ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT AND SPECIAL STUDIES REPORT

2014

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County of Los Angeles Public Health

Acute Communicable Disease Control Program

Annual Morbidity Report

2014

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 2014 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, outbreak response, education and preparedness activities. 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 Ebola, Middle East Respiratory Syndrome Coronavirus (MERS-CoV), pandemic influenza, antimicrobial resistant organisms, 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. 2014 is a year that will be remembered for several very notable communicable disease events. Foremost, in 2014 we were reminded that diseases know no borders. Instead, due to our highly mobile societies, infectious diseases are not limited to foreign countries of origin and can occur and spread in the US and locally. This was true of Ebola virus disease (EVD). During the final few months of 2014 and into 2015, three countries in West Africa (Guinea, Liberia, and Sierra Leone) experienced the largest outbreak of EVD on record which prompted heightened surveillance and preparedness activities throughout the US. In LAC, the majority of the DPH's EVD response and outreach responsibilities were headed by ACDC staff. EVD, however, was not the only emerging disease originating from another country that ACDC monitored and investigated in 2014. During 2014 ACDC increased our outreach and surveillance for MERS-CoV, a novel viral infection first identified in the Middle East in 2012. Over the course of the year, LAC DPH conducted rule-out testing for 10 suspected MERS-CoV cases. LAC also saw increases in travel-associated mosquito-borne diseases. ACDC identified the first imported cases of Chikungunya infection since 2007 and documented the second highest incidence of West Nile virus infections since it first appeared in 2003. In 2014 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 8 deaths and more than 250 people hospitalized for more than two days. Vaccine preventable diseases are highlighted with measles cases occurring linked to a theme park (mostly due to under-immunization) and continuing outbreaks of pertussis, while disease caused by pneumococcal pneumoniae decreased in all age groups due to high vaccine coverage of a newly 13 valent pneumococcal conjugate vaccine.

Also attached is the 2014 ACDC Special Studies Report that showcases our activities related to special data analyses and studies. Highlights include a summary of Ebola Virus Disease Hospital Preparedness and MERS-CoV Response activities along with a description of an increase of invasive meningococcal disease among men who have sex with men. Of note, both ACDC Annual Morbidity and Special Studies Reports do not include information on tuberculosis, sexually transmitted diseases, or HIV and AIDS. Communicable diseases are constantly evolving and priorities in our surveillance, outreach, and prevention efforts must also continually adapt and change. ACDC prides itself in our ability to rapidly and effectively respond to an enormous range of diseases. I hope that this report will be a useful resource to you and your organization.

Sincerely,

Laurene Mascola

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Director of Acute Communicable Disease Control Program

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Los Angeles County Department of Public Health
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● EXECUTIVE SUMMARY ●

The 2014 Acute Communicable Disease Control Program (ACDC) Annual Morbidity Report and Special Studies Report describe the current status, trends, and key issues in communicable diseases in Los Angeles County (LAC) as well as highlighting some of our key investigations and prevention activities that were implemented during the year.

About ACDC

ACDC's Mission is *to prevent and control infectious disease in Los Angeles County implementing tools for surveillance, outbreak response, education, and preparedness activities*. The 66 ACDC staff include a range of public health professionals with expertise in medicine, infectious diseases, infection prevention, epidemiology, statistics, health education, program implementation, administration and management. ACDC provides training to fellows from CDC's Epidemic Intelligence Service and Public Health Associates Program, and the Council of State and Territorial Epidemiologists, as well as hosting students from various programs. ACDC Units focus their work around specific infectious diseases and conditions, and the settings where disease occurs such as hospitals, skilled nursing facilities, ambulatory surgery centers and others.

The greatest challenge that faced ACDC, the LAC Department of Public Health (DPH), and health departments across the U.S. was preparedness for and response to the threat of Ebola. From spring 2014 through 2015 the largest outbreak of **Ebola virus disease** (EVD) that has ever occurred was centered in the West African countries of Guinea, Liberia and Sierra Leone. Nearby countries also experienced some disease and several cases occurred in the U.S. and Europe among healthcare workers and travelers exposed in outbreak countries. In the U.S., concern about the possible spread of infection by travelers from affected countries led to screening at airports and monitoring by local health departments for fever and other symptoms during the 21 day EVD incubation period. The Special Report by Itano and colleagues describes monitoring in LAC for 56 travelers from September through December. Of these, nine (16%) developed EVD-like symptoms and, after further assessment, one was transferred to an Ebola Treatment Facility for evaluation; a PCR test done at the LAC Public Health Laboratory and confirmed by CDC was negative (note that other persons under investigation for EVD were tested and negative in 2015, and not included in this report). The success of LAC DPH's Ebola monitoring program reflects the close collaboration of ACDC and Community Health Services, and coordination with the California Department of Public Health (CDPH) and the Centers for Disease Control and Prevention (CDC).

Readiness for Ebola also required engaging with the healthcare system to ensure that hospitals were prepared should a case of EVD present to the emergency department (ED) and that a smaller group of hospitals achieved a high level of preparedness to serve as CDC-designated Ebola Treatment Centers. Led by ACDC's Hospital Outreach Unit, from September through December, all 71 LAC hospitals with EDs were contacted and site visits were made at 51 hospitals for policy reviews, ED assessments and participation in drills (see Special Report by Marquez and colleagues). Collaboration and support with two LAC hospitals led to their designation as Ebola Treatment Facilities and two additional hospitals met criteria as Assessment Centers. In addition, ACDC developed guidance for outpatient facilities; engaged in planning with multiple partners for a potential EVD patient at LAX; contributed substantially to the development of guidance and procedures ranging from investigation of a potential case to fatality management and handling of potentially infectious medical waste; developed health education and communication materials; and responded to inquiries from healthcare personnel, media and the public. In addition to improving hospital and healthcare system readiness for Ebola, ACDC's activities enhanced preparedness for other infectious diseases—both emerging threats and "every day" infections – and further strengthened relationships between DPH and our key healthcare partners. The majority of the LAC DPH's EVD response and outreach responsibilities were headed by ACDC staff; about half of ACDC staff diverted their typical responsibilities to manage LAC's EVD response.

While Ebola represented a serious disease threat, other communicable diseases continued to emerge as substantial causes of disease among LAC residents. **West Nile virus** (WNV) infection, which first occurred in LAC in 2003 and initially caused an outbreak every fourth year, has evolved as an annual health threat with an increasing number of cases reported each year since 2011, peaking at 218 case reports in 2014. The number of cases and rate of WNV disease are among the highest for any health jurisdiction in the U.S. These infections included 156 cases of neuroinvasive disease (paralysis, encephalitis and meningitis) of whom 9 died, 43 WNV fever cases, and 19 asymptomatic infections in blood donors. 2014 also saw the first LAC cases since 2007 of **Chikungunya** infection, a mosquito-borne disease characterized by fever, muscle pain, arthritis, headache and rash. Cases occurred among travelers returning from the Caribbean, Central and South America, and Mexico. As the distribution of disease in those areas outside of the U.S. changes, so too does the source for cases in LAC. In 2014, 37 (74%) of the 50 definite and probable Chikungunya cases were acquired in El Salvador, with Mexico emerging in the latter part of the year as an increasing threat. Although no locally acquired cases of Chikungunya or of **dengue**, another "tropical" mosquito-borne disease have occurred, since 2011 the *Aedes* mosquitos that can transmit these infections have been indigenous to LAC. The locations where these mosquitos have been found continues to grow despite extensive control efforts creating a risk of local transmission, and requiring strong ongoing surveillance and close collaboration between ACDC and the vector control agencies.

About LAC

LAC is the nation's most populous county with about 10 million residents, and one of the nation's largest counties, covering over 4,000 square miles. LAC's population is exceeded by only eight states and despite its size, is densely populated, with over one-fourth of the state's population. LAC is home to 99 acute care hospitals with 71 emergency departments, more than 30,000 licensed physicians, over 450 sub-acute healthcare facilities, and about 25 thousand retail food establishments. LAC encompasses a wide variety of geographic areas including mountain ranges, arid deserts, and over 80 miles of ocean coastline which contributes to the variety of diseases that occur.

Another challenge in LAC is the diversity of the 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; 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 U.S. According the U.S. Department of Homeland Security Yearbook of Immigration Statistics 2012, California remains the leading state of residence of legal permanent residents/immigrants in the country. 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.

Another emerging disease that ACDC monitored in 2014 was **Enterovirus D68** (EV-D68), an enterovirus type with the potential to cause severe infection among children. EV-D68 was first detected in California in 1962 and is one of more than 100 enterovirus types. However, in August 2014, EV-D68 outbreaks occurred in the Midwest causing severe respiratory disease, often requiring intensive care, primarily among children with asthma. On September 11, 2014, LAC DPH sent out a Health Alert notifying healthcare providers about the EV-D68 outbreak and requesting providers to report suspected cases of EV-D68 for testing at CDPH. Surveillance was passive and voluntary and cases of EV-D68 are not reportable to federal, state, or local health jurisdictions. Of 25 reported EV-D68 cases in LAC, 15 occurred in Long Beach and were investigated by that health department. Of the other LAC cases, 70% were among children who have asthma and 40% were admitted to an intensive care unit (ICU). Two cases had acute flaccid paralysis associated with EV-D68 respiratory disease. The EV-D68 outbreaks nationwide and association with paralysis has led to CDC funding LAC DPH and others for acute flaccid myelitis surveillance and in 2015, LAC has made this condition reportable through a Health Officer order.

Identifying, investigating and controlling disease outbreaks are key ACDC functions. In 2014, 25 confirmed outbreaks were reported from acute care hospitals, an increase of 32% compared with 2013. Particularly concerning were the increased number of outbreaks caused by **multi-drug resistant organisms**, such as methicillin resistant *Staphylococcus aureus* (MRSA) and carbapenem resistant enterobacteriaciae (CRE), and the eight outbreaks that occurred in neonatal ICU. **Legionnaires' disease** outbreaks occurred in both hospital and long-term care settings. During the year, the ACDC Food Safety Unit investigated 27 outbreaks, of which 24 involved a complaint regarding a restaurant. Of these, a meal was epidemiologically implicated in 18 (75%)

and a specific food item was implicated in 10 (42%). An ill food handler was implicated in 3 (13%) outbreaks. In addition to these LAC outbreaks, the Food Safety Unit worked with State and Federal agencies investigating 55 ***Salmonella***, 9 ***Listeria***, 7 **Shiga toxin producing *E. coli***, and 4 ***Shigella*** outbreaks where some of the cases occurred in LAC. Recommended control measures implemented in hospitals and restaurants experiencing outbreaks in every case, resulted in control of the outbreak, preventing additional cases. Moreover, lessons learned through the investigations contributed to prevention programs that will reduce future outbreaks.

To prevent outbreaks of **healthcare associated infections** (HAIs) in hospitals and skilled nursing facilities, ACDC has stepped up liaison, monitoring, education, and intervention to improve infection control practices. Unique among health departments in California, ACDC has liaison Public Health Nurses (PHNs) within the Healthcare Outreach Unit who work closely with the infection preventionists at all 99 LAC hospitals to support improved disease reporting and prevention. Over a third of the hospitals in LAC invite the liaison PHN to their infection control committee meetings, demonstrating integration of public health goals into the hospital setting. Outreach also has expanded to include non-hospital healthcare settings, such as psychiatric hospitals, large clinics, correctional medical services, and ambulatory care settings. Part of the approach to prevent HAIs has been to promote improved adherence with **influenza vaccination** of healthcare workers consistent with a Health Officer's order requiring vaccination or, for those declining vaccination, wearing a mask throughout influenza season. Evaluation of the impact of this order showed that the mean influenza vaccination rate in hospitals increased from 63% to 80% in the season following the order.

Although immunizations have proven to be an effective public health prevention strategy, the occurrence of annual outbreaks/clusters of **measles** cases among unimmunized individuals due to a single travel-related exposure source has become a pattern in LAC. Unimmunized measles index cases identified annually in the last 5 years acquired measles while traveling to regions of the world where measles is either endemic or experiencing a resurgence. They subsequently returned to the U.S. and spread the illness in various settings, such as airlines, shopping malls, and most concerning, in health care settings. Even if a health care setting has a high immunization coverage level among its patients, measles has been observed to spread among patients exposed in a waiting room who were too young to be immunized or immune-compromised and could not launch an adequate immune response. To further exacerbate the problem, the clinic may support an alternate immunization schedule for its patients as was the case in the cluster of 5 measles cases that occurred in a single LAC clinic during the first quarter of 2014. The combination of a highly effective MMR vaccine, which confers over 97% of individuals with a lifetime immunity with two doses, along with an immunization coverage level of 90% among LAC kindergartners cannot prevent large scale outbreaks when an exposure source is introduced in a setting with a large number of unimmunized individuals clustering together. This was the case with the large measles outbreak that began at Disneyland in late-2014. The outbreak began among intentionally unimmunized individuals or those whose immunization status was unknown or undocumented and 3 LAC cases occurred by the end of the year. By the end of the outbreak in April 2015, 131 cases had occurred in California, of which 88% resided in Southern California. By the end of the outbreak, LAC's 28 cases had exposed over 3,300 individuals. Approximately 2,200 were in health care settings. This underscores the need for educating health care facility staff about effective strategies to curtail exposure to measles in the healthcare facility setting.

Ongoing outbreaks when immunization levels are suboptimal are also a concern with other vaccine-preventable diseases such as **mumps, varicella, and pertussis**. Although a large-scale outbreak of mumps has not occurred since 2010 in LAC, clusters of cases continue to occur annually among individuals with unknown or undocumented immunization status. In 2014, a varicella outbreak of 33 cases was identified at a private school with over 61% of students not immunized against varicella. Since 2013, approximately 30 LAC pertussis school outbreaks/clusters have occurred annually. This is most likely due to the increase in pertussis cases reported in 2013 that led into a statewide pertussis epidemic in 2014 with over 11,000 cases reported, the most cases reported annually since 1947. Pertussis outbreaks occurred despite a 2014 Tdap coverage level of about 98% among LAC students in grades 7-12, with many cases in students who had been vaccinated with Tdap 1-2 years earlier. However, outbreaks with the largest number of cases or outbreaks that propagated the longest had cases that were unimmunized and clustered together. Although studies have shown a rapid waning of immunity from the Tdap booster, it has also been shown that the vaccine confers some level of protection with most unimmunized students that acquire pertussis exhibiting less severe symptoms, compared to unvaccinated

students. Despite overall high immunization coverage levels in LAC, these ongoing outbreaks highlight the continued efforts needed to address the clustering of unimmunized individuals in LAC.
By contrast, vaccination of young children with 13-valent pneumococcal conjugate vaccine has been highly effective and has continued to reduce the rates of **invasive pneumococcal disease** (IPD) not only among the vaccinated population but among all age groups. In 2014, the incidence of IPD was 4.9 cases per 100,000 persons, which was 15% lower than the 2013 rate of 5.6 cases per 100,000, and a continued reduction from the average over the past 5 years of 6.5 cases per 100,000. Compared with the 5-year average, incidence decreased in every age group, consistent with a reduction of carriage and transmission of pneumococci leading to herd immunity across the entire population. While the rate of IPD among Blacks remains higher than for other racial/ethnic groups, the 31% reduction in the Black population compared with 2010-13 exceeded that for others helping to reduce disparities.

Another vaccine associated success was the continued reduction in **invasive meningococcal disease**, with only 11 cases in 2014—the lowest ever reported number of cases and lowest rate in LAC. No cases occurred among persons less than 22 years old in 2014 and no cases occurred in those less than 14 years old since 2011. Of the 11 cases, 4 were serogroup C and 3 serogroup Y (vaccine preventable) and 4 were serogroup B (for which a new vaccine is available but not routinely recommended). From October 2012 through September 2014, 38% of LAC meningococcal disease cases occurred among men-who-have sex-with-men (MSM) for an estimated incidence of 2.4 per 100,000 persons—about 10 times the rate among the entire population. There was no common bacterial strain among infected MSM and no common exposure. Because of the increased risk in this group, in April 2014, LAC DPH recommended vaccination for MSM who are HIV positive or regularly have close or intimate contact with multiple partners, or seek partners through the use of digital applications ("apps"), particularly those who share cigarettes/marijuana or illegal drugs. Following the recommendation, LAC DPH distributed about 3,500 vaccine doses to clinics that serve MSM and HIV-positive populations, made vaccine available at public health clinics, and provided information to healthcare providers and education through channels that would reach the at risk population. While the overall coverage of vaccination likely remained low, no cases among MSM occurred in 2014 after the end of July.

