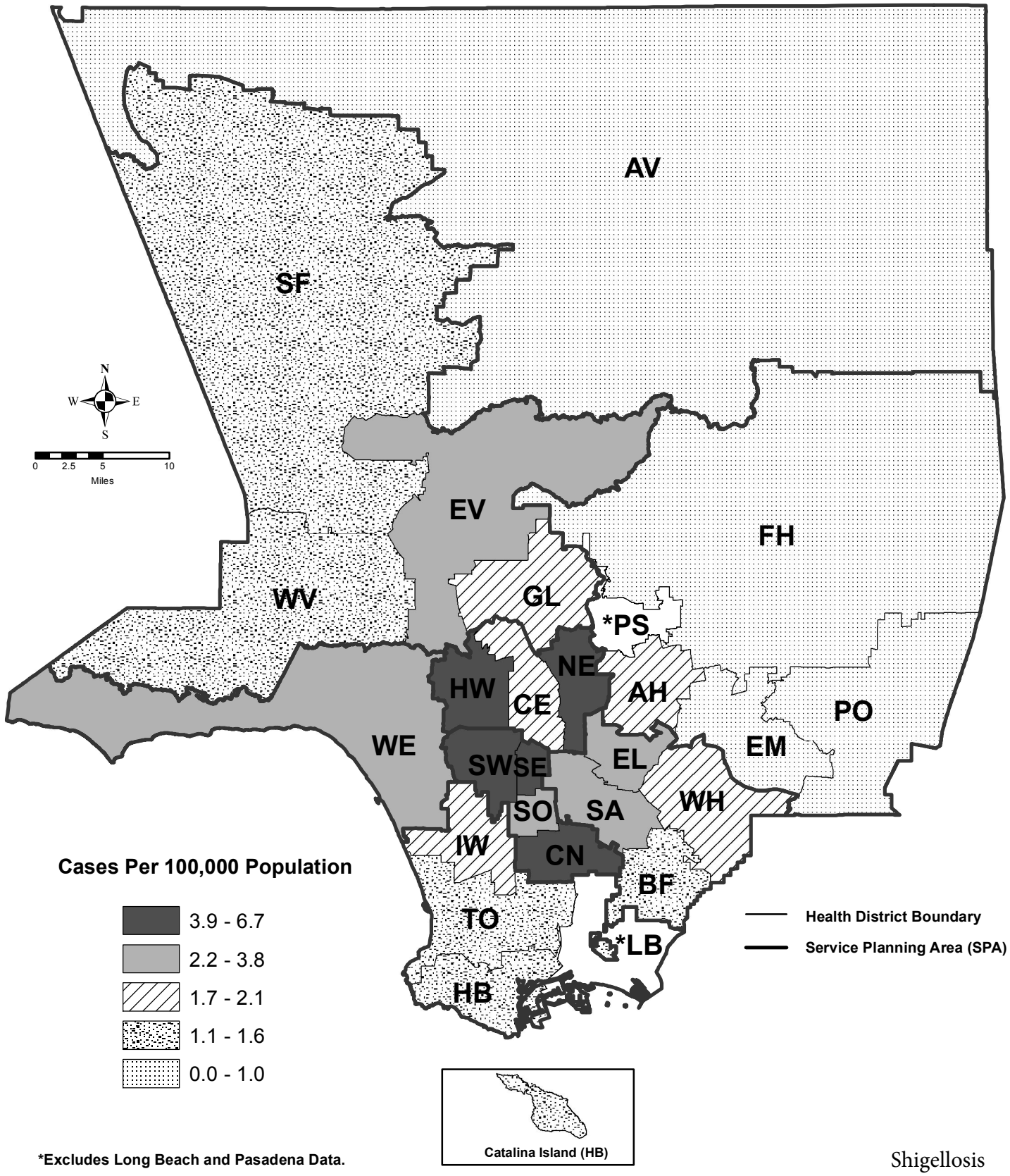


**Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2009-2013**



Map 14. Shigellosis
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

SEVERE *STAPHYLOCOCCUS AUREUS* INFECTION IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	26
Annual Incidence	
LA County[a]	0.28
California[b]	0.45
United States[c]	N/A
Age at Diagnosis	
Mean	48
Median	49
Range	0-87 years

[a]Cases per 100,000 population
[b]See Yearly Summary Reports of Selected General Communicable Diseases in California at: http://www.cdph.ca.gov/data/statistics/Pages/CD-YearlyTables.aspx (2011 data)
[c]Not notifiable.

DESCRIPTION

Staphylococcus aureus (S. aureus) is bacteria that can cause a number of diseases as a result of infection of various tissues of the body. *S. aureus*-related illness can range from mild and requiring no treatment to severe and potentially fatal. It is a common cause of skin infections, causing boils, abscesses, and cellulitis. It can also cause invasive skin and soft-tissue infection, necrotizing fasciitis, musculoskeletal infection, and osteomyelitis. Infection can result in severe illness, including bacteremia, sepsis, pneumonia, empyema and necrotizing pneumonia.

Certain groups of people are at greater risk, including people with chronic conditions such as diabetes, cancer, vascular disease, and lung disease. Injecting drug users, those with skin injuries or disorders, intravenous catheters, surgical incisions, and those with a weakened immune system due either to disease or a result of immune suppressing medications all have an increased risk of developing *S. aureus* infections.

For surveillance purposes, a case of community-associated severe *S. aureus* infection is defined as a laboratory-confirmed *S. aureus* infection in a person resulting in admission to an intensive care unit (ICU) or death who had not been hospitalized or had surgery, dialysis, or residency in a long-term care facility in the year prior to illness, and did not have an indwelling catheter or percutaneous medical device at the onset of illness. If any of these conditions were present, the case would be considered healthcare-associated.

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

2013 TRENDS AND HIGHLIGHTS

- 2013 cases aged <1 year had the highest rate (0.8 per 100,000) which was similar to 2012 (Figure 1).
- As in the previous year, blacks had the highest rate (0.6 per 100,000) (Figure 2).
- The male:female ratio in 2013 was 1:0.4.
- Similar to previous years, the incidence rate was highest in SPA 6 (0.5 per 100,000) (Figure 3).
- Cases were distributed throughout the year with the peak months being January to May (Figure 4).
- Seven (27%) of the reported cases were *S. aureus* infections resistant to methicillin (Figure 5).
- The most frequently reported risk factors were liver disease, diabetes, current smoker, and intravenous drug user (Table 1).
- Severe *S. aureus* cases presented most often with bacteremia and pneumonia (Table 2).
- Fifty-eight percent of cases were reported from two reporting sources 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, 2009-2013

	2009 (N=27)			2010 (N=28)			2011 (N=44)			2012 (N=24)			2013 (N=26)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	1	4.0	0.8	0	0.0	0.0	1	4.2	0.8	1	3.8	0.8
1-4	1	3.7	0.2	0	0.0	0	0	0.0	0.0	0	0	0	0	0	0
5-14	2	7.4	0.1	3	10.7	0.2	2	4.5	0.2	1	4.2	0.1	0	0	0
15-34	5	18.5	0.2	6	21.4	0.2	6	13.6	0.2	3	12.5	0.1	7	26.9	0.2
35-44	3	11.1	0.2	3	10.7	0.2	6	13.6	0.5	2	8.3	0.2	2	7.7	0.2
45-54	6	22.2	0.5	7	25.0	0.5	9	20.4	0.7	3	12.5	0.2	6	23.0	0.5
55-64	4	14.8	0.4	3	10.7	0.3	8	18.2	0.8	5	20.8	0.5	5	19.2	0.5
65+	6	22.2	0.6	5	17.9	0.5	13	29.5	1.2	9	37.5	0.8	5	19.2	0.5
Unknown	0	0.0		0	0.0		0	0.0		0			0		
Race/Ethnicity															
Asian	1	3.7	0.1	4	14.2	0.3	7	15.9	0.5	4	16.7	0.3	3	11.5	0.2
Black	3	11.1	0.4	4	14.2	0.5	3	6.8	0.4	4	16.7	0.5	5	19.2	0.6
Hispanic	12	44.4	0.3	7	25.0	0.2	17	38.6	0.4	4	16.7	0.1	10	38.5	0.2
White	11	40.7	0.4	13	46.4	0.5	15	34.1	0.6	10	41.7	0.4	8	30.8	0.3
Other	0	0.0	0.0	0	0.0	0.0	1	2.3		1	4.2		0		
Unknown	0	0.0		0	0.0		1	2.3		1	4.2				
SPA															
1	3	11.1	0.8	1	4.0	0.3	0	0.0	0.0	2	8.3	0.5	1	3.8	0.3
2	2	7.4	0.1	6	21.4	0.3	12	27.3	0.6	1	4.2	0.0	6	23.0	0.3
3	4	14.8	0.2	6	21.4	0.4	7	15.9	0.4	8	33.3	0.5	1	3.8	0.1
4	3	11.1	0.3	4	14.2	0.4	2	4.5	0.2	2	8.3	0.2	4	15.4	0.4
5	1	3.7	0.2	2	7.1	0.3	5	11.4	0.8	1	4.2	0.2	2	7.7	0.3
6	9	33.3	0.9	2	7.1	0.2	11	25.0	1.1	5	20.8	0.5	5	19.2	0.5
7	2	7.4	0.1	4	14.2	0.3	5	11.4	0.4	4	16.7	0.3	3	11.5	0.2
8	2	7.4	0.1	2	7.1	0.2	1	2.3	0.1	0	0	0	2	7.7	0.2
Unknown	1	3.7		1	4.0		1	2.3		1	4.2		2	7.7	

*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, 2011-2013

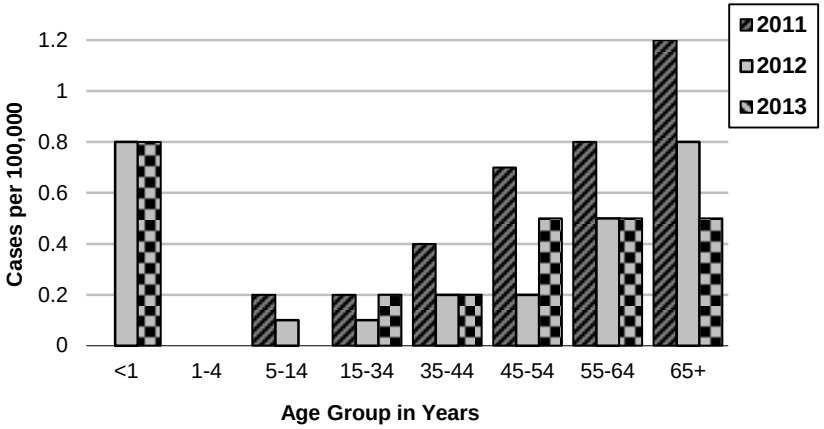


Figure 2. Severe S. *aureus* Infection Incidence Rates* by Race/Ethnicity LAC, 2011-2013

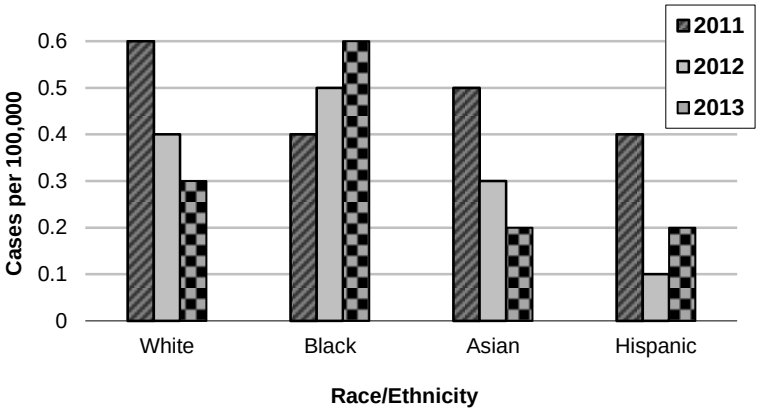


Figure 3. Incidence Rates* of Severe S. *aureus* Infection by SPA LAC, 2011-2013

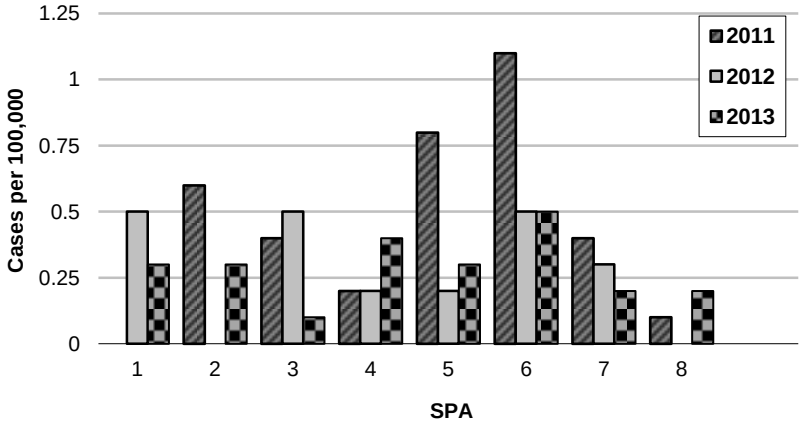
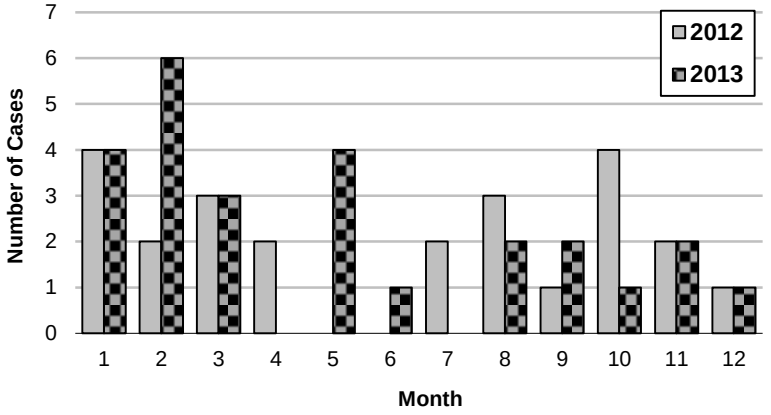
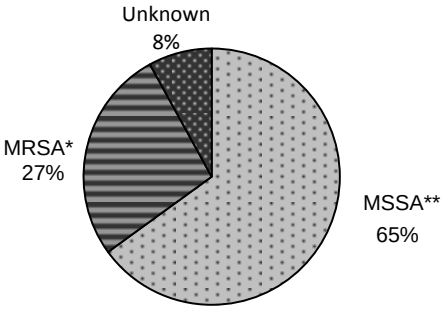


Figure 4. Reported Severe S. *aureus* Cases by Month of Onset LAC, 2012-2013



*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, 2013 (N=26)



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

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2013

Syndrome	Number	Percent*
Bacteremia (without focus)	19	73
Pneumonia	7	27
Endocarditis	4	15
Skin Infection	4	15
Wound Infection	3	12
Septic emboli	3	12
Meningitis	1	4
Septic arthritis	1	4
Toxic Shock Syndrome	1	4
Other	7	27

*Overlapping syndromes will total over 100%.

Table 1. Severe *S. aureus* Medical Conditions by Date of Onset, 2012-2013

	2012 N = 24	2013 N = 26
	N(%)*	N(%)*
Liver Disease	2(8)	8(31)
Diabetes	4(17)	7(27)
Current Smoker	5(21)	6(23)
Intravenous Drug Use	4(17)	5(19)
Alcohol Abuse	3(13)	3(12)
Heart Failure/CHF	2(8)	3(12)
Emphysema	3(13)	2(8)
HIV/AIDS	1(4)	2(8)
Chronic Renal Insufficiency	0(0)	2(8)
Malignancy-Solid	2(8)	1(4)
Malignancy-Hem	0(0)	1(4)
Chronic Dermatitis	2(8)	0
Asthma	2(8)	0
Eczema	3(13)	0
Other	10(41)	8(31)
None	4(17)	7(27)

*Overlapping risk factors will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	195
Annual Incidence[a]	
LA County	2.07
California[b]	N/A
United States[c]	3.4
Age at Diagnosis	
Mean	50
Median	51
Range	0–99 years

[a]Cases per 100,000 population.
[b]Not notifiable.
[c]Estimate from Centers for Disease Control and Prevention's Division of Bacterial Diseases--Active Bacterial Core Surveillance Report, 2012. http://www.cdc.gov/abcs/reports-findings/surv-reports.html. Accessed 6/27/2014.

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, pneumonia, and a toxic shock syndrome. It is the most frequent cause of necrotizing fasciitis, and is commonly known as "flesh eating bacteria." IGAS occurs in all age groups but more frequently occurs among the very old. Infection can result in severe illness, including death.

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

2013 TRENDS AND HIGHLIGHTS

- The incidence rate of reported IGAS was 2.07 cases per 100,000 during 2013, which is the highest it has been since 2010, when it was also 2.07.
- Cases aged ≥65 years had the highest rate of IGAS (4.9 per 100,000) followed by cases aged less than one (4.1 per 100,000) (Figure 2). The age groups <1 year, 45-54 and ≥65 years had increased rates compared with 2012. Remaining age groups had the same or decreased rates from the year prior.
- Blacks continued to have the highest rate of IGAS. In 2013, blacks had the highest rate relative to the four most recent years (2009-2012). In 2013, rates of disease in whites increased from 1.7 to 1.9 and decreased for Hispanics from 1.3 to 0.6. Asians remained consistent with the previous year at a rate of 0.6 (Figure 3). Thirty-seven percent of cases had an unknown race/ethnicity.
- SPA 4 and 5 had the highest incidence rate at 2.9 and 2.8 cases per 100,000, respectively (Figure 4). SPA 5 had the largest incidence rate increase, 1.6 to 2.8 per 100,000 from 2012 to 2013, respectively.
- In 2013, the number of reported cases peaked in January with 28 cases, followed by 25 cases in December. The number of reported cases throughout the year was higher overall than the previous five-year average and higher than any other individual year since 2008 (Figure 5).

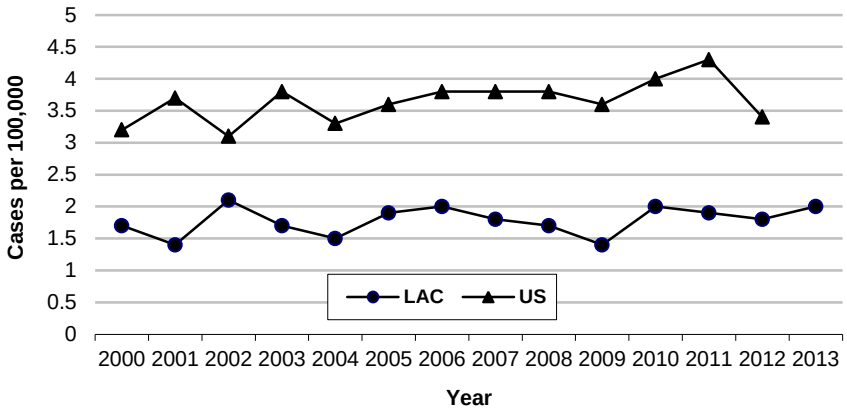
- IGAS cases presented most often with bacteremia (without focus) and cellulitis (Table 1).
- Consistent with the past several years, diabetes was reported more than any other risk factor (28%) and history of blunt trauma (17%). Thirty percent of cases reported having none of the traditional risk factors (Table 2).
- Risk factors in the category of other included renal failure (3%), stroke (5%) and organ transplant (3%).
- Although the number of cases in 2013 is highest over the last five year period (2008-2012), this increase may be attributable to an increase reporting due to the development of more efficient electronic reporting systems.

Reported Invasive Group A Streptococcus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=129)			2010 (N=191)			2011 (N=175)			2012 (N=168)			2013 (N=195)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.8	0.8	4	2.1	3.3	1	0.6	0.7	3	1.8	2.5	5	2.6	4.1
1-4	3	0.6	0.6	6	3.1	1.2	6	3.4	1	5	3	1.1	4	2.1	0.8
5-14	9	0.7	0.7	6	3.1	0.5	10	5.7	0.8	7	4.2	0.6	10	5.1	0.8
15-34	15	11.6	0.5	33	17.3	1.2	16	9.1	0.5	27	16.1	1	29	14.9	1.0
35-44	14	11	1.0	21	11.0	1.6	28	16	1.9	20	11.9	1.5	20	10.3	1.5
45-54	29	22.5	2.3	34	17.8	2.6	32	18.3	2.4	31	18.5	2.4	41	21.0	3.2
55-64	23	17.8	2.5	29	15.2	3.0	36	20.6	3.7	35	20.8	3.4	31	15.9	3.0
65+	35	27.1	3.5	58	30.4	5.8	46	26.3	4.3	39	23.2	3.5	54	27.7	4.9
Unknown	0			0			0			0			1	0.5	
Race/Ethnicity															
Asian	10	7.8	0.8	16	8.4	1.2	13	7.4	1	8	4.8	0.6	8	4.1	0.6
Black	16	12.4	2.1	25	13.1	3.2	22	12.6	2.6	24	14.3	3.1	29	14.9	3.7
Hispanic	43	33.3	1.0	52	27.2	1.2	49	28	1	58	34.5	1.3	29	14.9	0.6
White	40	31	1.5	53	27.7	2.0	45	25.7	1.6	44	26.2	1.7	50	25.6	1.9
Other	1	0.8	3.9	3	1.6	11.6	0	0	0	2	1.2		5	2.6	
Unknown	19	14.7		42	22.0		46	26.3		32	19		74	37.9	
SPA															
1	5	3.8	1.3	2	1.0	0.5	3	1.7	0.8	0	0	0	4	2.1	1.0
2	24	18.6	1.1	34	17.8	1.6	34	19.4	1.5	32	19	1.5	38	19.5	1.7
3	17	13.1	1.1	30	15.7	1.9	22	12.6	1.3	17	10.1	1.1	23	11.8	1.4
4	11	8.5	1.0	38	19.9	3.4	31	17.7	2.5	38	22.6	3.4	33	16.9	2.9
5	7	5.4	1.1	12	6.3	1.9	14	8	2.1	10	6	1.6	18	9.2	2.8
6	14	10.8	1.4	29	15.2	2.9	22	12.6	2.1	24	14.3	2.4	23	11.8	2.2
7	17	13.1	1.3	12	6.3	0.9	20	11.4	1.5	17	10.1	1.3	16	8.2	1.2
8	13	10.0	1.2	13	6.8	1.2	28	16	2.5	21	12.5	2	24	12.3	2.2
Unknown	21	16.2					1	0.5		9	5.4		16	8.2	

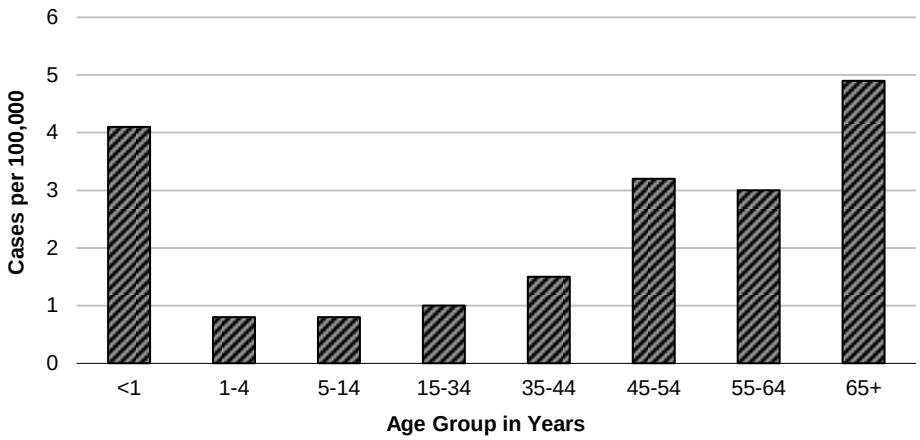
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Invasive Group A Streptococcus LAC and US, 2000-2013



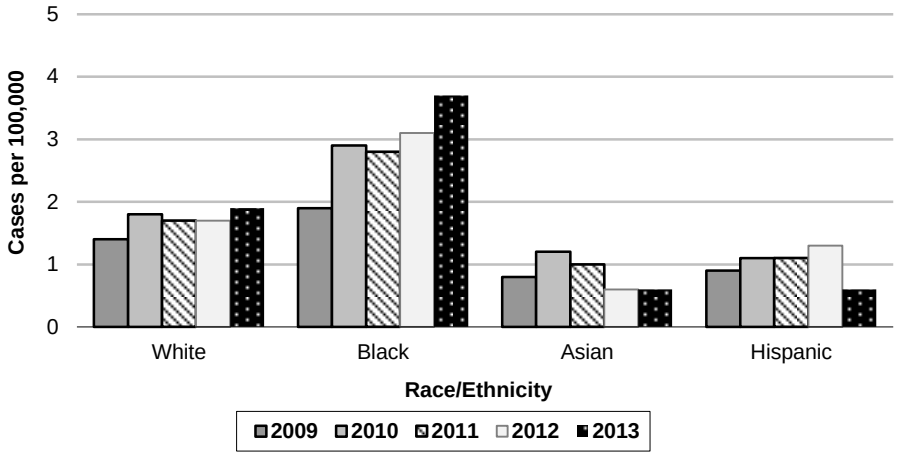
*United States incidence rate estimates from Active Bacterial Core Surveillance Reports [1].

Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2013 (N=195)



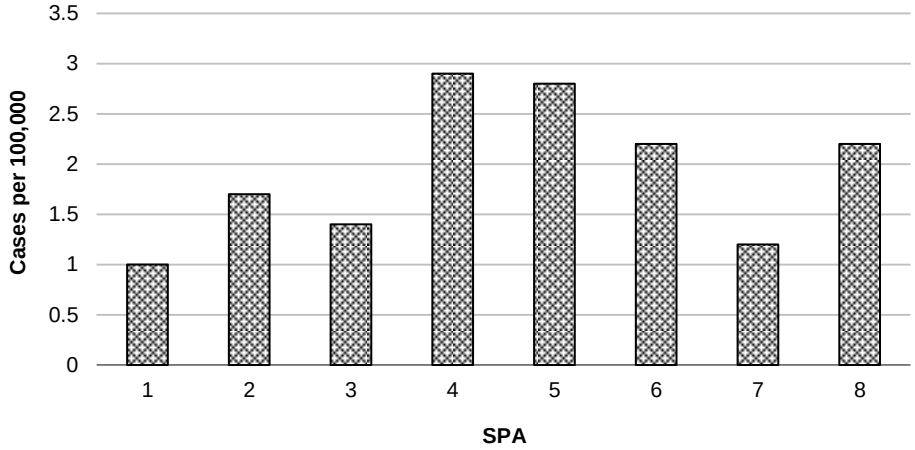
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence Rates* by Race/Ethnicity LAC, 2009-2013



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates* of Invasive Group A Streptococcus by SPA LAC, 2013 (N=195)



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2013 (N=195)

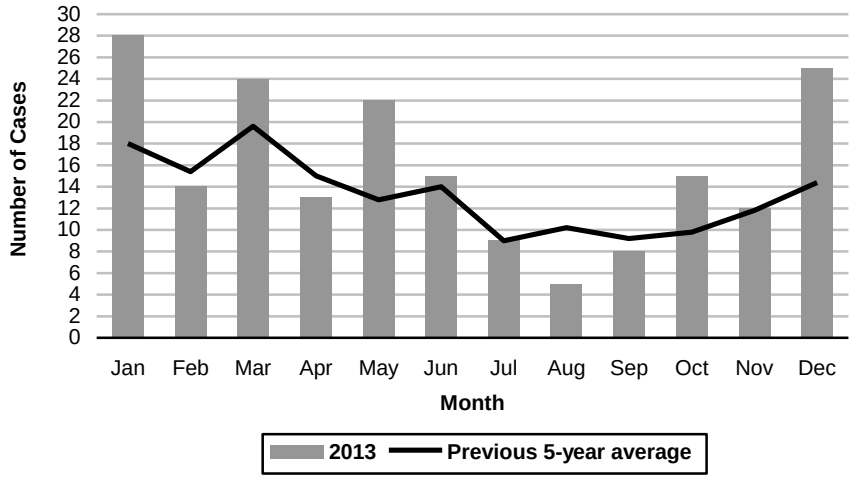


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2013 (N=195)

Syndrome	Number	Percent*
Bacteremia (without focus)	77	39
Cellulitis	51	26
Other	42	22
Non-Surgical Wound Infection	22	11
Pneumonia	21	11
STSS	18	9
Necrotizing Fasciitis	14	7
Postpartum Sepsis	5	3

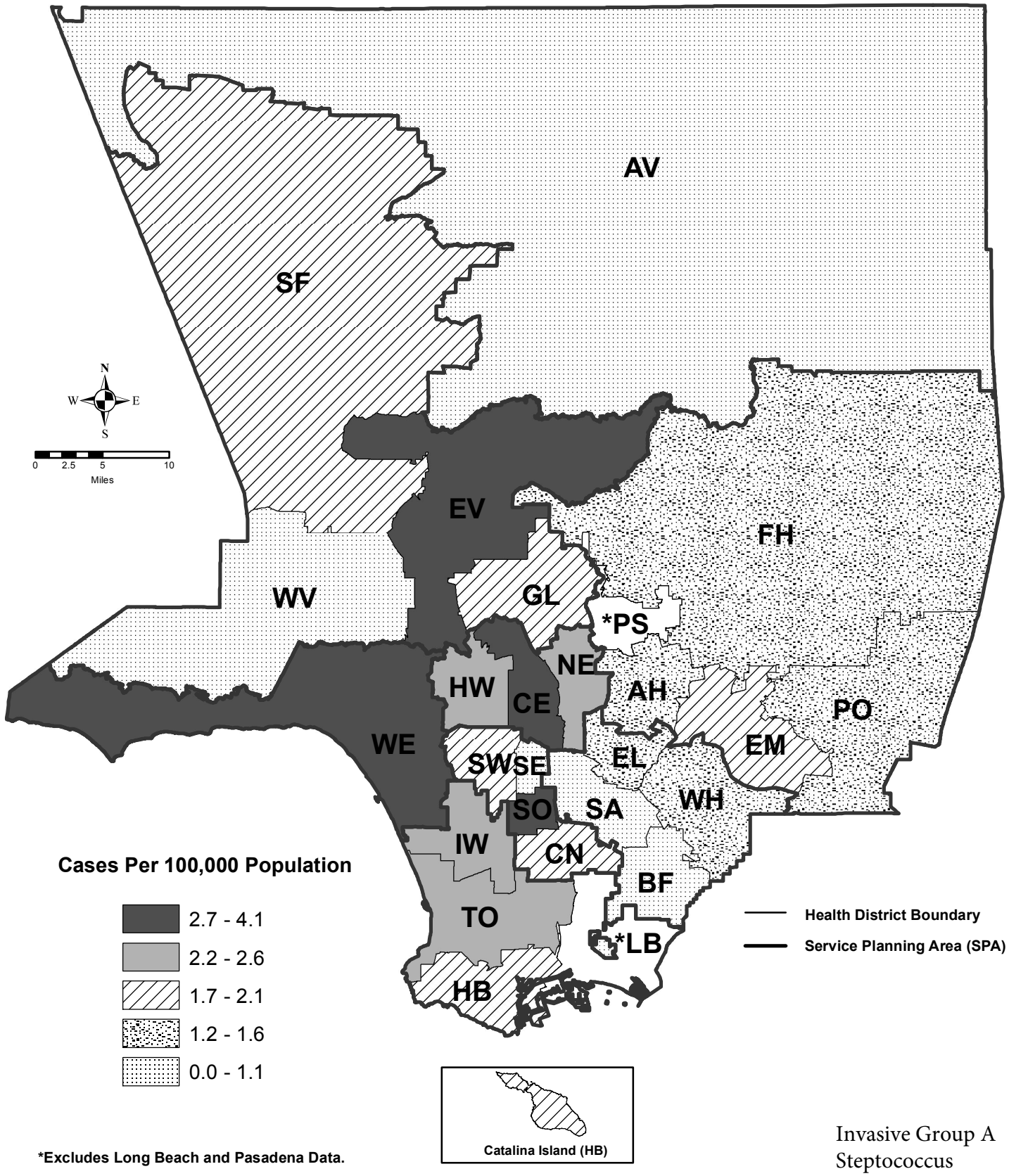
*Overlapping syndromes will total over 100%.
**Cases with unknown symptoms excluded.

Table 2. Percentage of IGAS Risk Factors – Based on Date of Onset Between 1/1/2011-12/31/2013

Risk Factors*	2011 (N = 175)	2012 (N =168)	2013 (N =195)
	%**	%**	%**
Alcohol Abuse	16	13	13
Chronic Heart Disease	23	11	14
Chronic Lung Disease	12	3	6
Cirrhosis	8	9	5
Diabetes	45	26	28
History of Blunt Trauma	33	10	17
HIV/AIDS	6	1	2
IV Drug Use	5	6	7
Malignancy	14	4	13
Other	41	1	15
None	55	26	30

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

Map 15. Streptococcus, Group A Invasive
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

TYPHOID FEVER, ACUTE AND CARRIER

ACUTE TYPHOID CRUDE DATA	
Number of Cases	17
Annual Incidence[a]	
LA County[b]	0.18
California[c]	0.18
United States[c]	0.11
Age at Diagnosis	
Mean	23.4
Median	23
Range	2-62

[a]Cases per 100,000 population.
[b]Rates based on less than 19 observations are considered unreliable.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

DESCRIPTION

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

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

Hand washing after using the toilet, before preparing or serving food, and before and after direct or intimate contact with others is important in preventing the spread of typhoid. When traveling to locations where sanitary practices are uncertain, foods should be thoroughly cooked; bottled water should be used for drinking, brushing teeth, and making ice. Vaccination should be considered when traveling in endemic areas. Los Angeles County (LAC) Department of Public Health (DPH) screens household contacts of confirmed cases for *S. typhi* to identify any previously undiagnosed carriers or cases. A modified order of isolation restricts a carrier from engaging in a sensitive occupation or situation. LAC DPH monitors compliance with such isolation order and offers the case the chance to clear the infection with antibiotics.