ACDC's success detecting disease largely depends on the quality of surveillance, the strong relationship with key reporting sources, and ever improving infrastructure that makes reporting easier, and in the case of **electronic laboratory-based reporting** (ELR), automatic. The number of hospitals and laboratories reporting through LAC DPH's ELR increased to 27 in 2014 with about 70% of reports coming through this infrastructure. LAC DPH also has the flexibility to add new conditions for surveillance responding to new threats or opportunities. Using the mechanism of the Health Officer order, severe **respiratory syncytial virus** (RSV) disease was added to the list of reportable conditions in 2014, generating new information about the epidemiology of this condition in LAC and helping identify potential opportunities for prevention. Disease specific surveillance also was augmented by **syndromic surveillance** with information from hospitals where about 70% of the ED visits occur throughout the county being transmitted to ACDC in near real-time to provide early detection of emerging infectious diseases or outbreaks, related to bioterrorism or natural disease. Finally, reflecting the strong relationship of ACDC with hospitals countywide, all LAC hospitals have agreed to share their data on HAIs which is reported through the **National Healthcare Safety Network**. These systems and infrastructures provide a strong foundation for ACDC's work.

2014 also saw an expansion of **collaborative programming** between ACDC, other LAC DPH divisions and programs, and external partners. In addition to collaborations for Ebola preparedness with multiple groups, ACDC worked with: 1) Community Health Services to investigate outbreaks in schools, residential, and community settings; 2) the Public Health Laboratory to identify pathogens and specific bacterial strains in the context of outbreak investigations; 3) the Environmental Health, Health Facilities Inspection Division to investigate HAI outbreaks; 4) Environmental Health experts to identify and remediate the source of *Legionella* during outbreaks; 5) the Mosquito and Vector Control Districts to prevent West Nile virus infections; and 6) Environmental Health to survey restaurant workers and assess the potential impacts of a new California law mandating paid sick leave for all restaurant workers which could decrease disease and outbreaks associated with restaurant staff working while ill.

Progress made by ACDC in 2014 preparing for emerging threats, tracking and responding to current diseases, and developing and implementing prevention strategies all contribute to improved health and health security for

the LAC population. Although the occurrence of specific new threats cannot necessarily be predicted, as we saw with Ebola, ACDC's strong infrastructures, expert staff and effective partnerships will help ensure acute communicable disease prevention and control.

Acute Communicable Disease Control Program

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- Meningitis, Viral……..Van Ngo, MPH
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Publications

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OVERVIEW

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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: This reprt 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 2014 Summary of Nationally Notifiable Infectious Diseases published in the Morbidity and Mortality Weekly Report (MMWR).[2]

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

[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*.

[2] Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033. Available at : www.cdc.gov/mmwr/preview/mmwrhtml/mm6436a8.htm

from LAC morbidity data, and their populations subtracted from LAC population data. Exceptions to this rule are noted in the text when they occur.

DATA SOURCES

Data on occurrence of communicable diseases in LAC were obtained through passive and sometimes active surveillance. Every healthcare provider or administrator of a health facility or clinic, and anyone in charge of a public or private school (of any grade level) 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[3] is used with some exceptions as noted in the text of the individual diseases. Since verification by a laboratory test is required for the diagnosis of some diseases, cases reported without such verification may not be true cases. Therefore, an association between a communicable disease and a death or an outbreak possibly may not be identified.

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

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). The SPAs are shown on the map included in this section. 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.
   - **Other** – includes persons that do not list themselves according to any of the above categories and those that note multiple race/ethnicity categories.

   Because population data is not available for uknown, other, or multiple race categories, rate caluations for these groups are not possible.

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
2014

Table A. Los Angles County* population by year, 2009–2014

Year	Population	% change
2009	9,236,297	
2010	9,223,225	-0.14%
2011	9,259,218	0.4%
2012	9,296,158	0.4%
2013	9,404,275	1.16%
2014	9,452,968	0.52%

* Does not include cities of Pasadena and Long Beach.

Table B. Los Angles County* population by age group, 2014

Age (in years)	Population	%
<1	118,259	1.3%
1–4	488,523	5.2%
5–14	1,208,886	12.8%
15–34	2,820,573	29.8%
35–44	1,322,668	14.0%
45–54	1,299,191	13.7%
55-64	1,062,798	11.2%
65+	1,132,070	12.0%
Total	**9,452,968**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table C. Los Angles County* population by sex, 2014

Sex	Population	%
Male	4,664,908	49.3%
Female	4,788,060	50.7%
Total	**9,452,968**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table D. Los Angles County* population by race, 2014

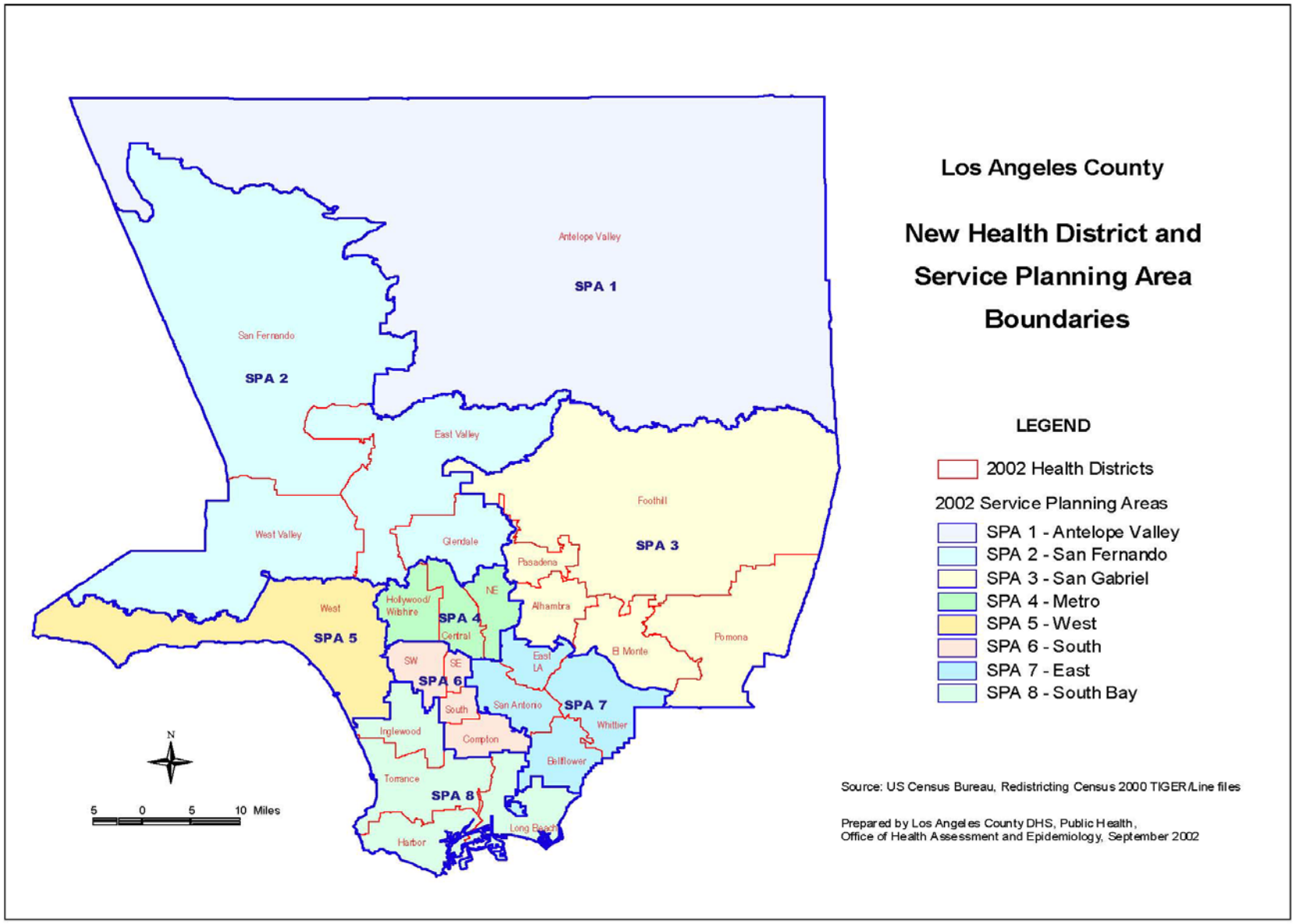
Race	Population	%
Asian	1,377,486	14.6%
Black	785,962	8.3%
Latino	4,610,073	48.8%
White	2,661,022	28.1%
Other**	18,425	0.2%
Total	**9,452,968**	**100.0%**

* 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, 2014**

Health District	Population
SPA1	**392,730**
Antelope valley	392,730
SPA 2	**2,190,391**
East Valley	452,934
Glendale	342,633
San Fernando	512,708
West Valley	882,116
SPA 3	**1,640,214**
Alhambra	347,794
El Monte	440,254
Foothill	308,519
Pomona	543,647
SPA 4	**1,149,691**
Central	345,144
Hollywood Wilshire	494,227
Northeast	310,320
SPA 5	**652,160**
West	652,160
SPA 6	**1,033,672**
Compton	284,311
South	193,482
Southeast	174,165
Southwest	381,714
SPA 7	**1,312,015**
Bellflower	358,606
East Los Angeles	204,509
San Antonio	426,211
Whittier	322,689
SPA 8	**1,082,095**
Inglewood	416,404
Harbor	206,119
Torrance	459,572
Total	**9,452,968**

* 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
West
SPA 4
Central
Alhambra
SPA 5
SW
SE
East LA
El Monte
Pomona
SPA 6
South
San Antonio
SPA 7
Whittier
Inglewood
Compton
Bellflower
Torrance
SPA 8
Harbor
Long Beach
N
5 0 5 10 Miles
Source: US Census Bureau, Redistricting Census 2000 TIGER/Line files
Prepared by Los Angeles County DHS, Public Health,
Office of Health Assessment and Epidemiology, September 2002

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

Table F. List of Acronyms

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

LOS ANGELES COUNTY HEALTH DISTRICTS

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

TABLES OF NOTIFIABLE DISEASES

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Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2009-2014

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2009	2010	2011	2012	2013	2014		
Amebiasis	107	119	86	99	57	64	94	135
Botulism	1	1	3	4	4	1	3	5
Brucellosis	4	7	6	4	10	7	6	11
Campylobacteriosis	1135	1239	1259	1546	1703	1506	1376	1793
Cholera	0	0	0	0	0	0	0	0
Coccidioidomycosis[b]	171	235	304	327	362	426	280	414
Cryptosporidiosis[b]	51	61	51	44	48	78	51	62
Cysticercosis	9	3	37	11	1	9	12	38
Dengue[b]	2	1	0	2	2	32	1	3
E. *coli* O157:H7	17	12	21	19	12	22	16	23
E. *coli* Other Stec	23	55	65	78	90	68	62	107
Encephalitis[b]	51	51	59	75	79	92	63	86
Foodborne Outbreaks	16	17	22	21	12	24	18	25
Giardiasis	354	308	292	294	392	346	328	405
Haemophilus Influenzae Type B	2	0	0	0	0	0	0	2
Hansen's Disease (Leprosy)	3	2	2	3	1	3	2	4
Hepatitis A	66	51	45	47	60	42	54	69
Hepatitis B	41	54	60	38	55	42	50	66
Hepatitis C	8	4	10	7	5	5	7	11
Hepatitis Unspecified	19	5	4	0	0	0	6	19
Legionellosis[b]	66	108	116	111	85	140	97	134
Listeriosis, Nonperinatal	15	14	19	26	23	27	19	28
Listeriosis, Perinatal	5	4	6	7	4	5	5	7
Lyme Disease	4	5	6	1	11	5	5	12
Malaria	24	25	22	19	16	21	21	28
Measles[b]	1	8	8	6	3	13	5	11
Meningitis, Viral	399	570	317	303	355	400	389	578
Meningococcal Infections	21	26	37	12	17	11	23	39
Mumps	7	20	3	13	9	10	10	22
Pertussis[b]	156	972	453	154	296	1558	406	1001
Pneumococcal Disease, Invasive[c]	785	576	658	504	522	460	609	811
Psittacosis	1	0	0	0	0	0	0	1
Q-fever	0	1	0	3	2	1	1	3
Relapsing Fever	0	0	0	0	0	1	0	0
Rheumatic Fever, Acute	1	1	0	0	0	0	0	1
Rubella	0	0	1	0	0	0	0	1
Salmonellosis	1194	1142	900	1041	1010	1141	1057	1259
Shigellosis	259	355	264	306	227	350	282	369
Staphylococcus Aureus Infection	27	28	44	24	26	17	30	44
Streptococcus, Group A Invasive[b]	129	191	175	168	195	222	172	218
Strongyloidiasis[b]	0	0	0	0	11	35	2	11
Taeniasis	2	4	5	6	4	3	4	7
Tetanus	0	0	0	0	1	0	0	1
Trichinosis	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0
Typhoid Fever, Case	17	15	15	6	17	15	14	22
Typhoid Fever, Carrier	1	4	3	0	0	0	2	5
Typhus Fever	9	31	38	50	68	44	39	78
Vibrio[b]	26	13	19	29	26	52	23	34
West Nile Virus	25	4	63	174	165	218	86	225

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

[b]2014 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, 2009-2014

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2009	2010	2011	2012	2013	2014
Amebiasis	1.16	1.29	0.93	1.06	0.61	0.68
Botulism	0.01	0.01	0.03	0.04	0.04	0.01
Brucellosis	0.04	0.08	0.06	0.04	0.11	0.07
Campylobacteriosis	12.29	13.43	13.60	16.63	18.11	15.93
Cholera	-	-	-	-	-	-
Coccidioidomycosis	1.85	2.55	3.28	3.52	3.85	4.51
Cryptosporidiosis	0.55	0.66	0.55	0.47	0.51	0.83
Cysticercosis	0.10	0.03	0.40	0.12	0.01	0.10
Dengue	0.02	0.01	-	0.02	0.02	0.34
E. *coli* O157:H7	0.18	0.13	0.23	0.20	0.13	0.23
E. *coli* Other Stec	0.25	0.60	0.70	0.84	0.96	0.72
Encephalitis	0.55	0.55	0.64	0.81	0.84	0.97
Giardiasis	3.83	3.34	3.15	3.16	4.17	3.66
Haemophilus Influenzae Type B	0.02	-	-	-	-	-
Hansen's Disease (Leprosy)	0.03	0.02	0.02	0.03	0.01	0.03
Hepatitis A	0.71	0.55	0.49	0.51	0.64	0.44
Hepatitis B	0.44	0.59	0.65	0.41	0.58	0.44
Hepatitis C	0.09	0.04	0.11	0.08	0.05	0.05
Hepatitis Unspecified	0.21	0.05	0.04	-	-	-
Legionellosis	0.71	1.17	1.25	1.19	0.90	1.48
Listeriosis, Nonperinatal	0.16	0.15	0.21	0.28	0.24	0.29
Listeriosis, Perinatal[a]	4.60	3.23	4.95	5.71	3.34	4.11
Lyme Disease	0.04	0.05	0.06	0.01	0.12	0.05
Malaria	0.26	0.27	0.24	0.20	0.17	0.22
Measles	0.01	0.09	0.09	0.06	0.03	0.14
Meningitis, Viral	4.32	6.18	3.42	3.26	3.77	4.23
Meningococcal Infections	0.23	0.28	0.40	0.13	0.18	0.12
Mumps	0.08	0.22	0.03	0.14	0.10	0.11
Pertussis	1.69	10.54	4.89	1.66	3.15	16.48
Pneumococcal Disease, Invasive	8.50	6.25	7.11	5.42	5.55	4.87
Psittacosis	0.01	-	-	-	-	-
Q-fever	-	0.01	-	0.03	0.02	0.01
Relapsing Fever	-	-	-	-	-	0.01
Rheumatic Fever, Acute	0.01	0.01	-	-	-	-
Rubella	-	-	0.01	-	-	-
Salmonellosis	12.93	12.38	9.72	11.20	10.74	12.07
Shigellosis	2.80	3.85	2.85	3.29	2.41	3.70
Staphylococcus Aureus Infection	0.29	0.30	0.48	0.26	0.28	0.18
Streptococcus, Group A Invasive	1.40	2.07	1.89	1.81	2.07	2.35
Strongyloidiasis	-	-	-	-	0.12	0.37
Taeniasis	0.02	0.04	0.05	0.06	0.04	0.03
Tetanus	-	-	-	-	0.01	-
Trichinosis	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-
Typhoid Fever, Case	0.18	0.16	0.16	0.06	0.18	0.16
Typhoid Fever, Carrier	0.01	0.04	0.03	-	-	-
Typhus Fever	0.10	0.34	0.41	0.54	0.72	0.47
Vibrio	0.28	0.14	0.21	0.31	0.28	0.55
West Nile Virus	0.27	0.04	0.68	1.87	1.75	2.31

[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, 2010-2014

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	6.4	6.2	9.8	5.4	7.0	8.4	7.8	6.8	5.8	6.0	5.8	8.0	85.0
Botulism	0.4	-	-	-	0.4	0.2	0.2	-	0.2	0.2	0.2	0.2	2.0
Brucellosis	0.2	0.4	0.2	0.8	0.4	0.2	-	0.6	0.2	0.2	-	-	6.8
Campylobacteriosis	51.6	28.6	32.6	38.0	47.6	54.0	69.6	74.2	59.2	63.6	57.2	35.8	1450.0
Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-
Coccidioidomycosis	28.4	24.2	20.4	21.2	28.8	31.4	32.6	30.0	25.0	30.4	28.0	30.4	330.8
Cryptosporidiosis	4.0	3.6	3.8	5.2	3.6	3.4	4.8	9.8	3.4	2.6	3.0	3.2	56.4
Cysticercosis	-	0.2	0.4	0.4	0.2	0.2	0.6	-	-	-	0.2	0.2	3.6
Dengue	0.8	0.2	0.2	0.4	0.6	0.6	1.6	-	0.6	1.0	0.2	1.0	7.4
E. *coli* O157:H7	0.4	0.4	1.0	1.4	0.8	2.0	4.2	1.6	1.6	1.6	0.6	0.8	17.2
E. *coli* Other Stec[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Encephalitis	2.6	2.2	4.2	2.0	2.6	2.4	5.6	10.8	21.0	7.0	4.0	2.4	71.2
Giardiasis	26.8	21.0	23.8	24.6	25.8	24.4	30.2	32.0	35.4	24.6	24.2	24.6	326.4
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	2.8	3.6	3.4	4.2	5.4	4.6	4.4	4.8	4.4	4.0	4.2	3.2	49.0
Hepatitis B	5.4	3.8	4.6	4.4	5.2	3.8	2.8	4.2	3.8	3.6	5.2	3.0	49.8
Hepatitis C	0.8	0.8	0.4	0.8	0.2	0.8	-	0.4	0.8	1.0	0.2	-	6.2
Hepatitis Unspecified	-	-	0.2	-	-	-	-	-	-	-	-	-	1.8
Legionellosis	9.0	8.2	9.8	8.8	6.2	8.0	11.0	7.0	7.6	9.2	8.4	18.8	112.0
Listeriosis, Nonperinatal	1.0	0.8	1.4	0.8	2.2	2.0	2.2	3.2	2.6	2.0	1.4	1.4	21.8
Listeriosis, Perinatal	0.8	0.8	-	0.2	0.4	-	0.2	0.4	1.2	0.6	-	0.4	5.2
Lyme Disease	0.4	0.2	0.4	0.4	0.8	1.2	1.6	1.6	0.2	0.4	0.2	-	8.0
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	1.4	0.6	1.2	1.0	0.4	0.4	0.4	0.8	0.6	-	0.2	0.6	7.6
Meningitis, Viral	17.6	14.2	17.4	19.4	22.0	23.2	36.8	51.0	58.4	45.2	27.6	23.2	389.0
Meningococcal Infections	2.4	2.4	2.2	2.4	1.8	1.0	1.2	1.8	0.6	0.8	1.4	2.6	20.6
Mumps	0.2	1.0	0.6	1.0	1.6	1.4	0.8	0.6	0.4	0.8	0.2	2.4	11.0
Pertussis	34.2	27.0	37.6	49.8	57.0	79.8	92.6	74.4	61.8	60.0	56.0	56.4	686.6
Pneumococcal Disease, Invasive[b]	95.4	88.0	65.8	44.8	36.6	31.8	21.2	18.0	23.0	24.0	36.2	59.8	544.6
Psittacosis	-	-	-	-	-	-	-	-	-	-	-	-	-
Q-fever	0.2	-	-	0.6	-	-	-	-	-	-	-	-	1.4
Relapsing Fever	-	-	-	-	-	-	-	0.2	-	-	-	-	0.2
Rheumatic Fever, Acute	-	0.2	-	-	-	-	-	-	-	-	-	-	0.2
Rubella	-	-	-	0.2	-	-	-	-	-	-	-	-	0.2
Salmonellosis	58.4	57.0	58.8	71.8	107.0	94.6	118.0	122.2	109.0	96.4	64.6	53.8	1046.8
Shigellosis	15.0	15.8	13.0	13.8	22.2	19.2	29.0	42.6	40.6	34.0	23.2	19.6	300.4
Staphylococcus Aureus Infection	3.0	3.2	2.8	1.6	1.4	1.6	1.0	2.8	2.8	2.2	3.0	2.0	27.8
Streptococcus, Group A Invasive	21.8	17.0	22.8	17.6	15.8	16.4	12.0	9.4	10.0	12.2	13.2	18.2	187.4
Strongyloidiasis[a]	0.2	0.4	0.2	0.2	0.4	2.0	1.6	1.2	-	0.2	0.6	1.0	9.2
Taeniasis[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichinosis	-	-	-	-	-	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-	-	-	-	-	-
Typhoid Fever, Case	0.8	1.4	0.6	1.6	1.4	1.4	1.2	1.8	0.6	0.8	1.2	0.6	13.6
Typhoid Fever, Carrier	-	0.2	0.2	0.2	0.4	-	0.2	-	-	-	-	-	1.4
Typhus Fever	2.8	1.2	0.8	0.6	4.2	3.4	4.6	7.4	6.2	6.0	5.6	3.2	46.2
Vibrio	0.8	-	0.2	1.4	1.6	1.8	4.2	6.8	4.2	1.8	1.0	1.0	27.8
West Nile Virus	-	-	-	-	-	0.2	11.8	35.2	58.6	17.0	2.0	-	124.8

[a]Not applicable.

[b]Specimen collection date.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2014

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	2	1	3	19	17	12	4	6	64
Botulism	0	0	0	1	0	0	0	0	1
Brucellosis	0	0	0	1	0	1	2	3	7
Campylobacteriosis	27	118	159	437	192	175	155	239	1506
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	0	1	4	68	61	91	93	108	426
Cryptosporidiosis	0	2	5	29	17	15	5	4	78
Cysticercosis	0	0	0	4	1	2	1	1	9
Dengue	0	0	3	7	3	9	9	1	32
E. *coli* O157:H7	0	6	7	4	3	0	0	2	22
E. *coli* Other Stec	1	36	10	6	1	8	4	2	68
Encephalitis	1	2	4	5	3	10	23	44	92
Giardiasis	0	19	27	96	70	63	42	29	346
Haemophilus Influenzae Type B	0	0	0	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	2	0	1	0	3
Hepatitis A	0	0	1	17	9	0	8	7	42
Hepatitis B	0	0	0	5	16	14	3	4	42
Hepatitis C	0	0	0	2	2	1	0	0	5
Hepatitis Unspecified	0	0	0	0	0	0	0	0	0
Legionellosis	0	0	0	3	11	17	29	80	140
Listeriosis, Nonperinatal	0	0	1	0	2	1	3	20	27
Listeriosis, Perinatal[b]	0	0	0	3	2	0	0	0	5
Lyme Disease	0	1	1	2	0	0	0	1	5
Malaria	1	1	1	10	4	3	0	1	21
Measles	2	3	4	1	2	1	0	0	13
Meningitis, Viral	47	8	54	114	43	43	42	44	400
Meningococcal Infections	0	0	0	6	1	3	1	0	11
Mumps	0	0	1	3	5	0	0	1	10
Pertussis	250	219	664	325	41	26	18	15	1558
Pneumococcal Disease, Invasive	7	18	12	31	42	65	97	188	460
Psittacosis	0	0	0	0	0	0	0	0	0
Q-fever	0	0	0	0	0	0	1	0	1
Relapsing Fever	0	0	1	0	0	0	0	0	1
Rheumatic Fever, Acute	0	0	0	0	0	0	0	0	0
Rubella	0	0	0	0	0	0	0	0	0
Salmonellosis	62	162	181	248	110	111	99	168	1141
Shigellosis	2	30	51	85	64	57	30	31	350
Staphylococcus Aureus Infection	0	0	0	3	3	3	3	5	17
Streptococcus, Group A Invasive	7	7	16	34	24	43	35	56	222
Strongyloidiasis	0	0	1	6	4	6	10	7	35
Taeniasis	0	0	0	2	1	0	0	0	3
Tetanus	0	0	0	0	0	0	0	0	0
Trichinosis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid Fever, Case	0	0	2	7	2	2	1	1	15
Typhoid Fever, Carrier	0	0	0	0	0	0	0	0	0
Typhus Fever	0	1	1	10	6	10	8	8	44
Vibrio	0	0	2	18	13	6	7	6	52
West Nile Virus	0	0	0	23	15	44	55	81	218

[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, 2014

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	1.7	0.2	0.2	0.7	1.3	0.9	0.4	0.5
Botulism	-	-	-	-	-	-	-	-
Brucellosis	-	-	-	-	-	0.1	0.2	0.3
Campylobacteriosis	22.8	24.2	13.2	15.5	14.5	13.5	14.6	21.1
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	-	0.2	0.3	2.4	4.6	7.0	8.8	9.5
Cryptosporidiosis	-	0.4	0.4	1.0	1.3	1.2	0.5	0.4
Cysticercosis	-	-	-	0.1	0.1	0.2	0.1	0.1
Dengue	-	-	0.2	0.2	0.2	0.7	0.8	0.1
E. *coli* O157:H7	-	1.2	0.6	0.1	0.2	-	-	0.2
E. *coli* Other Stec	0.8	7.4	0.8	0.2	0.1	0.6	0.4	0.2
Encephalitis	0.8	0.4	0.3	0.2	0.2	0.8	2.2	3.9
Giardiasis	-	3.9	2.2	3.4	5.3	4.8	4.0	2.6
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-	0.2	-	0.1	-
Hepatitis A	-	-	0.1	0.6	0.7	-	0.8	0.6
Hepatitis B	-	-	-	0.2	1.2	1.1	0.3	0.4
Hepatitis C	-	-	-	0.1	0.2	0.1	-	-
Hepatitis Unspecified	-	-	-	-	-	-	-	-
Legionellosis	-	-	-	0.1	0.8	1.3	2.7	7.1
Listeriosis, Nonperinatal	-	-	0.1	-	0.2	0.1	0.3	1.8
Listeriosis, Perinatal[a]	-	-	-	3.2	7.3	-	-	-
Lyme Disease	-	0.2	0.1	0.1	-	-	-	0.1
Malaria	0.8	0.2	0.1	0.4	0.3	0.2	-	0.1
Measles	1.7	0.6	0.3	-	0.2	0.1	-	-
Meningitis, Viral	39.7	1.6	4.5	4.0	3.3	3.3	4.0	3.9
Meningococcal Infections	-	-	-	0.2	0.1	0.2	0.1	-
Mumps	-	-	0.1	0.1	0.4	-	-	0.1
Pertussis	211.4	44.8	54.9	11.5	3.1	2.0	1.7	1.3
Pneumococcal Disease, Invasive	5.9	3.7	1.0	1.1	3.2	5.0	9.1	16.6
Psittacosis	-	-	-	-	-	-	-	-
Q-fever	-	-	-	-	-	-	0.1	-
Relapsing Fever	-	-	0.1	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-	-	-	-	-
Rubella	-	-	-	-	-	-	-	-
Salmonellosis	52.4	33.2	15.0	8.8	8.3	8.5	9.3	14.8
Shigellosis	1.7	6.1	4.2	3.0	4.8	4.4	2.8	2.7
Staphylococcus Aureus Infection	-	-	-	0.1	0.2	0.2	0.3	0.4
Streptococcus, Group A Invasive	5.9	1.4	1.3	1.2	1.8	3.3	3.3	4.9
Strongyloidiasis	-	-	0.1	0.2	0.3	0.5	0.9	0.6
Taeniasis	-	-	-	0.1	0.1	-	-	-
Tetanus	-	-	-	-	-	-	-	-
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	-	-	0.2	0.2	0.2	0.2	0.1	0.1
Typhoid Fever, Carrier	-	-	-	-	-	-	-	-
Typhus Fever	-	0.2	0.1	0.4	0.5	0.8	0.8	0.7
Vibrio	-	-	0.2	0.6	1.0	0.5	0.7	0.5
West Nile Virus	-	-	-	0.8	1.1	3.4	5.2	7.2

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

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

Table L. Number of Cases of Selected Notifiable Diseases by Race/Ethnicity Los Angeles County, 2014

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	5	7	26	23	0	3
Botulism	0	0	0	1	0	0
Brucellosis	0	0	2	1	1	3
Campylobacteriosis	61	39	219	272	27	888
Cholera	0	0	0	0	0	0
Coccidioidomycosis	33	42	139	175	3	34
Cryptosporidiosis	5	12	22	34	2	3
Cysticercosis	0	0	8	0	1	0
Dengue	2	0	19	2	1	8
E. *coli* O157:H7	2	2	7	11	0	0
E. *coli* Other Stec	3	1	47	14	0	3
Encephalitis	8	3	24	40	0	17
Giardiasis	24	25	113	175	3	6
Haemophilus Influenzae Type B	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	0	3
Hepatitis A	11	4	14	12	1	0
Hepatitis B	3	6	20	10	1	2
Hepatitis C	1	0	2	2	0	0
Hepatitis Unspecified	0	0	0	0	0	0
Legionellosis	16	21	39	62	0	2
Listeriosis, Nonperinatal	9	1	10	4	0	3
Listeriosis, Perinatal[b]	1	0	2	1	0	1
Lyme Disease	1	0	0	3	0	1
Malaria	0	14	1	0	0	6
Measles	3	0	2	7	0	1
Meningitis, Viral	22	26	186	99	12	55
Meningococcal Infections	2	2	6	1	0	0
Mumps	1	5	1	2	0	1
Pertussis	58	76	1013	359	15	37
Pneumococcal Disease, Invasive	34	70	161	154	15	26
Psittacosis	0	0	0	0	0	0
Q-fever	0	0	0	0	0	1
Relapsing Fever	0	0	0	0	0	1
Rheumatic Fever, Acute	0	0	0	0	0	0
Rubella	0	0	0	0	0	0
Salmonellosis	140	67	575	344	10	5
Shigellosis	17	19	167	132	1	14
Staphylococcus Aureus Infection	4	2	3	0	1	7
Streptococcus, Group A Invasive	6	10	29	51	11	115
Strongyloidiasis	3	0	10	5	0	17
Taeniasis	2	0	1	0	0	0
Tetanus	0	0	0	0	0	0
Trichinosis	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0
Typhoid Fever, Case	10	0	5	0	0	0
Typhoid Fever, Carrier	0	0	0	0	0	0
Typhus Fever	3	0	17	17	1	6
Vibrio	4	3	16	12	0	17
West Nile Virus	11	3	73	97	0	34

[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, 2014

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.4	0.9	0.6	0.9
Botulism	-	-	-	-
Brucellosis	-	-	-	-
Campylobacteriosis	4.4	5.0	4.8	10.2
Cholera	-	-	-	-
Coccidioidomycosis	2.4	5.3	3.0	6.6
Cryptosporidiosis	0.4	1.5	0.5	1.3
Cysticercosis	-	-	0.2	-
Dengue	0.1	-	0.4	0.1
E. *coli* O157:H7	0.1	0.3	0.2	0.4
E. *coli* Other Stec	0.2	0.1	1.0	0.5
Encephalitis	0.6	0.4	0.5	1.5
Giardiasis	1.7	3.2	2.5	6.6
Haemophilus Influenzae Type B	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-
Hepatitis A	0.8	0.5	0.3	0.5
Hepatitis B	0.2	0.8	0.4	0.4
Hepatitis C	0.1	-	-	0.1
Hepatitis Unspecified	-	-	-	-
Legionellosis	1.2	2.7	0.8	2.3
Listeriosis, Nonperinatal	0.7	0.1	0.2	0.2
Listeriosis, Perinatal[a]	4.6	-	3.0	4.5
Lyme Disease	0.1	-	-	0.1
Malaria				
Measles	0.2	-	0.0	0.3
Meningitis, Viral	1.6	3.3	4.0	3.7
Meningococcal Infections	0.1	0.3	0.1	-
Mumps	0.1	0.6	0.0	0.1
Pertussis	4.2	9.7	22.0	13.5
Pneumococcal Disease, Invasive	2.5	8.9	3.5	5.8
Psittacosis	-	-	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-
Rubella	-	-	-	-
Salmonellosis	10.2	8.5	12.5	12.9
Shigellosis	1.2	2.4	3.6	5.0
Staphylococcus Aureus Infection	0.3	0.3	0.1	-
Streptococcus, Group A Invasive	0.4	1.3	0.6	1.9
Strongyloidiasis	0.2	-	0.2	0.2
Taeniasis	0.1	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.7	-	0.1	-
Typhoid Fever, Carrier	-	-	-	-
Typhus Fever	0.2	-	0.4	0.6
Vibrio	0.3	0.4	0.3	0.5
West Nile Virus	0.8	0.4	1.6	3.6

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

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

Table N. Number of Cases and Annual Incidence Rate of Selected Notifiable Diseases by Sex Los Angeles County, 2014