2013 TRENDS AND HIGHLIGHTS

- In 2013, 76% (n=13) of acute typhoid cases reported traveling to countries with endemic typhoid fever.
- The Asian population had the highest percentage of acute cases; however, in the previous two years this disease was observed among the Hispanic population (Figure 3).
- Service Planning Area (SPA) 3 had the highest number of acute cases (Figure 4). There was at least one case reported within each of the SPAs 2, 3, 4, 5, 6, and 8.
- Typically, most cases occur in the spring; however, cases were observed during all seasons. Cases peaked last year during June above the five year average (Figure 5).
- No new chronic carriers were reported.
- LAC continues to semi-annually monitor existing carriers who are on the state typhoid registry until they are cleared of infection (Figure 6). In 2013, there were no new carriers reported.
- Three paratyphoid cases were reported in 2013. Two reported travel to Asia.

Reported Acute Typhoid Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=17)			2010 (N=15)			2011 (N=15)			2012 (N=6)			2013 (N=17)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0	0.0	0	0	0	1	6.6	0.7	0	0	0	0	0	0
1-4	0	0	0.0	3	20.0	0.6	0	0	0	0	0	0	3	17.6	0.6
5-14	3	17.6	0.2	4	26.6	0.3	1	6.6	0.1	1	16.7	0.1	3	17.6	0.2
15-34	6	35.2	0.2	5	33.3	0.2	6	40.0	0.2	3	50.0	0.1	7	41.1	0.2
35-44	3	17.6	0.2	1	6.6	0.1	2	13.3	0.1	1	16.7	0.1	1	5.8	0.1
45-54	4	23.5	0.3	1	6.6	0.1	3	20.0	0.2	1	16.7	0.1	2	11.7	0.2
55-64	1	5.8	0.1	1	6.6	0.1	1	6.6	0.1	0	0	0	1	5.8	0.1
65+	0	0	0.0	0	0	0	1	6.6	0.1	0	0	0	0	0	0.0
Unknown	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0.0
Race/Ethnicity															
Asian	9	52.9	0.7	11	73.3	0.8	7	46.6	0.5	2	33.3	0.2	12	70.5	0.9
Black	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0	0	0.0
Hispanic	8	47.0	0.2	3	20	0.1	8	53.3	0.2	4	66.7	0.1	5	29.4	0.1
White	0	0	0.0	1	0	0.0	0	0	0.0	0	0	0	0	0	0.0
Other	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0	0	0.0
Unknown	0	0	0.0	0	0	0.0	0	0	0	0	0	0	0	0	0.0
SPA															
1	0	0	0	1	6.6	0.3	1	6.6	0.3	0	0	0.0	0	0	0.3
2	4	23.5	0.2	6	40.0	0.3	4	26.6	0.2	1	16.7	0.0	4	23.5	0.2
3	3	17.6	0.2	2	13.3	0.1	0	0	0	1	16.7	0.0	3	17.6	0.2
4	2	11.7	0.2	2	13.3	0.2	4	26.6	0.3	2	33.3	0.1	2	11.7	0.2
5	3	17.6	0.5	1	6.6	0.2	3	20.0	0.5	0	0	0.0	3	17.6	0.5
6	2	11.7	0.2	2	13.3	0.2	1	6.6	0.1	0	0	0.0	2	11.7	0.2
7	0	0	0	1	6.6	0.1	1	6.6	0.1	1	16.7	0.0	0	0	0.0
8	3	17.6	0.3	0	0.0	0.0	1	6.6	0.1	1	16.7	0.0	3	17.6	0.3
Unknown	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0.0

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

Reported Typhoid Fever Carrier Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=1)			2010 (N=4)			2011 (N=3)			2012 (N=0)			2013 (N=0)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	1	100	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
35-44	0	0.0	0.0	2	50.0	0.1	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
45-54	0	0.0	0.0	0	0.0	0.0	1	33.0	0.1	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	2	50.0	0.2	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Race/Ethnicity															
Asian	0	0.0	0.0	2	50.0	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	1	100	0.2	2	50.0	0.0	3	100	0.1	0	0.0	0.0	0	0.0	0.0
White	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
3	0	0.0	0.0	1	25.	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
4	0	0.0	0.0	2	50.	0.2	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	0	0.0	0.0	1	25.	0.1	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	0	0	0.0	0	0.0	0.0	0	0.0	0.0
8	1	100	0.2	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0	0.0	0	0.0	0.0	0	0	0.0	0	0.0	0.0	0	0.0	0.0

0

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

Figure 1. Incidence Rates by Year of Onset of Acute Typhoid Fever LAC and US, 2003-2013

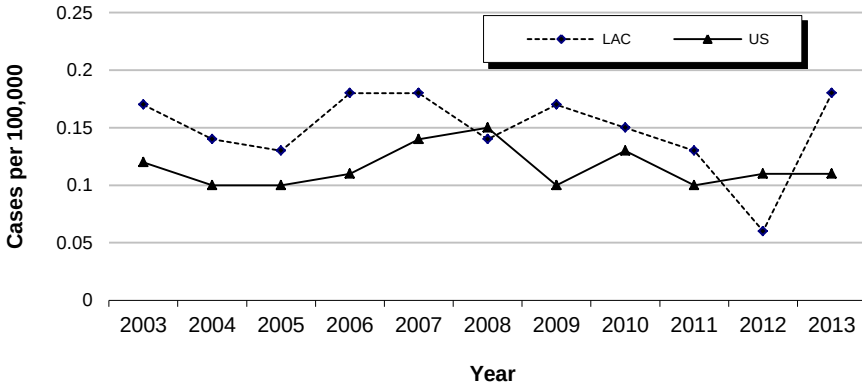


Figure 2. Acute Typhoid Fever Cases by Age Group LAC, 2013 (N=17)

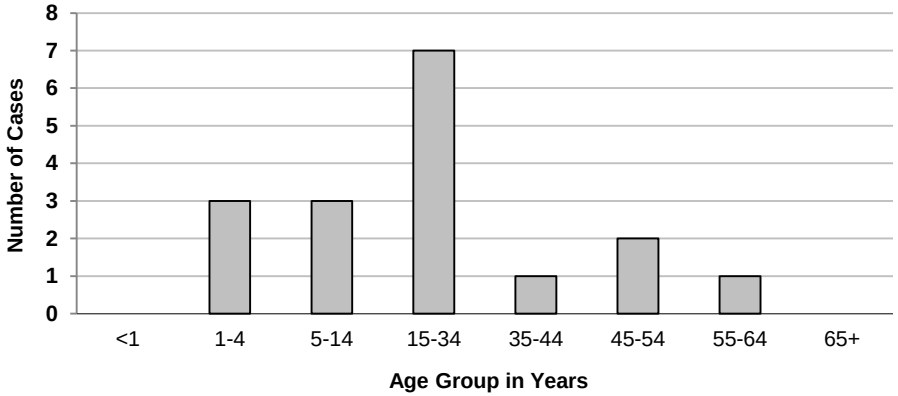


Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity LAC, 2013 (N=17)

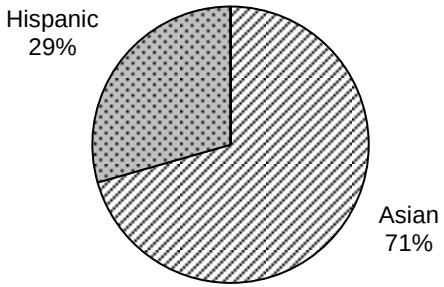


Figure 4. Reported Acute Typhoid Fever Cases by SPA LAC, 2013 (N=17)

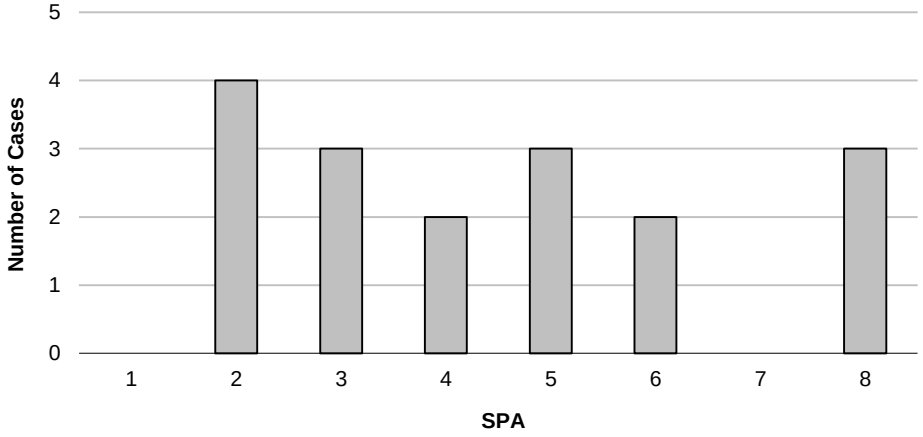


**Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2013 (N=17)**

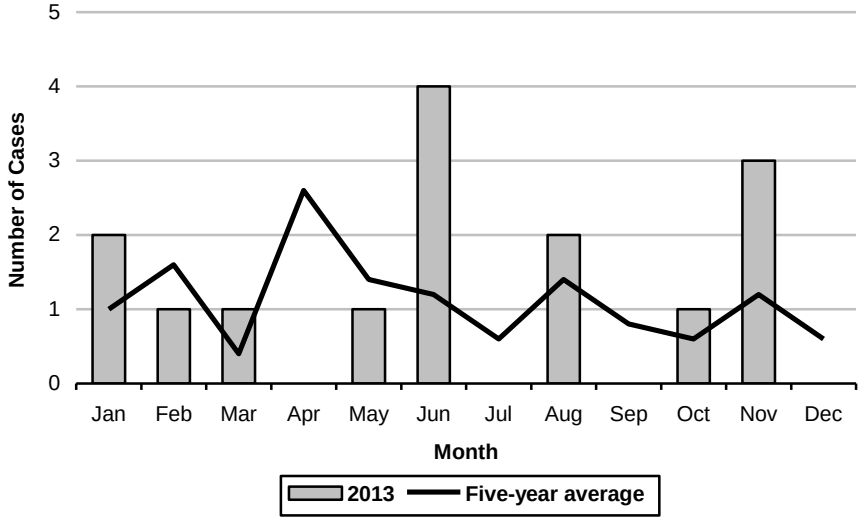
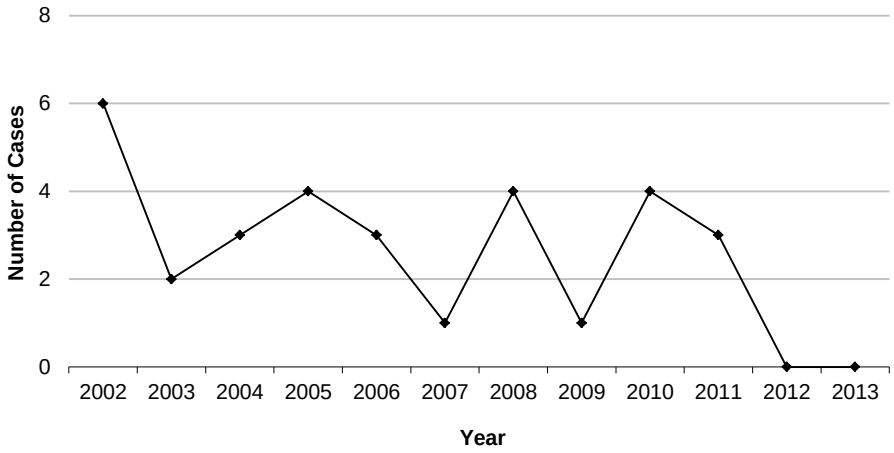


**Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 2002-2013**



TYPHUS FEVER

CRUDE DATA	
Number of Cases	68
Annual Incidence[a]	
LA County	0.72
California	
United States[b]	N/A
Age at Diagnosis	
Mean	42.7
Median	43
Range	4-77

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

DESCRIPTION

Typhus fever (murine typhus, endemic typhus) is caused by the bacteria *Rickettsia typhi* and *Rickettsia felis* and is transmitted through contact with feces that is discharged when an infected flea bites. Reservoir animals are predominantly rats, opossums, and feral cats. In Los Angeles County (LAC), most reported cases of typhus occur in residents of the foothills of central LAC. However, since 2006 the distribution of typhus has expanded to other regions of LAC, particularly towards the western part of the county (SPA 5). Symptoms include fever, severe headache, chills, and myalgia. A fine, macular rash may appear three to five days after onset. Occasionally, complications such as pneumonia or hepatitis may occur. Fatalities are uncommon, occurring in less than 1% of cases, but increase with age. The disease is typically mild in young children. Typhus is not vaccine preventable, but can be treated with antibiotics.

Because typhus fever is not a nationally reportable disease, there is no national case definition. In California, a standard case definition was developed beginning 2012 because of expansion of the agent into new regions, including Long Beach and Orange County. Cases included in LAC surveillance have, at minimum, a single high IgM or IgG titer positive for any *Rickettsia* species, along with the appropriate symptoms

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.

2013 TRENDS AND HIGHLIGHTS

- LAC continued to document a record number of typhus fever cases in 2013 with a 36% increase from 50 cases in 2012 to 68 cases in 2013 (Figure 1). Most reported cases were hospitalized (n=50, 74%), indicating that milder cases may not have been diagnosed and reported. Our surveillance then would grossly undercount the true number of cases.
- The mean and median ages of hospitalized patients were 44.5 years and 44 years, respectively. Ages of non-hospitalized cases were slightly younger, with a mean and median of 36.7 and 43 years, respectively. Cases occurring in young children <5 years old are rare.
- The large majority of cases were of white or Hispanic/Latino race/ethnicity (n=35, 52%, and n=24, 35%, respectively). Asians and blacks have been consistently underrepresented in comparison to the general LAC population (Figure 5).
- The number of typhus cases continued to be highest in SPA 3 (n=20) (Figure 3), which has had high numbers historically, followed by SPA 4 (n=18). Typhus has been an increasing problem in SPA 4 in recent years. Typhus cases resided in all SPAs with the exception of SPA 1, indicating that typhus has established itself in new areas where it has not been usually seen for decades.
- This year followed a more typical seasonal curve with the highest monthly case count in August (n=15) (Figure 4). However, cases were documented in nearly all months of the year. Physicians and residents should assume that there is risk of typhus infection throughout the entire year in LAC.
- Only fifteen cases recalled a flea exposure (22%). A large proportion of cases reported an exposure to cats or dogs at or around

[1] 2007 Los Angeles County Health Survey. Los Angeles County Department of Public Health. http://www.publichealth.lacounty.gov/ha/hasurveyintro.htm

their home (n=50, 74%) (Table 1). This is much higher than the overall rate of pet ownership in LAC (40%).[1] Animal exposures at their place of employment were minimal.

- The increase in cases may be due to a number of factors including the natural relocation of host animals (opossums and feral cats) to regions not previously enzootic for typhus; changes in weather that favor flea survival; increased testing and reporting due to better educated physicians; and increase reporting to public health department by electronic laboratory reporting.

Reported Typhus Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=9)			2010 (N=31)			2011 (N=38)			2012 (N=50)			2013 (N=68)		
	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		0	0.0		1	2.6		0	0.0		1	1.5	0.2
5-14	2	22.2		3	9.7		3	7.9		6	12.0		5	7.4	0.4
15-34	1	11.1		4	12.9		5	13.2		11	22.0		16	23.5	0.6
35-44	0	0.0		7	22.6		5	13.2		13	26.0		12	17.6	0.9
45-54	4	44.9		5	16.1		9	23.7		10	20.0		13	19.1	1.0
55-64	2	22.2		10	32.3		9	23.7		4	6.7		13	19.1	1.3
65+	0	0.0		2	6.5		6	15.8		6	12.0		8	11.8	0.7
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	11.1		2	6.5		1	2.6		0	0.0		3	4.4	0.2
Black	0	0.0		2	6.5		2	5.3		2	4.0		1	1.5	0.1
Hispanic	1	11.1		10	32.3		9	23.7		15	30.0		24	35.3	0.5
White	7	77.8		14	45.2		23	60.5		25	50.0		35	51.5	1.3
Other	0	0.0		0	0.0		0	0.0		3	6.0		1	1.5	
Unknown	0	0.0		3	9.7		3	7.9		5	10.0		4	5.9	
SPA															
1	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	0.0
2	1	11.1		5	16.1		9	23.7		5	10.0		6	8.8	0.3
3	5	55.6		9	29.0		13	34.2		18	36.0		20	29.4	1.2
4	3	33.3		5	16.1		5	13.2		13	26.0		18	26.5	1.6
5	0	0.0		6	19.4		5	13.2		6	12.0		5	7.4	0.8
6	0	0.0		4	12.9		0	0.0		4	6.7		7	10.3	0.7
7	0	0.0		0	0.0		5	13.2		3	6.0		4	5.9	0.3
8	0	0.0		2	6.5		1	2.6		1	2.0		8	11.8	0.7
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. Typhus Fever Cases by Year
LAC, 2000-2013

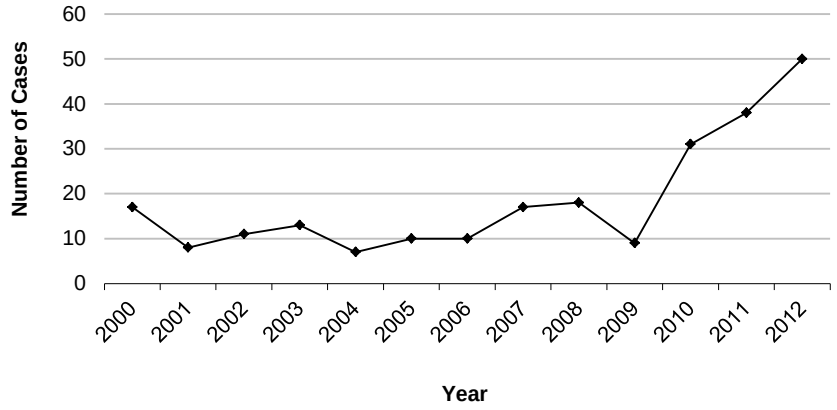


Figure 2. Typhus Fever by Age Group
LAC, 2013 (N=68)

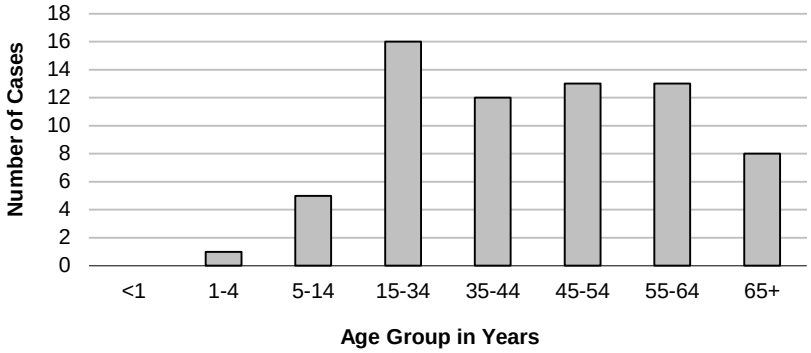


Figure 3. Typhus Fever Cases by SPA
LAC, 2013 (N=68)

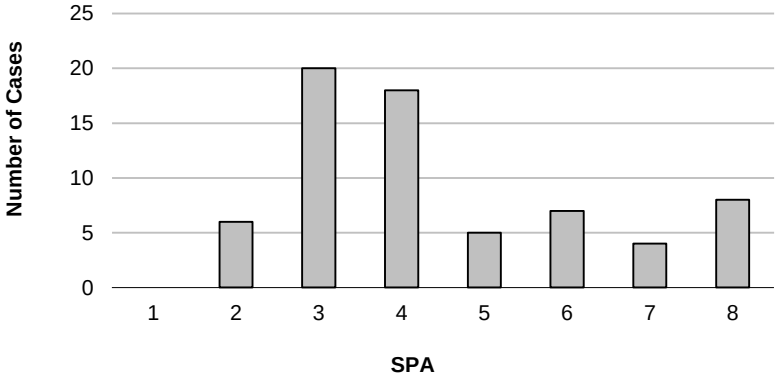


Figure 4. Typhus Fever Cases by Month of Onset
LAC, 2013 (N=68)

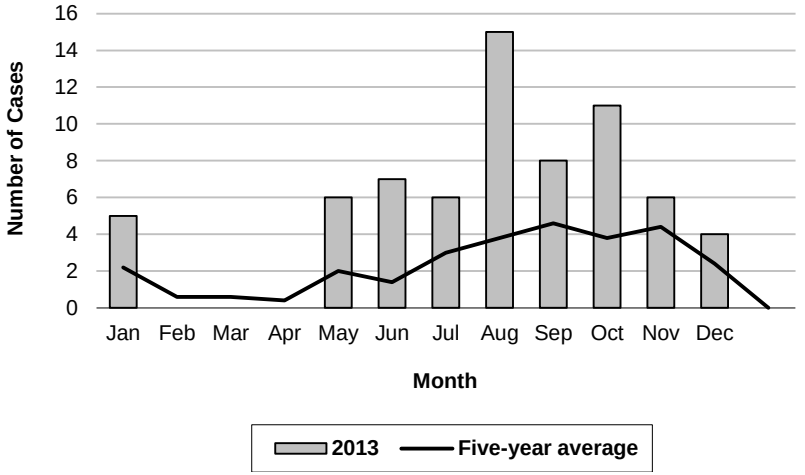


**Figure 5. Typhus Fever Cases by Race/Ethnicity
LAC, 2009 -2013**

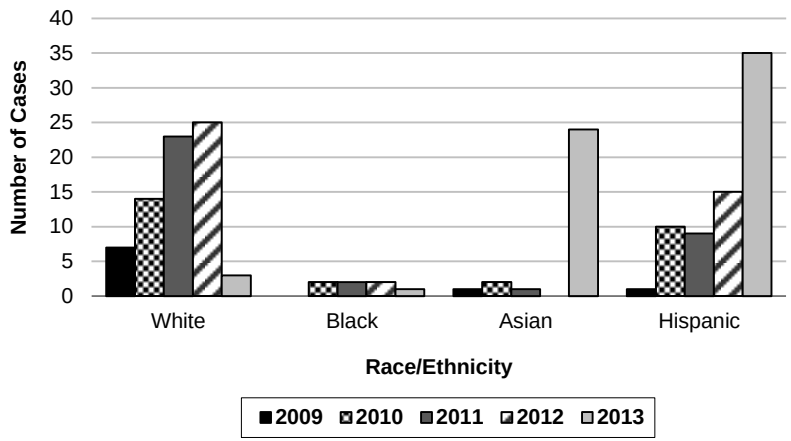
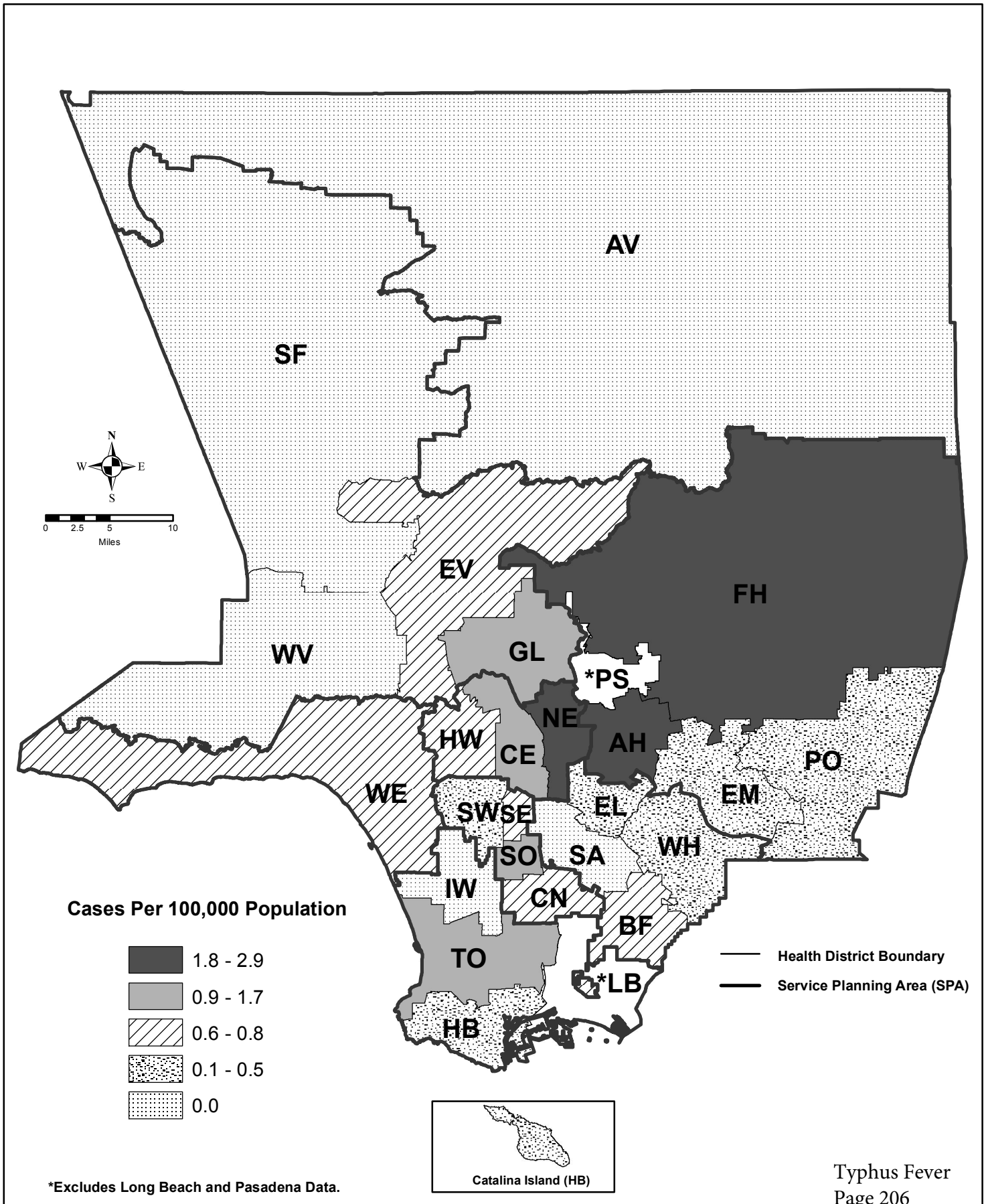


Table 1. Animal Exposure* of Cases, LAC, 2013 (N=68)		
	Home n (%)	Employment n (%)
Cat	37 (54)	5 (7)
Dog	32 (47)	3 (4)
Cat or Dog	50 (74)	6 (9)
Opossum	39 (57)	3 (4)
Rodent	12 (18)	2 (3)

*Exposures will total more than 100% as cases may report more than one exposure.

Map 16. Typhus Fever
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

VIBRIOSIS

CRUDE DATA	
Number of Cases	26
Annual Incidence[a]	
LA County[b]	0.28
California[c]	0.39
United States[c]	0.41
Age at Diagnosis	
Mean	43
Median	43
Range	10-83

[a]Cases per 100,000 population.
[b]Rates calculated based on less than 19 cases or events are considered unreliable.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Disease. MMWR 63(32):702-716.

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.

2013 TRENDS AND HIGHLIGHTS

- Last year ACDC changed the way it calculates the vibriosis incidence rate for the United States. Prior to 2012, rates were calculated from unadjusted US population data taken from the Census. Because not all states report vibriosis, it was decided to compare rates only to states that list vibriosis as a reportable disease. Thus in 2012 and 2013, rates were adjusted to reflect populations in states reporting vibriosis morbidity, excluding states where vibriosis is not a reportable condition.
- In 2013, non-Hispanic whites comprised the largest proportion of all vibriosis cases (n=15, 58%) (Figure 3).
- SPA 2 had seven confirmed cases of vibriosis in 2013 (Figure 4). SPAs 4 and 5 each had five confirmed cases. In both of these regions, raw oyster or other seafoods were significant sources of vibriosis. SPA 4 had five confirmed cases reporting raw oyster consumption or foreign travel prior to their onset.
- Typically vibriosis cases peak during July and August because *Vibrio* flourishes in rising water temperatures. (Figure 5).
- *V. parahæmolyticus* was the most common etiologic agent isolated (n=15). Eleven *V. parahæmolyticus* cases reported having eaten raw oysters prior to onset. One case who ate raw oysters personally harvested them in Santa Monica Bay. Another case was part of a national cluster associated with oysters from Cape Cod. Ten cases reported eating "seafood," but only four

claimed that the seafood was eaten raw. Four cases reported foreign travel. Foreign countries included France, the United Kingdom, Haiti, Canada, and Singapore. Exposure history could not be determined for one case.

- There were five confirmed cases of *V. alginolyticus.* Four cases had a history of recreational water exposure. The one case that did not report water exposure had stepped on a nail, and the wound tested positive for *V. alginolyticus.*
- *V. choleræ* non-O1, non-O139 was isolated from two persons. One case reported travel to Taiwan and the other reported recreational water exposure in Arizona.
- There was one confirmed case of each of the following: *V. mimicus, V. damsela, V. fluvialis.* The *V. mimicus* case had traveled to Guatemala. The *V. damsela* case traveled to Mexico and became injured in the ocean. The exposure of the *V. fluvialis* case was unknown. There was also one case whose specific species of *vibrio* was unknown but had a history of travel to Mexico and eating both seafood and oysters.
- Five cases of vibriosis occurred among women, while 21 cases occurred among men (80.8%). Historically, vibriosis cases have been predominantly male, but in recent years, women have made up a greater proportion of cases. The high proportion of male cases in 2012 (77.8%) and in 2013 appear to be reversing the recent trend.
- There were no vibriosis deaths in 2013.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=26)			2010 (N=13)			2011 (N=19)			2012 (N=27)			2013 (N=26)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	1	3.8	0.2	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	2	15.4	0.2	1	5.3	0.1	3	11.1	0.3	3	11.5	0.2
15-34	11	42.3	0.4	5	38.5	0.2	5	26.3	0.2	7	25.9	0.3	4	15.3	0.1
35-44	4	15.4	0.3	0	0.0	0.0	3	15.8	0.2	4	14.8	0.3	7	26.9	0.5
45-54	5	19.2	0.4	3	23.1	0.2	5	26.3	0.4	5	18.5	0.5	6	23.0	0.5
55-64	3	11.5	0.3	2	15.4	0.2	3	15.8	0.3	4	14.8	0.4	2	7.6	0.2
65+	2	7.7	0.2	1	7.7	0.1	2	10.5	0.2	4	14.8	0.4	4	15.3	0.4
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	3.8	0.1	1	7.7	0.1	0	0.0	0.0	2	7.4	0.2	3	11.5	0.2
Black	0	0.0	0.0	0	0.0	0.0	1	5.3	0.1	1	3.7	0.1	0	0.0	0.0
Hispanic	8	30.8	0.2	4	30.8	0.1	9	47.4	0.2	9	33.3	0.2	6	23.1	0.1
White	15	57.7	0.5	4	30.8	0.2	9	47.4	0.3	13	48.1	0.6	15	57.7	0.6
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	2	7.7		4	30.8		0	0.0	0.0	2	7.4	--	2	7.6	--
SPA															
1	2	7.7	0.5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.4	0	0.0	0.0
2	6	23.1	0.3	1	7.7	0.0	4	21.1	0.2	6	22.2	0.3	7	26.9	0.3
3	3	11.5	0.2	2	0.0	0.4	2	10.5	0.1	2	7.4	0.2	3	11.5	0.2
4	4	15.4	0.4	2	7.7	0.2	4	21.1	0.3	5	18.5	0.4	5	19.2	0.4
5	5	19.2	0.8	4	30.8	0.6	1	5.3	0.2	6	22.2	0.9	5	19.2	0.8
6	0	0.0	0.0	2	15.4	0.2	4	21.1	0.3	2	7.4	0.3	2	7.7	0.2
7	2	7.7	0.2	1	7.7	0.1	2	10.5	0.1	2	7.4	0.2	0	0.0	0.0
8	3	11.5	0.3	3	23.1	0.3	2	15.8	0.2	4	14.8	0.4	4	15.4	0.4
Unknown	1	3.8													

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

Figure 1. Reported Cases of Vibriosis
LAC, 2004-2013

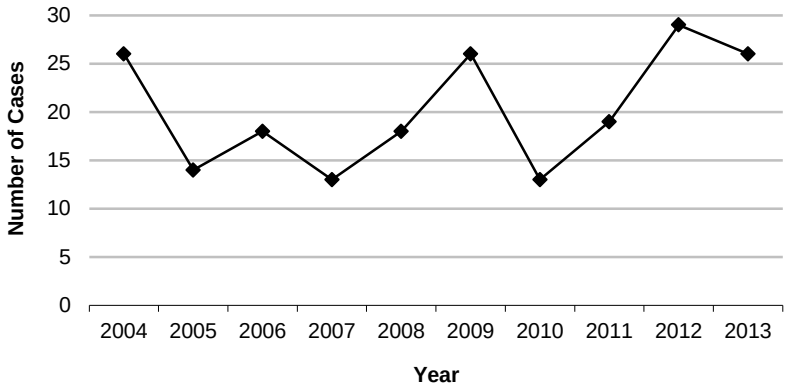


Figure 2. Reported Cases of Vibrosis by Age Group
LAC, 2013 (N=26)

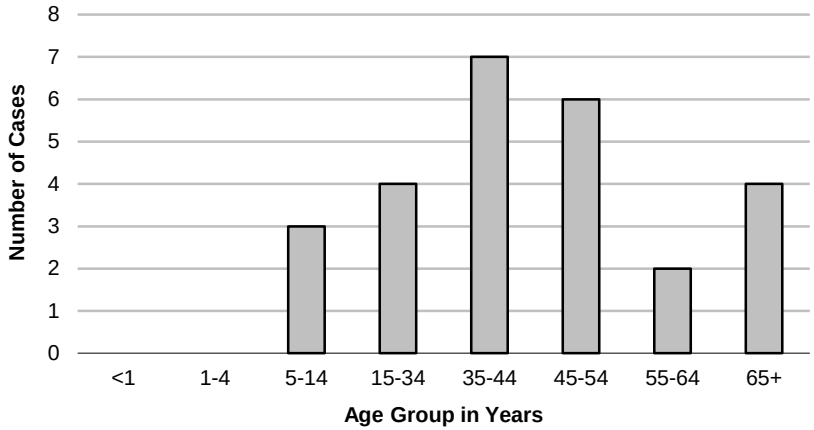


Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2013 (N=26)

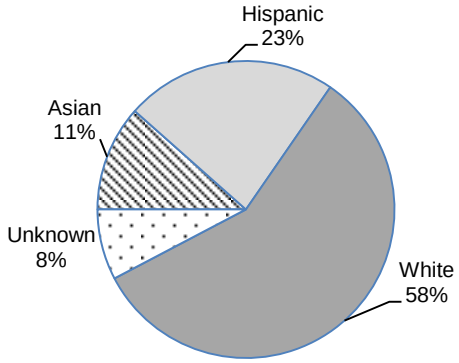


Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2013 (N=26)

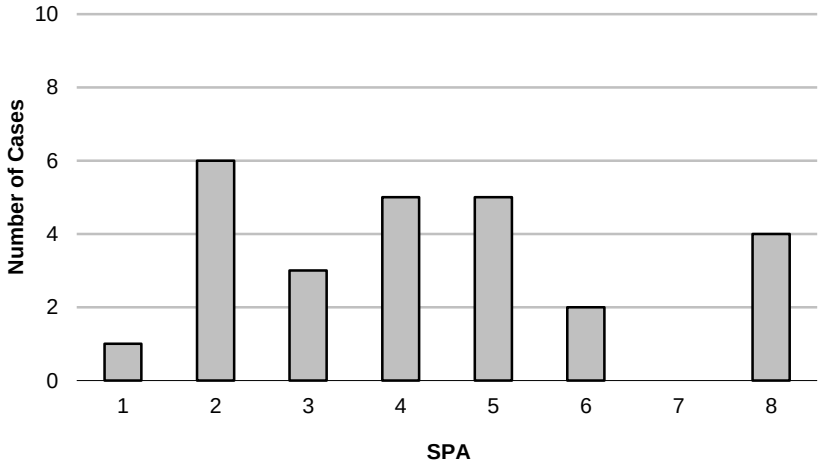


**Figure 5. Reported Vibriosis Cases by Month of Onset
LAC, 2013 (N=26)**

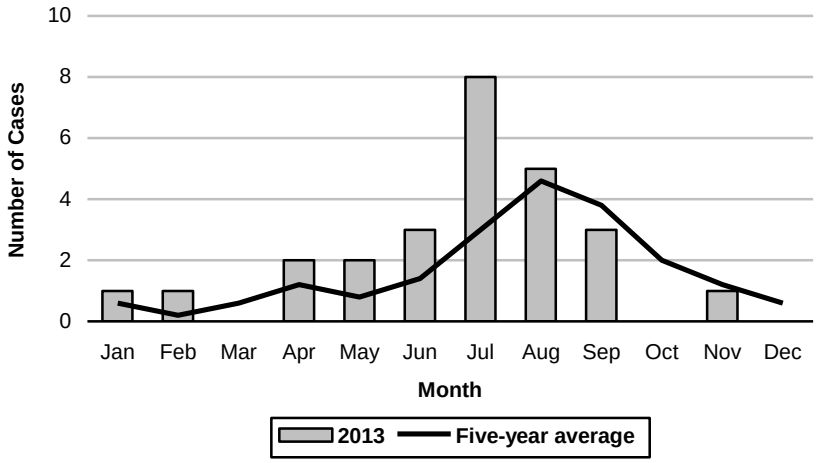
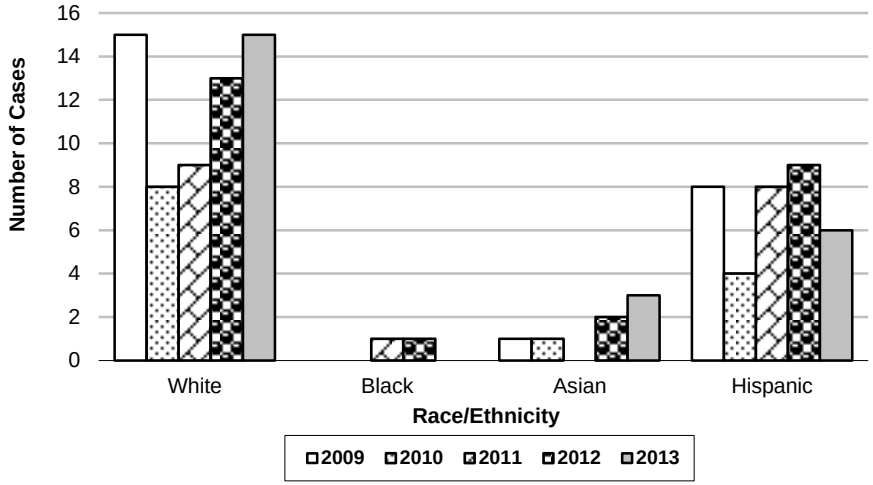


**Figure 6. Reported Cases of Vibriosis by Race/Ethnicity
LAC, 2009-2013**



WEST NILE VIRUS

CRUDE DATA	
Number of Cases[a]	165
Annual Incidence[b]	
LA County[a]	1.75
California[c]	1.00
United States[c]	0.79
Age at Diagnosis	
Mean	54.2
Median	56.5
Range	7-92

[b]Includes asymptomatic infections.
[b]Cases per 100,000 population. CA and US rates do not include asymptomatic infections.
[c]Calculated from Final 2013 Reports of Nationally Notifiable Infectious Diseases. MMWR 63(32):702-716.