Disease	Male		Female	
	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	52	1.1	12	0.3
Botulism	0	-	1	0.0
Brucellosis	4	0.1	2	0.0
Campylobacteriosis	790	16.9	691	14.4
Cholera	0	-	0	-
Coccidioidomycosis	267	5.7	159	3.3
Cryptosporidiosis	47	1.0	30	0.6
Cysticercosis	4	0.1	5	0.1
Dengue	18	0.4	14	0.3
E. *coli* O157:H7	14	0.3	8	0.2
E. *coli* Other Stec	33	0.7	34	0.7
Encephalitis	56	1.2	33	0.7
Giardiasis	239	5.1	106	2.2
Haemophilus Influenzae Type B	0	-	0	-
Hansen's Disease (Leprosy)	3	0.1	0	-
Hepatitis A	26	0.6	16	0.3
Hepatitis B	29	0.6	13	0.3
Hepatitis C	1	0.0	4	0.1
Hepatitis Unspecified	0	-	0	-
Legionellosis	79	1.7	61	1.3
Listeriosis, Nonperinatal	12	0.3	14	0.3
Listeriosis, Perinatal[a]	0	-	5	8.5
Lyme Disease	4	0.1	1	0.0
Malaria	10	0.2	11	0.2
Measles	9	0.2	4	0.1
Meningitis, Viral	218	4.7	172	3.6
Meningococcal Infections	7	0.2	4	0.1
Mumps	3	0.1	7	0.1
Pertussis	748	16.0	810	16.9
Pneumococcal Disease, Invasive	256	5.5	204	4.3
Psittacosis	0	-	0	-
Q-fever	1	0.0	0	-
Relapsing Fever	0	-	1	0.0
Rheumatic Fever, Acute	0	-	0	-
Rubella	0	-	0	-
Salmonellosis	531	11.4	610	12.7
Shigellosis	222	4.8	126	2.6
Staphylococcus Aureus Infection	8	0.2	5	0.1
Streptococcus, Group A Invasive	136	2.9	69	1.4
Strongyloidiasis	13	0.3	13	0.3
Taeniasis	2	0.0	1	0.0
Tetanus	0	-	0	-
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	7	0.2	7	0.1
Typhoid Fever, Carrier	0	-	0	-
Typhus Fever	23	0.5	21	0.4
Vibrio	39	0.8	13	0.3
West Nile Virus	138	3.0	76	1.6

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

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

Table O-1. Selected Notifiable Diseases
SPA 1. Antelope Valley Area
Los Angeles County, 2014

Disease	Frequency	Rate (Cases per 100,000)[b]
	Antelope	Antelope
Amebiasis	2	0.5
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	55	14.0
Cholera	0	-
Coccidioidomycosis	103	26.2
Cryptosporidiosis	3	0.8
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	1	0.3
E. *coli* Other Stec	1	0.3
Encephalitis	1	0.3
Giardiasis	10	2.5
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	2	0.5
Hepatitis B	2	0.5
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Legionellosis	3	0.8
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	0	-
Measles	0	-
Meningitis, Viral	33	8.4
Meningococcal Infections	0	-
Mumps	1	0.3
Pertussis	63	16.0
Pneumococcal Disease, Invasive	16	4.1
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	29	7.4
Shigellosis	5	1.3
Staphylococcus Aureus Infection	0	-
Streptococcus, Group A Invasive	5	1.3
Strongyloidiasis	0	-
Taeniasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	2	0.5
West Nile Virus	2	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-2. Selected Notifiable Diseases
SPA 2. San Fernando Area
Los Angeles County, 2014

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**EV**	**GL**	**SF**	**WV**	**TOTAL**	**EV**	**GL**	**SF**	**WV**	**TOTAL**
Amebiasis	2	3	2	6	13	0.4	0.9	0.4	0.7	0.6
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	2	1	0	0	3	0.4	0.3	-	-	0.1
Campylobacteriosis	74	59	97	158	388	16.3	17.2	18.9	17.9	17.7
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	14	6	56	49	125	3.1	1.8	10.9	5.6	5.7
Cryptosporidiosis	5	1	11	6	23	1.1	0.3	2.1	0.7	1.1
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	6	2	2	1	11	1.3	0.6	0.4	0.1	0.5
E. *coli* O157:H7	2	2	2	1	7	0.4	0.6	0.4	0.1	0.3
E. *coli* Other Stec	5	0	5	6	16	1.1	-	1.0	0.7	0.7
Encephalitis	3	1	3	14	21	0.7	0.3	0.6	1.6	1.0
Giardiasis	17	14	18	40	89	3.8	4.1	3.5	4.5	4.1
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	1	2	2	7	12	0.2	0.6	0.4	0.8	0.5
Hepatitis B	6	1	2	3	12	1.3	0.3	0.4	0.3	0.5
Hepatitis C	1	1	1	0	3	0.2	0.3	0.2	-	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	15	5	7	19	46	3.3	1.5	1.4	2.2	2.1
Listeriosis, Nonperinatal	0	3	1	5	9	-	0.9	0.2	0.6	0.4
Listeriosis, Perinatal[a]	0	0	0	1	1	-	-	-	0.5	0.2
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	1	0	1	1	3	0.2	-	0.2	0.1	0.1
Measles	2	1	2	2	7	0.4	0.3	0.4	0.2	0.3
Meningitis, Viral	13	5	6	49	73	2.9	1.5	1.2	5.6	3.3
Meningococcal Infections	1	0	0	2	3	0.2	-	-	0.2	0.1
Mumps	1	0	0	0	1	0.2	-	-	-	-
Pertussis	75	35	139	124	373	16.6	10.2	27.1	14.1	17.0
Pneumococcal Disease, Invasive	27	15	15	45	102	6.0	4.4	2.9	5.1	4.7
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	1	1	-	-	-	0.1	0.0
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	48	40	59	91	238	10.6	11.7	11.5	10.3	10.9
Shigellosis	11	8	13	27	59	2.4	2.3	2.5	3.1	2.7
Staphylococcus Aureus Infection	1	0	1	0	2	0.2	-	0.2	-	0.1
Streptococcus, Group A Invasive	12	4	7	15	38	2.6	1.2	1.4	1.7	1.7
Strongyloidiasis	1	6	0	4	11	0.2	1.8	-	0.5	0.5
Taeniasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	1	0	1	-	-	0.2	-	0.0
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	1	2	0	0	3	0.2	0.6	-	-	0.1
Vibrio	3	2	1	5	11	0.7	0.6	0.2	0.6	0.5
West Nile Virus	8	0	5	47	60	1.8	-	1.0	5.3	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 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, 2014

	Frequency					Rate (Cases per 100,000)[b]				
Disease	**AH**	**EM**	**FH**	**PO**	**TOTAL**	**AH**	**EM**	**FH**	**PO**	**TOTAL**
Amebiasis	2	2	1	2	7	0.6	0.5	0.3	0.4	0.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	0	0	-	-	-	-	-
Campylobacteriosis	52	56	47	62	217	15.0	12.7	15.2	11.4	13.2
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	6	15	8	15	44	1.7	3.4	2.6	2.8	2.7
Cryptosporidiosis	0	1	3	1	5	-	0.2	1.0	0.2	0.3
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	1	1	2	4	-	0.2	0.3	0.4	0.2
E. *coli* O157:H7	0	0	1	5	6	-	-	0.3	0.9	0.4
E. *coli* Other Stec	1	6	4	3	14	0.3	1.4	1.3	0.6	0.9
Encephalitis	3	4	3	4	14	0.9	0.9	1.0	0.7	0.9
Giardiasis	3	7	7	9	26	0.9	1.6	2.3	1.7	1.6
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	1	0	0	0	1	0.3	-	-	-	0.1
Hepatitis A	1	3	1	0	5	0.3	0.7	0.3	-	0.3
Hepatitis B	1	0	0	0	1	0.3	-	-	-	0.1
Hepatitis C	0	1	1	0	2	-	0.2	0.3	-	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	2	5	5	4	16	0.6	1.1	1.6	0.7	1.0
Listeriosis, Nonperinatal	2	2	1	0	5	0.6	0.5	0.3	-	0.3
Listeriosis, Perinatal[a]	0	0	0	1	1	-	-	-	0.9	0.3
Lyme Disease	1	0	0	0	1	0.3	-	-	-	0.1
Malaria	1	0	0	1	2	0.3	-	-	0.2	0.1
Measles	1	0	3	0	4	0.3	-	1.0	-	0.2
Meningitis, Viral	25	29	18	25	97	7.2	6.6	5.8	4.6	5.9
Meningococcal Infections	0	1	0	0	1	-	0.2	-	-	0.1
Mumps	0	0	0	1	1	-	-	-	0.2	0.1
Pertussis	30	120	33	96	279	8.6	27.3	10.7	17.7	17.0
Pneumococcal Disease, Invasive	12	20	16	18	66	3.5	4.5	5.2	3.3	4.0
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	1	0	1	-	-	0.3	-	0.1
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	58	52	40	85	235	16.7	11.8	13.0	15.6	14.3
Shigellosis	5	17	4	3	29	1.4	3.9	1.3	0.6	1.8
Staphylococcus Aureus Infection	4	1	0	1	6	1.2	0.2	-	0.2	0.4
Streptococcus, Group A Invasive	11	10	11	17	49	3.2	2.3	3.6	3.1	3.0
Strongyloidiasis	1	1	1	2	5	0.3	0.2	0.3	0.4	0.3
Taeniasis	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	2	0	0	3	5	0.6	-	-	0.6	0.3
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	8	2	5	2	17	2.3	0.5	1.6	0.4	1.0
Vibrio	1	1	1	2	5	0.3	0.2	0.3	0.4	0.3
West Nile Virus	11	6	3	14	34	3.2	1.4	1.0	2.6	2.1

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

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

Table O-4. Selected Notifiable Diseases
SPA 4. Metro Area
Los Angeles County, 2014

Disease	Frequency				Rate (Cases per 100,000)[b]			
	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	5	12	2	19	1.4	2.4	0.6	1.7
Botulism	0	0	0	0	-	-	-	-
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	54	106	38	198	15.6	21.4	12.2	17.2
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	11	9	10	30	3.2	1.8	3.2	2.6
Cryptosporidiosis	4	17	0	21	1.2	3.4	-	1.8
Cysticercosis	2	0	0	2	0.6	-	-	0.2
Dengue	2	2	1	5	0.6	0.4	0.3	0.4
E. *coli* O157:H7	2	0	0	2	0.6	-	-	0.2
E. *coli* Other Stec	2	4	0	6	0.6	0.8	-	0.5
Encephalitis	6	3	3	12	1.7	0.6	1.0	1.0
Giardiasis	25	52	5	82	7.2	10.5	1.6	7.1
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	1	0	1	-	0.2	-	0.1
Hepatitis A	1	9	2	12	0.3	1.8	0.6	1.0
Hepatitis B	4	6	1	11	1.2	1.2	0.3	1.0
Hepatitis C	0	0	0	0	-	-	-	-
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Legionellosis	8	13	2	23	2.3	2.6	0.6	2.0
Listeriosis, Nonperinatal	0	0	2	2	-	-	0.6	0.2
Listeriosis, Perinatal[a]	0	1	0	1	-	0.9	-	0.4
Lyme Disease	1	0	0	1	0.3	-	-	0.1
Malaria	0	4	1	5	-	0.8	0.3	0.4
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	9	16	9	34	2.6	3.2	2.9	3.0
Meningococcal Infections	1	5	0	6	0.3	1.0	-	0.5
Mumps	0	0	0	0	-	-	-	-
Pertussis	46	46	37	129	13.3	9.3	11.9	11.2
Pneumococcal Disease, Invasive	25	16	14	55	7.2	3.2	4.5	4.8
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	34	46	50	130	9.9	9.3	16.1	11.3
Shigellosis	26	66	16	108	7.5	13.4	5.2	9.4
Staphylococcus Aureus Infection	2	2	1	5	0.6	0.4	0.3	0.4
Streptococcus, Group A Invasive	18	18	8	44	5.2	3.6	2.6	3.8
Strongyloidiasis	1	1	2	4	0.3	0.2	0.6	0.3
Taeniasis	2	0	0	2	0.6	-	-	0.2
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	1	3	0	4	0.3	0.6	-	0.3
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	1	3	1	5	0.3	0.6	0.3	0.4
Vibrio	2	5	2	9	0.6	1.0	0.6	0.8
West Nile Virus	7	19	2	28	2.0	3.8	0.6	2.4

[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-5. Selected Notifiable Diseases
SPA 5. West Area
Los Angeles County, 2014

Disease	Frequency	Rate (Cases per 100,000)[b]
	West	West
Amebiasis	7	1.1
Botulism	0	-
Brucellosis	1	0.2
Campylobacteriosis	189	29.0
Cholera	0	-
Coccidioidomycosis	21	3.2
Cryptosporidiosis	4	0.6
Cysticercosis	0	-
Dengue	3	0.5
E. *coli* O157:H7	0	-
E. *coli* Other Stec	2	0.3
Encephalitis	11	1.7
Giardiasis	46	7.1
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	1	0.2
Hepatitis B	1	0.2
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Legionellosis	12	1.8
Listeriosis, Nonperinatal	2	0.3
Listeriosis, Perinatal[a]	0	-
Lyme Disease	2	0.3
Malaria	0	-
Measles	0	-
Meningitis, Viral	14	2.1
Meningococcal Infections	0	-
Mumps	0	-
Pertussis	74	11.3
Pneumococcal Disease, Invasive	25	3.8
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	62	9.5
Shigellosis	25	3.8
Staphylococcus Aureus Infection	1	0.2
Streptococcus, Group A Invasive	11	1.7
Strongyloidiasis	0	-
Taeniasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	6	0.9
Vibrio	9	1.4
West Nile Virus	24	3.7

[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 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, 2014

Disease	Frequency					Rate (Cases per 100,000)[b]				
	CN	SO	SE	SW	TOTAL	CN	SO	SE	SW	TOTAL
Amebiasis	0	1	0	3	4	-	0.5	-	0.8	0.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	1	0	0	1	-	0.5	-	-	0.1
Campylobacteriosis	38	24	30	44	136	13.4	12.4	17.2	11.5	13.2
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	14	5	5	18	42	4.9	2.6	2.9	4.7	4.1
Cryptosporidiosis	3	1	0	2	6	1.1	0.5	-	0.5	0.6
Cysticercosis	1	0	0	0	1	0.4	-	-	-	0.1
Dengue	0	1	0	3	4	-	0.5	-	0.8	0.4
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
E. *coli* Other Stec	0	1	1	5	7	-	0.5	0.6	1.3	0.7
Encephalitis	1	1	0	3	5	0.4	0.5	-	0.8	0.5
Giardiasis	7	4	1	12	24	2.5	2.1	0.6	3.1	2.3
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	0	1	0	3	4	-	0.5	-	0.8	0.4
Hepatitis B	1	1	2	2	6	0.4	0.5	1.1	0.5	0.6
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	3	1	0	6	10	1.1	0.5	-	1.6	1.0
Listeriosis, Nonperinatal	0	1	1	1	3	-	0.5	0.6	0.3	0.3
Listeriosis, Perinatal[a]	1	0	0	0	1	1.5	-	-	-	0.4
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	0	2	2	-	-	-	0.5	0.2
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	14	5	10	9	38	4.9	2.6	5.7	2.4	3.7
Meningococcal Infections	0	0	0	0	0	-	-	-	-	-
Mumps	1	0	0	2	3	0.4	-	-	0.5	0.3
Pertussis	64	30	31	40	165	22.5	17.2	16.0	10.5	16.0
Pneumococcal Disease, Invasive	16	9	11	24	60	5.6	4.7	6.3	6.3	5.8
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	30	28	26	58	142	10.6	14.5	14.9	15.2	13.7
Shigellosis	10	13	8	9	40	3.5	6.7	4.6	2.4	3.9
Staphylococcus Aureus Infection	0	1	0	0	1	-	0.5	-	-	0.1
Streptococcus, Group A Invasive	6	5	8	6	25	2.1	2.6	4.6	1.6	2.4
Strongyloidiasis	0	1	0	4	5	-	0.5	-	1.0	0.5
Taeniasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	2	0	2	-	-	1.1	-	0.2
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	1	1	0	1	3	0.4	0.5	-	0.3	0.3
Vibrio	3	0	0	3	6	1.1	-	-	0.8	0.6
West Nile Virus	2	2	2	7	13	0.7	1.0	1.1	1.8	1.3

[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-7. Selected Notifiable Diseases
SPA 7. East Area
Los Angeles County, 2014