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 has been documented as an enzootic disease throughout the continental US, Canada and Mexico.

Normally transmitted by mosquitoes (usually *Culex* or *Anopheles* species) between bird reservoir hosts, humans are incidentally infected with the virus when bitten by an infected mosquito. About 20% of persons infected will develop WNV fever with symptoms that include fever, headache, rash, muscle weakness, fatigue, nausea and vomiting, and occasionally lymph node swelling. Fewer than 1% will develop more severe illness, manifesting as WNV neuro-invasive disease (NID), including meningitis, encephalitis, and acute flaccid paralysis. WNV-associated meningitis usually involves fever, headache, and stiff neck, and has a good prognosis. WNV-associated encephalitis is commonly associated with fever, altered mental status, headache, and seizures, and usually necessitates a high level of specialized medical care. Long-term neurological and cognitive sequelae are not uncommon.

After being infected with WNV, most people sustain a viremia and may remain asymptomatic or eventually develop symptoms. In 2002, asymptomatic blood donors were documented to transmit WNV to blood product recipients. Beginning 2003, blood products have been screened for WNV utilizing polymerase chain reaction (PCR) testing. To date, there have been no blood transfusion-associated secondary WNV infections from asymptomatic WNV-infected blood donors from Los Angeles (LAC) residents. However, four cases of WNV-associated infection including three cases of NID were documented from a LAC organ donor in 2011, not known to be infected with WNV infection at the time of organ donation. Additional routes of transmission that can occur include vertical transmission transplacentally, through breast milk, and occupational exposure.

Vector management programs are the most effective approach to prevention and control of WNV and other arboviral diseases. 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 IR3535 (3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester).

2013 TRENDS AND HIGHLIGHTS

- The incidence of WNV infections reported in 2013 (1.75 per 100,000 population), as in 2012 (1.87 per 100,000), is among the highest documented in LAC since WNV appeared in 2003 (Figure 1).
- Of 144 reported symptomatic WNV infections, there were 40 cases of WNV fever and 104 NID cases (52 with meningitis, 46 encephalitis, and 6 acute flaccid paralysis) (Figure 2). Nine WNV-associated deaths were reported among symptomatic cases (6%). Twenty-one asymptomatic donors (13%) were reported from local blood banks (Figure 2).
- The mean age of infected cases was 54 years with the largest proportion in the 55 to 64 years age group (n=46, 28%). This was closely followed by the 65 years and older age group (N=44, 27%). Incidence increased as age increased (Figure 3).
- Most WNV infections were of white or Hispanic/Latino race/ethnicity (n=80, 49%, and n=50, 30%, respectively).
- The male to female ratio was 2.4:1.
- In contrast to previous years, WNV infections occurred in all SPAs. The highest number of people infected with WNV resided in the San Fernando Valley area (n=62). However, the highest incidence rate occurred in the Antelope Valley area with 3.8 cases per 100,000 (n=15) (Figure 5). This is the second year in a row in which the Antelope Valley had an unusually active WNV season. A substantial increase in documented human infections also occurred in SPA 8, increasing from 0 to 3 infections per year previously to 29 infections in 2013.
- This year, human WNV infections occurred from July to November, with the last case occurring on 11/5/2013. The human WNV season in LAC often runs from June through the end of October. Peak onset in 2013 occurred in September, similar to the five-year average (Figure 6). Statewide, 379 human symptomatic cases were reported. Nationally, 2469 were reported.

Reported West Nile Virus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2013

	2009 (N=25)			2010 (N=4)			2011 (N=63)			2012 (N=174)			2013 (N=165)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	1	1.6	0.1	2	1.1	0.2	6	3.6	0.5
15-34	5	20.0	0.2	1	25.0	0.0	5	7.9	0.2	24	13.8	0.9	19	11.5	0.7
35-44	0	0.0	0.0	0	0.0	0.0	3	4.8	0.2	17	9.8	1.3	15	9.1	1.1
45-54	10	50.0	0.7	1	25.0	0.1	16	25.4	1.2	33	19.0	2.6	34	20.6	2.6
55-64	4	16.0	0.4	0	0.0	0.0	17	27.0	1.8	34	19.5	3.3	46	27.9	4.5
65+	6	24.0	0.6	2	50.0	0.2	21	33.3	2.0	64	36.8	5.8	45	27.3	4.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	4.0	0.1	0	0.0	0.0	1	1.6	0.1	9	5.2	0.7	6	3.6	0.4
Black	0	0.0	0.0	0	0.0	0.0	1	1.6	0.1	3	1.7	0.4	3	1.8	0.4
Hispanic	5	20.0	0.1	1	25.0	0.01	26	41.3	0.5	59	33.9	1.3	50	30.3	1.1
White	16	64.0	0.5	3	75.0	0.1	30	47.6	1.0	91	52.3	3.4	80	48.5	3.0
Other	0	0.0		0	0.0		2	3.2		2	1.1		2	1.2	
Unknown	3	12.0		0	0.0		3	4.8		10	5.7		24	14.5	
SPA															
1	12	48.0	3.3	0	0.0	0.0	1	1.6	0.3	10	5.7	2.6	15	9.1	3.8
2	9	36.0	0.4	0	0.0	0.0	39	61.9	1.8	73	42.0	3.4	62	37.6	2.9
3	2	8.0	0.1	2	50.0	0.1	16	25.4	0.9	47	27.0	2.9	23	13.9	1.4
4	1	4.0	0.1	0	0.0	0.0	1	1.6	0.1	18	10.3	1.6	6	3.6	0.5
5	1	4.0	0.2	0	0.0	0.0	1	1.6	0.2	8	4.6	1.3	2	1.2	0.3
6	0	0.0	0.0	0	0.0	0.0	1	1.6	0.1	2	1.1	0.2	4	2.4	0.4
7	0	0.0	0.0	2	50.0	0.1	4	6.3	0.3	13	7.5	1.0	24	14.5	1.8
8	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	1.7	0.3	29	17.6	2.7
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 West Nile Virus
LAC, 2004-2013**

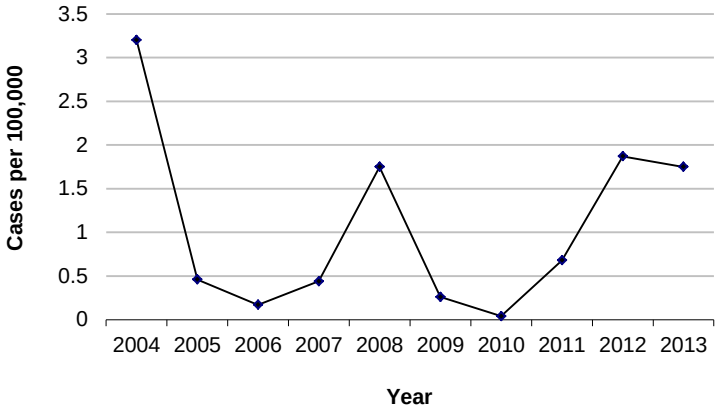
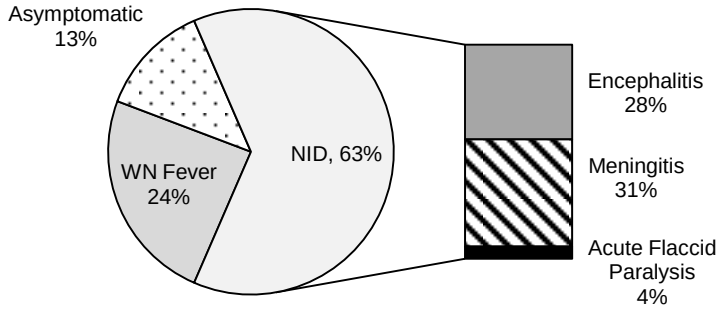


**Figure 2. Percent Cases of West Nile Virus by Presentation
LAC, 2013 (N=165)**



*R

**Figure 3. Incidence Rates* of West Nile Virus by Age Group
LAC, 2013 (N=165)**

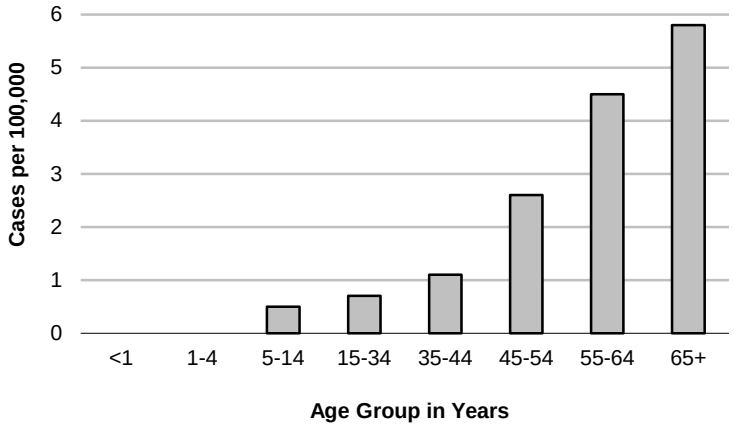


**Figure 4. West Nile Virus Incidence* by Race/Ethnicity
LAC, 2009-2013**

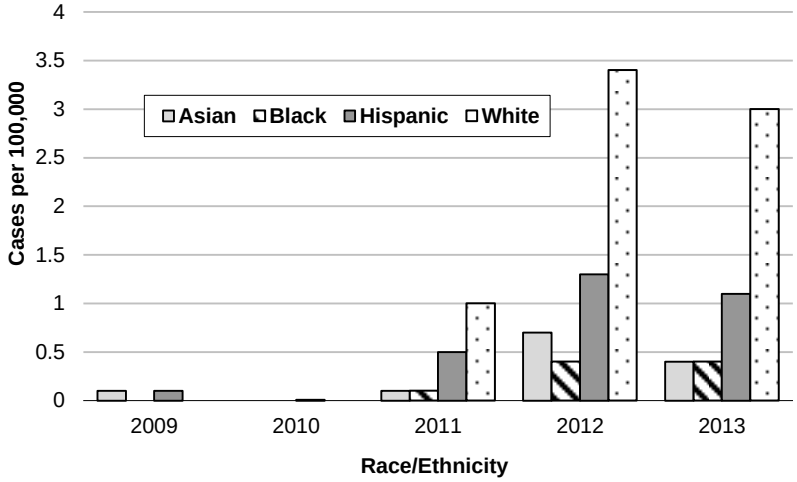


**Figure 5. Incidence Rates* of West Nile Virus by SPA
LAC, 2013 (N=165)**

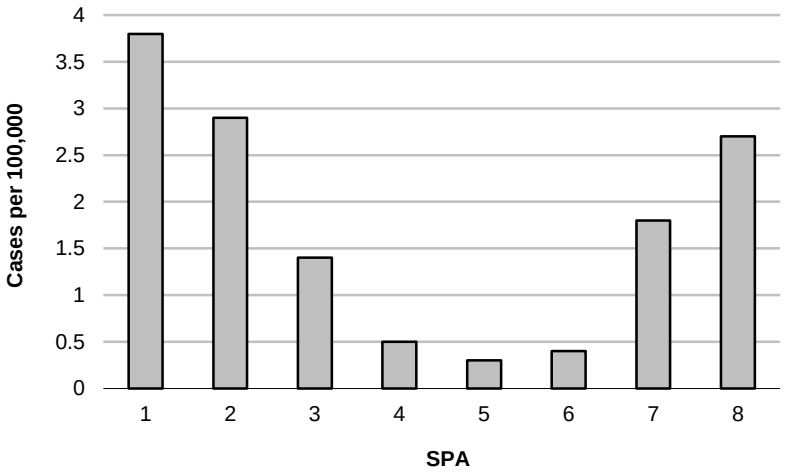
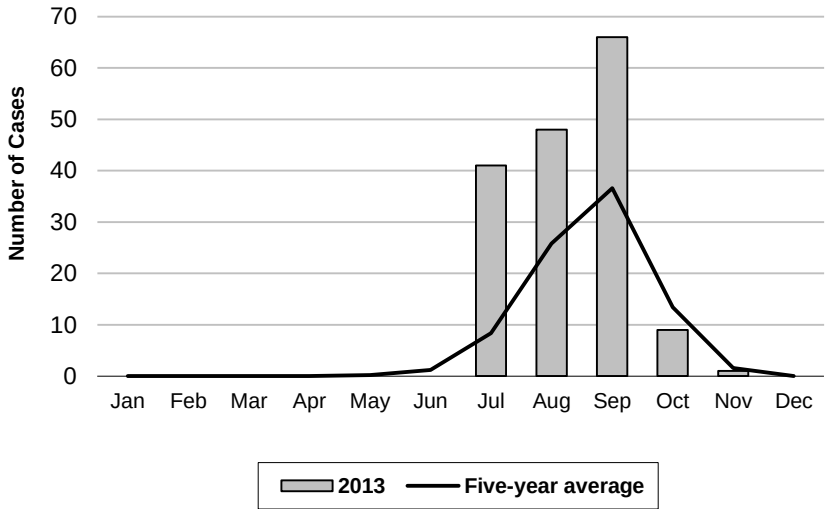
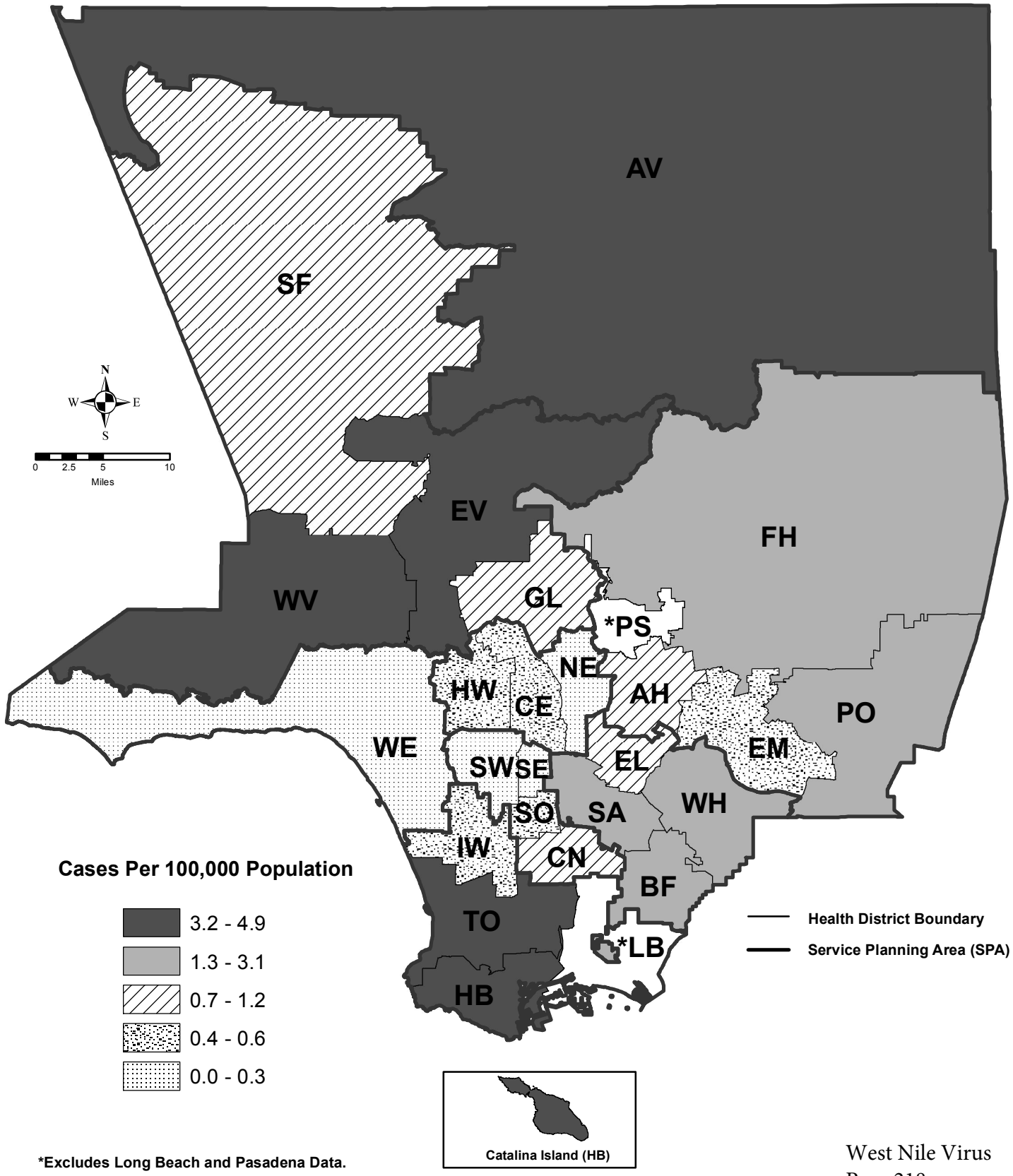


**Figure 6. Reported West Nile Virus Cases by Month of Onset
LAC, 2013 (N=165)**



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

Map 17. West Nile Virus
Rates by Health District, Los Angeles County, 2013*



*Excludes Long Beach and Pasadena Data.

DISEASE OUTBREAK SUMMARIES

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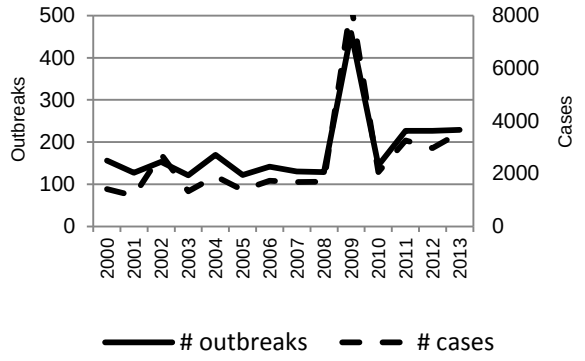
COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2013, 229 community-acquired disease outbreaks accounted for 3553 cases of illness (Figure 1).
- Three general disease categories accounted for 80% of all outbreak causes. Respiratory, ectoparasites, and Gastroenteritis (GE) outbreaks contributed 28%, 28%, and 24% of all outbreaks, respectively. (Figure 2, Table 2).
- Three outbreak settings accounted for almost all (92%) of the reported outbreaks. Pre-schools, schools, and residential/assisted living settings contributed 41%, 30% and 21%, respectively. (Figure 3, Table 2)
- Only 1 percent of the outbreaks were caused by disease conditions which are individually reportable. (Tables 1, 2).

Figure 1
Community-Acquired Outbreaks
Number of Persons Affected
LAC 2000-2013



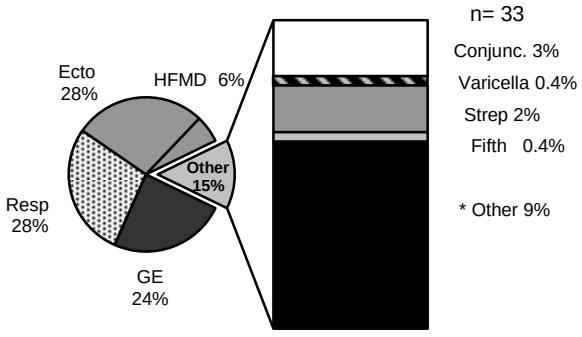
DATA

A disease outbreak is an infection/infestation cluster, occurring in place and time, with case numbers above expected for a specified population or location. Depending on the nature of the outbreak, investigation responsibility is maintained by either ACDC or Community Health Services with ACDC providing as-needed consultation. The outbreaks reported in this section do not include outbreaks associated with food (see Foodborne Outbreaks section) or facilities specifically regulated/licensed to provide medical care (see Healthcare Associated Outbreaks section).

Most reported outbreaks in 2013 were respiratory in nature. Sixty-four (64) respiratory outbreaks were reported; ten were confirmed as caused by influenza. Respiratory outbreaks averaged 18 cases per outbreak, with one multi-grade school influenza outbreak reporting 176 cases. Outbreaks occurred almost exclusively early in the year with 57 of the 64 outbreaks (89%) reported in the first three months; all of the confirmed influenza outbreaks were in this period. In comparison, the beginning of the 2013-2014 respiratory illness season was very quiet with only four respiratory outbreak reports coming in September through December of 2013. Even without year-long activity, 2013 had more respiratory reports then previous years – 23 in 2012, 49 in 2011. Most (72%) of the respiratory outbreaks included a younger population, associated with elementary (28) or pre-schools (18). Residential/assisted living facilities reported 11 respiratory outbreaks; but with a greater proportion (4) confirmed as influenza.

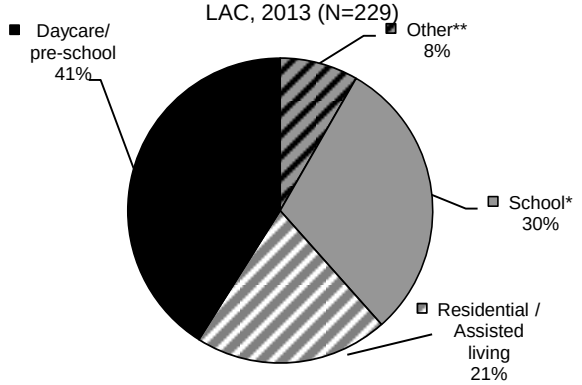
Ectoparasites (i.e., headlice and scabies) continue to be in the top three reported causes for outbreaks (63). Scabies outbreaks were more common in the older age group with 9 of 13 reported in residential/assisted-living settings. (Table 2) Scabies outbreaks were distributed throughout the year

Figure 2
Community-Acquired Outbreaks by Type of Disease* LAC, 2013 (N=229)



*Other includes: Coccidioidomycosis, ringworm, MRSA, pertussis, unknown rash, and unspecified.

Figure 3
Community-Aquired Outbreaks by Setting
LAC, 2013 (N=229)



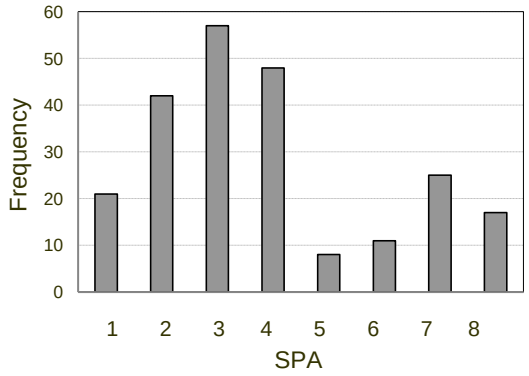
* School includes: Elementary (53), Middle (3) and High School (8), multi-grade (3), and Univerisity (2)
**Other includes: worksite (2), maternal/infant homes (6), substance rehab (1), church (2), foster care (2), juvenile hall (1), hotel (1), spec. ed (1), rec. centers (3)

and averaged eight cases per outbreak. Pediculosis (headlice) dominates the ectoparasite category with 50 reported outbreaks. Averaging six cases per outbreak, headlice tends to be in the youngest age groups with 86% of the 50 outbreaks in pre-school (35) or elementary school (8) settings.

The 56 GE outbreaks in 2013 were primarily caused by either norovirus (17) or of undetermined GE etiology (37), but also included one *E. coli*–other STEC and one Salmonella. GE outbreaks also had the highest outbreak case counts; norovirus outbreaks had a mean of 47 cases per outbreak and unspecified GE outbreaks had 20 cases per outbreak. Many of the GE outbreaks of undetermined etiology had characteristics similar to the confirmed norovirus outbreaks, but specimens were not available for testing. The relative ability to obtain stool specimens from individuals in a residential/assisted living facility compared with a school setting maybe a factor in why the majority of norovirus confirmed outbreaks were identified in the former setting. The GE figures for 2013 highlight the continuing circulation of norovirus and reflect the ease this agent can be transmitted from person-to-person in community settings. The strain of norovirus (GII.4 Sydney) first seen in late 2012 in Los Angeles and mainly was affecting the older populations in residential/assisted living communities continued for this year (Table 1, 2).

There is a strong relationship between outbreak setting and the disease being reported. The predominance of outbreaks reported among children in educational settings (preschool to university) is well recognized. In 2013 the most common outbreak settings were again pre-schools and schools accounting for 71% of all outbreaks. (Figure 3, Table 2). In the preschool setting, Hand, Foot, and Mouth Disease (HFMD) and pediculosis accounted for 51% of the reports. GE outbreaks were dominant in the residential/assisted living sites; the location of record for 45% of all GE outbreaks and 53% of the outbreaks reported from this setting. Nearly all of the confirmed norovirus outbreaks (82%) were in residential/assisted living sites. Ectoparasites continues to be a major cause of outbreaks and also show a location preference; residential/assisted living settings tend to report scabies, while schools and pre-schools are affected more often by head lice.

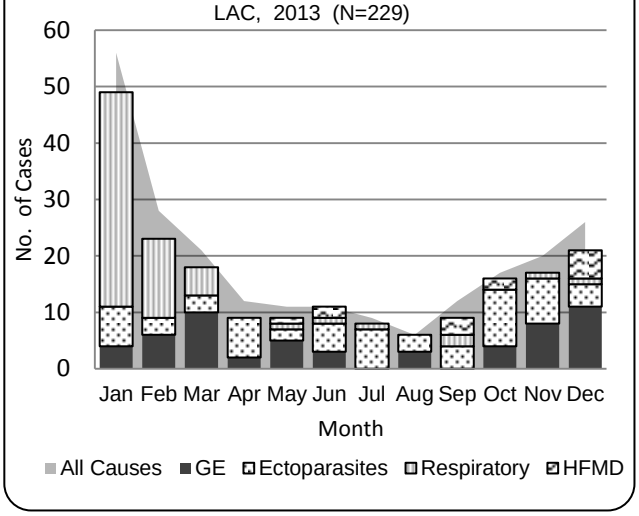
Figure 4
Community-Acquired Outbreaks by SPA
LAC, 2013 (N=229)



Outbreaks were reported from all eight SPAs (Figure 4). SPA 3, San Gabriel (57); SPA 4, Central (48); and SPA 2, San Fernando (42) had the most outbreaks for the past 3 years.

The graph of community-acquired outbreaks by report month (Figure 5) further illustrates the impact of respiratory, GE, ectoparasite, and HFMD outbreaks. These four disease categories accounted for the majority of outbreaks each month throughout the year.

Figure 5
Community-Acquired Outbreaks by Selected Disease and Report Month
LAC, 2013 (N=229)



COMMENTS

Outbreaks are most often reported from locations with the ability to recognize an unusual occurrence of illness/infestation in a group of individuals and have a procedure in place to report to the local health department. This results in most outbreaks being reported in pre-schools, schools and residential facilities.

Defining a cluster of illness as an outbreak can be problematic. With rare exception, a minimum of two cases linked in time and exposure are required. An additional measure - above the usual number or background - is also used to define an outbreak situation. Initially, all outbreak reports are considered suspect and are rapidly investigated. Even in situation where an outbreak designation is not met, rapid public health intervention can result in the prevention of future cases and good relationships with facilities that may need public health assistance in the future.

Characteristics of community-acquired outbreaks result from interactions among people in a particular setting and the specific disease etiology. A profile emerges where children acquire infection or infestation associated with a school setting (94 outbreaks reported in pre-schools, 53 reported in elementary schools – 64% of all outbreaks). Gastroenteritis, respiratory infection and pediculosis (head lice), were most common in this young group. While illness is often linked to schools, it must be noted that a school association might be incidental to the real location where transmission occurs. Children who share a school setting often have other social interactions that could also account for the infection or infestation (e.g., sleepovers, parties, play dates, after school care, sports camps). But whatever the original exposure source, schools need to be vigilant to prevent further transmission and can be greatly aided by the expertise of public health nurses in this effort. The second most affected age group for community-acquired outbreaks is an older population associated with residential/assisted living settings. In this age category, GE and scabies are most common (Table 2).

Table 1. Community-Acquired Outbreaks by Disease— LAC, 2013

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Varicella	1	3	3	3
Streptococcal	5	57	11	3-27
Scabies	13	110	8	2-41
Hand, foot & mouth disease	13	102	8	3-30
Pediculosis	50	318	6	2-37
GE illness-Norovirus	17	806	47	13-120
GE illness-Shigella	0	0	0	0
GE illness-Salmonella	1	4	4	4
GE illness- e. coli	1	2	2	2
GE illness-Unknown	37	754	20	4-91
Fifth disease	1	8	8	8
Conjunctivitis	6	41	7	2-11
Influenza	10	461	46	4-176
Respiratory-Unknown	54	717	13	4-52
Other*	20	170	9	2-26
Total	**229**	**3553**	**16**	**2–176**

* Includes: Unk. rash(2), ringworm (1), MRSA(2), coccidioidomycosis (2), Pertussis (3), and unspecified (10).

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2013

Disease	Residential/ assisted living	School[a]	Preschool or Daycare	Other[b]	TOTAL
Varicella	0	0	0	1	**1**
Streptococcal	0	4	1	0	**5**
Scabies	9	1	0	3	**13**
Hand, foot & mouth disease	0	0	13	0	**13**
Pediculosis	1	8	35	6	**50**
GE illness-Norovirus	13	0	2	2	**17**
GE illness-Shigella	0	0	0	0	**0**
GE illness-Salmonella	0	0	1	0	**1**
GE illness- e. coli	0	0	1	0	**1**
GE illness-Unknown	12	8	15	2	**37**
Fifth disease (Parvovirus)	0	0	1	0	**1**
Conjunctivitis	0	0	3	3	**6**
Influenza	4	4	2	0	**10**
Respiratory-Unknown	7	31	16	0	**54**
Other	1	13	4	2	**20**
Total	**47**	**69**	**94**	**19**	**229**

[a] Includes elementary (53) middle school (3) high school (8), multi-grades (3) and universities (2).
[b] Includes work events (2) special ed. sites (1), juvenile camp (1), maternal care center (6), foster care (2) church (2), substance rehab (1), rec center (3) and hotel (1) .

FOODBORNE OUTBREAKS 2013

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 the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food.[1]

The surveillance system used by Los Angeles County (LAC) Department of Public Health (DPH) for detection of foodborne outbreaks begins with a Foodborne Illness Report (FBIR). This 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* [also: shiga toxin producing *E. coli*, or STEC]). LAC Environmental Health Service's (EHS) Wholesale Food and Safety Program (WFS) investigates each FBIR by contacting the reporting individual and evaluating the public health importance and need for expanded follow-up. When warranted, a thorough inspection of the facility is conducted. This public health action is often sufficient to prevent additional foodborne illnesses.

LAC DPH Acute Communicable Disease Control (ACDC)'s Food Safety Unit also reviews all FBIRs. Joint investigations are conducted on 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 there are ill individuals who attended a large event with the potential for others to become ill. The objective of each investigation is to determine the 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.

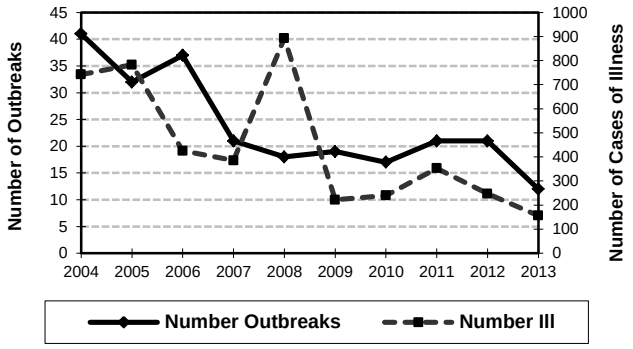
RESULTS

The number of FBIRs received in 2013 (1591) was lower than that received in 2012 (2087). Public reporting via the web accounted for 58% (n=926) of FBIRs this year. WFS contacted each person making the FBIR and performed a site inspection on 29% of FBIR reports that were deemed high priority (n=438). Sixty percent of the complaints (n=950) were referred to district EHS offices and 8% (n=133) were referred to other EHS specialty programs (such as Vehicle Inspection, Street Vending Compliance, Drinking Water, etc.), other LAC departments (e.g., Department of Weights and Measures), or agencies outside LAC (e.g., other local health jurisdictions, state agencies, federal agencies). There were 116 FBIRs (7%) on which WFS did not take action or were duplicates. The categories listed above (i.e., site inspections, referral to district EH offices, and other referrals) sometimes overlap because one FBIR can involve more than one suspected food facility or the findings of an investigation may warrant its referral to another program or agency.

The ACDC Food Safety Unit conducted 14 outbreak investigations this year, all of which were investigated by the Food Safety Unit. Nine of these outbreaks were initiated by FBIR complaints and five were initiated through other surveillance activities. Of these 14 investigations, two (14%) were not considered to be foodborne as the evidence collected during the investigations did not support a foodborne source (OB# 237, 268). 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. Other reasons for these investigations not being considered to be foodborne outbreaks were as follows: 1) no food item was implicated in the case-control study or 2) no significant food violations or ill food handler was identified by the inspection. Determining whether a food item was the source in these outbreaks can be challenging as well as time and resource consuming.

The 12 outbreaks determined to be foodborne are listed in Table 1 and summarized below. These outbreaks represent 156 cases of foodborne illness (Figure 1) and 14 hospitalizations. No deaths were identified. Outbreaks occurred throughout the year, with an unusual peak in June (Figure 2).

Figure 1.
Foodborne Outbreaks
Number of Persons Affected
LAC, 2004–2013



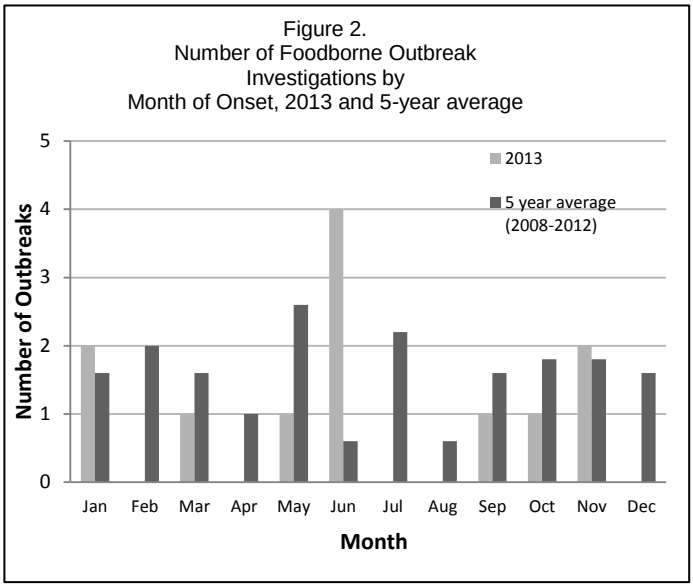
Etiology of Foodborne Outbreaks

A meal was epidemiologically implicated in ten investigations during 2013 (83%) with a specific food item implicated in seven of these. An ill food handler was implicated as the cause of two foodborne outbreaks investigated this year. WFS inspections also identified factors such as temperature violations, improper storage of food items, or improper cleaning of equipment that contributed to occurrence of outbreaks during 2013.

Cooked food items

There was one outbreak involving a cooked food item (refried beans) where a bacterial toxin such as *Bacillus cereus* was suspected. When foods are held at unsafe temperatures bacteria are allowed to grow and produce toxins. Some *B. cereus* toxins are heat-stable and cooking will not destroy the toxin.[2]

Figure 2.
Number of Foodborne Outbreak
Investigations by
Month of Onset, 2013 and 5-year average



Chicken enchiladas were another cooked food item identified in one outbreak where the etiologic agent was confirmed as *Salmonella* Typhimurium. Although salmonellosis is not usually associated with cooked food items, chicken enchiladas eaten at a church fundraising event was the only common food item among the four salmonellosis cases. It is possible that the chicken was undercooked or the crema served on top of the enchiladas was contaminated. It is also possible that the person who prepared the enchiladas was infected with S*almonella*.

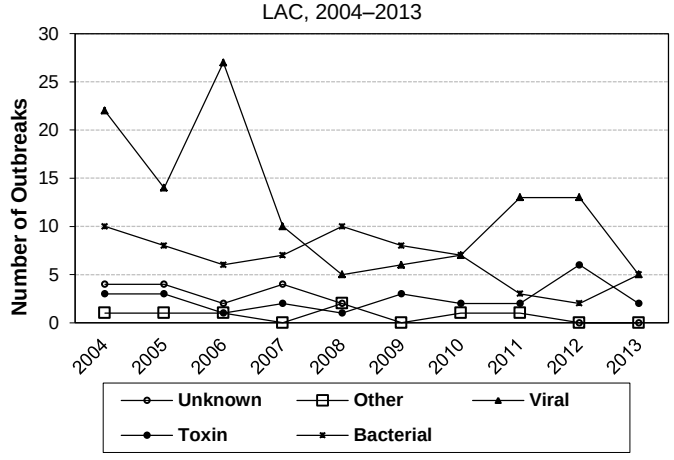
Uncooked food items

There were two outbreaks involving an uncooked food item where the etiologic agent was suspected to be a calicivirus such as norovirus. These items included an antipasto salad and ice cream with berries. The preparation of the antipasto salad requires a fair amount of hand manipulation and it is suspected that a food handler lacking proper hygiene and infected with the virus contaminated this dish. Regardless of whether the ice cream was made in the restaurant, it is also possible that a food handler could have contaminated the ice cream while scooping it into the serving dish. Similarly, the berries could have been contaminated by a food handler.

Foodborne Agents

An etiological agent was identified in all of the foodborne outbreak investigations this year (N=12) and confirmed in 58% (n=7, Figure 3). A viral agent was responsible for five outbreaks, bacterial agents for five outbreaks, and bacterial toxins for two outbreaks (Figure 3).

Figure 3.
Foodborne Outbreaks by Etiologic Agent Category
(Lab Confirmed and Suspect)
LAC, 2004–2013



Norovirus Outbreaks

Norovirus was confirmed or suspected in five foodborne outbreaks this year (42%), which is the less than that observed in 2012 and a considerable drop from the peak number observed in 2006 (N=25).

The largest laboratory-confirmed foodborne norovirus outbreak this year involved at least 13 cases from three different parties who ate at the same LAC restaurant on the same day (OB#202). The incubation times were consistent with a point-source outbreak but no food items were associated with illness. Three patrons tested positive for norovirus. The source of this outbreak was likely food contaminated with norovirus by an ill food handler. However, all food handlers denied illness. Education on ill employee reporting and on norovirus was provided to the management.

Another laboratory-confirmed norovirus outbreak involved ten cases who ate at the same LAC restaurant during the same weekend (OB#169). Seven restaurant employees and three patrons tested positive for norovirus. One of the employees with a positive norovirus laboratory result was ill while preparing the restaurant's salsa for the weekend.

Bacterial Outbreaks

Salmonella was confirmed in four outbreaks this year (OB#85, 123, 159, and 196). The first salmonellosis outbreak occurred in persons eating chicken enchiladas at a church fund raiser. The second salmonellosis outbreak was due to *Salmonella* Mbandaka. Over the course of nine months 15 cases of persons infected with *S*. Mbandaka were reported to LAC DPH. These persons also lived or worked in the same geographic area. Food and restaurant histories were obtained from 11 of the 15 persons. All 11 reported eating at a particular fast food chain restaurant. All restaurant employees were tested for *Salmonella* and two were culture-positive for the outbreak strain of *S*. Mbandaka. Having worked at the restaurant the entire duration of the outbreak, the manager was the more likely source.

The third salmonellosis outbreak was due to *Salmonella* Enteriditis and occurred in a private LAC school. The school had students in kindergarten through high school. During the last week of school several special events took place that involved the serving of food not normally available on campus. Thirty-three ill persons were identified (10 laboratory-confirmed, 23 probable). An analysis of the food items consumed during the week identified tomatoes as being significantly associated with illness. However, anecdotal evidence (provided by the school chef) that some hamburger patties were not fully cooked suggests that hamburgers may have been the source of infection. This evidence is plausible given that the teacher overseeing the cooking of the hamburgers admitted that thermometers were not used to check whether the hamburger patties were completely cooked. Because students were not asked whether the hamburger they ate was undercooked this theory could not be tested statistically.

The last salmonellosis outbreak was due to *Salmonella* Johannesburg and occurred in persons living in the same geographic area. There were 12 laboratory-confirmed cases but no common food source was found. The two most named places were a popular warehouse store and a popular chain restaurant.

However, there was not enough epidemiologic evidence to link the two sources or implicate one over the other. Therefore, there was no testing of employees for either establishment.

Campylobacter jejuni was confirmed in one outbreak (OB#231). This was a point-source gastroenteritis outbreak caused by *Campylobacter* jejuni that occurred among attendees of a fundraising event at an LAC club. Although the dried cod dish was found to be associated with illness, the results are not conclusive due to the small sample size and the lack of biological plausibility. For the cod to be the source of infection, the most likely scenario is that it became contaminated sometime during or after its preparation.

Other Foodborne Outbreaks

There were two outbreaks in which a bacterial toxin was identified as the source (OB#170 & 247). The larger of the two outbreaks involved 11 cases who attended a graduation party held in a private residence in LAC. A caterer set up a taco bar where guests received their tortilla and taco meat from the caterer then topped their taco with various condiments (e.g., salsa, guacamole, onions, cheese) themselves. The symptoms and duration of illness reported by cases were consistent with the ingestion of a toxin secreted by bacteria such as *B. cereus*.[2] Although the etiology of this outbreak was not laboratory confirmed, the incubation times of cases are consistent with a point source exposure involving possibly a bacterial toxin, with exposure occurring at the time that the attendees reported eating food at the party. The beans were eaten by 91% of the cases and significantly associated with illness.

State and National Investigation Involving Los Angeles County

LAC assisted state and federal investigators with 38 *Salmonella*, six STEC, three *Shigella* and one Typhoid cluster investigations that required additional interviews by LAC DPH ACDC staff.

Outbreak Locations

Locations for reported foodborne outbreaks included restaurants (5), the workplace (2), a residence, a community club, a school, and a church, with one unknown location. Service Planning Area (SPA) 2 reported the largest number of outbreaks (42%, Table 2), as was the case in 2010, 2011, and 2012.

Table 1. Foodborne Outbreak Investigation 2013 (N=12)

	Agent	Lab Confirmed	OB#	Setting	Number of Cases	Health District	Food Implicated
1	Salmonella Typhimurium	YES	85	Church	4	South	Chicken Enchiladas
2	Norovirus	NO	104	Restaurant	5	Alhambra	None
3	Salmonella Mbandaka	YES	123	Restaurant	15	West Valley	None
4	Salmonella Enteriditis	YES	159	School	31	West Valley	Raw Tomato
5	Norovirus	NO	167	Office	15	Whittier	Antipasto
6	Norovirus	YES	169	Restaurant	10	Glendale	None
7	Bact Toxin	NO	170	Residence	11	Pomona	Beans
8	Salmonella Johannesburg	YES	196	Unknown	12	West Valley/ Glendale	None
9	Norovirus	YES	202	Restaurant	13	Central	None
10	Campylobacter jejuni	YES	231	Community Club	21	Harbor	Cod
11	Bact Toxin	NO	247	Office	4	Whittier	Tuna Sandwich
12	Norovirus	NO	257	Restaurant	13	Glendale	Ice cream with berries

Table 2. Frequency of Foodborne Outbreaks by Service Planning Area or Location, LAC, 2013 (N=12)

SPA	Frequency	Percent
1	0	0%
2	5	42%
3	2	17%
4	1	8%
5	0	0%
6	1	8%
7	2	17%
8	1	8%

ADDITIONAL RESOURCES

LAC resources:

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

CDC:

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

Other national agencies:

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

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2. Food and Drug Administration. Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins. Second Edition. [*Bacillus cereus* and other *Bacillus* species, pp 96-99]. 2012. Accessible online at:
   http://www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM297627.pdf

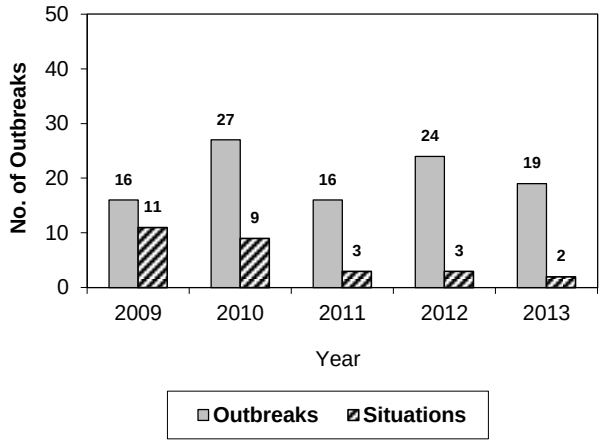
HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITALS

DEFINITION

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

A situation event is defined as a cluster of infections in the setting of a general acute care hospital that may not clearly meet all outbreak criteria defined above, for which additional information is required to determine if an outbreak has occurred.

Figure 1.
General Acute Care Hospital Outbreaks
and Situation Events
LAC, 2009–2013



ABSTRACT

There were 19 confirmed outbreaks reported in acute care hospitals in 2013 (Figure 1), a decrease of 21% from 2012. Seventy-four percent (n=14) occurred in a unit providing intensive or focused specialized care (e.g., neonatal intensive care, hematology/oncology, and cardiothoracic surgery units). Ten percent (n=2) occurred across multiple units within the acute care hospital (Table 1). Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) and *C. difficile* outbreaks each accounted for 16% of all outbreaks. Forty-two percent (n=8) of acute care hospital outbreaks were of bacterial etiology from a frequently reported multidrug-resistant organism (MDRO) such as *Acinetobacter baumannii (A. baumannii)* and CRKP (Table 2 and Figure 2). While scabies, both typical and atypical, accounted for only three outbreaks, they included the greatest number of cases (43, 35%). There were two situation events reported in acute care hospitals in 2013 (Table 4).

Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2013

Outbreak Location	No. of Outbreaks
Critical Care	1
Cardiothoracic Surgery	1
Hematology/oncology	3
Intensive Care – Adult	6
Intensive Care- Neonatal	3
Medical/Surgical	1
Multiple units	2
Newborn nursery	1
Sub-acute Unit within a Hospital - Peds	1
Total	**19**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition/Etiologic agent—LAC, 2013

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
A. baumannii	2	9
Carbapenem-resistant *Klebsiella pneumoniae*	3	27
Clostridium difficile	3	9
Extended-spectrum beta lactamase *E. coli*	2	10
Legionellosis	1	2
Omphalitis	1	6
Scabies	2	29
Scabies, atypical	1	14
Serratia marcescens	1	4
Staphylococcus aureus	1	4
Stenotrophomonas maltophilia	1	4
Unknown Gastroenteritis	1	4
Total	**19**	**122**

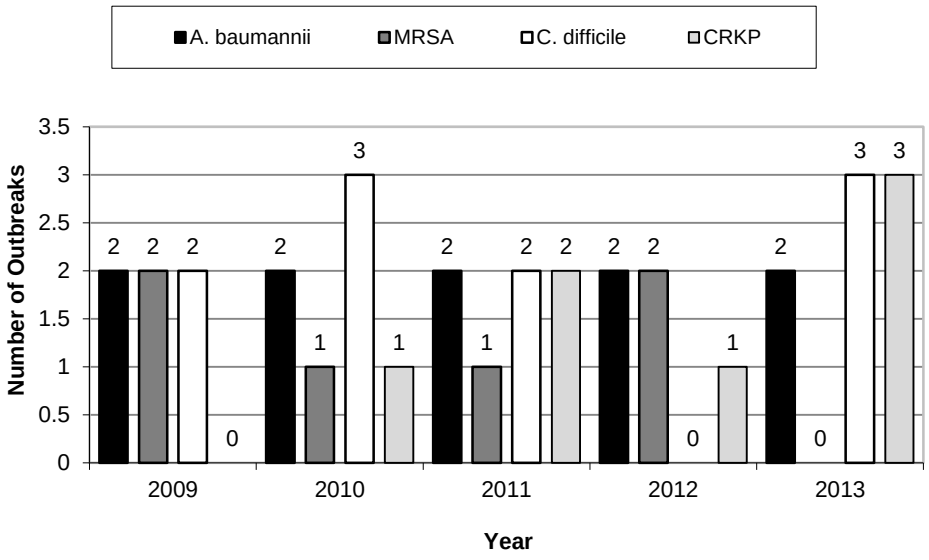
Table 3. General Acute Care Hospital Situation Events by Unit—LAC, 2013

Outbreak Location	No. of Events
ICU	1
NICU	1
Total	**2**

Table 4. General Acute Care Hospital Situation Events by Disease/Condition—LAC, 2013

Disease/Condition/ Etiologic Agent	No. of Events	No. of Cases
Aspergillus	1	3
RSV	1	2
Total	**2**	**5**

Figure 2.
Outbreaks of Selected Bacterial Infections
by Year, LAC 2009-2013



COMMENTS

Antibiotic resistant bacteria have had a direct impact on the U.S. healthcare system and the delivery of services. Multidrug-resistant organisms (MDRO) are dynamic by nature and a significant reason for the rise in healthcare costs. These organisms continue to flourish and cause significant morbidity and mortality in hospitalized patients.[1] The CDC notes that "Each year in the United States, at least 2 million people acquire serious infections with bacteria that are resistant to one or more of the antibiotics designed to treat those infections. At least 23,000 people die each year as a direct result of these antibiotic-resistant infections".[2] According to Zimlichman, E. and Henderson, D. et al., "Hospital-acquired infections account for a large proportion of the harms caused by health care and high rates of morbidity, mortality and costs…there are approximately 444,000 of these infections annually among US adult inpatients and…annual costs are $9.8 billion with over a third attributable to [skin and soft tissue infection]".[3]

In 2013, 63% (n=12) of the acute care hospital outbreaks reported in Los Angeles County were due to an MDRO. CRKP and *C. difficile* were each responsible for three separate outbreaks. All three *C. difficile* outbreaks occurred in specialty care areas treating critically ill or immunocompromised patients and two of three CRKP outbreaks occurred in long-term acute care settings.

This was the first year extended-spectrum β-lactamase (ESBL) *Escherichia coli* (*E. coli*) outbreaks were reported, and both occurred in NICUs. The first outbreak occurred in Hospital A and involved a mother who was febrile on admission and during delivery of twin neonates. The mother was identified as ESBL *E. coli* blood culture positive the day after delivery, and both neonates tested positive in the urine immediately after birth. Infection control measures were implemented after the neonates were first diagnosed, and later enhanced when both became sputum positive. A third, unrelated neonate became blood culture positive 11 days later. Isolates from the mother, twin A, and the third neonate were indistinguishable via pulsed-field gel electrophoresis (PFGE). Vertical transmission from the mother to the twins most likely occurred, with person-to-person transmission to the unrelated neonate via the hands of a healthcare worker. The Infection Preventionist stated that they occasionally identify ESBL *E. coli* in their adult patient population, but these were the first ESBL *E. coli* patients identified in the NICU.

The second ESBL *E. coli* outbreak involved seven neonates in the NICU of Hospital B over a three month period from October 2013-January 2014. These were also the first ESBL *E. coli* neonates identified among the NICU population of this facility. Review of staff assignments and environmental cultures did not identify a point source for the outbreak. Isolates from all neonates were available and tested via PFGE. Four neonates were genetically related to each other. One neonate and one healthcare worker (HCW) who tested positive via surveillance culture were genetically related to each other but unrelated to the other cases, and two neonates were unrelated to each other and to the other cases. An informal survey of LAC hospitals with NICUs showed ESBL *E. coli* organisms identified in only one of 20 facilities that responded to the survey. These two outbreaks may signal the emergence of ESBL *E. coli* in the LAC healthcare community.

Each of these outbreaks was discovered by an astute clinician or IP conducting routine MDRO surveillance. Their subsequent actions illustrate the importance of consistent vigilance surrounding healthcare acquired infections and demonstrate the need for continued surveillance of these pathogens.

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1. Kontra, J, Reduction of Surgical Site Infections by Pre-Operative Eradication of the Staphylococcus Aureus Carrier State: A Paradigm Whose Time has Come. The Journal of Lancaster General Hospital; Spring 2012:Vol. 7-No.1, p.4-7.

2. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Antibiotic Resistance Threats in the United States, 2013. http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf#page=28.

3. Zimlichman, E, Henderson, D and Tamir, Orly, et al., Original Investigation Healthcare-Associated Infections: A Meta-analysis of Costs and Financial Impact on the US Health Care System, JAMA Intern Med; Published online September 2, 2013,

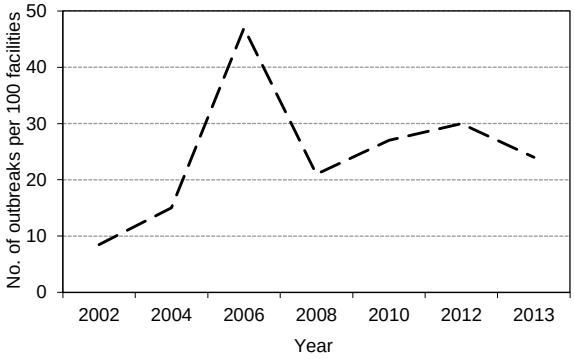
HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

DEFINITION

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

The sub-acute care facilities include free-standing dialysis centers, skilled nursing facilities (SNF), intermediate care facilities and psychiatric care facilities. SNFs provide continuous skilled nursing care to patients on an extended basis. Intermediate care facilities also provide skilled nursing and supportive care to patients who need these services but do not require continuous nursing care. Psychiatric facilities provide 24-hour inpatient care for patients with psychiatric care needs.

Figure 1.
Skilled Nursing Facility Outbreak Rates
LAC, 2002 – 2013*



* The total number of licensed SNFs , 399, was utilized to calculate the 2012 and 2013 SNF outbreaks per 100 facility rate.

ABSTRACT

- Total confirmed sub-acute care associated outbreaks decreased by 21% from to 124 to 98 outbreaks in 2012 and 2013, respectively.
- The number of SNF outbreaks decreased by 19% from 119 to 96 outbreaks in 2012 and 2013, respectively (Table 1). The rate of SNF outbreaks was 24 per 100 facilities in 2013 compared with 30 per 100 in 2012. (Figure 1).
- There were outbreaks in all three categories of sub-acute healthcare facilities with the exception of dialysis facilities in 2013 (Table 1).

Table 1. Number of Reported Outbreaks in Sub-acute Healthcare Facilities LAC, 2007–2013

	YEAR						
Type of Facility	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Intermediate Care Facilities	3	-	3	-	4	2	1
Psychiatric Care Facilities	3	2	-	-	3	3	1
Dialysis Centers	-	-	-	-	1	-	-
Skilled Nursing Facilities	110	85	166	104	102	119	96
Total	116	87	169	104	110	124	98

Intermediate Care Facilities: One unknown respiratory outbreak was reported in an intermediate care facility in 2013 compared with two gastroenteritis (GI) outbreaks in 2012.

Psychiatric Facilities: One scabies outbreak was reported in a psychiatric care facility in 2013 compared with three total outbreaks reported in 2012 to include norovirus, unknown GI and unknown rash.

Skilled Nursing Facilities: Ninety-six outbreaks were reported by SNFs. Rash illness was the most frequently reported outbreak category, 40 (41%) outbreaks, and GI illness involved the greatest number of

outbreak- associated illness, with 743 (42%) cases. In 2012, GI outbreaks, were both the most frequently reported outbreak type, 62 (52%) outbreaks, and also had the greatest number of outbreak associated illness cases, 1405 (71%).

Table 2. All Sub-acute Healthcare Facilities Outbreaks by Disease/Condition LAC, 2013

Disease/Condition	No. of Outbreaks	No. of Cases
Gastroenteritis (GI) • Unspecified (n=10) • Norovirus (n=23) • Clostridium difficile (n=2)	35	743
Respiratory illness • Unspecified (n=15) • Influenza (n=8)	23	533
Rash Illness • Scabies (n=27) • Unknown Rash (n= 13)	40	506
Total	**98**	**1782**

COMMENTS

The total number of outbreaks within sub-acute care facilities decreased by 21% in 2013 compared to 2012 with 98 and 124 outbreaks reported in respective years. In 2013, rash illness outbreaks were the most frequently reported outbreak type. Rash illness outbreaks decreased in 2013 compared to 2012 with 40 to 43 outbreaks documented in respective years. Scabies outbreaks increased by 12% with 27 (28%) outbreaks associated with 349 total cases in 2013 compared with 24 outbreaks with a total of 214 cases in 2012. The number of unknown rash outbreaks decreased by 32% from 19 to 13 in 2012 and 2013, respectively. Since 2009, a scabies toolkit and guidelines has been posted on the public health web site to enhance reporting, documentation and control. The reasons for the increase in scabies and decline in unknown rash outbreaks is unclear. It is possible that more rash outbreaks are being appropriately diagnosed as scabies to result in fewer rash outbreaks being classified as unknown rash.

The total number of reported GI outbreaks decreased by 48% in 2013 compared to 2012. In 2013, 35 (23 confirmed norovirus, 10 unknown GI, and 2 *Clostridium difficile)* were documented compared to 67 GI outbreaks (40 confirmed norovirus, 24 unknown GI, 3 *Clostridium difficile*) in 2012. The total number of GI outbreak associated cases in 2013 decreased by 56% with 743 cases of which 28 (4%) were hospitalized and 1 (0.1%) deceased compared with 1626 cases in 2012 of which 86 (5%) were hospitalized and 1 (0.06%) deceased. The average number of cases for each GI outbreak was 21 and 25 cases in 2013 and 2012, respectively. The total number of documented symptomatic staff declined by 52% with 158 (21%) and 326 (19%) staff members affected by GI illness in 2013 and 2012, respectively, however, the proportion of affected staff within outbreaks increased slightly from 2012 to 2013. In 2013, of 158 symptomatic staff affected by GI outbreaks, most staff were direct care, 111 (70%) and 43 (27%) were non-direct care staff (i.e., housekeeping) and for 4 (2%) cases, staffing duties were not available (Table 3). SPA 3 has consistently reported the most GI outbreaks of any LAC SPA since 2008 with 25 (37%) and 16 (46%) outbreaks in 2012 and 2013, respectively.

A greater proportion of norovirus outbreak strain typing was completed for laboratory-confirmed norovirus outbreaks in 2013 compared with 2012 with 17 of 23 (74%) and 25 of 40 (63%) outbreaks typed in respective years. As in 2012, the GII.4 Sydney strain was the predominant norovirus strain type in LAC sub-acute facilities in 2013. The GII.4 Sydney strain was first identified in Australia in March 2012 and found to

be responsible for over 50% of United States gastroenteritis outbreaks reported to Centers for Disease Control and Prevention (CDC) by December 2012[1]. Of the 17 norovirus strain typed outbreaks in 2013, 14 (61%) were GII.4 Sydney strain, three outbreaks were strain typed as GI.6A, GII.5, and GII.13, with one outbreak each, respectively. In 2013, norovirus outbreaks peaked in December 2013 with ten (43%) outbreaks; in contrast, in 2012, the norovirus season started in October with ten (40%) outbreaks and peaked with 25 (63%) outbreak reports in November 2012. The mean duration of norovirus outbreaks decreased from 11 to 9 days, in 2012 and 2013, respectively.

In 2013, 23 respiratory outbreaks were investigated causing 533 cases of outbreak-associated illness. Of 23 outbreaks, eight (35%) outbreaks were most likely caused by the influenza virus and 15 (65%) were due to unknown etiologies. Respiratory outbreaks were classified as influenza if there were at least two documented laboratory-confirmed cases of influenza. January was the most frequently reported month of influenza outbreak onset, five (63%), followed by March and February with two (25%) and one (12%) outbreaks, respectively. Influenza outbreaks were associated with 273 cases of respiratory illness to include 45 hospitalizations and one death. Of 273 cases, 236 (86%) were residents and 37 (14%) were staff members to include 31 (84%) direct care staff, four (11%) with non-direct care responsibilities and in two (5%) cases staffing duties were not documented (Table 3). Of the 273 cases documented in influenza outbreaks, 25 (9%) cases were laboratory confirmed, of which 20 (80%) were confirmed as Influenza A and five (20%) were Influenza B. Of 25 confirmed influenza cases, only three (12%) were subtyped as Influenza A subtype H3. Of 533 respiratory outbreak cases, in 2013, 260 (49%) were classified as unspecified respiratory infection, compared with 89 (45%) in 2012.

Sub-acute facility outbreaks were investigated and documented from all LAC eight SPAs in 2013. The greatest proportion of outbreaks were investigated within SPA 3, 36 (37%) followed by SPA 2 with 26 (27%). This was consistent with outbreak reports in previous years.

Table 3. Symptomatic Patients and Staff from Sub-Acute Care Facility Outbreaks, LAC, 2013, N=1782.

Disease/Condition	Residents n=1455 (%)	Facility Staff n=327 (%)		
		Direct care staff n=249 (%)	Non-direct care staff n= 66 (%)	Unknown staff duties n=12 (%)
Gastroenteritis (GI)				
Unspecified	91 (6)	12 (5)	6 (9)	0
Norovirus	484 (33)	97 (40)	36 (55)	4 (33)
Clostridum difficile	10 (1)	2 (1)	1 (2)	0
Respiratory illness				
Unspecified	201 (15)	37 (15)	17 (26)	5 (42)
Influenza	236 (16)	31 (12)	4 (6)	2 (17)
Rash Illness				
Scabies	298 (20)	48 (19)	2 (2)	1(8)
Unknown Rash	135 (9)	22 (8)	0	0
Total	1455(100)	249 (100)	66 (100)	12 (100)

[1] CDC. Emergence of New Norovirus Strain GII.4 Sydney- United States, 2012. MMWR 2013; 62.

PREVENTION

The majority of outbreaks in sub-acute care facilities are caused by agents spread via person-to-person contact. Thus, appropriate hand hygiene practice by staff and residents is a crucial infection control measure. Influenza vaccination for sub-acute facilities staff and residents as well as proper hand washing, administrative controls, utilization of appropriate antiviral prophylaxis for facility residents and staff and isolation are essential in the prevention of seasonal influenza.

In the spring of 2012, Acute Communicable Disease Control (ACDC) in collaboration with Community Health Services (CHS), Health Facilities Inspection Division, Licensing and Certification Program (HF), and Environmental Health (EH) formed the Norovirus Outbreak Prevention Project (NOPP) in response to an increasing number of GI outbreaks reported by sub-acute facilities. Details of the NOPP are presented in a 2013 ACDC Special Report.

This is the first complete year that the impact of NOPP can be assessed. In 2013, the number of GI outbreaks decreased by 48% from 67 to 35 in 2012 and 2013, respectively. It is likely that increased awareness of norovirus disease from NOPP training led to better containment, investigation, and reporting of GI outbreaks. It can also be presumed that there was also increased community-wide immunity among both SNF patients and staff to the predominant circulating SNF outbreak strain (GII.4 Sydney) during the second year of circulation within LAC, which also contributed to a decline of GI outbreaks in 2013.

In 2013, our unit saw the widespread use of updated outbreak case line lists from the norovirus toolkit for all SNF-associated outbreaks. This facilitated the documentation of staff (direct and non-direct patient care) for all SNF related outbreaks. Overall, 327 (18%) staff member were reported ill from 98 sub-acute care outbreaks to include GI, respiratory or rash illness involving 1782 total illness cases. Of these staff members, 249 (76%) were direct care staff 66 (20%) were non-direct care staff and for 12 (4%) staffing duties were not available (Table 3). Assessment of staff risk factors in the spread of GI, respiratory and rash illness will continue to be an important goal in preventing the spread of disease by sub-acute facility staff members.