Disease	Frequency					Rate (Cases per 100,000)[b]				
	BF	EL	SA	WH	TOTAL	BF	EL	SA	WH	TOTAL
Amebiasis	4	2	1	0	7	1.1	1.0	0.2	-	0.5
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	1	1	2	-	-	0.2	0.3	0.2
Campylobacteriosis	31	27	47	32	137	8.6	13.2	11.0	9.9	10.4
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	8	7	10	5	30	2.2	3.4	2.3	1.5	2.3
Cryptosporidiosis	5	0	0	3	8	1.4	-	-	0.9	0.6
Cysticercosis	0	1	2	3	6	-	0.5	0.5	0.9	0.5
Dengue	2	0	1	1	4	0.6	-	0.2	0.3	0.3
E. *coli* O157:H7	0	1	1	0	2	-	0.5	0.2	-	0.2
E. *coli* Other Stec	4	1	7	3	15	1.1	0.5	1.6	0.9	1.1
Encephalitis	5	0	3	10	18	1.4	-	0.7	3.1	1.4
Giardiasis	9	3	8	11	31	2.5	1.5	1.9	3.4	2.4
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	1	0	0	2	3	0.3	-	-	0.6	0.2
Hepatitis B	1	0	4	1	6	0.3	-	0.9	0.3	0.5
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Legionellosis	4	2	1	7	14	1.1	1.0	0.2	2.2	1.1
Listeriosis, Nonperinatal	0	0	2	0	2	-	-	0.5	-	0.2
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	0	0	0	-	-	-	-	-
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	14	6	22	29	71	3.9	2.9	5.2	9.0	5.4
Meningococcal Infections	0	0	0	0	0	-	-	-	-	-
Mumps	0	0	1	0	1	-	-	0.2	-	0.1
Pertussis	69	37	72	65	243	19.2	18.1	16.9	20.1	18.5
Pneumococcal Disease, Invasive	18	6	14	18	56	5.0	2.9	3.3	5.6	4.3
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	41	29	63	43	176	11.4	14.2	14.8	13.3	13.4
Shigellosis	11	9	12	11	43	3.1	4.4	2.8	3.4	3.3
Staphylococcus Aureus Infection	0	0	0	0	0	-	-	-	-	-
Streptococcus, Group A Invasive	4	5	5	7	21	1.1	2.4	1.2	2.2	1.6
Strongyloidiasis	0	0	2	0	2	-	-	0.5	-	0.2
Taeniasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	0	0	1	0.3	-	-	-	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	1	1	2	1	5	0.3	0.5	0.5	0.3	0.4
Vibrio	1	0	2	0	3	0.3	-	0.5	-	0.2
West Nile Virus	19	0	3	23	45	5.3	-	0.7	7.1	3.4

[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-8. Selected Notifiable Diseases
SPA 8. South Bay Area
Los Angeles County, 2014

	Frequency				Rate (Cases per 100,000)[b]			
Disease	**HB**	**IW**	**TO**	**TOTAL**	**HB**	**IW**	**TO**	**TOTAL**
Amebiasis	0	3	2	5	-	0.7	0.4	0.5
Botulism	1	0	0	1	0.5	-	-	0.1
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	38	53	94	185	18.4	12.7	20.5	17.1
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	7	8	14	29	3.4	1.9	3.0	2.7
Cryptosporidiosis	0	3	4	7	-	0.7	0.9	0.6
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	1	1	-	-	0.2	0.1
E. *coli* O157:H7	0	2	2	4	-	0.5	0.4	0.4
E. *coli* Other Stec	1	3	3	7	0.5	0.7	0.7	0.6
Encephalitis	3	5	1	9	1.5	1.2	0.2	0.8
Giardiasis	9	3	26	38	4.4	0.7	5.7	3.5
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	1	0	1	-	0.2	-	0.1
Hepatitis A	0	1	2	3	-	0.2	0.4	0.3
Hepatitis B	1	1	1	3	0.5	0.2	0.2	0.3
Hepatitis C	0	0	0	0	-	-	-	-
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Legionellosis	2	6	6	14	1.0	1.4	1.3	1.3
Listeriosis, Nonperinatal	1	0	3	4	0.5	-	0.7	0.4
Listeriosis, Perinatal[a]	0	1	0	1	-	1.1	-	0.5
Lyme Disease	0	0	1	1	-	-	0.2	0.1
Malaria	1	6	1	8	0.5	1.4	0.2	0.7
Measles	0	0	2	2	-	-	0.4	0.2
Meningitis, Viral	11	13	13	37	5.3	3.1	2.8	3.4
Meningococcal Infections	0	1	0	1	-	0.2	-	0.1
Mumps	0	2	1	3	-	0.5	0.2	0.3
Pertussis	88	60	83	231	42.7	14.4	18.1	21.3
Pneumococcal Disease, Invasive	12	22	19	53	5.8	5.3	4.1	4.9
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	33	41	55	129	16.0	9.8	12.0	11.9
Shigellosis	11	16	14	41	5.3	3.8	3.0	3.8
Staphylococcus Aureus Infection	0	1	1	2	-	0.2	0.2	0.2
Streptococcus, Group A Invasive	3	7	14	24	1.5	1.7	3.0	2.2
Strongyloidiasis	0	0	1	1	-	-	0.2	0.1
Taeniasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	1	0	1	2	0.5	-	0.2	0.2
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	2	1	2	5	1.0	0.2	0.4	0.5
Vibrio	2	1	2	5	1.0	0.2	0.4	0.5
West Nile Virus	3	5	3	11	1.5	1.2	0.7	1.0

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

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

DISEASE SUMMARIES

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AMEBIASIS

CRUDE DATA	
Number of Cases	64
Annual Incidence[a]	
LA County	0.68
California[b]	0.70
United States[c]	N/A
Age at Diagnosis	
Mean	39
Median	37
Range	<1–76 years

[a]Cases per 100,000 population.
[b]Not available as of Aug 15, 2015.
[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 also can be transmitted from person-to-person through fecal-oral spread. 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. Intestinal disease is often asymptomatic. When symptoms occur, they 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 colon perforation.

Visual inspection of stool for ova and parasites in the microbiology laboratory cannot differentiate between pathogenic *E. histolytica* and non-pathogenic *E. dispar*. Clinicians frequently order stool inspection for ova and parasites for persons with enteric symptoms, particularly those who have been involved in recreational activities (e.g., hiking), travel, 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. Since many clinicians only obtain visual inspection of stool for ova and parasites without pursuing more specific Enzyme Immunoassay (EIA) stool antigen testing which can differentiate between *E. histolytica* and *E. dispar*, many reports may be of persons infected with the non-pathogenic *E. dispar*, 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.

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 to prevent transmission to others. Fecal exposure during sexual activity, anal intercourse and oral-anal sexual practices, should also be avoided. There is no vaccine available for disease prevention.

2014 TRENDS AND HIGHLIGHTS

- In 2013, the LAC DPH's protocol changed to count only symptomatic persons with suspected gastrointestinal and/or extra-intestinal amebiasis with laboratory evidence of *E. histolytica*. In 2014, the LAC DPH continued to count only laboratory confirmed symptomatic infections as confirmed cases of *Entamoeba histolytica*.
- While the 2014 incidence rate was slightly higher than 2013, there was a 62% decrease in the incidence from a mean of 1.13/100,000 in 2010-12 to 0.68/100,000 in 2014. The decrease in incidence is likely due to the change in case definition that occured in 2013.
- In 2014, clinical and laboratory findings documented one case with extraintestinal infection with evidence of amoebic abscesses in the liver.
- The greatest incidence of amebiasis was in <1 year olds (1.7 cases per 100,000) followed by those 35–44 years of age (1.3 cases per 100,000) (Figure 2).
- The greatest incidence of amebiasis occurred among whites and blacks (0.9 cases per

100,000) respectively, and followed by Hispanics (0.6 cases per 100,000) (Figure 6).

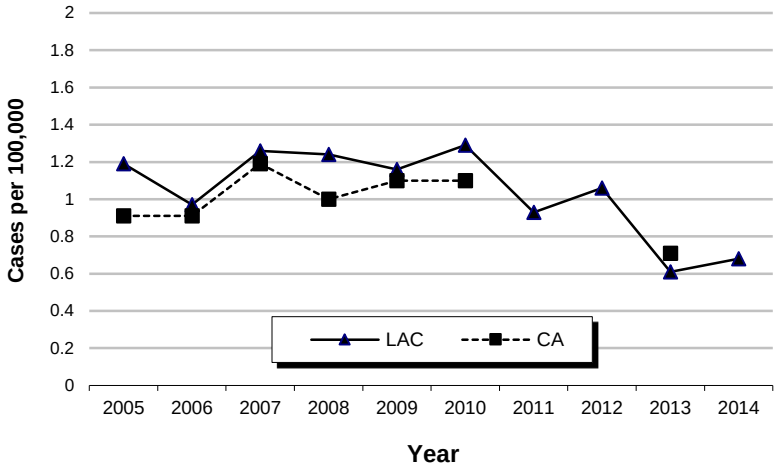
- The highest amebiasis incidence rates was documented within Service Planning Area (SPA) 4 (1.7 per 100,000) and SPA 5 had the second higestest incidence of cases (1.1 per 100,000). (Figure 4). Across the remaining 6 SPAs incidence of amebiasis cases were consistent, suggesting even geographical distribution of cases. Reasons for the higher incidence in SPA 4 may be attributable to a higher rate of MSM in that region.
- The number of cases peaked in March and this was consistent with previous five-year average (Figure 5).
- Consistent with previous years, males comprised the majority (81%) of reported cases in 2014. The incidence rate of males was 4 times greater than females, with 1.1 and 0.3 cases per 100,000, respectively.
- Risk factor information was available for all cases reported in 2014. More than one risk factor was identified for several cases. The most frequently reported risk factor was contact with animals, predominantly exposure to dogs (28%), followed by MSM (27%), travel to another country (19%), exposure to recreational water (16%), and consumption of raw cheese from Mexico (11%). Additional reported risk factors were recent refugee/immigrants and hiking (9%) respectively, drinking untreated water, cololonic procedure, diaper exposure, and camping.

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010–2014

	2010 (N=119)			2011 (N=86)			2012 (N=99)			2013 (N=57)			2014 (N=64)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	1	1.1	0.7	0	-	-	0	-	-	2	3.1	1.7
1-4	5	4.2	0.9	1	1.1	0.2	1	1	0.2	0	-	-	1	1.6	0.2
5-14	8	6.7	0.6	4	4.7	0.3	5	5.1	0.4	0	-	-	3	4.7	0.2
15-34	38	31.9	1.3	26	30.2	0.9	33	33.3	1.2	18	31.6	0.6	19	29.7	0.7
35-44	25	21	1.7	17	19.8	1.2	24	24.2	1.8	13	22.8	1	17	26.6	1.3
45-54	25	21	1.8	15	17.4	1.1	18	18.2	1.4	21	36.8	1.6	12	18.8	0.9
55-64	11	9.2	1.1	9	10.4	0.9	9	9.1	0.9	3	5.3	0.3	4	6.3	0.4
65+	7	5.9	0.7	13	15.1	1.2	9	9.1	0.8	2	3.5	0.2	6	9.4	0.5
Race/ Ethnicity															
Asian	2	1.9	0.2	1	1.1	0.1	6	6.1	0.5	3	5.3	0.2	5	7.8	0.4
Black	0	-	-	7	8.1	0.8	4	4	0.5	2	3.5	0.3	7	10.9	0.9
Hispanic	37	34.6	0.8	40	46.5	0.8	39	39.4	0.9	17	29.8	0.4	26	40.9	0.6
White	43	40.2	1.5	27	31.5	0.9	33	33.3	1.2	34	59.6	1.3	23	35.9	0.9
Other	1	0.9	-	2	2.3	-	0	-	-	0	-	-	0	-	-
Unknown	24	22.5	-	9	10.5	-	17	17.2		1	1.8		3	-	-
SPA															
1	2	1.9	0.5	0	-	-	1	1	0.3	1	1.8	0.3	2	3.1	0.5
2	49	45.8	2.2	25	29	1.1	29	29.3	1.4	21	36.8	1	13	20.3	0.6
3	9	8.4	0.5	7	8.1	0.4	4	4	0.2	5	8.8	0.3	7	10.9	0.4
4	18	16.8	1.4	20	23.3	1.6	25	25.3	2.2	13	22.7	1.1	19	29.7	1.7
5	8	7.5	1.2	6	7	0.9	8	8.1	1.3	8	14	1.2	7	10.9	1.1
6	4	3.7	0.4	13	15.1	1.2	13	13.1	1.3	3	5.3	0.3	4	6.3	0.4
7	12	11.2	0.9	10	11.6	0.7	15	15.2	1.2	3	5.3	0.2	7	10.9	0.5
8	3	2.8	0.3	4	4.7	0.4	4	4	0.4	3	5.3	0.3	5	7.8	0.5
Unknown	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, 2005-2014 *



* No data was collected for CA for 2011-2014.

Figure 2. Incidence Rates of Amebiasis by Age Group
LAC, 2014 (N=64)

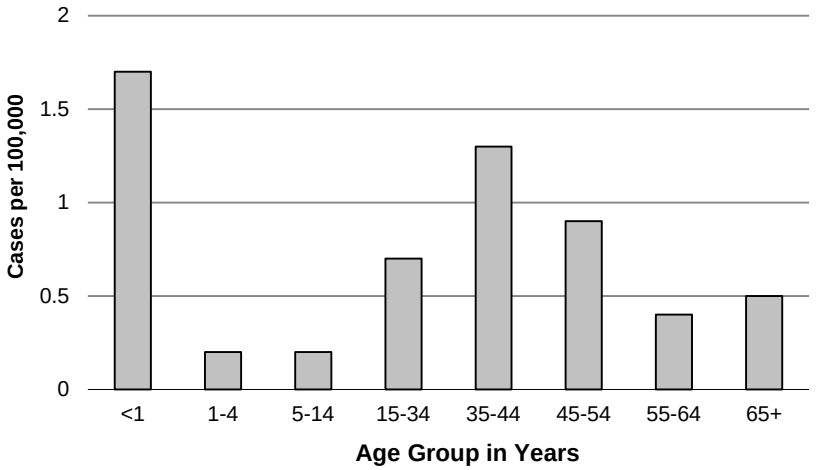


Figure 3. Percent Cases of Amebiasis by Race/Ethnicity
LAC, 2014 (*N=64)

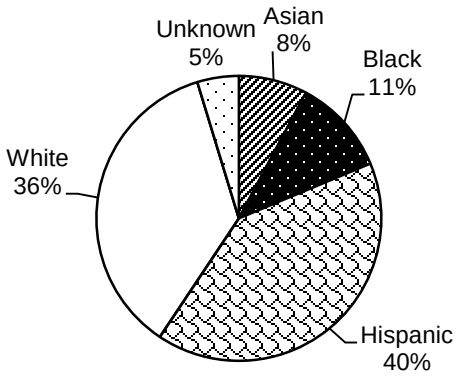
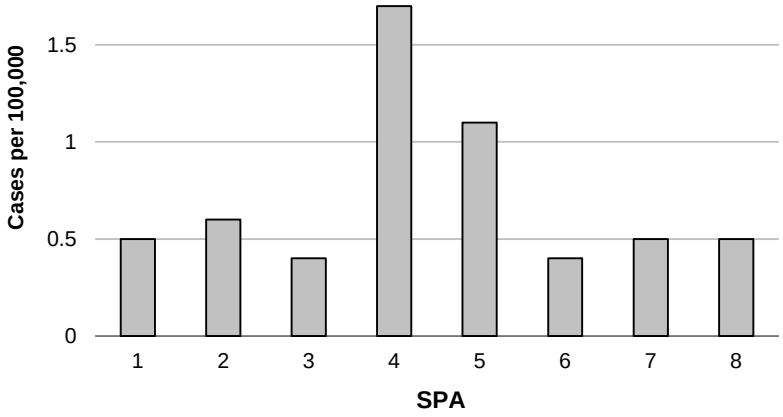


Figure 4. Incidence Rates of Amebiasis by SPA
LAC, 2014 (N=64)



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

Figure 5. Reported Amebiasis Cases by Month of Onset LAC, 2014 (N=64)