Acute Communicable Disease Control Program

Special Studies Report

2013

Los Angeles County
Department of Public Health

Laurene Mascola, MD, MPH, FAAP
Chief. Acute Communicable Disease Control

County of Los Angeles
Public Health

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ACDC SPECIAL STUDIES REPORT 2013

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BOTULISM CASE REPORT SUMMARY
LOS ANGELES COUNTY, 2013

Moon Kim, MD, MPH

Four cases of botulism were reported in 2013 that met case definition (four probable, one confirmed). All cases survived. All four cases were wound botulism cases. All four had a history of injection drug use with heroin. One was confirmed by mouse bioassay on serum for toxin A performed by the Los Angeles County Public Health Laboratory and two were classified as probable cases by the Centers for Disease Control and Prevention's (CDC) Matrix-assisted laser desorption/ionization-Time of Flight (MALDI-TOF) test for toxin A in serum[1]. One case was classified as a probable case based on history and clinical criteria. This case had history of black tar heroin use and presented with respiratory failure and was intubated in the emergency room; serum and stool collected almost three weeks after symptom onset were negative for botulism toxin.

Two additional reports of suspected botulism did not meet case definitions for confirmation. One patient was thought to have Miller Fisher variant of Guillain-Barré syndrome or myasthenia gravis as symptoms improved, antitoxin was never administered, and serum was negative for botulism toxin. The other patient was an injection drug user who presented with a clinical picture similar to botulism. He received antitoxin and intravenous gamma globulin, serum was negative for botulism toxin.

The local health department's only responsibility for infant botulism is immediate telephone reporting of suspected cases to the California Department of Public Health's (CDPH) Division of Communicable Disease Control. All suspected cases are investigated by the CDPH Infant Botulism Treatment and Prevention Program.[2]

[1] Barr JR, Moura H, Boyer AE, Woolfitt AR, Kalb SR, Pavlopoulos A, et al. Botulinum neurotoxin detection and differentiation by mass spectrometry. Emerg Infect Dis. 2005; 11 (10): 1578-1583
[2] Infant Botulism Treatment and Prevention Program. Division of Communicable Disease Control, California Department of Public Health. http://www.infantbotulism.org/.

PERTUSSIS CLUSTERS IN LOS ANGELES COUNTY SCHOOLS, 2013

A Nelson EL Amin, MD, MPH and Emmanuel Mendoza, MPH

INTRODUCTION

Since the California resurgence of pertussis in 2010, during which 972 pertussis cases were recorded in the Los Angeles County Health Jurisdiction with four infant deaths, the number of cases over subsequent years has steadily fallen, reaching near base-line levels in 2012 when 154 annual cases were reported. During the first six months of 2013, the State of California Immunization Branch documented a state-wide increase in pertussis cases, especially among children of middle to high school age, particularly notable in Northern California counties.

In the Los Angeles County Health jurisdiction, the number of year-to-date pertussis cases continued to be less than what was observed during the corresponding time period in 2012 until early November of 2013 when a definite increase in pertussis cases was noted. The year (2013) ended with 283 total pertussis cases having been reported, an 84% increase over what was reported in 2012. One contributing factor to this increase was a large number of pertussis cases among middle to high school-aged children attending five schools in the northern area of Los Angeles County. This increase in pertussis cases occurred despite the California middle-school Tdap vaccination requirement that was first implemented in 2011 (1). This report describes the cluster of pertussis cases that occurred at each of the five schools.

METHODS

Pertussis cases at each of the schools were assessed by a review of final contact investigation records with regard to time of symptom onset, temporal relationship to other pertussis cases at the same school, and in the same classroom, as well as, other linkages among the students. Cases are listed in the order that they developed symptoms, which did not always equate to the order in which they were reported to the Los Angeles County Department of Public Health.

Following the first case at a school, subsequent cases were classified as cohort cases if they occurred less than five days after the previous case, based on the fact that occasionally, the incubation period for pertussis can be as short as five days.

In accordance with this health jurisdiction's pertussis containment procedures, close family members and other social face-to-face contacts of pertussis cases, (especially persons at high risk of complications if they develop pertussis) were offered pertussis post-exposure prophylaxis (4). Asymptomatic, unvaccinated students, in the same classroom as the pertussis case, were given the option of one-time post-exposure prophylaxis, in lieu of being excluded from school for 21 days. Asymptomatic unvaccinated students who received post-exposure prophylaxis once, did not receive repeat prophylaxis if re-exposed to another case but were monitored for signs and symptoms of pertussis and treated (with exclusion from school for five days of treatment) if pertussis signs and symptoms developed.

RESULTS (refer to Tables 1 and 2, and Chart 1)

Of the total 38 cases included in this report, 30 were PCR positive and met the Centers for Disease Control and Prevention (CDC) clinical criteria for pertussis (two weeks or more of cough, with either paroxysmal coughing or post-tussive vomiting or an inspiratory whoop) (2). Seven (7) of the 38 cases were PCR positive, and had a cough illness of varying duration but did not meet the clinical criteria for pertussis. These seven cases were classified as "suspect" pertussis cases because of their positive PCR status, in accordance with California Department of Public Health Immunization Branch surveillance guidelines (3). One (1) of the 38 cases had an equivocal PCR test result but met the clinical criteria for pertussis and was therefore labeled a "probable" pertussis case.

School A – Student Population: 2,170

Case 1 had onset of cough illness on 9/3/2013 while case 2 had onset of disease on 9/22. Case 3, who shared two classes with case 1 and one class with case 2, became ill on 9/24. Additionally, case 3 participated on a community volleyball team with a student from another high school (referenced later) who developed pertussis on 11/27. Cases 2 and 3 are in the same cohort regarding time of disease onset.

Cases 4 and 5 had disease onset dates of 11/4 and 11/8, respectively and although they were cohort cases, did not share any classes with cases 1, 2, and 3. However, cases 4 and 5 both participated in the school band. Case 6 had onset of cough on 11/17. Case 7 had disease onset on 12/1 and was exposed to cases 4 and 5 during participation in the band. Case 7, also, shared a class with case 4.
Case 8 had onset of cough on 12/10 and shared a class with case 6.

School B – Student Population: 400

Case 1 had onset of cough illness on 9/9 and did not share classes with any of the subsequent cases that occurred at his school. Cases 2 and 3 had disease onset dates of 10/8 and 10/18, respectively. Case 4 became ill on 10/26 and shared five classes with case 2. Case 4 was, also, a sibling to case 3.

Case 5 had disease onset on 10/26 and was a sibling to case 2. Case 6 became ill on 11/9 and shared four classes with case 3. Case 7, who became ill on 11/16, shared one class with case 4 and a class with case 2.

The 8th and final case at this school had onset of disease on 11/27, shared three classes with case 3 and participated on the school volleyball team with cases 3 and 4.

School C – Student Population: 2,800

Cases 1 and 2 both had the onset of their symptoms on 10/25 and neither of them shared classes with other cases. Case 3 and 4 became ill on 11/4 and 11/27, respectively. Case 5, also, became ill on 11/27 and shared a class with case 3. Additionally, case 5 participated on the community volleyball team (previously noted) with a case from school A.

Cases 6 and 7 had the onset of their illnesses on 12/2 and 12/7, respectively and did not share classes with other cases. Cases 8 and 9 are siblings and both became ill on 12/16. Case 9 shared a class with case 3. Case 10 became ill on 12/22 and did not share classes with any other cases.

School D – Student Population: 218

Case 1 had disease onset on 11/18 and shared 6 classes with case 2. Case 2, a student who had not yet received the required Tdap booster vaccine dose, also, became ill on 11/18. Case 3 became ill on 11/27, and case 4, who shared six classes with case 3, became ill on 12/15. Case 5 became ill on 12/21 and did not share classes with other cases.

Most significantly, a school employee who worked in the attendance front office became ill with pertussis on 11/26 and may have transmitted disease to other cases for which no classroom linkages were identified. (Additional cases continued to occur at this school during January 2014 but are not included in this report.)

School E – Student Population: 3,000

Case 1 became ill on 11/28 and cases 2 and 3 both became ill shortly thereafter on 12/2. Case 4 had disease onset on 12/4 and shared a class with case 3. Case 5 had disease onset on 12/5 while case 6, who shared a class with case 5, developed a cough illness on 12/7. Case 7 became ill on 12/13 and shared a class with case 3.

Most of the cases at this school were cohort cases. However, case 7's illness may have resulted from classroom transmission. (Additional linked cases occurred at this school during January 2014 but are not included in this report.)

DISCUSSION

Multiple classroom linkages were identified among the majority of pertussis cases in most of the schools in this study. In some instances, pertussis cases shared as many as six classes with other pertussis cases, which probably resulted in intense exposures, contributing to disease in fully vaccinated children. Although multiple classroom linkages were identified for the cases in school D, most were among cohorts of cases who, with the exception of one, may have been infected from out-of-school contacts.

Non-classroom linkages, such as the school band and school volleyball team, were identified at two of the schools. Additionally, participation in a community-wide intramural volley-ball team linked pertussis cases at two of the schools.

School C had the highest number of pertussis cases but classroom linkages were identified for only two of the cases. However, as was observed during a meningococcal meningitis outbreak investigation at a high school in another region of California, adolescents often have patterns of intense social interaction at school, above and beyond classroom or other formal encounters (5). Also, at school C, two of the cases were siblings.

School C is located in a different community that is at the northern-most region of the area represented by all of the schools that were studied. It's possible that geographical factors, as well as, limited shopping options in that community (which could, paradoxically, facilitate a greater frequency of community contact) may have been responsible for increased non-school related exposures for persons attending school C. Additionally, one of the largest amusement parks in Southern California is immediately proximal to the communities served by all of the high schools in this analysis. This amusement park's unique rollercoaster rides, has always been a positive attraction for teens in the area, possibly contributing to teen intermingling and transmission of a disease like pertussis. However, because the students were not questioned regarding trips to the amusement park, no data is available to further assess the extent to which attendance at the park could have facilitated spread of pertussis within the community.

Our discussion would be remiss without a comment on the efficacy of one dose of pertussis vaccine as a preteen booster, as required by the California School law for students entering the 7th grade, especially since only one of the pertussis cases was under-immunized for pertussis (had not received the pertussis booster). A Tdap efficacy study in the State of Washington, that reviewed pertussis cases from counties with the highest case counts from January 1 through June 30, 2012, found that for adolescents who received all of their primary pertussis immunizations as acellular pertussis vaccine, the Tdap booster was about 75% effective in preventing pertussis within one year of Tdap vaccination but that level of effectiveness declined to only 40% or less two to four years after vaccination (6). When the total number of pertussis cases at the schools described in our report were stratified by grade level, the results showed a trend of fewer cases in grades 7 and 8 and more cases in grades 9, 10, and 11 (see chart 1), which supports a waning of vaccine effectiveness. However, it should be noted that the total number of pertussis cases observed during our analysis represented a very small percentage of the total student populations at each of the schools, suggesting a significant benefit from implementation of the 2011 middle-school Tdap requirement in California.

LIMITATIONS

A potential limitation of this analysis is that none of the pertussis specimens were submitted for *Bordetella pertussis* culture. However, the need to maintain fastidious culture media kits in physician offices, in order to ensure that specimens are kept viable for transportation to the laboratory, is a major limiting factor that prevents the widespread use of pertussis cultures to confirm the diagnosis in outpatient settings. The

providers serving the student population in our study area have all adopted PCR testing as practically more feasible.

Despite the lack of bacteriological culture results for any of the reported cases, the fact that 79 % of the PCR positive cases met CDC's clinical criteria for pertussis and could therefore be classified as laboratory-confirmed cases supports the classification of these cough illness clusters as pertussis outbreaks. Secondly, positive PCR results were obtained by various types of provider organizations (from small medical groups to large HMO organization such as Kaiser Permanente), minimizing the likelihood that a provider office contributing false-positives because of poor technique could significantly impact the results of this analysis. In an effort to minimize the potential for false-positive PCRs, providers we suspect might be obtaining false-positive results as a result of vaccine contamination are sent information regarding corrective steps.

Special acknowledgement and appreciation goes to the Los Angeles County Public Health Nurses in SPAs 1 and 2 who worked tirelessly to identify the intra-school and out-of-school linkages for the pertussis cases analyzed in this report.

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COCCIDIOIDOMYCOSIS AMONG CAST AND CREW OF A TELEVISION SHOW

Patricia Marquez, MPH and Dawn Terashita, MD, MPH

Coccidioidomycosis (cocci), or valley fever, is a fungal disease caused by the inhalation of *Coccidioides immitis* spores that are carried in dust. Environmental conditions conducive to an increased occurrence of cocci include arid to semi-arid regions, dust storms, hot summers, warm winters, and sandy, alkaline soils. This fungus is endemic in the northern part of Los Angeles County and much of the central valley of California. Exposure and risk for infection occurs when soil is disturbed and the spores become aerosolized; for this reason cocci is a known risk factor in construction and other outdoor, manual labor type jobs in these areas. We describe an outbreak of cocci among the cast and crew of a television show that was associated with an outdoor shoot in a cocci endemic area.

On March 25, 2013 the Los Angeles County Department of Public Health (LAC DPH) was contacted by, the Centers for Disease Control and Prevention (CDC) Epidemic Intelligence Service Officer at the California Department of Public Health (CDPH). CDPH had identified a cluster of coccidioidomycosis workers' compensation claims from a state occupational health database. The suspected location of exposure was a ranch located in Simi Valley, which is a film location that is used in outdoor shoots for movies and TV. The cluster involved crew from a TV show, and an on-location shoot from January 17-19, 2012. The shoot recreated an outdoor music festival, and it was suspected that exposure was created during the construction of sets that dispersed a lot of soil and dust or during the shoot through vehicular and foot traffic.

METHODS

CDPH provided a list of individuals from the same employer, Employer A, that had filed workers' compensation claims as well as a letter that the production studio, Studio A, distributed to cast and crew of the show shortly after identification of illness. CDPH provided LAC DPH with a list of eight claimants and medical records for four claimants. In the investigation a confirmed case was defined as any participant of the location shoot at the movie ranch who tested positive for coccidioidomycosis by any diagnostic method and had clinical symptoms consistent with cocci.

LAC DPH contacted the Environmental, Health and Safety Director for Studio A, who signed off on the notification letter. This safety director indicated he drafted the letter and sent it to the production manager. He stated he was unsure who received notification and how; he assumed the letter was posted in common areas for all to see. LAC DPH obtained a roster of approximately 655 employees from the production company to identify other cocci cases. Cross referencing the roster of cast and crew with the LAC DPH coccidioidomycosis surveillance database did not identify other ill individuals. A comparison of the roster with the worker's comp database and state reportable disease database conducted by CDPH also did not identify any other ill individuals.

An initial web search conducted by CDPH using terms specific to the name of the show and the site filming location led to fan websites, revealing that this particular episode of the television series was set primarily in an outdoor music event modeled after the Coachella Music Festival in Coachella, California. An LAC DPH web search of the name of the show and coccidioidomycosis identified one of the stars of the show as having been diagnosed with the disease and hospitalized at an LAC hospital in February 2012. This case regularly sent Tweets (social media messages) throughout their hospitalization, though they did not identify additional cases or suggest an outbreak. Upon interviewing this case we identified another patient who also met the case definition, a visitor to the set. Additional web searches identified an extra of this show that had been diagnosed with coccidioidomycosis but had not been on the set of

suspected exposure. Therefore, he is not considered a case in this investigation. Interestingly, he had been on a different ranch, for a different show, during his exposure period for coccidioidomycosis. Phone calls and attempts at contact were made for all individuals reported by CDPH and identified by social media; LAC DPH interviewed seven of the ten.

RESULTS

Of the ten cases identified, seven were male; median age was 37 years (range 23-58). Half (5) of the cases were actors, three were sound/camera operators, one was involved in construction of the sets and another was a visitor to the set (Table 1). The mean time to symptom onset was seven days (range 3-26 days). Of the ten cases identified during the investigation only two engaged in soil-disrupting activities during or immediately preceding the filming event. However, interviews with employees indicated that substantial manual digging and operating of heavy machinery was required for set construction, including erecting an amusement park and a large stage, and digging a large mud pit. Several cases indicated they were shuttled up to the set location from the main parking area of the ranch, and these shuttles generated a lot of dust up and down the roads. Two cases stated there was a water truck onsite at the film location, though we did not specifically ask about the conditions of the soil while digging. Five of the seven interviewed case patients reported dry dusty conditions during the filming event. Almost all sources of identification of cases were through Doctor's First Report of Occupational Injury and Illness (DFR).

A total of five confirmed cases, and five probable cases were identified from the investigation. A probable case had compatible clinical criteria and was present at the filming event. Severity of illness ranged from mild flu-like symptoms to pneumonia. Two cases were diagnosed with pneumonia and hospitalized at an LAC hospital; one case for four weeks the other for two days. These two cases experienced severe cough, fatigue, shortness of breath, chest pains and high fever. The remaining eight cases experienced cough, fever, fatigue, headaches and muscle pain for lengths varying two to four weeks. One case did experience a rash during the course of their respiratory illness. Two cases were seen as outpatients at a clinic that is affiliated with the entertainment industry. One case was seen at an LAC hospital and then treated at a hospital in Arizona. Four cases visited an ED for their illness.

DISCUSSION

The ten cases identified out of 655 employees reported by the production company yielded an attack rate of 1.5% for the on-location shoot. The onset of illness and the epidemiologic findings indicates the outdoor shoot as the most likely source of exposure for this cluster. Social media was useful in identifying two additional cases and a unique, though unrelated, case among an extra of that show that was not on this particular set. Social media technology permits the sharing of information, and is stored online indefinitely, to be readily searched when needed. Also, the millennial generation's increased willingness to share online may allow public health to connect the dots among cases in a wide spread of location and time.

Table 1. Coccidioidomycosis outbreak case characteristics

Case #	Confirmed/Probable	Interviewed	Occupation	Exposure period	Time to Illness	Hospitalized	Symptom Duration	Identification Source
1	Confirmed	Yes	Actor	3 days	5 days	4 weeks	4 weeks	Social Media
2	Probable	No	Actor	3 days	26 days	No	unk	DFR
3	Confirmed	Yes	Actor	3 days	4 days	No	1 week	DFR
4	Probable	Yes	Actor	3 days	3 day	No	3 weeks	DFR
5	Probable	No	Actor	3 days	unk	No	unk	DFR
6	Probable	No	Sound tech	3 days	13 days	No	unk	DFR
7	Confirmed	Yes	Camera operator	3 days	20 days	No	6 mos	DFR
8	Probable	Yes	Construction Manager	4 days	7 days	No	3 weeks	DFR
9	Confirmed	Yes	Prop Maker/built sets	3 days	2 days	No	4 weeks	DFR
10	Confirmed	Yes	N/A (visitor)	3 days	13 days	2 days	3 weeks	Patient Interview

LEGIONELLOSIS OUTBREAK AT A HOSPITAL ONCOLOGY UNIT

L'Tanya English, RN, MPH and Moon Kim, MD, MPH

BACKGROUND

Legionellosis, or Legionnaires disease (LD), is an opportunistic infection caused by the gram negative bacteria, *Legionella* species (spp.), which thrives in natural and man-made water environments. It is ubiquitous in nature and can be found in large water sources such as lakes, streams, and rivers. It also grows in man-made water environments such as hot and cold domestic water systems, water heaters, storage tanks, cooling towers and humidifiers.[1]

In the hospital setting, *Legionella* spp. can be found in the water system, tap water faucets, tubs and showers, whirlpool baths and fountains. Per the Centers for Disease Control and Prevention (CDC) Healthcare Infection Control Practices Advisory Committee (HICPAC) 2003 Guidelines for Environmental Infection Control in Health-Care Facilities, "In several hospital outbreaks, patients have been infected through exposure to contaminated aerosols generated by cooling towers, showers, faucets, respiratory therapy equipment, and room-air humidifiers."[2]

Legionella transmission is via inhalation or direct aspiration from a water source contaminated with *Legionella* spp. Individuals who are immunocompromised or have underlying medical conditions are at highest risk for *Legionella* acquisition.

On July 1, 2013, Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) received electronic notification of a single case of *Legionella pneumophila* serogroup 1 (LP1) from Hospital A. After review of additional clinical and laboratory data, ACDC determined that the infection was healthcare-associated (HA) based on CDC criteria and recommended a six-month retrospective review of patients with nosocomial pneumonia and prospective *Legionella* surveillance for at least two months at the end of the six-month retrospective surveillance period. On July 22, 2013, the infection preventionist (IP) notified ACDC of a second patient who was LP1 urinary antigen positive and occupied the same room after the first patient was discharged, and an outbreak investigation was initiated.

METHODS

Case Definition

A case was defined as a patient at Hospital A who was laboratory-confirmed LP1 urinary antigen positive between June 29, 2013 and July 30, 2013. A definite HA case was defined as a patient hospitalized ≥10 days continuously prior to the symptom onset. A possible HA case was defined as a patient hospitalized for two to nine days prior to symptom onset.

Case Characterization

ACDC conducted a comprehensive review of case clinical, laboratory and related records.

Case Room Review

ACDC reviewed the room locations for both cases from admission to discharge.

Control Measures

Multiple infection control measures were implemented by Hospital A upon identification of the positive cases.

Background *Legionella* Surveillance

ACDC reviewed all *Legionella* Confidential Morbidity Report (CMR) forms received between January 2011 and July 2013. In addition, patient epidemiologic background data was reviewed.

Facility *Legionella* Surveillance

The IP conducted six months retrospective surveillance from January 26, 2013 through June 26, 2013 to identify previous HA cases and prospective surveillance from June 26, 2013 through August 26, 2013 to identify additional HA cases as recommended by ACDC. Prospective surveillance continued through December 2013.

Site Investigations

Multiple joint site investigations with LAC DPH Environmental Health (EH) were conducted throughout the outbreak to gather additional information, update the status, collect environmental samples and observe the water remediation treatment.

Facility Construction, Repair and Remediation

There was a hospital-wide construction prior to the outbreak. On the oncology unit, there was major construction to a room that is adjacent to the case patients' room B. Construction activities involved removal of plumbing fixtures and water shut off to the room.

LAC DPH Environmental Sampling

LAC DPH EH collected swab and water samples, prior to the initial water remediation. All samples were submitted to the LAC Public Health Laboratory (PHL) for *Legionella* testing.

Facility Environmental Sampling

Hospital A hired an outside environmental consultant (OEC) to collect and test environmental samples. The OEC laboratory participates in the Environmental *Legionella* Isolation Techniques Evaluation (ELITE) program that is CDC-certified.

Facility Water Remediation and Water Management Plan

A plan for water remediation was developed by the OEC after the initial facility and LAC DPH water sampling results were available. The facility also developed an ongoing water management plan to address *Legionella* in the water system as directed by LAC DPH EH.

RESULTS

Case Definition

Two patients met the case definition which was based on CDC criteria. Case 1 was defined as a definite case and Case 2 was defined as a possible case.

Case Characterization

Case 1 was admitted from home through the emergency department (ED) to the telemetry unit on June 6, 2013. Diagnoses on admission were sepsis, leukocytosis and severe psoriasis. Temperature was normal and no complaints of cough, shortness of breath or difficulty breathing were noted. Physical assessment indicated the chest was clear with no wheezing, rales or rhonchi. A chest x-ray (CXR) on admission showed no infiltrate, consolidation, effusion, or increase in vascular markings.

On June 22, 2013, Case 1 transferred to the oncology unit, room B, due to census concerns and bed availability. On June 26th, Case 1 became symptomatic with a fever and new onset of respiratory symptoms. A urinary antigen on June 29, 2013 was LP1 positive, 23 days after admission. A CXR the same day showed an increase in moderate lung edema or infiltrate bilaterally. A physician progress note from June 30, 2013 indicates "persistent fevers overnight, chest x-ray suggestive of hospital-acquired pneumonia". Antibiotic treatment was initiated. Case 1 received nebulizer treatments from June 14, 2013 to July 11, 2013. Case 1 did not shower during the hospitalization; only sponge baths were given.

Case 2 had a history of lung cancer with multiple metastases and was admitted from home on July 12, 2013 through the ED to the medical surgical unit. The diagnosis was back pain after falling at home. On admission, Case 2 had no complaints of fever, shortness of breath or cough; physical exam indicated good air entry with no wheezing or crackles. On July 19th, Case 2 transferred to the oncology unit, room B, developed new onset of respiratory symptoms and was urinary antigen positive on July 21st, nine days after admission. On July 22, 2013, CXR findings showed no consolidation, congestion or pleural effusion. Antibiotic treatment was initiated. On July 23, 2013, CXR showed a "right suprahilar or paratracheal mediastinal mass…there are small bilateral pleural effusions". Case 2 was discharged to a skilled nursing facility on July 25, 2013 and readmitted to the hospital on July 26, 2013. Computerized tomography of the chest indicated a tiny amount of pleural fluid in the lung bases. On July 29, 2013, a second urine test was negative for *Legionella* antigen. A routine sputum culture (not specific for *Legionella*) was negative on July 21, 2013. Case 2 received nebulizer treatments from July 20, 2013 to July 21, 2013. Case 2 did not shower during the hospitalization, only sponge baths were given.

Case Room Review

Both cases were transferred from other units to the oncology unit, room B, a single occupancy room. Case 1 was located in room B for five days, from June 22 to June 26, 2013. Case 2 was located in room B for four days, from July 19, 2013 to July 22, 2013. The facility voluntarily closed the room twice to new admissions after water testing identified *Legionella*. The room was initially closed on July 23, 2013, and reopened on October 22, 2013 after water hyperchlorination was performed on September 28, 2013. On November 21, 2013, the room was closed a second time after repeat water testing identified *Legionella* and reopened four days later after point of use water filters were placed on the sink and shower faucets.

Control Measures

On July 30, 2013, the ED ice machine was placed out of service on the recommendation of LAC DPH EH and was voluntarily removed from the ED by facility engineering on August 6, 2013. All hospital ice machines were cleaned and sanitized. All sinks that tested positive for *Legionella* spp. were descaled and disinfected and flushed. The oncology unit nurse's station sink was removed from service after testing positive for LP1. All plumbing fixtures in closed units located on floors above the oncology unit were also flushed.

Background *Legionella* Surveillance

There were ten confirmed community-acquired (CA) *Legionella* urinary antigen positive patients throughout the hospital in the two years prior to the 2013 cluster and no HA *Legionella* confirmed cases during the same time period. In 2011, there were three *Legionella* confirmed CA patients and in 2012 there were seven confirmed CA *Legionella* patients.

Facility *Legionella* Surveillance

Legionella surveillance was conducted by the IP and did not identify any additional cases. All patients hospitalized in room B from October 22, 2013 through November 26, 2013 were also assessed for respiratory symptoms. Patients with a history of respiratory symptoms on admission or who developed respiratory symptoms during their hospitalization were tested for *Legionella*. Nine patients occupied the room during this time period and only one patient had respiratory symptoms; urine test results were *Legionella* antigen negative. In December 2013, ACDC was notified of a patient on a different unit who

was *Legionella* urinary antigen positive two days past admission. CXR was normal on admission. Two days later the CXR showed a large right lower lobe infiltrate not present on admission. ACDC reviewed the medical records and determined that the *Legionella* infection was CA and not HA.

Site Investigations

ACDC conducted multiple site investigations. Entrance and exit conferences were held in addition to a walkthrough of the affected unit and other areas of the facility that the two cases may have shared in common. The initial site investigation was conducted on July 30, 2013. The oncology unit, and several other areas both cases shared in common, e.g., the ED and post-anesthesia care unit, were toured. Two live plants were observed at the oncology unit nurse's station, both were removed. In the patient food pantry, there were two basins under the sink, one with water bottles and paper towels, the other with a used cloth towel. Both were immediately removed. On July 31, 2013 and August 2, 2013, DPH returned to collect environmental water and swab samples for testing by the LAC PHL. LAC DPH provided preliminary management recommendations during the exit conference. On October 22, 2013, LAC DPH conducted an onsite meeting to discuss the status of the outbreak, next steps, and future LAC DPH surveillance.

Facility Construction and Repair/Remediation

In June 2013, major construction occurred on the oncology unit in room C, which is adjacent to room B on the same side of the unit. There were appropriate construction signs visibly posted as well as a hard wall barrier in place with tacky mats at the entrance. The floor below the oncology unit was undeveloped shell space with water going to the oncology unit and dead-end pipes throughout.

LAC DPH Environmental Sampling

LAC DPH collected 29 environmental samples on July 31, 2013 and August 2, 2013. Three samples that were collected from a nursing station hand washing sink on the oncology unit were positive for LP1, the same serogroup found in the two cases. *Legionella* spp. or *Legionella*-like organisms were isolated from 21 additional samples collected throughout the facility. Five samples had no growth of *Legionella*.

Facility Environmental Sampling

Two-hundred forty water or swab environmental samples were collected by the OEC from various locations throughout the facility between August 2013 and December 2013 (148 water, 92 swabs). Of these, 67 (28%) samples were *Legionella* culture positive. LP1 was found in two water samples and one swab sample on sinks in two non-patient care areas. *Legionella* spp. 2-14 and *Legionella* spp., non-*pneumophila* were also found on the oncology unit in addition to other patient care and non-patient care areas.

Facility Water Remediation and Water Management Plan

In September 2013, the OEC conducted hyperchlorination of the domestic potable hot and cold water systems to the main facility building. Additional water hyperchlorination was conducted in December 2013. A comprehensive water management plan was developed to manage and control bacteria identified in the water system. The plan included the hot and cold potable water, industrial water and the fountain water supply, cooling towers and ice machines. The plan addressed critical control point determination, routine and emergency maintenance and disinfection, water treatment, outbreak investigation and subsequent actions to be taken. It also addressed plan review and evaluation. A multi-disciplinary water management team oversaw the plan implementation.

DISCUSSION

We document our investigation of two cases of HA LD among patients hospitalized on the oncology unit. Since its first recognition in 1976, much more is known about LD and the occurrence of *Legionella* in man-made water environments or other water systems. According to Stout and Yu, "*Legionella* spp. have been shown to colonize 12-85% of hospital water systems."[3] Transmission is via inhalation and certain circumstances can increase the likelihood of *Legionella* colonization in man-made water environments, including temperature of 25-42°C, stagnation and scale and sediment.[4]

Hospital A's water system is supplied by the Los Angeles Department of Water and Power, and the water is chloraminated which presumably inhibits *Legionella* growth. Sink faucets on the oncology unit are equipped with non-aerator laminar flow devices. Numerous environmental samples obtained by LAC DPH and the facility were positive for *Legionella* spp., including LP1. LP1 was not found in the water in room B, however *L. pneumophila* serogroups 2-14 were found in room B. Both LP1 and *L. pneumophila* serogroups 2-14 were found in multiple other sites in the water system.

There was construction on the oncology unit immediately prior to the outbreak. In June 2013, major construction began on a room adjacent to room B on the same side of the unit. Construction involved removal of plumbing fixtures and water shut off. In addition, two nursing units on the 4th and 5th floors were closed, so water usage was inactive.

Due to the absence of clinical patient cultures for legionella, a molecular link could not be established with environmental samples. However, epidemiologic links existed between the patients. Both cases occupied room B, both were tested for *Legionella* after the onset of new respiratory symptoms and both received antibiotic treatment for legionellosis. Water exposure during the hospitalization was minimized; both cases received nebulizer treatments. In addition, major construction to a room adjacent to room B on the oncology unit, and the floor below had dead-end water pipes which have been shown to collect stagnant water and support microbial growth that could lead to *Legionella* transmission.[5] Lastly, in addition to the oncology unit, *Legionella* spp. was found in other patient care and non-patient care areas of the facility.

Case 2 initially had a positive urinary antigen test for legionella and then a negative repeat urinary antigen for legionella eight days later; however, since the sensitivity of the test is approximately 80%, a negative test does not rule out the presence of legionellosis. The legionella urinary antigen has a specificity of 100% so false positives are rare. A study by Kohler et al. showed that antigen excretion can be prolonged but it also showed that in some patients, the urinary antigen was no longer detected within several days of therapy.[6] Another possibility is that the initial positive test and then repeat negative test could also have been due to weak cross-reactivity with a non-LP1 serogroup *L. pneumophila*.[7]

Based on our investigation, both cases were likely exposed to legionella from an environmental source at Hospital A. No additional HA cases were identified after July 2013.

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INVESTIGATION OF PLATELET RICH PLASMA THERAPY AS POTENTIAL RISK FACTOR FOR HEPATITIS B INFECTION

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BACKGROUND

In June 2013, Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control (ACDC) Program received a report of a patient (index case) with acute hepatitis B infection with onset in May, with elevated liver functions tests and positive for hepatitis B surface antigen (HBsAG) and immunoglobulin (IgM). The index case was interviewed by ACDC staff and the main risk factor identified during the incubation period (six weeks to six months prior to the onset of symptoms) for acute hepatitis B virus (HBV) infection was treatment in February with platelet rich plasma (PRP) therapy, a type of autologous blood injection, at an outpatient orthopedic clinic (Facility A). The PRP procedure was performed during the incubation period for the index case's infection with acute hepatitis B. The index case underwent a second PRP procedure in May, while symptomatic with HBV infection.

METHODS

Chart Record Review

Chart abstraction was conducted of the index case, and the three other patients that underwent PRP procedure at Facility A one week prior to and three days following the index case first PRP procedure.

Case Finding

Case definition: A case of acute hepatitis B was defined as an acute illness with a discrete onset of any sign or symptom consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and either a) jaundice, or b) elevated serum alanine aminotransferase (ALT) levels > 100 IU/L, and HBsAg positive, and IgM antibody to hepatitis B core antigen (IgM anti-HBc) positive (if done). A case of chronic hepatitis was defined as hepatitis B core antigen (IgM anti-HBc) negative and positive HBsAg.[1]

Facility A staff identified all patients that were seen one week prior to and three days following the index case's PRP procedure. Additionally, Facility A was asked to identify patients that received lidocaine injections and PRP seven days following the index case's second PRP procedure. The names of patients were entered into the LAC DPH hepatitis B database registry. The patient names were also submitted to the California Department of Public Health (CDPH) for cross checking in their HBV registry.

Facility A contacted the select patients by phone or email to request they be tested for hepatitis B either at Facility A, the patient's primary physician, or the local public health center. Hepatitis B vaccination status was requested of office healthcare workers, or blood testing for hepatitis B if vaccination status was not ascertained or available.