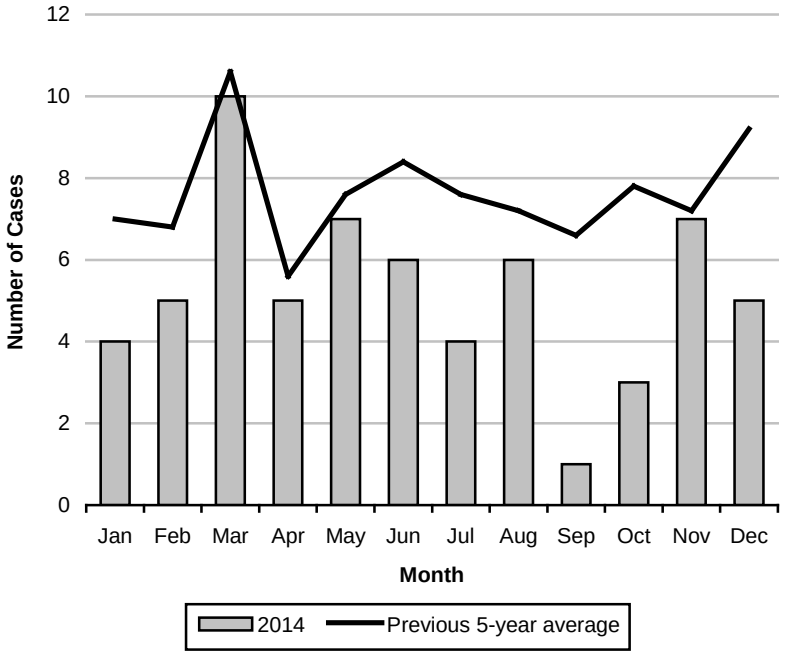
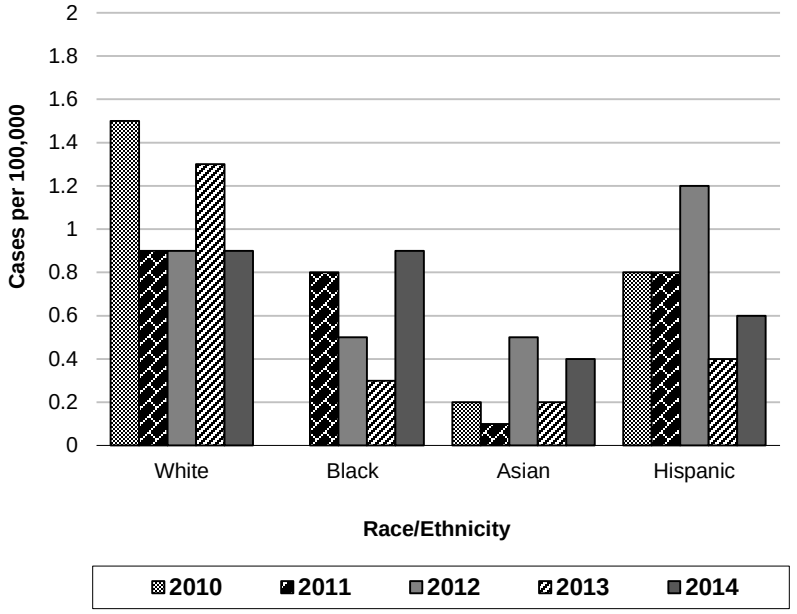
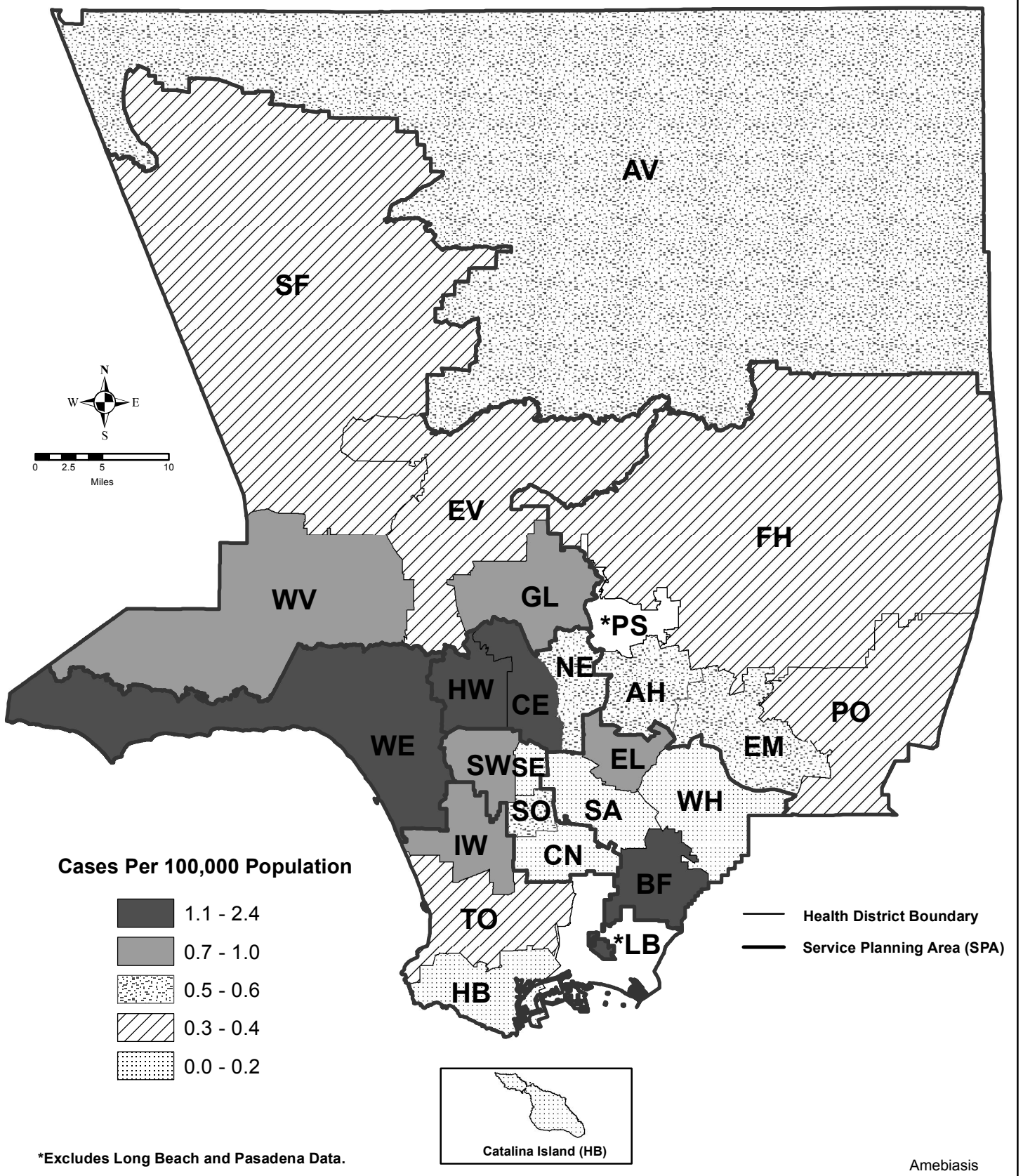


Figure 6. Incidence Rate of Amebiasis by Race/Ethnicity LAC, 2010-2014, 2014 (N=64)



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1506
Annual Incidence[a]	
LA County	15.93
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	37.42
Median	35
Range	0–99 years

[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.

2014 TRENDS AND HIGHLIGHTS

- The 2014 incidence rate of camplyobacteriosis was lower than 2013: 15.9 per 100, 000 versus 18.1 per 100,000, respectively. (Figure 1).
- The highest rates were among children aged 1 to 4 (24.2 per 100,000) followed by persons aged <1 years (22.8 per 100,000) (Figure 2).
- Service Planning Area (SPA) 5 had the highest rate (29.0 per 100,000) which is consistent with previous years (Figure 3).
- No outbreaks of campylobacteriosis were reported in 2014.
- Routine interviewing of campylobacteriosis cases was discontinued in 2010; however we continue to monitor reported cases and FBI.

Reported Campylobacteriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=1239)			2011 (N=1259)			2012 (N=1546)			2013 (N=1546)			2014 (N=1506)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	24	1.9	20.0	16	1.2	11.5	46	2.9	38.7	45	2.6	37.2	27	1.7	22.8
1-4	150	12.1	30.9	158	12.5	27.2	136	8.7	28.6	159	9.3	32.7	118	7.8	24.2
5-14	175	14.1	14.1	146	11.5	11.0	181	11.7	15.1	173	10.1	14.3	159	10.5	13.2
15-34	318	25.6	11.4	366	29.0	12.4	418	27.0	15.1	495	29.0	17.5	437	29.0	15.5
35-44	157	12.6	11.7	133	10.5	9.2	169	10.9	12.8	182	10.6	13.7	192	12.7	14.5
45-54	136	10.9	10.6	142	11.2	10.5	186	12.3	14.5	185	10.8	14.3	175	11.6	13.5
55-64	96	7.7	10.1	114	9.0	11.9	163	10.5	16.0	177	10.3	17.2	155	10.2	14.6
65+	165	13.3	16.4	172	13.6	16.2	238	19.1	21.5	281	16.5	25.3	239	15.8	14.6
Unknown	18	0	1.4	12	0.9	-	9	0.6	-	6	0.3	-	4	0.2	-
Race / Ethnicity															
Asian	35	2.8	2.7	28	2.2	2.1	37	2.3	2.8	46	2.6	3.4	61	.06	4.4
Black	13	1.0	1.7	21	1.6	2.5	34	2.1	4.4	46	2.6	5.9	39	2.5	5.0
Hispanic	182	14.6	4.1	157	12.4	3.3	161	10.4	3.6	167	9.8	3.6	219	14.5	4.8
White	118	9.5	4.4	119	9.4	4.2	228	14.7	8.6	386	22.6	14.5	272	18.0	10.2
Other	13	1.0	-	14	1.1	-	11	0.7	-	32	1.8	-	25	0	-
Unknown	878	70.8	-	920	73.0	-	1075	69.5	-	1026	60.2	-	890	59.1	-
SPA															
1	39	3.1	10.1	46	3.6	12.3	36	2.3	9.3	41	2.4	10.5	55	3.6	14.0
2	346	2.7	16.3	347	27.5	15.7	362	23.4	16.9	401	23.5	18.4	388	25.7	17.7
3	166	13.3	10.3	164	13.0	9.5	200	12.9	12.4	220	12.9	13.5	217	14.4	13.2
4	158	1.2	15.5	156	12.3	12.4	234	15.1	20.8	292	17.1	25.6	198	13.1	17.2
5	130	10.4	20.5	142	11.2	21.5	228	14.7	35.7	218	12.7	33.7	189	12.5	29.0
6	122	9.8	12.2	123	9.7	11.5	140	9.0	13.8	175	10.3	17.0	136	10.3	13.2
7	145	11.7	11.2	136	10.8	9.9	179	11.5	13.8	180	10.5	13.7	137	9.0	10.4
8	127	10.2	12.0	145	11.5	12.9	157	10	14.7	172	10.0	16.0	185	12.2	17.1
Unknown	4	0.3	-	0	-	-	10	0.6	-	4	0.2	-	1	-	-

*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, 2003-2014**

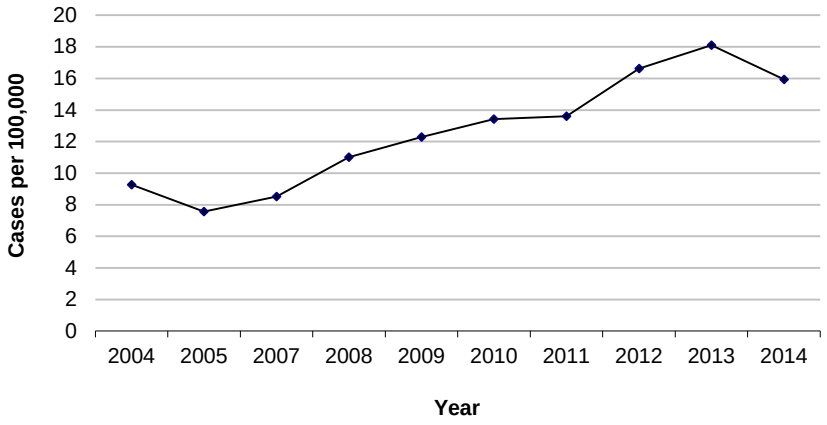


**Figure 2. Reported Campylobacteriosis Rates by Age Group
LAC, 2014 (N=1506)**

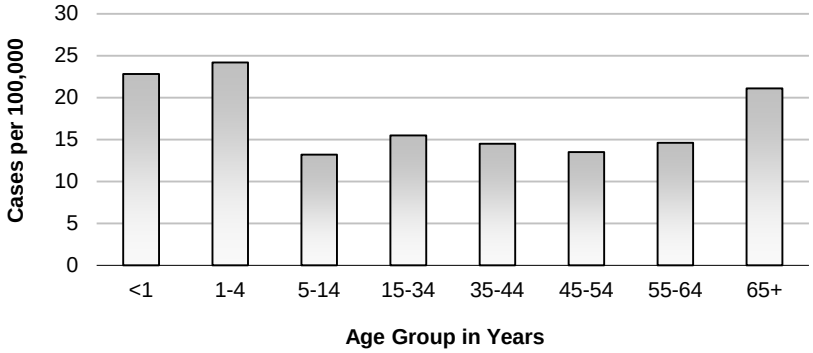
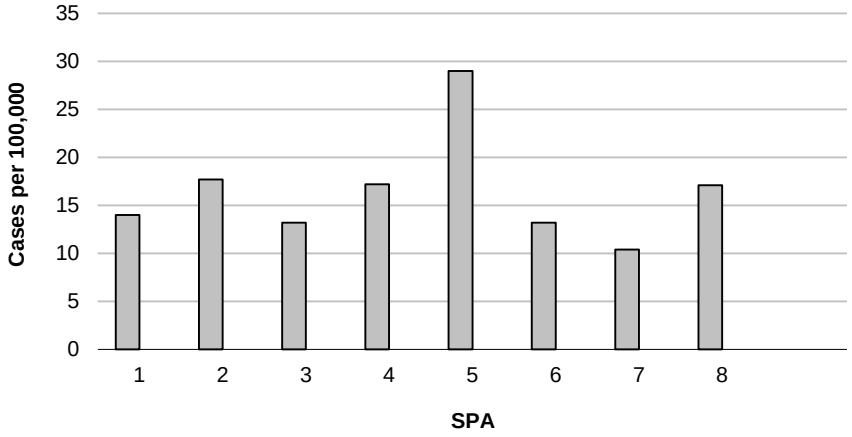
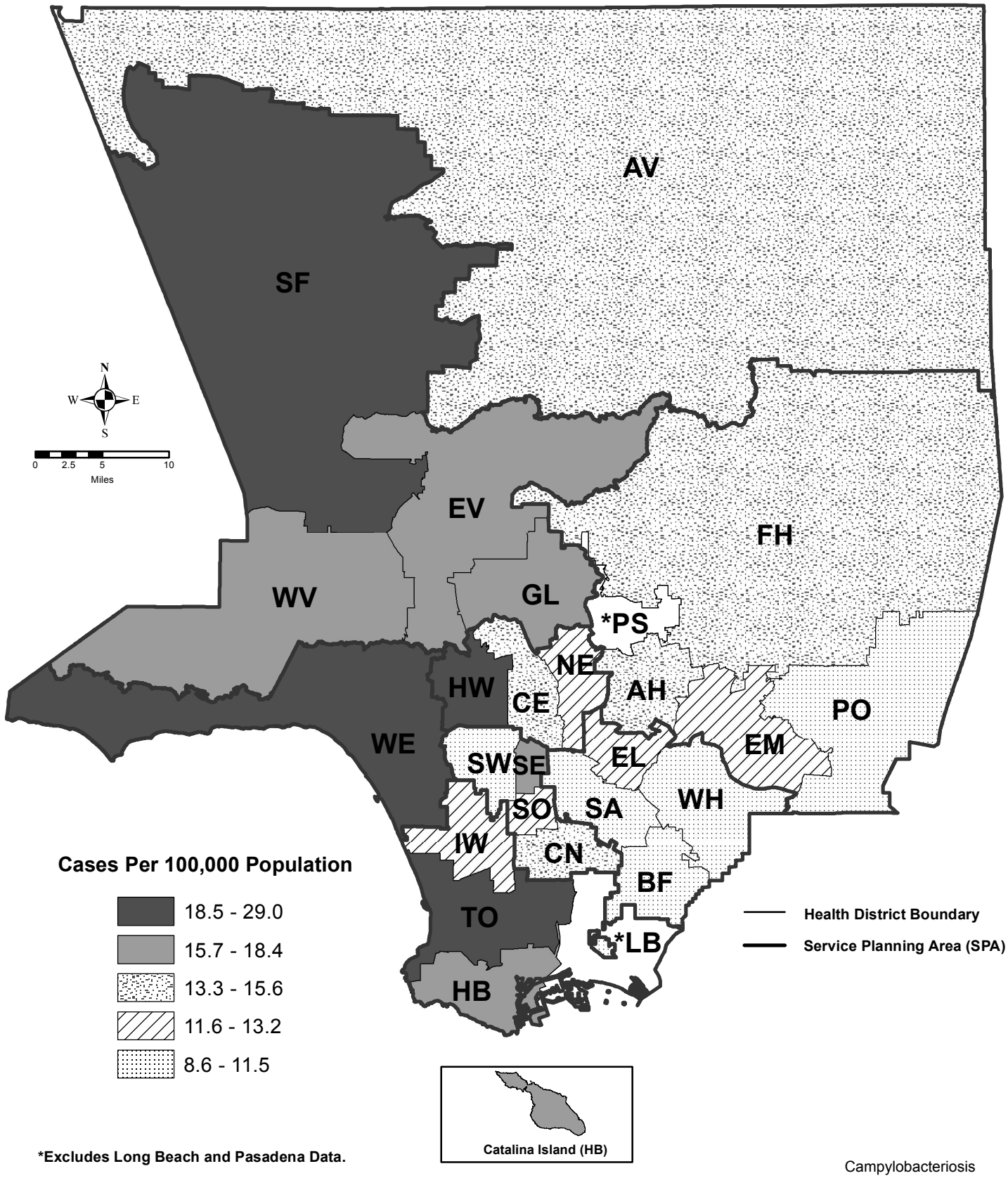


**Figure 3. Reported Campylobacteriosis Rates by SPA
LAC, 2014 (N=1506)**



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	426
Annual Incidence[a]	
LA County	4.51
California[b]	5.90
United States[b]	2.58
Age at Diagnosis	
Mean	52
Median	53
Range	2–91 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 soil. 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 higher 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 exposure and risk associated with construction, a growing naïve population in the endemic area, and antifungal treatments that are toxic and not uniformly effective validate the need for prevention efforts.