Site Visits

An initial site visit was made to Facility A by ACDC medical and nursing staff. ACDC interviewed the front office manager and back office supervisor, toured the clinic, conducted chart abstraction, reviewed medication storage and preparation areas, and observed a mock demonstration of the PRP preparation by the unlicensed back office manager, who is the designated person to prepare PRP. Infection control deficiencies were identified and corrective actions were verbally discussed with office staff and sent through a summary letter.

[1] CDC CSTE 2012 Hepatitis B, acute, case definition
http://wwwn.cdc.gov/nndss/script/casedef.aspx?CondYrID=711&DatePub=1/1/2012%2012:00:00%20AM

A second site visit was made by ACDC nursing and epidemiology staff to obtain updates of HBV laboratory testing, vaccination verification of patients and office staff, review updated office infection control policies and procedures, and see the new centrifuge obtained for PRP processing.

Consultations
ACDC requested information from the centrifuge manufacturer, "Manufacturer X", regarding the specific cleaning guidelines and correct use of the equipment devices. ACDC inquired with the company that purchases the centrifuges from Manufacturer X and private labels them as "Brand Y" for information regarding the appropriate use of equipment devices. ACDC contacted the Food and Drug Administration (FDA) as the centrifuge device is FDA registered, in addition to the Centers for Disease Control and Prevention (CDC) and CDPH for consultation and guidance.

RESULTS

Medical Record Review
The medical record review verified that a total of four patients including the index case received PRP one week prior to and three days following the index case's PRP procedure. The index case also received a second PRP procedure in May.

Case Finding
A total of 155 patients were seen in Facility A during the time period requested in February. Fourteen patients were identified through billing codes as receiving PRP or lidocaine injections including the index case; four of the 14 patients received PRP procedure. A total of four patients received lidocaine injections and only the index case received PRP during the May time period.

A total of 159 patient names and ten office staff member names were entered into the LAC DPH and CDPH hepatitis B database registry to determine if any had been previously reported with HBV infection. There were no hepatitis B cases identified in patients or staff members through this search.

In total, 15 of the 17 patients that had either a PRP procedure or lidocaine injection had a blood test for HBsAG, HBsAB, HBcAB, and HB IgM. All tested negative for chronic or acute hepatitis B. Eight of the ten current office staff members were either tested for hepatitis B or provided documentation of hepatitis B vaccination. Two of the ten were no longer employed at the facility. Four staff members tested negative for chronic hepatitis B, three provided documentation of hepatitis B vaccination, and one started the hepatitis B vaccination series.

Site Visits
In August, ACDC staff conducted a site visit to perform chart abstraction of the four patients (including the index case) that had undergone a PRP procedure during the time period in question.

ACDC staff interviewed the back office supervisor regarding infection control procedures and injectable medications used during the PRP procedure and other clinic medical procedures. Routine injectable multi-dose and single-dose medication vials used during office procedures were stored in each office exam room. Vials of medications were open and stored without a date of opening, and the single-dose vials of lidocaine were open and being used incorrectly for multiple patients. Expired vials of medication were observed in the exam room cabinets and also in the medical supply room refrigerator. The back office medical staff prepared injection supplies according to guidelines outlined by the physicians. All injections were reportedly drawn and administered by the physicians only. Other medications stored in the medical supply room refrigerator included pre-filled syringes of Synvisc® and Euflexxa™, which were dedicated to individual patients and administered by the physicians only.

ACDC asked the back office supervisor to provide a mock demonstration of their usual way of preparing for the PRP procedure. The representative who provided the training and sold the Brand Y Centrifuge and PRP system to Facility A was present during the mock demonstration. A designated single centrifuge is used for all patients requiring PRP therapy. ACDC observed demonstration of the routine cleanup of the Brand Y centrifuge and environmental areas after the PRP preparation was completed. The back office

manager and the representative reported that blood often leaks out of the concentrating device into the metal centrifuge buckets that holds it during centrifugation. If any gross blood is noted, it was reportedly cleaned and disinfected by using CaviWipes®, an intermediate-level surface disinfectant towelette. A policy for PRP preparation, procedure and cleaning was not available.

The cast room contained a steam sterilizer used for disinfection of suture removal equipment; however, there were no written protocols or practice in place for monitoring or assuring sterility of autoclave using biological indicators as indicated by the manufacturer.

During the July site visit, ACDC observed several infection control deficiencies and had concerns for potential blood borne pathogen exposure risks for the healthcare workers performing the PRP and the patients receiving PRP since there were reportedly times when blood escaped from the concentrating devices into the centrifuge buckets. There was inadequate cleaning and disinfection of the centrifuge and device between PRP procedures. Facility A lacked policies and procedures for infection control, PRP preparation, procedure, and cleaning. ACDC observed incorrect use of single-dose vials of medication, storage, and preparation; policies and procedures related to medication preparation, storage and administration were not available.

ACDC recommended immediately stopping all PRP procedures and using a centrifuge and PRP device system from a manufacturer that does not allow for blood leakage out of the system as there was concern for blood borne pathogen exposure.

ACDC provided other recommendations to Facility A such as: discontinued use of single-dose vials of medications for multiple patients, development of infection control procedures/guidelines for PRP preparation, use of aseptic technique, and cleaning/disinfection of the PRP centrifuge according to manufacturer instructions. Other recommendations included the development of policies and procedures related to medication storage, preparation, and administration, safe injection procedures, correct use of single-dose and multi-dose vials, and assuring sterility of the sterilizer by using biological indicators (e.g., Attest™ by 3M). In addition, ACDC suggested providing regular infection control training for healthcare staff and performing regular competency evaluations.

ACDC requested records of hepatitis B vaccination or immunity for all office healthcare employees who were at risk of exposure to blood borne pathogens.

In August, ACDC staff returned to Facility A for a second site visit. Office policies and procedures were developed for areas specifically noted to be deficient during the initial site visit in July, including centralized storage of medications, mechanisms implemented to review mediations on a weekly basis, discontinue ordering and use of single-dose vials, dating opened medication vials and discarding within 28 days or sooner if not used, and weekly monitoring of sterility of sterilizer using a biological indicator as recommended by the sterilizer manufacturer.

The PRP procedures were discontinued as recommended by ACDC on the first site visit, however, the centrifuge machine which had been used for PRP procedure had been exchanged for another one. The new centrifuge system was the same as the previous model and manufacturer, except for the addition of plastic caps that were being placed on top of both buckets without screwing on during the centrifugation. The newly created office policy and procedure for the PRP preparation, administration and cleaning did not address positioning of the caps onto the buckets or the appropriate cleaning of the centrifuge, caps and equipment after each patient use.

After the initial site visit in July, ACDC recommended that Facility A change their PRP equipment to ensure no leakage and risks for blood borne pathogen transmission. The addition of the plastic caps as observed during the second visit in August did not guarantee elimination of risk of blood borne pathogen exposure and was still not consistent with the centrifuge manufacturer's instructions. In August, ACDC continued to recommend Facility A discontinue PRP procedures and to follow the correct manufacturer's instructions/guidelines.

Consultations

ACDC sent a letter to the Brand Y Corporation Director of Regulatory Affairs informing them of the findings reported by Facility A of blood leaking out of the concentrating device (on more than one occasion) into the metal centrifuge bucket that holds it during centrifugation. ACDC informed Brand Y so they could take the appropriate actions with respect to the centrifuge and container leaks which include mandatory reporting to the FDA.[2]

The manufacturer's Operator's Manual and Routine Maintenance of Centrifuges for the centrifuge machine used in Facility A for PRP stated to only use their screw-threaded buckets with the caps screwed on to create an aerosol-tight seal for safe use. According to Manufacturer X, any deviation from their instructions can result in potential infection control risks to the healthcare staff and the patients.

A discrepancy remained between the manufacturer's recommendations and Facility A's method for attaching the threaded caps to the buckets and the cleaning/disinfection of the centrifuge equipment.

CONCLUSIONS AND RECOMMENDATIONS

Transmission of blood borne viruses and bacterial infections have been associated with, and are known to occur due to, unsafe and improper injection practices by healthcare professionals in a variety of clinical settings throughout the United States.[3,4] Infectious agents, such as HBV, can be transmitted through indirect contact transmission, even in the absence of visible blood. Indirect contact transmission is defined as the transfer of an infectious agent (e.g., HBV) from one patient to another through a contaminated intermediate object (e.g., patient-care devices) or person (e.g., healthcare personnel hands). Patient-care devices may transmit pathogens if devices contaminated with blood or body fluids are shared between patients without proper cleaning and disinfecting between patients.

Although there were no other cases of hepatitis B identified during the investigation process, and the source of hepatitis B infection for the index case was not definitely connected to the PRP procedure, ACDC advised Facility A to adopt all recommendation conveyed to the facility since the Brand Y devices (both the centrifuge and the concentrating device containers) cannot be completely ruled out as a potential source for transmission of blood borne pathogens to patients.[5]

ACDC recommended that Facility A review the steps involved in the PRP preparation (including proper filling of the concentration device to prevent leakage), review the manufacturer's instructions, and resolve the discrepancies between Brand Y and the Manufacturer X centrifuge instructions. If not possible, ACDC recommended using a centrifuge and PRP device system from a different manufacturer that prevents any blood leakage out of the PPR system.

It is ultimately the responsibility of Facility A to ensure that PRP equipment is properly used, cleaned, and disinfected according to the manufacturer's instructions to eliminate any risk of blood borne pathogen transmission.

[2] The Medical Device Reporting (MDR) regulation (21 CFR 803) contains mandatory requirements for manufacturers, importers and user facilities to report significant medical device adverse events to the FDA. MDR Mandatory Reporting Requirements: Manufacturers are required to report to FDA when they learn one of their devices may have caused or contributed to a death or serious injury. Manufacturers must also report to FDA when they become aware that one of their devices has malfunctioned and would be likely to cause or contribute to a death or serious injury if the malfunction happened again.

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A MULTI-STATE OUTBREAK OF HEPATITIS A ASSOCIATED WITH COSTCO TOWNSEND FARMS ORGANIC ANTIOXIDANT BLEND BERRIES

Susan Hathaway, PHN, MPH; Christine Selzer, MPH and Rachel Civen, MD, MPH

BACKGROUND

On May 31, 2013, the Los Angeles County (LAC) Department of Public Health (DPH) was made aware by the California Department of Public Health (CDPH) that a nationally distributed frozen food product, Townsend Farms brand Organic Antioxidant Blend, distributed in Costco stores (including LAC), had been linked to acute hepatitis A cases in New Mexico and Colorado. In response, the Acute Communicable Disease Control Program (ACDC) hepatitis surveillance unit began enhanced surveillance of all cases of acute hepatitis A infection and joined a multi-state foodborne outbreak investigation. Locally, this investigation involved collaboration with LAC public health programs to include: ACDC, Community Health Services (CHS), Environmental Health Food and Milk Program (EHFM) and the Public Health Laboratory (PHL). ACDC also worked closely with the California Department of Public Health (CDPH), United States (US) Food and Drug Administration (FDA) and Centers for Disease Control and Prevention (CDC) to help identify cases of hepatitis A linked to product consumption, identify a food source and other sources for exposures (restaurants, other food providers), remove the identified product from consumers, and provide post-exposure prophylaxis (PEP) to high risk contacts and persons who consumed the implicated product.

METHODS

ACDC initiated enhanced surveillance to identify additional acute hepatitis A cases associated with this outbreak from May 31 through August 31, 2013.

Case Definition

Minimal Criteria: Confirmed acute hepatitis A virus (HAV) infection meets the Counsel of State and Territorial Epidemiologists (CSTE) case definition for an acute case of hepatitis A: (1) discrete onset of sign or symptom consistent with acute viral hepatitis (fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and (2) jaundice and/or elevated serum aminotransference levels, and (3) immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive [1].

Confirmed Outbreak Case: A person with minimal criteria (noted above) and who meets one of the three following criteria: (1) reported consuming Townsend Farms brand Organic Antioxidant Blend, Harris Teeter brand Organic Antioxidant Blend, Woodstock Frozen Organic Pomegranate Kernels, or any other pomegranate product recalled for potential contamination with HAV in the 15-50 days prior to illness onset; or had the product in their freezer; or purchased the product per shopper card records; or has another clear exposure history to the specific product, or (2) genotype 1B HAV was recovered from a clinical specimen and no history of international travel to a country with endemic HAV genotype 1B infection, or (3) a known close contact to another confirmed case and was not exposed to any contaminated pomegranate products.

Case Investigation

ACDC notified LAC DPH CHS of the ongoing multi- state hepatitis A outbreak and provided additional case investigation questions to query warehouse store purchase of and/or consumption of frozen and fresh fruit and berries that occurred during the two to seven weeks prior to onset date. Acute cases of hepatitis A identified by CHS that met the minimal criteria were re-interviewed by the ACDC hepatitis A

investigation team using a standardized investigation questionnaire provided by the CDC. ACDC identified and re-interviewed previously reported acute hepatitis A cases with onsets from March 1 to May 31, 2013.

Laboratory Testing

Clinical laboratories were contacted to determine if serum samples were available for all confirmed cases without international travel history regardless of history of suspect product ingestion. If available, specimens were submitted to the LAC Public Health Laboratory (PHL) for shipment to CDC for confirmation of and genetic sequencing of hepatitis A virus.

Environmental Health

The LAC EHFM coordinated with CDPH, FDA, and Costco to monitor recalls and to inspect Costco and other retail locations to ensure that the recalled product was removed from the stores. EHFM reviewed the distribution list from Costco to determine how much product had been sold in LAC. EHFM also coordinated collection of the implicated product from acute outbreak cases and transfer to the FDA for testing.

Public Health Action

LAC DPH issued press releases notifying the public of the outbreak on May 31, 2013. CHS offered PEP to persons who had potentially consumed contaminated product within the previous 14 days and to household contacts of acute hepatitis A cases at CHS clinics from June 1 through June 14, 2014.

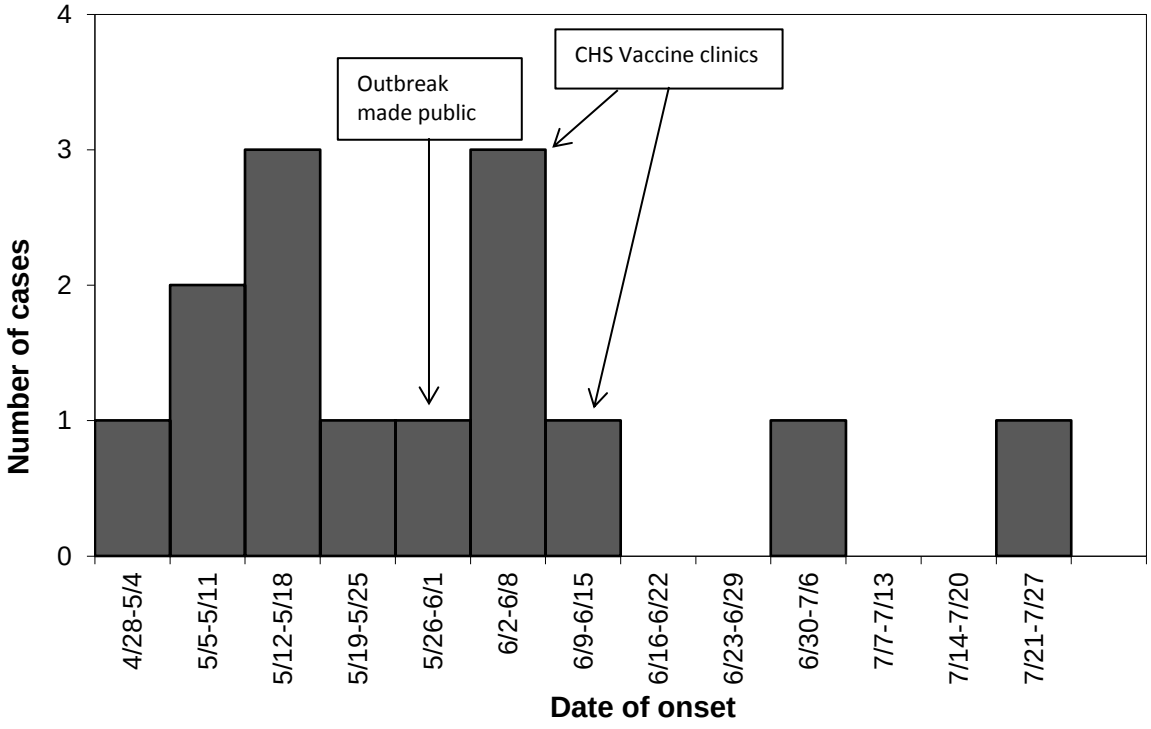
RESULTS

Case investigation

From March 1 to August 31, 2013, 14 cases were identified that met the confirmed outbreak case definition (Figure 1). The initial case identified had a symptom onset on the week of April 28th and the last case identified had a symptom onset during the last week in July. There were no secondary cases identified. The median case age was 50.5 years (range: 19-62) and 57% (8) were female. Ten (71%) cases were white non-Hispanic cases and the majority of cases resided in SPA 2 (n=6, 43%) (Table 1). Seven (50%) cases were hospitalized. Thirteen of the 14 cases reported eating Townsend Farms brand Organic Antioxidant Blend within two to seven weeks prior to symptom onset. One case reported no international travel and also denied consumption of the Townsend Farms brand Organic Antioxidant brand, however, pomegranate consumption was reported. This case matched the outbreak genotype strain.

Table 1. Demographics of LAC Confirmed Cases (N=14) Multistate Outbreak of Hepatitis A Virus	
Age (years)	**N (%)**
15-34	4 (29)
35-44	2 (14)
45-54	4 (29)
55-64	4 (29)
Gender	
Male	6 (43)
Female	8 (57)
Race/Ethnicity	
Asian	0 (0)
Black	1 (7)
Hispanic	3 (21)
White	10 (71)

Figure 1. Hepatitis A Virus Infection Associated with Consumption of Frozen Berry and Pomegranate



Laboratory

Of 14 cases, nine specimens were sent to CDC for serologic confirmation and viral sequencing; five cases did not have specimens available. Of the nine specimens provided to the CDC, six cases were found to have genotype 1b, the major outbreak strain; three of the cases could not be sequenced. Five of the six cases with genotype 1b reported consumption of the Townsend Farms brand Organic Antioxidant brand and one case reported no international travel and did not report consumption of the Townsend Farms brand Organic Antioxidant brand.

Environmental Health

EHFM reviewed distribution lists from Costco and determined that 3,000 units of the berry product were sold in LAC Costco stores from May 3 to May 31, 2013. EHFM visited eight Costco store locations and five stores of a local yogurt chain that had purchased Townsend Farms brand Organic Antioxidant Blend to verify that recalled product had been removed from the shelves. EHFM coordinated the transfer of remaining implicated product to the FDA; one confirmed case had product available.

Public Health Action

A LAC DPH press release on May 31, 2013 recommended against consuming contaminated product and also to obtain PEP for those who consumed the product in the last 14 days. CHS opened seven clinics on the weekend of June 1st and 2nd to provide hepatitis A vaccine or gamma globulin (IG) to those who potentially consumed the contaminated product within the last 14 days. PEP was also offered at 14 health clinics during normal business hours and for extended evening hours during two weeks from June 3 to June 14, 2013. CHS administered a total of 478 doses of hepatitis A IG and 417 doses of hepatitis A vaccine from June1 through June 14, 2013 (Figure 1).

DISCUSSION

During this investigation, ACDC identified 14 acute hepatitis A cases that met the outbreak case definition. Of these, thirteen cases reported consumption of the Townsend Farms brand Organic Antioxidant Blend berries. Six of the nine cases that were available for genotype studies matched the 1b genotype. The 1b genotype is a HAV genotype rarely seen in the US and commonly identified in the Middle East and North Africa [2]. EHFM made site visits to 13 Costco stores to ensure that the implicated product had been removed from store shelves. LAC DPH notified the public, recommending against consuming contaminated product and advised PEP for those who consumed the product in the last 14 days. CHS provided PEP to persons who consumed the contaminated product within the past 14 days, administering a total of a total of 478 doses of hepatitis A IG and 417 doses of hepatitis A vaccine from June1 through June 14, 2013. Prompt removal of the product and the provision of PEP to persons who consumed the implicated product may have prevented many additional cases of hepatitis A associated with this outbreak.

The preliminary CDC report indicates that from March 31 to July 26, 2013, 162 cases of hepatitis A were identified after eating Townsend Farms Organic Antioxidant Blend in ten states: Arizona (23), California (79), Colorado (28), Hawaii (8), New Hampshire (1), New Jersey (1), New Mexico (11), Nevada (6), Utah (3), and Wisconsin (2). [Note: The cases reported from Wisconsin resulted from exposure to the product in California, the cases reported from New Hampshire reported fruit exposure during travel to Nevada, and the case reported in New Jersey was a household contact of a confirmed case from Colorado.] Six of the confirmed cases were household contacts of confirmed cases (secondary cases) [2]. Nationwide, 117 specimens had the common HAV outbreak strain, genotype 1b.

Fecal contamination of foods that are not subsequently cooked are a potential source of HAV. This virus remains infectious for long periods under a variety of environmental conditions, including freezing [3]. Several hepatitis A outbreaks have been associated with the consumption of frozen fruit, including an outbreak associated with frozen strawberries in 1997 [4]. And while most outbreaks of foodborne hepatitis A are usually due to contamination of food by an infected food handler, contamination could occur during irrigation, harvesting, sorting, or processing [5]. Identifying an implicated source for the foodborne transmission for acute cases of HAV is challenging because of the long incubation period, 10-50 days prior to symptom onset. Cases must recall food purchase and intake history and also place of purchase. The outbreak investigation utilized targeted interviews with cases and shopper cards to help identify a source of infection.

By combining information gained from the FDA and CDC investigations, it was determined that the most likely vehicle for the hepatitis A virus appeared to be a common shipment of pomegranate seeds from a company in Turkey; Goknur Foodstuffs Import Export Trading. These pomegranate seeds were used by Townsend Farms to make the Townsend Farms and Harris Teeter Organic Antioxidant Blends and by Scenic Fruit Company to make the Woodstock Frozen Organic Pomegranate Kernels. On June 4 and June 28, 2013, Townsend Farms conducted recalls of certain lots of its frozen Organic Antioxidant Blend because of potential hepatitis A virus contamination. On June 26, 2013, Scenic Fruit Company recalled specific lots of Woodstock Frozen Organic Pomegranate Kernels because of potential hepatitis A virus contamination [2].

It is also likely that Costco stores also played an important role in the containment of this multi- state outbreak. Costco notified customers who purchased Townsend Farms brand Organic Antioxidant Blend and made HAV PEP available to purchasers. Using Costco card customer contact information, a series of robo-calls were made to Costco members informing purchasers that this product should be discarded and a product refund would be available. Additionally, selected Costco pharmacies provided hepatitis A vaccine as PEP or paid the cost of PEP from medical providers. The FDA, CDC and CDPH served as the primary contacts for Costco in California and other states. LAC DPH had minimal interaction with Costco with the exception of EHFM sites visits, to ensure that the implicated product had been removed from LAC stores. Costco has not shared the number of robo-calls made to LAC residents, vaccines and other PEP information provided with LAC DPH officials. Therefore, it is difficult to quantitate Costco's overall contribution to outbreak containment.

Determining the origination of the contamination was complex as there were multiple food products in the Townsend Farms' Organic Antioxidant Blend which originated from multiple countries. Identification of a potential source of pomegranate seeds originating in Turkey supported the hypothesis of contamination with HAV genotype 1b based on the global genotype prevalence.

CONCLUSION

This multi-state outbreak of hepatitis A required successful collaboration between public health professionals from the local, state and federal level and Costco to identify a source, recall the product and to provide PEP to those who potentially consumed contaminated product. Although the incidence of hepatitis A has declined in the US, the rise of imported foods from hepatitis A-endemic regions with less stringent controls increases the potential for foodborne spread in the US. Improving food production environmental controls and importation policy can help reduce foodborne transmission of hepatitis A. Reducing foodborne hepatitis A can be ultimately achieved through routine vaccination of persons at risk for HAV infection.

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A FISH-ASSOCIATED OUTBREAK OF *CAMPYLOBACTER JEJUNI*

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BACKGROUND

Campylobacter are gram-negative bacilli that can cause diarrhea, cramps, fever, and vomiting in humans.[1] The bacteria are typically found in poultry and cattle; ingestion of undercooked poultry and beef is the usual form of transmission. However, transmission of *Campylobacter* can also occur through contact with infected animals, the ingestion of raw milk, or the ingestion of contaminated food or water. Campylobacteriosis is a reportable disease in California, but Los Angeles County (LAC) Department of Public Health (DPH) does not routinely interview cases to obtain additional information such as type of food eaten, animal contact, etc.

On October 21, 2013, LAC DPH received a foodborne illness report stating that 25 of 140 persons became ill with diarrhea, vomiting, abdominal cramps, fever, and nausea after attending a fundraising dinner for a private LAC community club. The event was held on October 12. The LAC DPH Acute Communicable Disease Control Program (ACDC) initiated an epidemiological investigation to determine the extent of the outbreak, risk factors for the disease, and steps needed to prevent further spread.

METHODS

LAC DPH Environmental Health Services (EHS), Food and Milk Program (F&M) contacted the party on the Foodborne Illness Report (FBIR) complaint to obtain more detailed information about the menu, symptoms, and contact information for all attendees. F&M and the Environmental Health District made a site visit for inspection of the club on October 23, 2013. A partial list of ill attendees was obtained during this inspection.

ACDC created an illness and food history questionnaire which was used to interview persons eating food at the event. ACDC called fundraiser attendees and interviewed them via telephone. ACDC also contacted reported campylobacteriosis cases that resided in the same geographic area as the club. The standardized questionnaire was administered once it was determined that the confirmed case attended the fundraising event.

An outbreak-associated case was defined as a person eating at the event who either had a 1) positive laboratory test for *Campylobacter jejuni*, 2) became ill with diarrhea and abdominal cramps, or 3) became ill with diarrhea and two other symptoms (nausea, fatigue, headache, body aches, chills, or fever). An outbreak-associated control was defined as a person who ate at the event but did not get sick.

ACDC collected data in Microsoft Access and calculated frequency and distribution of symptoms among cases. An analysis of food items was also performed. All analyses were conducted using SAS 9.1 analysis software and Microsoft Excel.

RESULTS

Setting

On October 12, 2013, a fundraising event was held at an LAC community club. Approximately 150 persons attended the event. Food served at the fundraiser was prepared in the club kitchen. However, the names of persons preparing the food were not made available to ACDC or F&M. Interviews were completed on 31 attendees (21%). Twenty-one ill attendees met the case definition and seven controls were identified. Three ill persons who did not meet the case definition were excluded from the analysis.

Cases

No attendees reported illness prior to the event on October 12, 2013. The median age of cases was 68 years, with ages ranging from 49 to 77 years (Table 1). Cases were both male (58%) and female (42%). Symptoms of cases included diarrhea (100%), abdominal cramps (89%), chills (68%), body aches (53%), and nausea (47%) (Table 2). Illness onsets occurred from October 13, 2013 to October 18, 2013 (Figure 1). The average incubation period was 33 hours (range: 12-124 hours). The average duration of illness was 72 hours (range: 12-360 hours). Five cases were laboratory-confirmed and three were hospitalized. No known deaths occurred as a result of this outbreak.

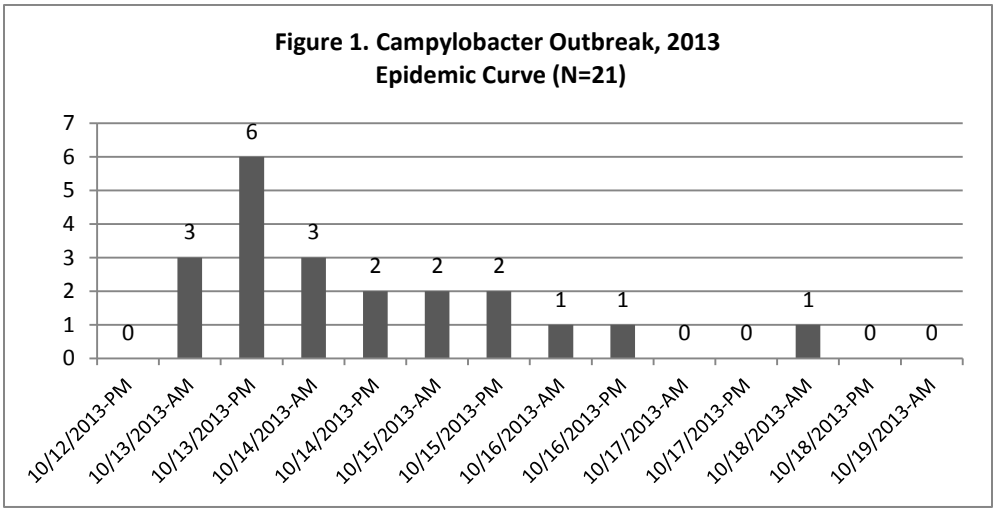

Table 1. Campylobacter Outbreak, 2013
Case Demographics (N=21)

	n	Percent
Male	11	52%
Female	10	48%
Age Group		
< 1 year	0	0%
1-4	0	0%
5-9	0	0%
10-19	0	0%
20-49	2	10%
50-74	18	86%
75+	1	5%
Median age	68 years	range: 20-77 years

Table 2. Campylobacter Outbreak, 2013
Reported Symptoms (N=21)

Symptom	n	Percent
Diarrhea	21	100%
Bloody Diarrhea	0	0%
Abdominal cramps	19	90%
Nausea	10	48%
Fatigue	10	48%
Chills	15	71%
Body Aches	11	52%
Headache	7	33%
Fever	10	48%
Fever > 102˚F	0	0%
Dizziness	6	29%
Vomiting	5	24%
Tingling	0	0%
Rash	0	0%
Median Duration= 72 hours (range: 12-360 hours)		
Median Incubation= 33 hours (range 12-124 hours)		

Food Analysis

The results of the analysis of food items are shown in Table 3. The cod was eaten by all cases and was significantly associated with illness ($p<0.001$). No other food item was significantly associated with becoming ill. The dehydrated cod was soaked in hot water, mixed with other ingredients such as potatoes, and then cooled overnight. This dish may have become cross-contaminated during its preparation or cooling/storage.

Table 3. Campylobacter Outbreak, 2013 Food Items Eaten							
	Cases (N=21)			Controls (N=7)			
Food Item	**Percent**	**n**	**N**	**Percent**	**n**	**N**	**p-value**
Cod	100%	21	21	43%	3	7	<0.001
Calamari	71%	15	21	86%	6	7	0.450
Octopus	95%	20	21	71%	5	7	0.078
Salad	76%	16	21	100%	7	7	0.154
Swordfish	71%	15	21	57%	4	7	0.483
Beans	62%	13	21	43%	3	7	0.378
Risotto	95%	20	21	71%	5	7	0.078
Potatoes	76%	16	21	57%	4	7	0.334
Walnut Roll	38%	8	21	43%	3	7	0.823
Fried Doughnut	33%	7	21	57%	4	7	0.264
Red Wine	52%	11	21	29%	2	7	0.274
White Wine	33%	7	21	0%	0	7	0.078
Water	71%	15	21	57%	4	7	0.483
Other Exposures							
Restroom use	48%	10	21	57%	4	7	0.663

Kitchen Inspection

F&M and the EHS South Bay District Office inspected the facility on October 23, 2013. The inspectors were not immediately allowed into the kitchen; the inspection began after all food preparation and cleanup had occurred. The facility was also operating without a Public Health permit and was instructed to stop preparing and serving food until a valid health permit was obtained.

DISCUSSION

The symptoms and durations reported by cases were consistent with campylobacteriosis, although the food items and incubation periods were not. The laboratory results of five cases confirmed the etiology for this outbreak. The shorter incubation periods may have been due to the advanced age of a majority of the victims. Although the consumption of cod was statistically significant, there are many factors that make that finding questionable. First, many of the club members had communicated with each other and determined that the cod was what made them sick. This bias could have led to cod consumption being overrepresented in the cases, which could then lead to the significant association observed in the analysis. In addition to this recall bias, there is the lack of biological plausibility in that *Campylobacter* infection is usually associated with raw or undercooked poultry, unpasteurized milk, or contaminated water.[1] Fish, especially dried fish, is a highly unlikely source of *Campylobacter*. The more likely scenario is that the cod was contaminated after, or during, its preparation in the club kitchen. The cod was prepared only for the fundraising event so its preparation and storage could not be directly observed by the environmental health inspectors. None of the cod was available for testing.

PREVENTION/EDUCATION

The EHS South Bay District Office held a hearing with four members/organizers of the private club. During the hearing they were informed that food at events must be from a licensed caterer. They were given Plan Check Guidelines and a Community Event information/application packet.

LIMITATIONS

In addition to the recall bias mentioned above, the study was limited by the small number of non-ill attendees participating in the study. Consequently, the control group may not be representative of the target population. The direction in which this bias skews the results cannot be assessed as it cannot be determined how different from each other the study and the actual at-risk populations were.

CONCLUSIONS

This was a point-source gastroenteritis outbreak caused by *Campylobacter jejuni* that occurred among attendees of a fundraising event at an LAC community club. Although cod was found to be associated with illness, the results are not conclusive due to the small sample size and unlikelihood of the dried fish being contaminated before it was distributed. It is more likely that cross-contamination of the cod dish occurred. No other complaints of illness have been received for this club and the outbreak appears to be limited to the fundraising attendees.

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COCCIDIOIDOMYCOSIS OUTBREAK ASSOCIATED WITH A PALEOSEISMOLOGY TEACHING SITE, LOS ANGELES COUNTY

Jessica Silvaggio, MPH; Patricia Marquez, MPH and Dawn Terashita, MD, MPH

Coccidioidomycosis is an infection caused by inhalation of airborne *Coccidioides* spp. Spores that are found in soil. The fungus grows in and is endemic to semiarid regions including the southwestern United States and Central and South America.[i] Sixty percent of infected patients are asymptomatic; however, symptomatic patients tend to experience influenza-like illness, pneumonia, and rash or skin lesions among a range of other clinical symptoms. Disseminated coccidioidomycosis is rare and occurs in approximately one in every 200 diagnosed infections.[ii] Documented exposures associated with coccidioidomycosis outbreaks include archaeological excavations, dust storms, severe drought, and earthquakes.

BACKGROUND

On November 19, 2013, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) was notified of a possible outbreak of coccidioidomycosis by a university affiliated physician. The physician saw Patient A, a LAC graduate student, who had returned from a paleoseismologic excavation on an Indian reservation in the Cabazon region of Riverside County in May 2013. Paleoseismology involves looking at geological sediment and rocks for signs of ancient earthquakes, and is used to supplement monitoring for the calculation of seismic hazard of faults. The purpose of the fieldwork was to estimate the frequency with which earthquakes occur and consisted of digging large trenches along fault lines in dusty, dry desert. The group of six participants consisted of four students, one project lead, and a United States Geological Survey (USGS) collaborator.

METHODS

Case Definitions

A confirmed case of coccidioidomycosis was defined as a resident of LAC that met the Centers for Disease Control and Prevention coccidioidomycosis case definition and that traveled to the Cabazon region between May 1, 2013 and May 30, 2013. Clinical illness included one or more of the following characteristics: fever, chest pain, cough, myalgia, arthralgia, headache, influenza-like illness or pulmonary lesion by chest X-ray, rashes including erythema nodosum or erythema multiforme, involvement of bones, joints, or skin by dissemination, meningitis, or involvement of viscera and lymph nodes. Laboratory-confirmation of coccidioidomycosis included culture, histopathologic, or molecular evidence of *Coccidioides* species or serologic evidence of coccidioidal antibodies.

Case Finding

ACDC contacted the project lead for more information on the excavation site and group participants. A list of students and collaborators who participated in the site excavation between May 10 and May 30, 2013 was reviewed. ACDC did not receive an official list of participants who were potentially exposed on a separate site visit which occurred May 1 to May 6, 2013. Based on the interview with the index case, ACDC searched the surveillance system for additional LAC cases. ACDC made a minimum of three call attempts during the morning and afternoon hours in an effort to reach potentially exposed participants for which there was contact information. Among the four participants for whom there was contact information, ACDC discussed potential exposure with three for disease acquisition. Medical records were reviewed for three of four excavation participants.

Conference Calls

ACDC held two conference calls with the project lead and a university administrator to discuss the implications of exposure and status of the situation. Riverside County was also notified.

RESULTS

Case Definition

There were six participants in the field including four undergraduate/graduate students, a project lead, and a USGS collaborator. Three participants met the case criteria. Case A was laboratory confirmed with a *Coccidioides* antibody titer of 1:256 and a history of an influenza-like illness. Case B has laboratory confirmed with a *Coccidioides* antibody titer of 1:32. Case C tested positive and presented with a lung nodule and an antibody titer of 1:16. One participant tested negative with symptoms unknown, and two participants were not known to have been tested.

Case Characterization

LAC DPH spoke with all three cases; however, only Case A and B were formally interviewed. All three cases were exposed to the site from May 10 to May 15, 2013 and again on May 20th when they returned to the site for additional digging. Case A experienced symptoms on May 13, 2013, and was admitted to the hospital on May 23, 2013. Upon admission, Case A was symptomatic with muscle pain, shortness of breath and night sweats lasting for one week. Case B experienced symptoms on May 23, 2013 and indicated subsequently seeking care on May 26, 2013. Case B reported experiencing headache, body aches, weakness and fatigue one week after fieldwork commenced. He was also symptomatic with fever, cough, chest pain, and sputum production. Initial treatment included azithromycin and cefuroxime with no signs of improvement. Case C experienced night sweats, fever and chills. Two of the cases indicated rarely visiting the Antelope Valley, Bakersfield, San Luis Obispo and Kern County. All cases reported wearing a surgical mask while in the field but removed the mask to eat and drink. The approximate time in the field was one week usually twelve hours daily, though this varied among researchers.

All cases were male. Two of the cases were similar in age, race, education and insurance status. All cases had not been previously diagnosed and reported similar case definition symptoms. The three cases' occupation and outdoor activities overlapped. All cases reported having heard of coccidioidomycosis (Table 1).

ACDC provided the team lead with recommendations for communicating and educating students on potential risks associated with conducting fieldwork in coccidioidomycosis-endemic regions. There were no additional cases.

Table 1. Case Characteristics Aggregated (N=3)	
Demographics	**n**
Gender (male)	3
Age(median)	32
Race (white)	3
Symptoms and Hospitalization	
Range of days from exposure to onset (mean)*	5-13
Hospitalized	2
Commonly reported symptoms :	
Fever	3
Chills	3
Night sweats (> 3 weeks)	3
Headache	2
Joint pain	2
Weight loss	2
Cough	1
Shortness of breath	2
Rash	1
Muscle pain	2
Wheezing	2
Time between symptom onset and seeking care	3-6 days
Risk Factors	
Rarely visited a coccidioidomycosis-endemic region within one month of symptom onset*	2
Indicated wearing mask*	2
Common outdoor activities performed:	
Soil excavation	3
Camping	1
Hiking	1
Cycling	1
Mineral finding	1
Dust exposure during job or outdoor activities prior to illness (yes)	2
Knowledge of coccidioidomycosis	
Heard of coccidioidomycosis before diagnosis (yes)	3
Knowledge of coccidioidomycosis transmission before diagnosis (yes)	2
*Incomplete data on all cases	

DISCUSSION

ACDC conducted an investigation of three coccidioidomycosis cases among participants in a paleoseismologic excavation. Two previous outbreaks among archeology students in California have been documented in the literature.[iii,iv] Earlier studies discuss outbreaks of coccidioidomycosis associated with a common soil exposure which contained *Coccidioides* immitis.[iii] Among previously documented California coccidioidomycosis outbreaks to date among archeologic academic researchers, excavations have primarily occurred in Northern California.[iv]Clinical presentation, laboratory confirmation, and

epidemiology of the three cases confirm this was an outbreak among paleoseimologic excavation participants. All cases indicated not initially being diagnosed with coccidioidomycosis. Given the combination of symptoms, recent outdoor activity, and visits to a known coccidioidomycosis-endemic area, clinicians should consider coccidioidomycosis as a diagnosis.

The 1970s outbreaks prompted the California Department of Public Health to send recommendations to all California archeology and anthropology programs notifying them of worksite risks. [iv] Recommendations included not requiring fieldwork in coccidioidomycosis endemic regions, providing information on coccidioidomycosis, and exercising dust control measures (i.e., wearing a mask and lodging upwind of the site). These recommendations are also appropriate for paleoseismology.

The project lead supervising the earthquake fault line excavation described clearly explaining possible coccidioidomycosis exposure at the field site in the syllabus; however, field participants indicated not being notified of potential risks.

This situation underscores the importance of delivering health education materials and communicating health risks associated with conducting fieldwork or working outdoors in coccidioidomycosis-endemic regions with an emphasis on university affiliated participants and external collaborators. It also highlights the importance of wearing proper personal protective equipment (i.e., mask) for possible exposure risk and the need for physicians to explain the importance of signs, symptoms, risk factors and testing of coccidioidomycosis.[v]

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SALMONELLA MBANDAKA OUTBREAK ASSOCIATED WITH A POPULAR FAST-FOOD RESTAURANT

Roshan Reporter, MD, MPH; Marifi Pulido, PhD and Rita Bagby, RN, PHN, MSN

BACKGROUND

Salmonellosis is a bacterial disease characterized by gastroenteritis symptoms including diarrhea, vomiting, and nausea.[1] Other common symptoms include fever, headache, and abdominal pain. Humans usually become infected by eating food items contaminated with *Salmonella*, drinking contaminated water, or after coming in contact with infected animals. Infection is confirmed by culturing the organism from stool, blood, or urine. The laboratory also performs pulsed-field gel electrophoresis (PFGE) to determine whether *Salmonella* from two or more cases could have come from the same source.[2]

In March, 2013, the Los Angeles County Department of Public Health (LAC DPH), Acute Communicable Disease Control Program (ACDC) investigated a cluster of 17 *Salmonella* Mbandaka cases living in the same geographic area of SPA 2 (Region A) and indistinguishable to each other by PFGE. The onset dates of the cases ranged from January 2012 to February 2013. ACDC opened the epidemiological investigation to determine the source of the ongoing outbreak and subsequently implement procedures needed to prevent further infections.

METHODS

ACDC conducted surveillance of LAC *Salmonella* cases in Region A. ACDC reviewed case history forms completed by the LAC DPH district public health nurses. ACDC also interviewed cases using open-ended questioning and a standardized questionnaire. Responses were used to create a second questionnaire assessing case exposure to nine local restaurants and grocery sources. This survey was administered to all cases. No controls were interviewed.

Outbreak cases were defined as individuals residing in LAC who had a stool, urine, or blood sample taken between January 2012 and February 2013 which grew *S.* Mbandaka with the outbreak PFGE pattern (TDRX01.0305) on culture. The LAC DPH Public Health Laboratory (PHL) tested laboratory specimens for further identification, serotyping, and PFGE.

On March 19, 2013, LAC DPH Environmental Health Services (EHS) inspected the suspect restaurant. On March 20, 2013, ACDC and LAC DPH Community Health Services (CHS) held a joint meeting with restaurant staff to distribute stool collection vials and to discuss proper stool collection methods. During this meeting, employees filled out a standard questionnaire collecting data on illness, travel, job duties, and job history. Stool specimens were collected from employees and tested by PHL for S*almonella* and S*higella*.

RESULTS

ACDC investigated the primary *Salmonella* cluster with indistinguishable PFGE pattern in June of 2012 (n=7). Onsets ranged from January 5, 2012 to May 24, 2012. These cases were geographically clustered in Region A. Cases were interviewed with hypothesis generating questionnaires but no specific food or restaurant was implicated. ACDC continued to monitor sporadic cases from Region A reported from June 2012 to January 2013 (n=4).

PHL identified the second grouping of *Salmonella* cases in March 2013 again in Region A (n=4). This time, a particular local restaurant was mentioned by two cases, which prompted the creation of a second standardized questionnaire with a list of nine restaurants and two grocery sources. This questionnaire was administered to all primary cases identified since January 2012.

A total of 17 cases (15 primary and 2 secondary) was included in this investigation. Gastroenteritis (GE) symptom onsets for primary cases ranged from January 5, 2012 through February 19, 2013 (Figure 1). One primary case, who was tested due to a chronic urinary tract infection, did not have GE symptoms when tested so the onset date is unknown. The mean age for primary cases was 41.7 years (range: 0 to 73 years) with no predominant gender (F:M=1.1:1) (Table 1). All cases lived or had business in Region A. Primary cases reported symptoms that included diarrhea (71%), nausea (50%), fever (50%), abdominal cramps (43%), and vomiting (29%) (Table 2). The average duration of symptoms was 10.3 days (range 2 to 53 days). All 15 primary cases sought medical care, and three cases were hospitalized, but no deaths occurred. Secondary cases were household contacts of the primary cases.

Analysis of Restaurant Sources

Of the 15 primary cases, ACDC was able to obtain food and restaurant dining histories on 11 cases; two cases were lost to follow up and two cases refused to respond to the request for a second interview. All cases (100%) who responded to the follow-up interview reported eating at the same suspect restaurant (Table 3).

Environmental Health Services Inspection

EHS inspection of the suspect restaurant on March 19, 2013 found no major health and safety violations. Some minor health code violations included grease build-up on lids of food containers, soiled containers used for storage of utensils to be used by customers, peeling paint on the wall where the ice scoop is mounted, wet floors, and missing hood filters. The health inspector discussed risk factors contributing to foodborne illness and communicable disease reporting. Food facility information packets and norovirus handouts were also issued.

Restaurant Employee Meeting

ACDC and CHS met with the owner and staff of the suspect restaurant on March 20, 2013. At that time questionnaires were distributed to the employees. The employees completed the questionnaires and returned them to ACDC staff by the end of the meeting. Restaurant employees were also given stool collection vials along with written and verbal instructions on proper stool collection techniques. They were given until the next morning to bring their samples to the restaurant. The samples would then be picked up by CHS and sent to PHL. All 25 current employees submitted stool samples and completed the standardized questionnaire. All employees denied having any recent gastrointestinal illness.

Laboratory Results: Cases

The 17 *Salmonella* isolates (15 primary cases, 2 secondary cases) received by PHL were of the same serotype (Mbandaka) and had the same unique PFGE pattern, indicating these ill persons were likely infected from the same source. Mbandaka is a relatively rare serotype, less than 5% of all serotypes circulating in the United States during 2011.[3] From January 1 to April 30, 2013, the PFGE XbaI pattern associated with this cluster (TDRX01.0305) was disproportionately represented in LAC. This pattern accounted for 70% of the *S*. Mbandaka patterns in LAC but only 9.6% of all *S*. Mbandaka patterns in the national database during the 120 days prior to April 30, 2013.

Laboratory Results: Restaurant Employees

Two employees tested positive for the outbreak strain of *S*. Mbandaka with the same outbreak PFGE pattern. Both denied symptoms on their questionnaires. One of these employees was a cashier who had only been working for the restaurant for three months and did not handle food. The other employee was a manager who had worked at the restaurant during the entire time period of the outbreak and helped with the food orders when the restaurant was busy. The manager also had a gall bladder condition that predisposes one to become a carrier of *Salmonella*.[1,4-6] The spouse, daughter, and pet chameleon of the manager were also tested. The spouse and daughter tested negative. The chameleon tested positive for

a different *Salmonella* serotype (*S*. Tennessee). The remaining 23 employees tested negative for *Salmonella* and *Shigella*.

PREVENTION

The two positive employees were removed from work duties immediately. Both positive employees were treated and subsequently cleared by stool testing. There were no additional community cases of S. Mbandaka after the two employees were discovered and removed from food handling duties.

DISCUSSION

The geographic clustering of cases and 14 month range of onsets suggested that the source of the outbreak was a carrier who had some connection with each of the cases. This hypothesis was supported by the finding that a particular restaurant located at the geographic center of this outbreak was frequented by all of those *S*. Mbandaka cases who responded to the specific outbreak questionnaire. Further supportive evidence was an employee who worked through the 14 months of the outbreak and tested positive for the same *S.* Mbandaka PFGE pattern found in all the cases. In addition to having a *Salmonella* positive stool specimen, this employee denied having GE symptoms during the outbreak period. The employee had a past history of gallbladder stones. A study by Crawford et al found that *Salmonellae* can form gallstone biofilms in humans which facilitate gallbladder colonization and shedding.[4] Although the employee claims to be have been free of gallstone symptoms for at least three years prior to the outbreak, a recent study asserts that gallbladder epithelium alone may play a role in the chronic carriage of *Salmonella*.[6] The lack of GE symptoms and having a gall bladder condition is medically consistent with being an asymptomatic carrier rather than a victim of the outbreak.

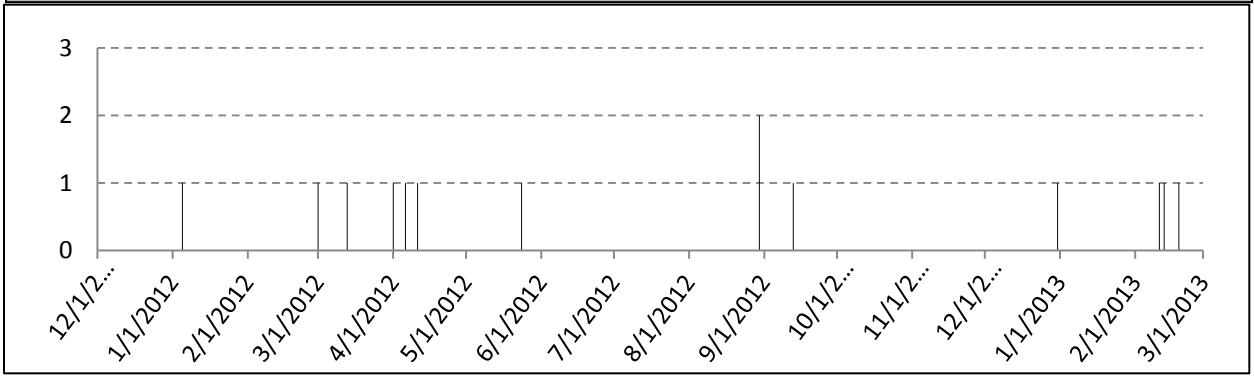
LIMITATIONS

Because a long time had passed between exposure and the interview, and many cases ate at the restaurant regularly, a food analysis was not possible. Regardless, such an analysis would most likely have yielded null results as the source case may have contaminated various foods. Additionally, some cases were not able to be contacted or were no longer willing to be interviewed. Although the lack of a control group may be viewed as a limitation of this study, this is only the case if an analysis of food items were conducted. The strength of the laboratory evidence (i.e., matching PFGE patterns) as well as 100% of cases having eaten at the restaurant is enough to implicate this particular restaurant.

CONCLUSION

A common source outbreak of *Salmonella* Mbandaka occurred among persons eating at a restaurant in LAC over a period of 14 months. The outbreak was very likely due to an asymptomatic *Salmonella* carrier working as the restaurant's manager. However, the manager may have been a carrier for years prior to the outbreak. This fact makes it difficult to determine where and how the manager became infected. No new cases have been reported as of March 2014, one year after the onset of the last known case.

Figure 1. Onset of Gastroenteritis (GE) Symptoms for Salmonella Cluster LAC (N=14*) OB2013-123



*There was one primary case with an unknown onset date for GE symptoms.

Table 1. Primary Case Demographics (N=15) OB2013-123

	n	Percent
Gender		
Male	7	53%
Female	8	47%
Age Group (years)		
Infant (<1)	1	6%
1-4	0	0%
5-9	0	0%
10-19	2	12%
20-49	7	41%
50-74	7	41%
75+	0	0%

Mean Age	Median Age	Range
41.7 years	45 years	0-73 years

Table 2. Reported Symptoms (N=15) OB2013-123 Symptom	n	Percent
Diarrhea	12	71%
Bloody Diarrhea	2	12%
Abdominal cramps	6	35%
Nausea	8	47%
Fever	8	47%
Vomiting	5	29%
Other*	1	6%
Hospitalized	3	18%
Duration (days)**		
Mean = 10.3	Median = 7	Range (2 - 53)

*One case had chronic urinary tract infection; unknown if/when the case had gastroenteritis symptoms
**Based on 12 cases (excluded 3 cases with unknown duration)

Table 3. Restaurant Exposure (N=11) OB2013-123 Restaurant Exposure	n	Percent
Suspect Restaurant	11	100%
Restaurant 2	4	36%
Restaurant 3	2	18%
Grocery 1	3	27%
Grocery 2	5	45%

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EXTENDED-SPECTRUM β-LACTAMASE *ESCHERICHIA COLI* OUTBREAK INVESTIGATION AMONG INFANTS IN THE NEONATAL INTENSIVE CARE UNIT, LOS ANGELES COUNTY, 2013

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BACKGROUND

Infants hospitalized in the neonatal intensive care unit (NICU) are often exposed to endemic pathogens in the NICU and are vulnerable to healthcare associated infections (HAI). Preterm birth, low birth weight, immature immune system and invasive devices place infants at high risk resulting in longer hospitalization and poor outcomes. Disease transmission may be vertical, from the mother to the infant or horizontal, through direct or indirect contact.[1] Sarah Tschudin-Sutter, et. al., notes that "multiple outbreaks of ESBL-producing *Enterobacteriaceae* in ICUs and increased rates of illness and death, especially in NICUs, have been reported".[2]

In November 2013, the infection preventionist (IP) at Hospital A notified the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) of three cases of culture positive extended-spectrum β-lactamase (ESBL) *Escherichia coli* (*E. coli*) among infants located in the NICU. Four additional ESBL *E. coli* positive cases were identified during the investigation. There were no deaths among the cases.

METHODS

Multiple methods were used throughout the outbreak to identify the source and prevent further transmission. A comprehensive review of case clinical, laboratory and associated records was conducted. The NICU ESBL *E. coli* background rate for 2012 and 2013 was reviewed as well as case location at the time of positive culture. Staff hand hygiene observations and infant and staff surveillance culture reports were reviewed. A comprehensive staffing analysis of physicians, respiratory therapists (RT) and nurses who provided direct care to the cases was conducted.

Multiple site investigations to gather additional information, conduct comprehensive medical record review and perform observations of NICU staff infection control practices was conducted. Outbreak management and control recommendations were also provided throughout the investigation.

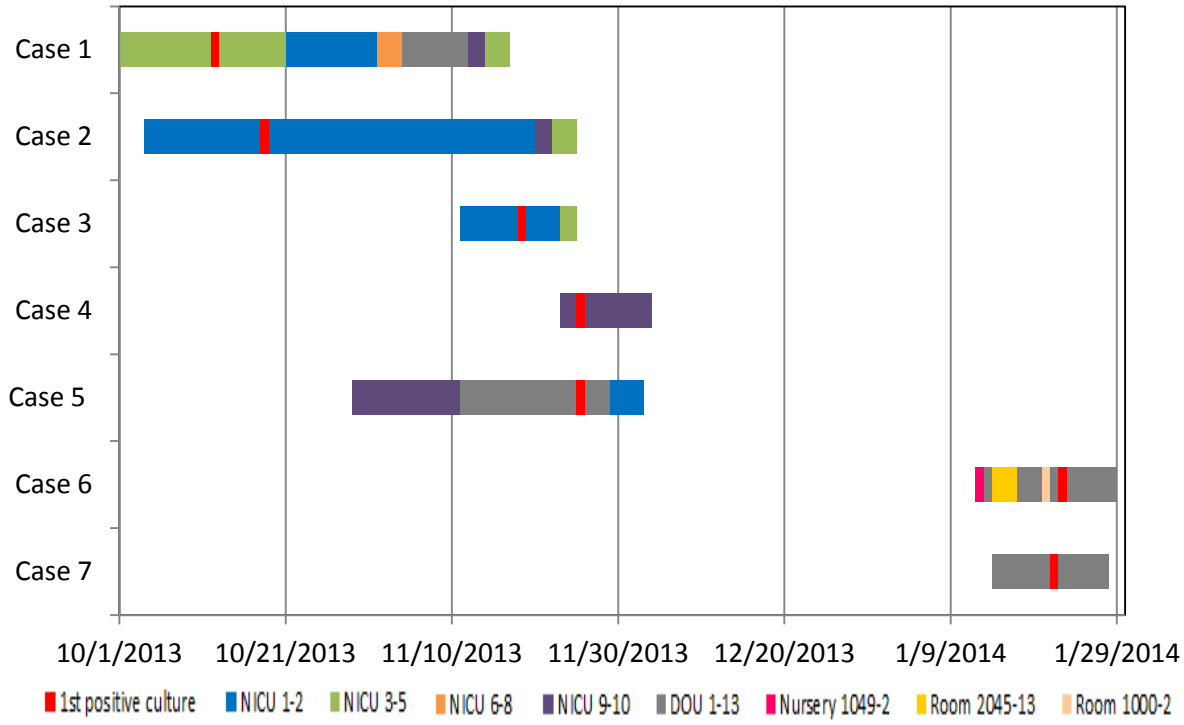
RESULTS

Cases

A case was defined as an infant hospitalized in the NICU, infected or colonized, with culture positive ESBL *E. coli*, any site, from October 12, 2013 to January 21, 2014 (Figure 1). Seven infants met the case definition. All cases were delivered at Hospital A, three by cesarean section and four by normal spontaneous vaginal delivery. Six cases were born preterm and one case was born full term. Three cases are male and four cases are female. Four cases were infected and three cases were colonized. The mean gestational age and birth weight was 29 weeks and 1617 grams, respectively. Common procedures included phototherapy (n=6), intubation (n=4) and blood transfusion (n=3). Feeding methods for all infants included total parenteral nutrition and six infants were also fed breast milk.

There were no infants with ESBL *E. coli* positive cultures in the NICU in 2012 and none from January through September 2013. The first ESBL *E. coli* positive culture was collected on October 12, 2013. The background rate of *E. coli* was reviewed from January 2012 to September 2013. During this time period the NICU averaged one positive culture per month; the pooled mean rate was 1.4 per 1000 patient days.

Figure 1. ESBL *E. coli* positive cases and NICU locations, Hospital A, Los Angeles County, October 2013 - January 2014



Laboratory Testing

All cases were ESBL *E. coli* culture positive from at least one body site that included the eye (n=2), blood (n=1), perirectal (n=2) and/or umbilicus (n=2). Six case isolates had identical antibiotic resistance patterns to ampicillin, cefazolin, ceftazidime, ceftriaxone, gentamicin, levofloxacin, tobramycin and trimethoprim/sulfamethoxazole. One healthcare worker (HCW) tested ESBL *E. coli* surveillance culture positive and had an identical antibiotic resistance pattern to six of the cases.

Strain testing by pulsed-field gel electrophoresis (PFGE) indicated that cases 1 and 5 were genetically identical. Cases 2 and 3 were genetically related to cases 1 and 5. Case 4 and the HCW were different from the aforementioned cases but genetically related to each other, and cases 6 and 7 were unrelated to each other and to the other cases.

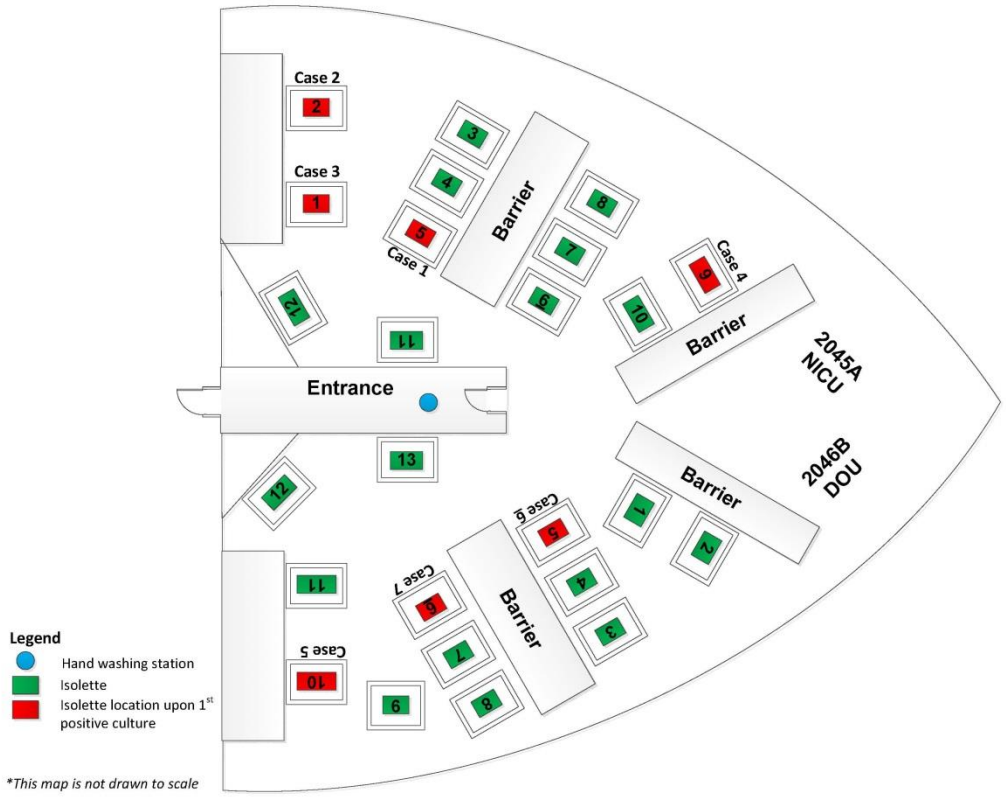
Case Location

Case location on the date of positive culture was reviewed to determine if isolette location was a risk factor for disease acquisition. The NICU has two sections and infants were frequently moved between

sections based on acuity level. Cases 1 through 5 were primarily located in the higher acuity section of the NICU while cases 6 and 7 were located in the lower acuity definitive observation unit (DOU) section. Four of seven cases became culture positive in the NICU section while three cases became positive in the DOU section (Figure 2).

Cases 6 and 7 were different from the other cases since they were less acute (e.g., had higher birth weights and experienced less reliance on central umbilical catheters), were colonized with ESBL *E. coli*, did not have as many invasive devices or procedures and were unrelated in time and space to the other cases.

Figure 2. ESBL *E. coli* positive case NICU and DOU locations, Hospital A, 2013



Staffing

A comprehensive analysis of direct care staff was conducted. There was overlap among physicians and RT as the same physicians and RTs usually provided direct care to the cases on the same days. Nursing staff overlap occurred primarily among cases 1 and 2, cases 1 and 5 and cases 6 and 7. The ESBL *E. coli* positive HCW provided care to case 4 prior to positive culture but did not provide care to cases 1, 2, 3 and 5.

Control Measures

Initial infection control measures implemented by Hospital A staff included contact precautions, infant and staff cohorting, enhanced hand hygiene education and enhanced environmental cleaning. Cleaning of

computer keyboard stations increased and equipment and surface cleaning logs were developed to track and ensure staff adherence to the enhanced cleaning regimen. An action plan was developed and environmental services (EVS) staff were re-educated on surface cleaning and disinfection.

Outbreak Management Recommendations

ACDC provided multiple outbreak management recommendations throughout the investigation, including infant and staff surveillance cultures and environmental cultures. Beginning on November 22, 2013, surveillance cultures were recommended on NICU infants. Subsequently, all new admissions to the NICU and ESBL *E. coli* negative infants were screened bi-weekly to identify continued transmission. A total of 128 infants were screened individually from December 2, 2013 to February 25, 2014. Surveillance cultures were also obtained on 67 direct care staff and one HCW was ESBL *E. coli* culture positive. All other staff cultures were ESBL *E. coli* negative. Twenty-five environmental cultures were obtained and all were ESBL *E. coli* negative.

On December 2, 2013, ACDC recommended strict cohorting of infants into three distinct and geographically separate groups with dedicated nurses and RTs designated for each cohort. Cohort 1 had newborn infant admissions never exposed in the NICU; cohort 2 had infants currently in NICU (exposed) but surveillance culture negative, and cohort 3 had infants who were ESBL *E. coli* culture positive. Physician rounds were conducted according to the three cohort groups, going from unexposed newborns to infants who were ESBL *E. coli* positive. Infants were examined in cohort 1 first, followed by cohorts 2 and 3. EVS daily cleaning was also conducted according to the infant cohort groups. In addition to strict cohorting, ACDC recommended Hospital A post an outbreak notification letter, in English and Spanish, at the NICU entrance and the nurses' station, and to provide the notification letter to all patients who deliver.

Follow-Up Investigation

Site investigations were conducted on November 25, 2013 and December 5, 2013. No lapses in staff infection control practices were noted during the unit walk-through on November 25th. On December 5th, ACDC conducted medical record review and lengthy direct observation of NICU staff infection control practices in each cohorted area. All staff complied appropriately with gowning, gloving and hand hygiene with the exception of a RT staff member who performed hand hygiene with soap and water but washed hands for only five seconds.

Hand hygiene observations were available for the months of December 2013 and January 2014. A rate was calculated for both months using The Joint Commission's composite measure of hand hygiene adherence rates,[3] which compiles multiple indications of hand hygiene opportunities into a single rate. This calculation gives partial credit for incomplete hand hygiene care and performance since healthcare workers may perform some, but not all, of the opportunities observed. The hand hygiene adherence rate for December 2013 was 89.2% and the adherence rate for January 2014 was 86.3%. The greatest deficiency in contact precautions was related to a lack of staff adherence to standard hand hygiene practices.

CONCLUSION

We document our investigation of seven cases of ESBL *E. coli* among infants hospitalized in the NICU. Cases 1 to 4 were considered infected and cases 5 to 7, identified via surveillance culture, were considered colonizations. *E. coli* is a gram-negative bacterium commonly found in the lower intestine. Few outbreaks of multi-drug resistant ESBL *E. coli* in the NICU have been reported in the literature. Risk

factors for colonization in newborns include low birth weight, duration of hospitalization, total parenteral nutrition, previous use of antimicrobial drugs and mechanical ventilation in a NICU.[2]

The exact source of the outbreak or how different strains of ESBL *E. coli* were introduced into the NICU was not able to be determined. We hypothesize that once the organism was introduced into the unit, lapses in staff infection control practice most likely led to further transmission. All cases were born at the facility and there were no case exposures outside of the NICU. There was significant overlap among nurses, RTs and physicians who cared for the cases that could account for transmission.

Based on medical record review, vertical transmission from the mother to case 1 may have occurred. The epidemiologic linkages and PFGE patterns indicated overlap in isolette locations, direct care staff, time, and a genetic relatedness among cases 1, 2, 3, and 5.

Case 4 and the positive HCW ESBL *E. coli* isolates were genetically related to each other but unrelated to the previous cases, and demonstrates possible transmission between case 4 and the HCW. Vertical transmission from the mother to infant could be a possibility. The mother of case 4 had reported having a urinary tract infection one day prior to delivery; however, records were not available to document this. The positive HCW provided direct care to case 4 on day of life (DOL) 1 and DOL 2. On DOL 3, case 4 became symptomatic and tested ESBL *E. coli* positive.

Cases 6 and 7 were both asymptomatic and identified only through surveillance culture two months after the initial five cases were identified. Molecular epidemiologic results showed that cases 6 and 7 were unrelated to the other cases.

Infant surveillance cultures were discontinued in February 2014 and there were no additional cases. As a result of the outbreak, the NICU medical administration is considering a protocol change to obtain maternal urine culture/sensitivities prior to antibiotic treatment when clinically indicated.

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VALIDATION OF LOS ANGELES COUNTY DEPARTMENT OF PUBLIC HEALTH RESPIRATORY SYNDROME USING ELECTRONIC HEALTH RECORDS

Kelsey OYong, MPH; Emily Kajita, MPH; Patricia Araki, MPH; Monica Luarca, MPH; and Bessie Hwang, MD, MPH

INTRODUCTION

Effective and valid surveillance of syndromes can be extremely useful in the early detection of outbreaks and disease trends. However, medical record validation without patient identifiers and lack of diagnoses in HL7 A08 data (messages received from hospitals containing a limited patient information update) has made validation difficult. With the rising availability of electronic health records (EHRs) to local health departments, the ability to evaluate syndromic surveillance systems has improved. In Los Angeles County (LAC), emergency department (ED) data are collected from hospitals and classified into categories based on chief complaints. The most reported syndrome in LAC is the respiratory classification, which is intended to broadly capture respiratory pathogen activity trends. To test the validity of the LAC Department of Public Health (DPH) respiratory syndrome classification, ED syndromic surveillance data were analyzed using corresponding EHRs from one hospital in LAC.