2014 TRENDS AND HIGHLIGHTS

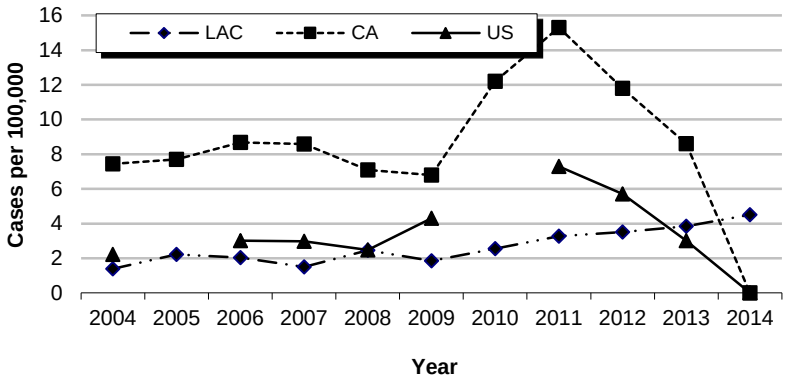
- Overall, the Los Angeles County incidence rate for coccidioidomycosis has continued to increase over the last ten years. No data were available for the US in years 2005 and 2010 (Figure 1).
- Case frequency and incidence rate increased with age. The 65+ year age group had the most cases at 25% and the highest incidence rate at 9.5 cases per 100,000 (Figure 2).
- Males represented 63% of cases; females 37% (Figure 3).
- Incidence rates by race/ethnicity have remained consistent over the past five years with the exception of 2014, in which whites had the highest incidence rate of 6.6 per 100,000 and blacks the second highest incident rate of 5.3 per 100,000. This in contrast with 2010-13 when the highest incidence rates occurred among blacks (Figure 4).
- SPA 1 reported the highest incidence rate of coccidioidomycosis in LAC; at 26.2 per 100,000 this is in comparison to the next highest incidence rate in SPA 2 of 5.7 per 100,000 (Figure 5).
- In 2014, December had the most cases at 11.3%. However, there are not marked seasonal differences in rate based on data from the past 5 years, other than a modest decrease in late-winter and early-spring (Figure 6).
- There were 28 cases of disseminated coccidioidomycosis reported in LAC in 2014. SPA 1 reported the highest incidence rate at 2.5 per 100,000; this is in comparison to the next highest incidence rate of 0.4 per 100,000 in SPA 2. Males made up 70% of disseminated cases reported in SPA 1, and 89% in SPA.

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010–2014

	2010 (N=235)			2011 (N=304)			2012 (N=327)			2013 (N=362)			2014 (N=426)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.4	0.8	0	-	-	0	-	-	1	0.3	0.8	0	-	-
1-4	0	-	-	1	0.3	0.2	3	9.2	0.6	0	-	-	1	0.2	0.2
5-14	5	2.1	0.4	3	1.0	0.2	3	9.2	0.3	6	1.6	0.5	4	0.9	0.3
15-34	43	18.3	1.5	62	20.4	2.1	68	20.8	2.5	67	18.5	2.4	68	16.0	2.4
35-44	38	16.2	2.8	35	11.5	2.4	53	16.2	4.0	55	15.2	4.1	61	14.3	4.6
45-54	55	23.4	4.3	67	22.0	5.0	84	25.7	6.5	86	23.8	6.7	91	21.3	7.0
55-64	42	17.9	4.4	54	17.8	5.6	46	14.1	4.5	73	20.2	7.1	93	21.8	8.8
65+	51	21.7	5.1	82	27.0	7.7	70	21.4	6.3	74	20.4	6.7	108	25.3	9.5
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	26	11.1	2.0	23	7.6	1.7	26	8.0	2.0	30	8.3	2.2	33	7.7	2.4
Black	43	18.3	5.6	48	15.8	5.6	46	14.1	5.9	50	13.8	6.4	42	9.9	5.3
Hispanic	71	30.2	1.6	94	30.9	2.0	133	40.7	2.9	104	28.7	2.3	139	32.6	3.0
White	76	32.3	2.9	134	44.1	4.7	121	37.0	4.6	132	36.5	5.0	174	40.8	6.5
Other	3	1.3	-	1	0.3		0	-	-	5	1.4	-	3	0.7	-
Unknown	16	6.8	-	4	1.3		1	0.3	-	41	11.3	-	35	8.2	-
SPA															
1	87	37.0	22.6	93	30.6	24.9	74	22.6	19.1	74	20.4	18.9	103	24.1	26.2
2	54	23.0	2.5	86	28.3	3.9	72	22.0	3.4	83	22.9	3.8	125	29.3	5.7
3	17	7.2	1.1	13	4.3	0.7	25	7.6	1.5	38	10.4	2.3	44	10.3	2.7
4	20	8.5	1.8	26	8.6	2.1	53	16.2	4.7	46	12.7	4.0	30	7.0	2.6
5	7	3.0	1.1	17	5.6	2.6	18	5.5	2.8	22	6.7	3.4	21	4.9	3.2
6	19	8.1	1.9	29	9.5	2.7	37	11.3	3.6	38	10.4	3.7	42	9.8	4.1
7	14	6.0	1.1	20	6.6	1.5	34	10.3	2.6	29	8.1	2.2	30	7.0	2.3
8	16	6.8	1.5	18	5.9	1.6	14	4.2	1.3	25	6.9	2.3	29	6.8	2.7
Unknown	0	-	-	2	0.7	-	0	-	-	-	-	-	0	-	-

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

Figure 1. Incidence Rates of Coccidioidomycosis US*, CA and LAC, 2004-2014



* No data were available for the US in years 2005 and 2010.

Figure 2. Incidence Rates of Coccidioidomycosis by Age Group LAC, 2014 (N=426)

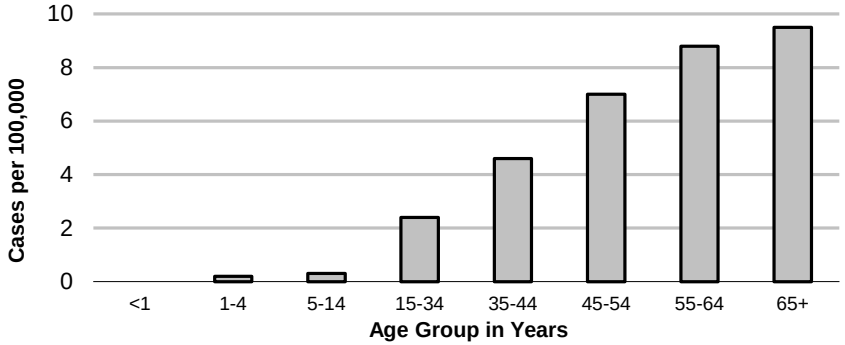


Figure 3. Percent of Reported Coccidioidomycosis Male Cases by SPA LAC, 2014 (N=426)

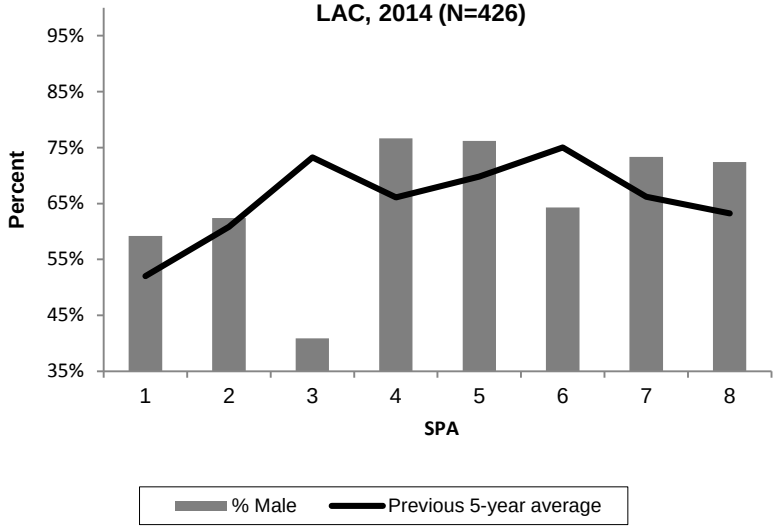


Figure 4. Coccidioidomycosis Incidence Rates by Race/Ethnicity LAC 2010-2014

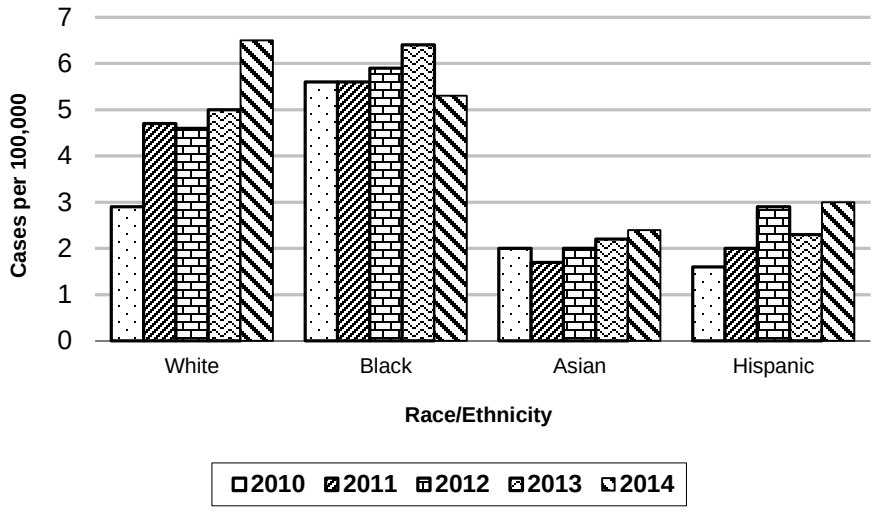


Figure 5. Incidence Rates of Coccidioidomycosis by SPA LAC, 2010-2014

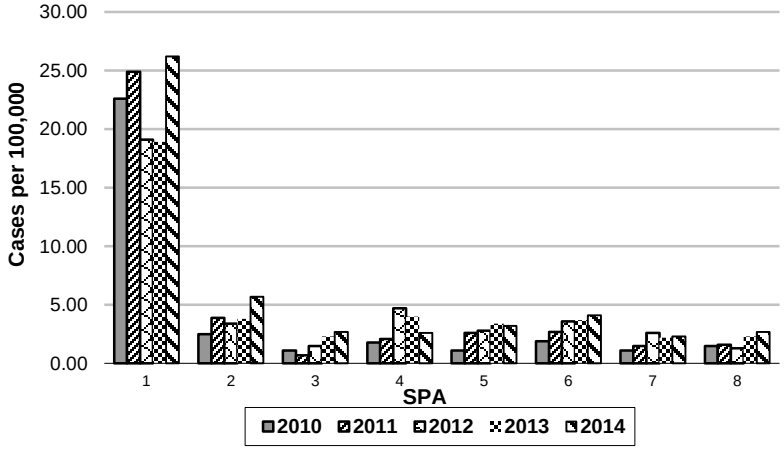
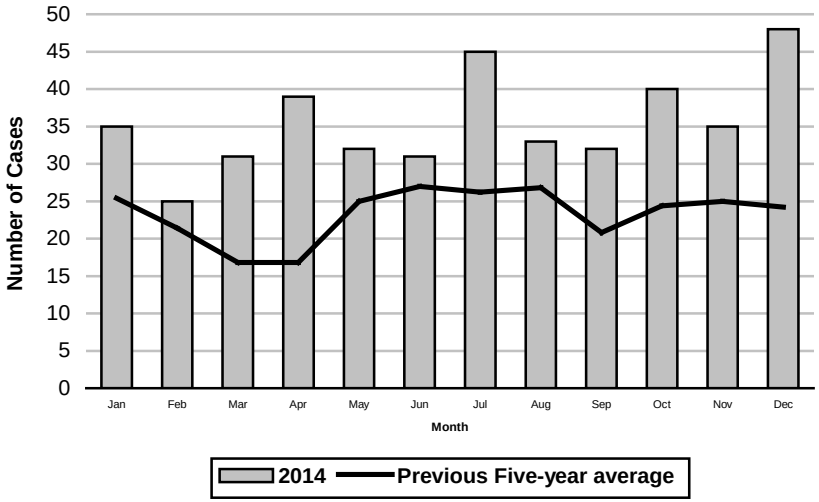
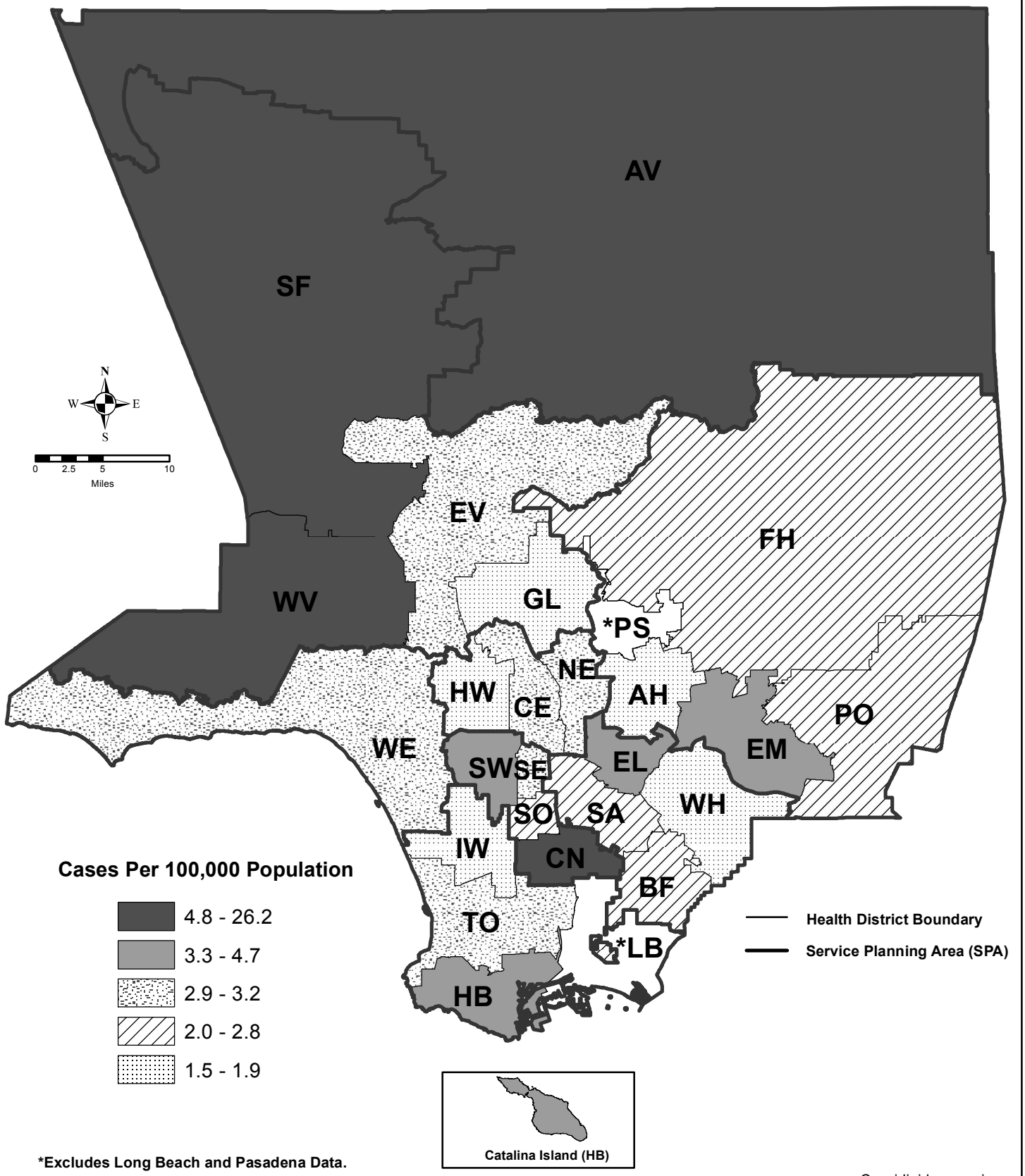


Figure 6. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2014 (N=426)



Map 3. Coccidioidomycosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases	78
Annual Incidence[a]	
LA County	0.83
California[b]	0.91
United States[b]	1.75
Age at Diagnosis	
Mean	36
Median	37
Range	3–75 years

[a]Cases per 100,000 population.

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

DESCRIPTION

Cryptosporidiosis is fecal-orally transmitted when cysts of the parasite *Cryptosporidium spp.* are ingested. Common causes include contact with animals, 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 recreational waters in order to prevent transmission to others. Fecal exposure during sexual activity, anal intercourse and oral-anal sexual practices, should also be avoided. Lastly, persons should avoid drinking untreated water that may be contaminated.