METHODS

The ED selected was part of a not-for-profit community hospital in LAC. The hospital has over 200 licensed beds and about 48,000 ED visits annually.

Records were selected from those captured by the LAC DPH syndromic surveillance systems and that were categorized as a respiratory syndrome. The number of total respiratory-classified cases was calculated by week. The study period chosen was the week of January 13, 2013 through January 19, 2013, selected for the high frequency of respiratory records during that time period. ED chief complaint data were extracted from the EHRs and analyzed by frequency. The ED chief complaint data were compared to discharge diagnoses with selected ICD-9-CM codes reflecting respiratory pathogen activity, as defined by the Centers for Disease Control and Prevention (CDC) [1]. LAC syndromic surveillance defines respiratory syndrome to include cough, shortness of breath, upper respiratory infection, difficulty breathing, fever, influenza, pneumonia, asthma, and several infectious respiratory diseases; excludes chief complaints associated with the common cold, such as stuffy nose and congestion. CDC-defined diagnoses that indicate respiratory pathogen activity include several specific infectious respiratory diseases, influenza, cough, pneumonia, respiratory abnormality, and lung abscess.

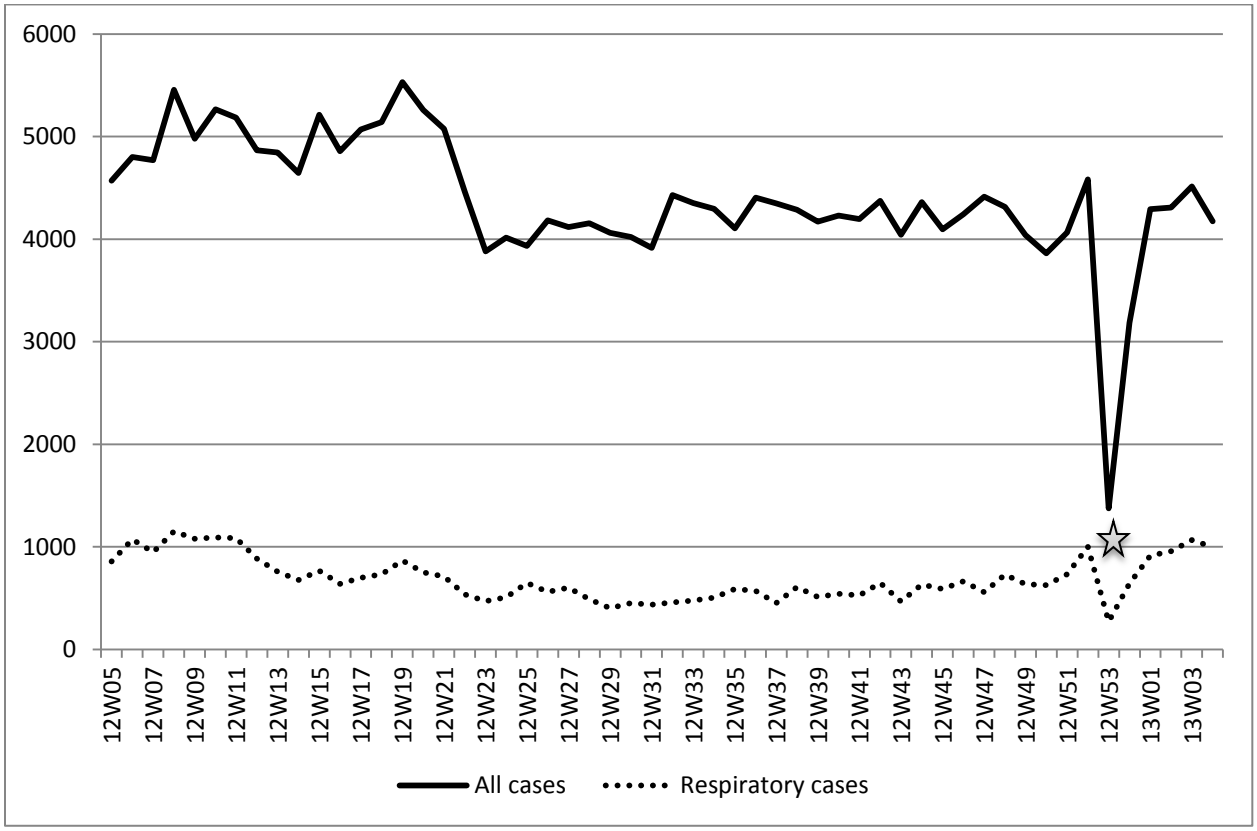
Frequencies of diagnoses and positive predictive value (PPV) of respiratory pathogen activity for each diagnosis were calculated. A kappa statistic for agreement between the LAC DPH classification and CDC-defined pathogen activity was calculated. All analyses were conducted using SAS 9.3.

RESULTS

The analysis found that weekly trends for respiratory-classified cases corresponded with number of total cases (cases classified into syndromes or not related) and exhibited seasonal variation, as shown in Figure 1. During the study period from January 13, 2013 through January 19, 2013, a total of 769 ED visits were made to Hospital A. Of those, 191 (24.8%) de-duplicated ED discharge records were categorized with respiratory syndrome. ICD-9 diagnosis code is included in 142 records (74.3%). The syndromic surveillance system classified 127 (89.4%) records as having CDC-defined respiratory pathogen activity.

The frequency and PPV for the most frequent chief complaints are shown in Table 1. Almost one-third (31.4%) of records contained a chief complaint of "fever," and the PPV of that complaint was extremely high, at 0.97. The frequencies of ICD-9 diagnoses in those records in the respiratory category are presented in Table 2. Most frequent were diagnoses of acute upper respiratory infection (26.0%), bronchitis (20.5%), influenza (15.7%), and pharyngitis (11.8%). The kappa statistic for the agreement between the LAC DPH respiratory syndromic classification and the discharge diagnosis was 0.75 (95% CI: 0.69-0.81).

Figure 1. Number of cases, all and respiratory-classified, by week, 2012-2013



☆ Decrease due to unavailability of data during Week 53 of 2012

Table 1. Frequency and PPV of chief complaints among respiratory cases, January 13-19, 2013

Chief complaint (not mutually exclusive)	Frequency	Percent of total	Positive predictive value
Fever	60	31.4%	0.97
Cough	30	15.7%	1.00
Shortness of breath	24	12.6%	0.75
Influenza	16	8.4%	0.71

Table 2. Frequency of ICD diagnoses among respiratory cases, January 13-19, 2013

ICD-9 diagnosis (not mutually exclusive)	Frequency	Percent of total
Upper respiratory infection, acute not otherwise specified	33	26.0
Bronchitis, acute	26	20.5
Influenza with other respiratory manifestations	20	15.7
Pharyngitis, acute not otherwise specified	15	11.8
Asthma, unspecified with acute exacerbation	9	7.1
Pneumonia, organism unspecified	8	6.3
Asthma, unspecified	8	6.3
Shortness of breath	7	5.5
Cough	7	5.5
Dyspnea/ respiratory abnormality, other	4	3.1

DISCUSSION

Our analysis confirmed that the number of respiratory cases by week followed established seasonal trends associated with respiratory pathogen activity. The agreement between syndromic surveillance systems and discharge diagnosis for respiratory reports is substantial (κ=0.75). This level of agreement is slightly higher than seen in other studies [2,3,4].

The calculated PPV was highest for chief complaints of “cough”, “fever,” “shortness of breath”, and “influenza.” Our chief complaint classification system can identify nearly all of cases with relevant conditions that indicate respiratory pathogen activity. A variety of different final ICD diagnoses within respiratory category were identified, with the highest frequency being diagnoses of upper respiratory infections, bronchitis, and influenza.

Some limitations in the analysis did exist. In over 25% of the EHRs, discharge diagnosis data were missing. Our analysis was only performed in one hospital and coding may differ from hospital to hospital, impacting the level of agreement. Additionally, the CDC definition of respiratory pathogen activity includes some broad diagnostic codes, such as “cough,” which may still overestimate the true prevalence of respiratory communicable disease.

Further efforts to validate other syndromic categories (e.g., gastrointestinal, neurological) and increase the power and agreement in the respiratory category are needed. However, modifying of the respiratory category may create trade-off between sensitivity and specificity, which should be considered [5]. With the growing use and availability of EHRs, the ability to validate syndromic surveillance systems is enhanced.

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USING SYNDROMIC SURVEILLANCE IN A VIRAL HEPATITIS OUTBREAK

Monica Luarca, MPH; Susan Hathaway, PHN, MPH; Emily Kajita, MS, MPH; Patricia Araki, MPH; and Bessie Hwang, MD, MPH

BACKGROUND

Hepatitis A (HepA) is a vaccine-preventable disease caused by HepA RNA virus. Transmission may occur person-to-person or by ingestion of food or water contaminated by feces of acute cases or carriers. In Los Angeles County (LAC), among adults with identified risk factors, the majority of cases are among international travelers, men who have sex with other men, and persons who use illegal drugs. Symptom of HepA include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored stool, joint paint, and jaundice.[1] HepA is a reportable disease in LAC; on average there are 64 HepA cases per year.[2] All acute infections must be reported to LAC Department of Public Health (DPH) within one working day.

The Syndromic Surveillance (SS) system at LAC uses emergency department (ED) patient registration data, among other data sources, to help provide early detection of disease outbreaks and assist in monitoring of the population's health. The SS system places chief complaints (CC), the primary symptom that a patient states as the reason for seeking medical care, and diagnoses into syndrome categories and monitors for any aberrations from established baselines and thresholds.

On May 31, 2013 the LAC DPH Acute Communicable Disease Control Program (ACDC) was notified of a multistate HepA outbreak; between May 2013 and August 2013 a total of 14 confirmed outbreak cases of HepA were reported to the ACDC. Cases were linked to pomegranate seeds included in Townsend Farms Organic Antioxidant Blend, a frozen berry blend sold at Costco warehouse locations; Townsend Farms voluntarily recalled all products sold at Costco on June 3, 2013. ACDC queried its SS databases to help gauge the scope of the outbreak and detect potentially missed cases.

OBJECTIVE

The purpose of this report is to describe the complementary usage of ED data, coroner data, and poison control call center (PC) data in a multistate viral hepatitis outbreak.

METHODS

We attempted to locate HepA cases among ED visitors within the SS database by querying for matches using two methods; first, by searching for specific CCs and diagnoses from May 1, 2013 and August 31, 2013. Key words for this query included ‘Hepatitis A’, the ICD-9 code for HepA, and multiple variations and abbreviations in the spelling of these words to capture errors in data entry. Secondly, we queried the SS database for matches of the 14 confirmed outbreak cases reported to LAC DPH based on known demographic information.

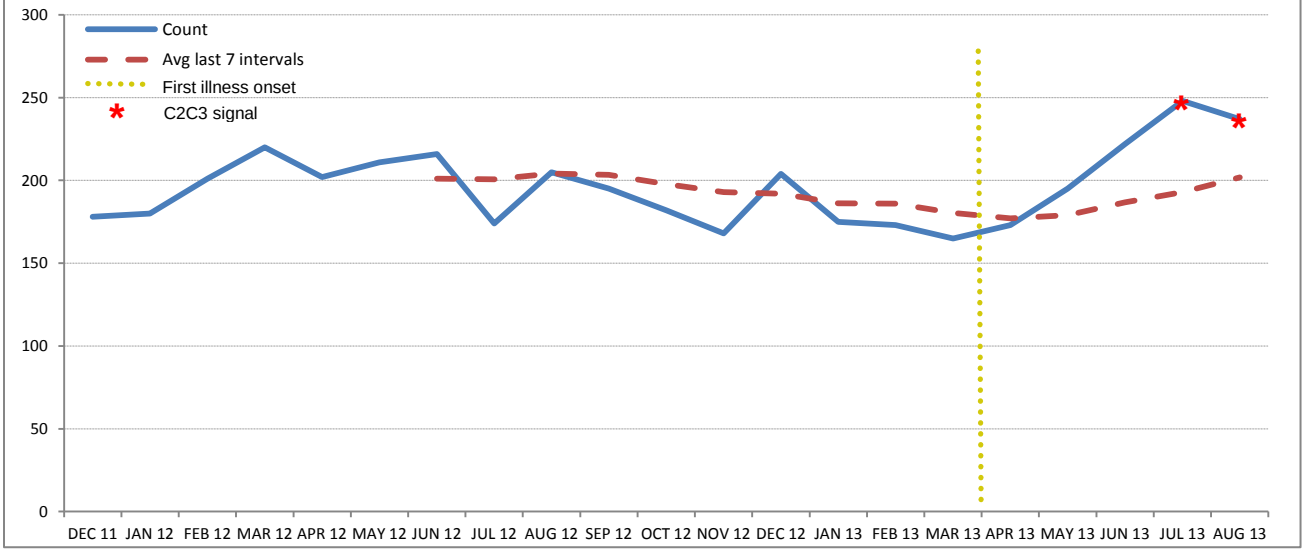
We queried coroner and California (CA) PC data for the same key words during the same time frame. Total ED visits were analyzed monthly using Early Aberration Reporting System (EARS) signal detection algorithms. All statistical analyses were conducted with SAS® version 9.3 (Cary, N.C.).

RESULTS

A total of 902 ED visits between May 1, 2013 and August 31, 2013 met the HepA syndrome definition when querying the SS database, with a high of 248 (27.5%) visits in July. Two individual visits stated “Costco hepatitis” in their CC and were reviewed, however were not confirmed cases. There was an overall increase in HepA ED visits in the months of July and August resulting in C2C3 signals (Figure1). There was no overall increase in the total number of HepA coroner deaths or in total HepA PC calls.

A total of 14 HepA confirmed outbreak cases were reported in LAC during the same time frame; seven of these reported visiting an ED (50%) of which six visited an ED ACDC currently monitors. Overall, we were able to locate three of the six cases (50%). There were no case matches in the coroner or PC databases and no new cases were identified while querying SS databases.

Figure. 1 Hep A ED visits in Los Angeles County
December 2011-August 2013



DISCUSSION

A multistate HepA outbreak was detected in May 2013 resulting in 162 confirmed cases.[3] Of the 79 cases in CA, 14 were reported in LAC. Three databases within the county's SS system were queried to determine whether there was an increase in HepA in LAC to aid in case ascertainment and to help establish tighter epidemiological links.

Ultimately, only seven of the 14 cases reported visiting an ED, and only six of those reported to an ED currently monitored by ACDC; SS could have been more successful if more cases had visited an ED. We were able to locate three of the six cases (50%) who reported to an LAC ED monitored by ACDC; however, a limitation in querying the SS databases is that the ED data are de-identified, thus, we cannot be sure that the cases we match are in fact the same person. Despite these limitations, SS is very useful in locating already known cases to collect CC and diagnosis information as long as symptoms are severe enough to warrant visits to the ED.

Alternative databases such as coroner deaths and CA Poison Control call centers have in the past proven useful in outbreak investigations that occur in unusual settings or among unique populations; however, no cases were found here. Reasons for this could include that there were no outbreak-associated deaths as HepA is a rare cause of death[4] and symptoms are too general to have been captured in the PC database. Also, since the average incubation period for HepA is 28 days (range: 15–50 days) [1] symptoms are not acute enough to warrant a call to PC. While no additional cases were found, the increase in ED visits, as well as the explicit reporting of "Costco berries" in the chief complaint, implies that the public was aware of this multistate outbreak.

This near real-time surveillance can be useful during large scale outbreaks to capture disease events or clusters that have not yet been identified. Future studies evaluating the SS system's capacity to detect

reportable disease clusters will be beneficial. As medical records transition to electronic medical records or electronic health records, we expect results to improve.

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NOROVIRUS OUTBREAK PREVENTION PROJECT
March 1, 2012 – MARCH 31, 2013

Karen Kuguru, MPA and Rachel Civen, MD, MPH

BACKGROUND

Noroviruses (NV) are the leading cause of both sporadic cases and reported outbreaks of acute gastroenteritis in the United States (US) [1, 2]. In the United States, an estimated 19-21 million illnesses, including 1.7-2.9 million outpatient visits, 400,000 emergency room visits, 56,000-71,000 hospitalizations and 570-800 deaths occur annually due to gastroenteritis illness. NV is both the leading cause of foodborne associated gastroenteritis and the most frequently reported cause of outbreaks within long–term care facilities. Approximately, one in five healthcare facility outbreaks are caused by NV [2]. Both nationally and locally, NV is the most common cause of outbreaks of gastrointestinal (GI) illness in nursing homes [2]. Skilled nursing facilities (SNFs) are the most frequently reported setting for NV outbreaks in Los Angeles County (LAC). In 2011, of 34 GI outbreaks reported from SNFs, 26 were confirmed to be due to NV, affecting 619 (80%) patients and 150 (20%) staff. Most outbreaks are associated with person to person transmission and contaminated environments [2]. These outbreaks result in increased staff work load due to acutely ill patients, intensive environmental cleaning, absenteeism among direct care and other facility staff and facility closures to new admissions by local public health.

During the spring of 2012, LAC Department of Public Health (DPH) convened the Norovirus Outbreak Prevention Working Group in response to the large number of SNF-associated NV outbreaks reported annually. The Working Group led to the development of the Norovirus Outbreak Prevention Project (NOPP), a collaborative project involving four DPH programs: Acute Communicable Disease Control Program (ACDC), Community Health Services (CHS), Environmental Health (EH), and Health Facilities Inspection Division of California DPH Licensing and Certification Program (HFs).

The goals of NOPP were to develop an educational toolkit for the prevention of NV outbreaks and provide NV outbreak prevention training to all SNFs in Service Planning Area (SPA) 3 including administrators, directors of nursing (DONs), direct and non-direct patient care providers. SPA 3 was selected because it had consistently reported the greatest number of SNF-associated outbreaks in the five years preceding the project and also this SPA had the 2nd largest number of licensed SNFs of any LAC SPA. The ultimate goal of NOPP training was to decrease the number and size of SNF-associated norovirus and other GI outbreaks and to increase the understanding of transmission and containment of NV outbreaks among all SNF staff (administrative, nursing and non-direct patient care).

This report will summarize the accomplishments of NOPP from March 1, 2012 to March 31, 2013, to include number of trainings conducted by ACDC and CHS staff and the total number of SNF line staff, DON and administrators educated at SPA 3 SNFs. Additionally, the characteristics of SPA 3's 2011-2012 GI outbreaks will be compared to the 2012-2013 GI outbreaks, which occurred during and after the NOPP intervention.

METHODS

Training and education

The norovirus toolkit was developed collaboratively by the Norovirus Working Group over a 5 month period (March-July 2012) and was launched on the ACDC web site in August 2012. The toolkit included a Microsoft Powerpoint® presentation aimed at direct and non-direct patient care providers, a fact sheet, environmental control measures, an outbreak management check list, two norovirus outbreak contact line lists (one for symptomatic staff members and the other for symptomatic residents) and additional health education information. All educational material within the toolkit were translated into Spanish. The tool kit

can be found posted on the ACDC website at
http://publichealth.lacounty.gov/acd/docs/Norovirus/NoroToolkit2012.pdf.
Seventy-eight licensed sub-acute healthcare facilities or SNFs were identified within SPA 3 as training sites by HFs. An invitation letter was sent to 78 facilities inviting them to attend one of two scheduled training sessions. Two types of trainings were provided, one training was targeted to SNF Administrators, DONs and CHS Public Health Nurses (PHNs), and the other was for direct and non-direct patient care staff. An ACDC physician conducted two training sessions for administrators and DONs and two sessions to CHS PHNs within the Monrovia and Pomona Health Districts. From October 1 to December 31, 2012, PHNs provided targeted onsite NV training to participating SNF line staff. The line staff and the DON/PHN/Administrators completed pre- and post-tests with six and 15 questions, respectively.

Case Definitions

A norovirus outbreak was defined as at least two or more NV occurrences resulting from a common exposure of which two or more were laboratory confirmed cases.

An unknown GI outbreak was defined as at least two or more occurrences of GI illness of an undetermined etiology resulting from a common exposure.

Data Analysis

The pre- and post-tests were entered into a Microsoft Access® database. A standardized outbreak investigation form and line list was completed by a PHN for each assigned outbreak. Demographic and clinical descriptions of GI outbreaks including details such as outbreak onset, duration, severity, hospitalizations, deaths, specimen collection and PHN's outbreak containment recommendations to SNFs were documented. Information from each outbreak was entered in a Microsoft Access® database. Data analysis was performed using SAS 9.2. SPA 3 GI outbreak characteristics from two norovirus seasons, September 2011-March 2012 and September 2012-March 2013, were compared. Laboratory confirmation of GI outbreaks and genotyping of norovirus strains was conducted at the Los Angeles County Public Health Lab (PHL) using polymerase chain reaction (PCR) based technology.

RESULTS

Training

Of 78 SPA 3 SNFs invited to participate in the training, 53 (68%) attended and 25 (32%) did not attend the training. A total of 136 SNF administrators and DONs and 38 PHNs attended one of the four training sessions. Of 174 participants, 173 (99%) completed the pre-test with a mean score of 13 and 174 (100%) attendees completed the post-test with a mean score of 14. SNF line staff training was provided to 60 of 78 SNFs by December 15, 2012; 18 refused or did not respond to multiple offers for training by PHNs. A total of 2264 line SNF staff received NOPP training, 1955 (86%) completed the pretest with a mean score of 5.5 and 1848 (82%) completed the post-test, with a mean score of 5.8 (Table 1).

Comparison of SPA 3 Outbreak Characteristics Pre- and Post NOPP Training

The total number of SPA 3 GI outbreaks increased by 54% from 13 GI outbreaks (9 confirmed NV and 4 unknown GI) during NV season 2011-2012 to 20 (14 confirmed NV and 6 unknown GI) GI outbreaks during 2012-2013 NV season. The total number of outbreak associated cases increased by 52 % in the 2012-2013 compared to 2011-2012 NV season, with 466 cases with 15 (3%) hospitalizations, and 306 cases with 10 (3%) hospitalizations in respective norovirus seasons. However, the average number of cases for each GI outbreak was nearly identical during both the 2011-2012 and 2012-2013 NV seasons, 24 and 23 cases, for respective NV seasons. There were no deaths due to NV or GI illness reported from any of the SNF outbreaks during the two NV seasons (Table 2).

Table 1. Norovirus Outbreak Prevention Training, Service Planning Area (SPA) 3 Skilled Nursing Facilities (SNFs), September- December 2012

	Administrators & Community Health Services (CHS)Training	SNF Line Staff Training
Completed Trainings	4	60
Total SNFs participating	53	60
Refused to participate/No Response	25	18
Number of participants:	174	2264
Number Completed Pre-test	173	1955
Number Completed Post-test	174	1848
Scores (1-15):		
Pre-test mean (range)	13.0 (5 - 15)	5.5 (1 - 6)
Post-test mean (range)	14.0 (7 -15)	5.8 (2 - 6)

The overall proportion of symptomatic staff remained the same for the two norovirus seasons, 2011-2012 and 2012-2013, respectively. Sixty-four staff or 21% of total GI illness outbreak cases were affected during GI outbreaks in 2011-2012. Of 64 SNF staff, 10 (15%) provided direct patient care, 5 (8%) were not involved in direct patient care and staffing duties were not available for 49 (77%) staff members. During the 2012-2013 NV season, 96 (21%) symptomatic staff were documented, 71 (74%) were direct patient care providers, 17 (18%) did not provide direct patient care and staffing duties were not available for 8 (8%) staff members (Table 2).

The mean and median duration of outbreaks increased during the 2012-2013 NV season compared with 2011-2012 season. The mean and median duration of GI outbreaks in 2011-2012 NV season was 8 and 6 days, respectively, compared to a mean and median of 10 and 8 days, respectively, during the 2012-2013 NV season. Reviewing the duration of outbreaks in SNFs outside of SPA 3, the 2011-2012 mean and median duration of SNF outbreaks was longer, 9 and 8 days, compared to 2012-2013 with 7 and 6 days (data not shown). The mean and median time to report an outbreak to LAC DPH decreased in SPA 3 in 2012-2013 compared to 2011-2012, from 4 and 3 days, respectively, compared to a mean and median of 3 days each for NV season 2012-2013 (Table 2).

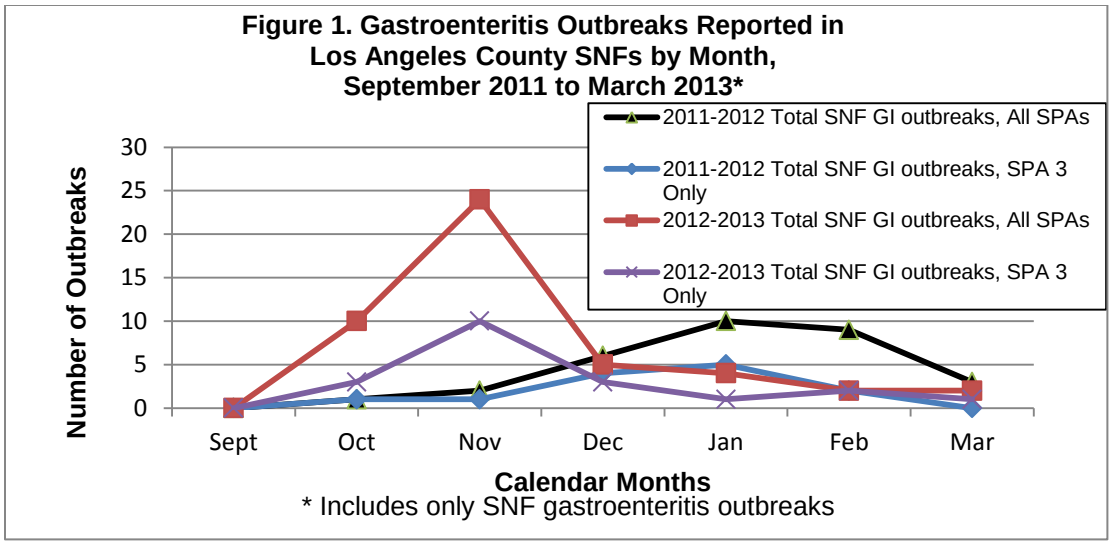
The peak report time for SNF outbreaks was two months earlier in 2012-2013 compared to 2011-2012 in SPA 3 and all SNF reported outbreaks within LAC. Reviewing SNF outbreak reports from all SPAs to DPH during the 2011-2012 season, the outbreak season peaked in January 2012 with 10 (32%) outbreaks and declined in March 2012 with 3 (10%) outbreaks. This outbreak epidemiologic trend was also consistent with the five year prior season (data not shown). For 2011-2012 norovirus season, SPA 3 followed a similar trend as the overall LAC SNF GI outbreaks with one outbreak reported in October 2012 and peak outbreak reports in January 2012 with 5 (39%) and declines noted in February 2012 with 2 (15%) outbreaks. In contrast, during the 2012-2013 NV season, community and SNF GI outbreaks were initially reported in October 2012 with 10 (21%) outbreaks and peaked in November 2012 with 24 (51%) and declined in December 2012 with 5 (11%) outbreaks followed by January 2013 with 4 (9%), February 2013 with 2 (4%) and March 2013 with 2 (4%) outbreaks. SPA 3 followed a similar trend with the first SNF outbreak reported in October 2012 followed by a peak in November 2012 with 10 (50%) and declined in December 2013 with 3 (15%) outbreaks. (Figure1).

More strain typing was completed on laboratory confirmed NV SNF outbreaks in SPA 3 during 2012-2013 compared to 2011-2012. Of nine NV outbreaks in the 2011-2012 norovirus season, 1 (11%) was identified as the GII.1 strain type, while 8 (89%) outbreaks were not strain typed. Strain typing was

completed on all 14 confirmed NV outbreaks in 2012–2013 SPA 3 SNFs, 12 (86%) were identified as the GII.4 Sydney strain, one (7%) was GII.4 New Orleans strain and one (7%) was GI.6A strain.

Table 2. Characteristics of SNF gastrointestinal illness (GI) Outbreaks, SPA 3, September 2011-March 2013

Outbreak Characteristics	Norovirus Season 2011-2012 N (%)	Norovirus Season 2012-2013 N (%)
Number of GI outbreaks reported in SNFs	13	20
Norovirus Confirmation and Strain Type:		
Norovirus (NV)	9 (69)	14 (70)
Unknown GI	4 (31)	6 (30)
Total NV outbreaks available for genotyping:	9	14
GII.4 Sydney	0	12 (86)
GII.4 New Orleans	0	1 (7)
GII.I	1 (11)	--
GI.6A	0	1 (7)
Unknown Strain	8 (89)	--
Patients with Illness:		
Total affected in the outbreak	242	370
Hospitalized	10	15
Died	0	0
Staff with Illness:		
Total affected in the outbreak	64 (21)	96 (21)
Direct Care	10 (3)	71 (15)
Non direct care	5 (2)	17 (4)
Unknown staffing duties	49 (16)	8 (2)
Total Patients and staff with illness	306	466
Average Number of cases/outbreak	24	23
Duration of outbreak (days):		
Mean	8	10
Median	6	8
Range	2-27	0-30
Days from symptom onset to report date:		
Mean	4	3
Median	3	3
Range	0-9	0-14



DISCUSSION

In the spring of 2012, LAC DPH convened the Norovirus Outbreak Prevention Working Group with the goal of enhancing training for SNF associated viral GI outbreaks (specifically norovirus), develop a toolkit for norovirus outbreak prevention and provide training for SNF nursing directors, administrators and direct and non-direct patient care staff. SPA 3 was targeted for NOPP because during previous NV seasons, this SPA reported the greatest number outbreaks and total cases of GI outbreaks in SNF compared to all other SPAs. Our working hypothesis was that enhanced training of supervisorial and line staff would lead to decreased outbreak reports and total number of cases per outbreaks. However, during the 2012-2013 norovirus season, SPA 3 reported an even greater number of GI outbreaks and total cases of GI illness compared to the 2011-2012 NV season. There are various reasons to explain these findings. It is likely that increased contact with our health department through onsite PHN training of line staff and administrators caused a surveillance bias and led to an increased understanding of the importance of outbreak reporting and more timely and thorough completion of investigation reports. However, we believe that the most important reason for this rise in cases and reports was the appearance of a new norovirus genotype, GII.4 Sydney.

In January 2013, MMWR “Notes from the Field” reported the emergence of a new norovirus strain, GII.4 Sydney, identified in Australia in March 2012, as the norovirus strain responsible for over 50% of US gastroenteritis outbreaks reported to Centers for Disease Control and Prevention by December 2012 [3]. This communication also noted that norovirus GI outbreak activity across the entire US commenced in October 2012, approximately three months earlier than previous seasons. In LAC, genotyping studies of NV outbreak strains in 2012 and 2013 demonstrated the presence of GII.4 Sydney strain in both SNF and community based GI outbreaks beginning in October 2012. For the 2012-2013 NV season, peak outbreak activity was identified in both SNF and community GI outbreaks in November 2012 in both SPA 3 and other SPAs, two months earlier than norovirus/GI outbreak seasons from 2008 to 2012, where GI outbreaks predictably peaked between January and February. This pattern was also identified from 2009-2012 nationally in both foodborne and non- foodborne NV outbreaks through the National Outbreak Reporting System [1]. Our time table of NOPP training activities during the fall of 2012 was based on annual peak NV patterns of the past 4 to 5 years. In contrast to prior years, both community and SNF-associated GI outbreaks in 2012-2013 started increasing in October 2012 and peaked by November 2012 (Figure1). Of 20 SPA 3 GI SNF outbreaks reported during 2012-2013 NV season, NV strain typing confirmed 12 were likely due to GII.4 Sydney, one GII.4 New Orleans and one GI.6A. The arrival of this new genotype during the SPA 3 enhanced training period most likely contributed to the increase in SNF-associated outbreaks and thus impacted the effect that the NOPP might have had in decreasing the number and size of outbreaks.

It is known that SNF patient care staff can be impacted by norovirus outbreaks. The Norovirus Outbreak Prevention toolkit provided an important addition to the outbreak line list by categorizing ill staff by their patient care roles, direct versus non-direct patient care, i.e., housekeeping. In both NV seasons 2011-2012 and 2012-2013, 21% of total outbreak cases were SNF staff members. Therefore, NV outbreaks are an important occupational health risk for SNF staff. Although direct patient care staff were more frequently ill, 71 (82%), there were 17 (18%) ill non-direct care staff reported during the 2012-2013 NV season. Non-direct patient care staff may have acquired NV infection by not utilizing proper personal protective equipment (PPE) during cleanup or entrance to the patient care environment. The contribution of SNF staff to amplification of outbreak and NV transmission within a SNF has not been well studied. It is possible that both patient care and non-patient care staff members worked different shifts in multiple facilities and contributed to the spread of NV disease at more than one SNF. More data collection of ill staff members over a longer time period will be necessary to better assess their contribution to the spread of viral GI illness and if guidelines to prevention are adequate and have compliance. Although we were not able to get any norovirus stool specimens to specifically demonstrate that staff members had the GII.4 Sydney strain, staff symptom onsets of illness within each outbreak linked them to each individual SNF outbreak. It is clear that education on norovirus prevention and environmental cleaning will need to be consistently targeted at both patient care and non-direct patient care staff to prevent illness among SNF staff.

There are important limitations of this investigation that need to be considered.

(1) Due to less frequent strain typing during NV season 2011-2012, we cannot definitely say that GII.4 Sydney strain had not arrived in LAC. However, the limited strain typing available from the 2011-2012 NV season in LAC SNFs support that GII.4 New Orleans was the predominant NV strain in 2011-2012.
(2) Ideally, NV stool specimens should have been collected on SNF staff members impacted by SNF outbreaks.
(3) The training schedule was presented in SPA 3 from January to March based on the usual past peak timing of norovirus season and we were not able to predict that the norovirus season would start much earlier in October of 2012.

To assess the effectiveness NOPP training and utilization of toolkit, norovirus outbreaks will need to be closely monitored in future seasons. Additionally, viral genotypes will need to be studied for emergence of new genotypes that predictably lead to an increase in cases among SNF patients and staff. Possible without the NOPP, the number of cases in outbreak could have been larger. It is also possible that decreases in outbreak reports and duration of outbreaks will be more apparent in the future as communication between SNF directors, line staff and PHNs encourage more prevention and containment efforts for NV within SNFs and the genotype of the circulating NV strains remains stable.

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