2014 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases in LAC increased from 0.51 to 0.83 cases per 100,000 in 2013 and 2014 respectively; however, over the last decade no trend exists (Figure 1).
- The greatest incidence of cryptosporidiosis was in persons 35-44 (1.3 cases per 100,000) followed by those 45-54 years of age (1.2 cases per 100,000). (Figure 2).
- The greatest incidence of cryptosporidiosis was in blacks (1.5 cases per 100,000) followed by whites (1.3 cases per 100,000) (Figure 6).
- SPA 4 had the highest incidence rate, 1.8 cases per 100,000 (Figure 4). This may be related to the greater proportion of MSM in that area.
- The number of cases reported peaked in August, which was consistent with the previous 5 years, consistent with risk factors such as exposure to recreational water, hiking and travel, which occur more commonly in the summer. (Figure 5).
- The male to female ratio for 2014 was almost 3:2 compared with 2013 when the ratio was approximately 4:1. Males have consistently comprised the larger proportion of cases.
- Complete risk factor data were available for all cases. More than one risk factor was identified for several cases. The most frequently reported risk factor was contact with animals (35%), of those, the majority had contact with dogs at home (85%), followed by MSM (26%). Other reported risk factors were travel to another country (24%), HIV positive status (19%) of which two-thirds were among MSM, exposure to recreational water (18%), hiking (14%), and diaper contact (10%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010–2014

	2010 (N=61)			2011 (N=51)			2012(N=44)			2013(N=48)			2014 (N=78)		
	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	-	-
1-4	2	3.3	0.3	3	5.8	0.5	2	4.6	0.4	1	2.1	0.2	2	2.6	0.4
5-14	5	8.2	0.4	6	11.7	0.5	4	9.1	0.3	2	4.2	0.2	5	6.4	0.4
15-34	15	24.6	0.5	16	31.3	0.5	13	29.5	0.5	16	33.3	0.6	29	37.2	1.0
35-44	14	23	1.0	10	19.6	0.7	8	18.2	0.6	8	16.7	0.6	17	21.8	1.3
45-54	13	21.3	1.0	6	11.7	0.4	8	18.2	0.6	14	29.1	1.1	15	19.2	1.2
55-64	5	8.2	0.5	3	5.8	0.3	4	9.1	0.4	2	4.2	0.2	5	6.4	0.5
65+	7	11.5	0.7	7	13.7	0.7	4	9.1	0.4	5	10.4	0.5	4	5.1	0.4
Unknown	0	-	-	0	-	-	1	2.2	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	2	3.3	0.1	3	5.8	0.2	1	2.3	0.1	2	4.2	0.1	5	6.4	0.4
Black	11	18.0	1.3	6	11.7	0.7	1	2.3	0.1	12	25	1.5	12	15.4	1.5
Hispanic	13	21.3	0.3	11	21.5	0.2	9	20.4	0.2	7	14.5	0.2	22	28.2	0.5
White	22	36.1	0.8	20	39.2	0.7	19	43.2	0.7	24	50.0	0.9	34	43.6	1.3
Other	0	-	-	0	-	-	0	-	-	2	4.2	-	2	2.6	-
Unknown	13	21.3	-	11	21.5	-	14	31.8	-	1	2.1	-	3	3.8	-
SPA															
1	3	4.9	0.8	6	11.7	1.6	5	11.4	1.3	4	8.3	1.0	3	3.8	0.8
2	16	26.2	0.7	15	29.4	0.7	12	27.3	0.6	15	31.3	0.7	23	29.5	1.1
3	9	14.8	0.5	4	7.8	0.2	7	15.9	0.4	4	8.3	0.2	5	6.4	0.3
4	10	16.4	0.8	8	15.7	0.7	6	13.6	0.5	6	12.5	0.5	21	26.9	1.8
5	5	8.2	0.8	5	9.8	0.8	6	13.6	0.9	6	12.5	0.9	4	5.1	0.6
6	10	16.4	0.9	4	7.8	0.4	1	2.3	0.1	5	10.4	0.5	6	7.7	0.6
7	1	1.6	0.1	1	2.0	0.5	1	2.3	0.1	3	6.3	0.2	8	10.2	0.6
8	4	6.6	0.4	1	2.0	0.1	3	6.8	0.3	5	10.4	0.5	7	9.0	0.6
Unknown	0	-	-	7	13.7	-	3	6.8	-	0	-	-	0	-	-

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

Figure 1. Incidence Rates of Cryptosporidiosis US, CA and LAC, 2005-2014

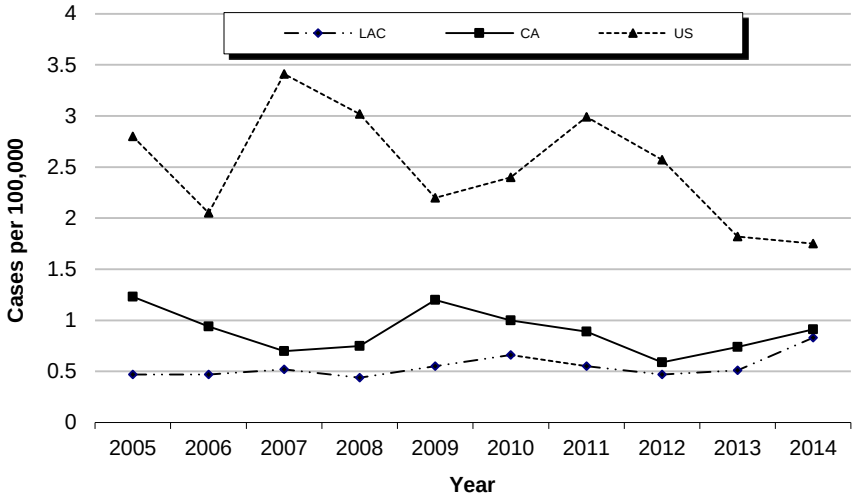


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2014 (N=78)

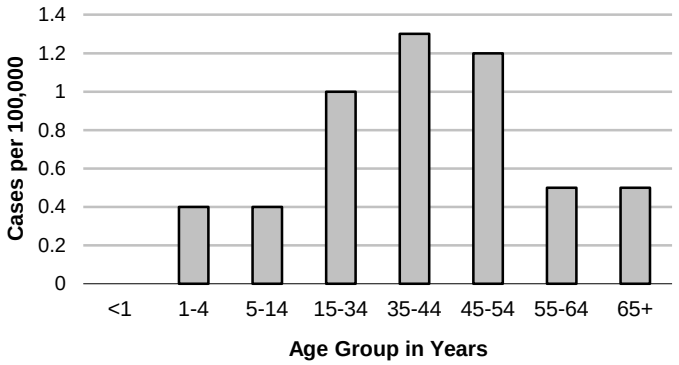


Figure 3. Percent of Cryptosporidiosis by Race/Ethnicity LAC, 2014 (*N=78)

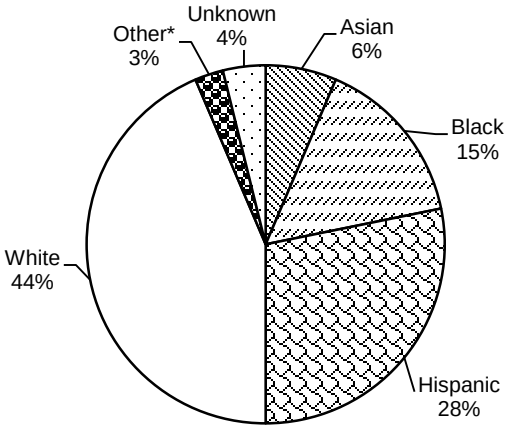
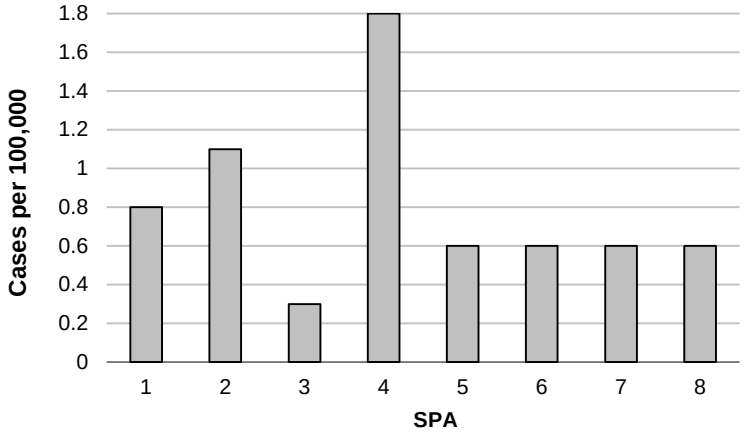


Figure 4. Incidence Rates of Cryptosporidiosis by SPA LAC, 2014 (N=78)



* 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, 2014 (N=78)

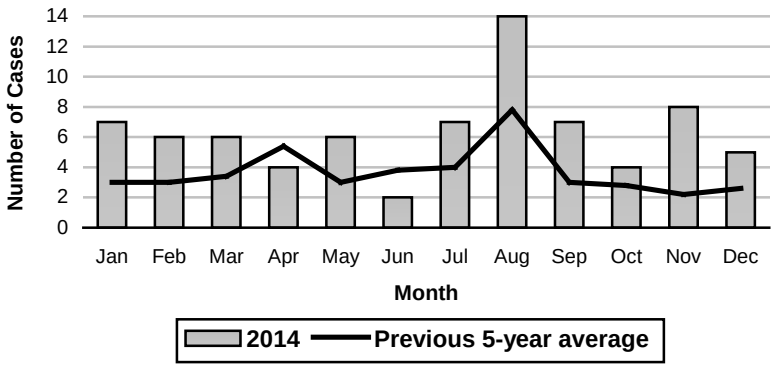
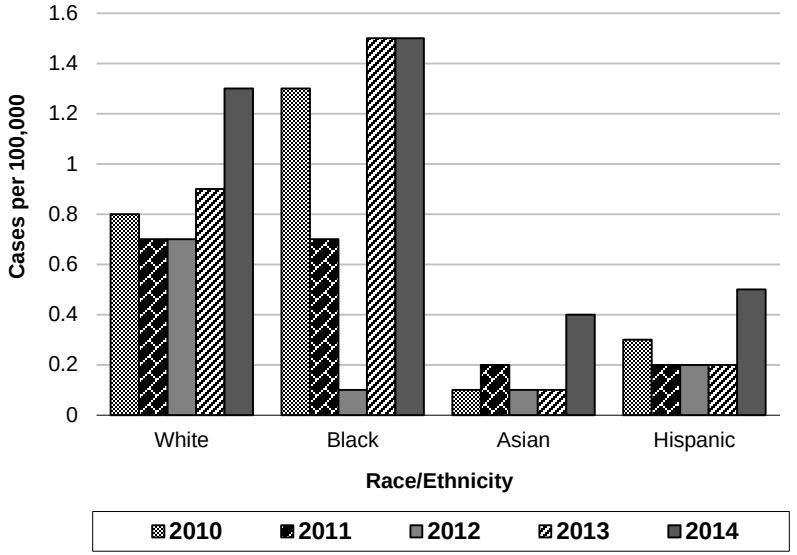
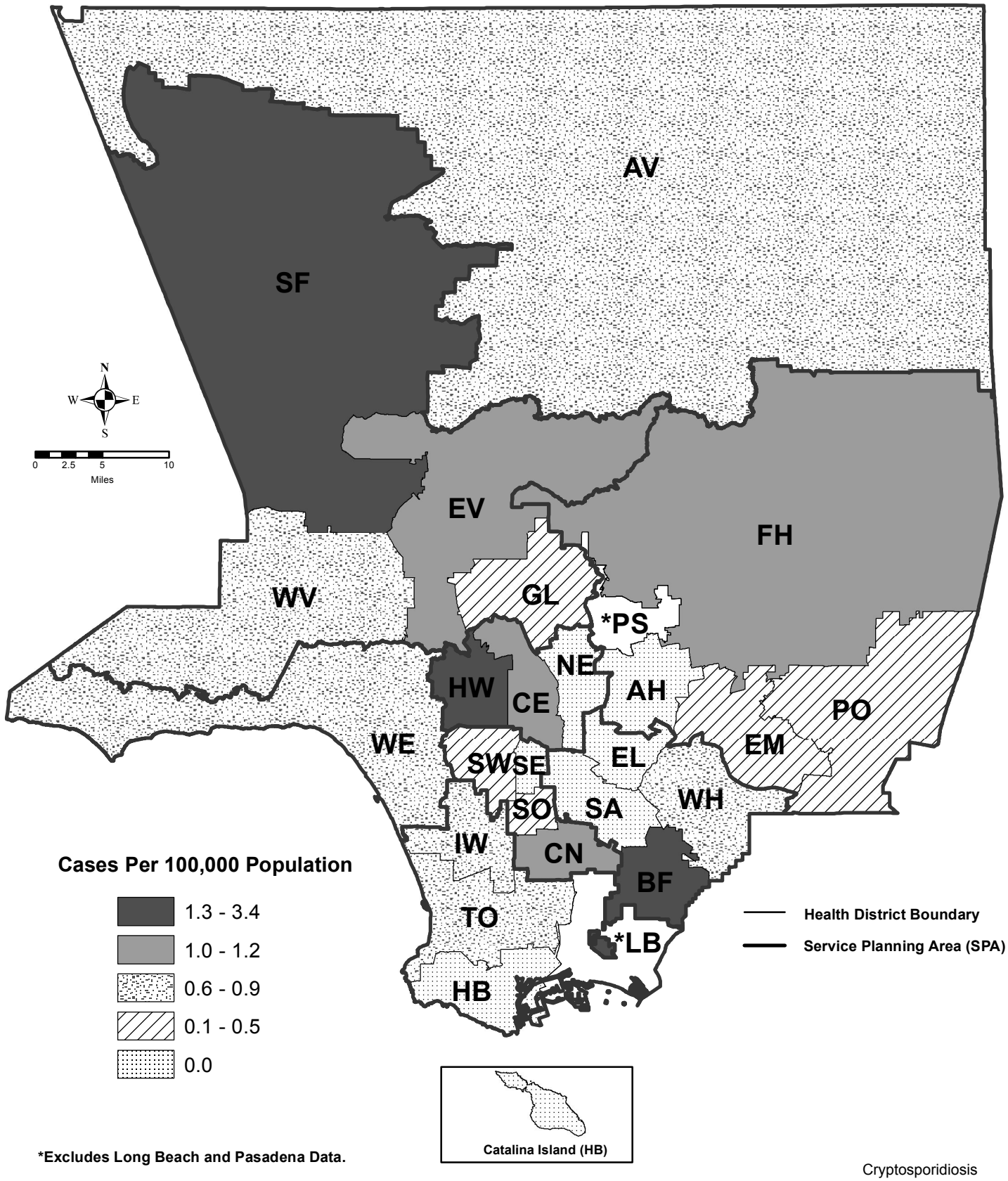


Figure 6. Incidence Rates of Cryptosporidiosis by Race/Ethnicity LAC, 2010-2014, 2014 (N=78)



Map 4. Cryptosporidiosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

ENCEPHALITIS

CRUDE DATA	
Number of Cases	92
Annual Incidence[a]	
LA County	0.97
California[b]	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	60 years
Median	63 years
Range	0–94 years

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

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. LAC DPH conducts passive surveillance and 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).

2014 TRENDS AND HIGHLIGHTS

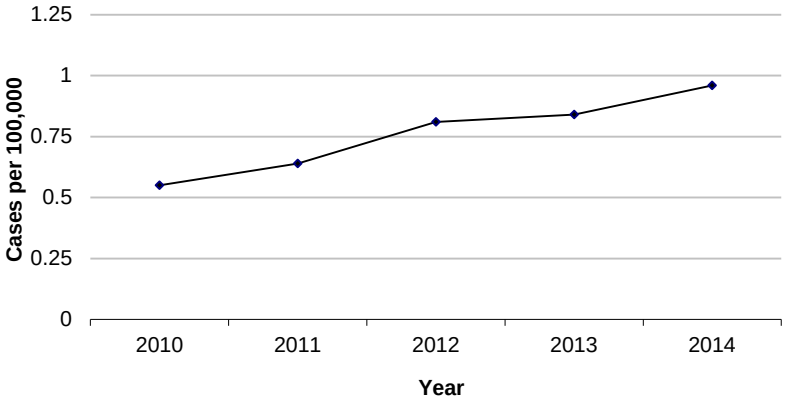
- A total of 92 cases of encephalitis were confirmed in 2014 compared with 79 cases reported in 2013. The 2014 surveillance year had the second highest number of total WNV infections since 2004 (see WNV chapter).
- Most cases (n=67, 73%) of encephalitis were laboratory confirmed to be WNV-associated encephalitis, the most frequently reported etiology for viral encephalitis in the U.S. Cases of WNV encephalitis were reported from late July through late November. The peak month of encephalitis reports, September, coincided with the WNV-infection peak in 2014 (Figure 4).
- Herpes virus encephalitis associated with herpes zoster due to infection with varicella zoster virus (VZV) and herpes simplex virus (HSV) was the third most common etiology for reported encephalitis; three (3%) each cases case of HSV and VZV associated encephalitis were documented.
- Sixteen (17%) encephalitis cases were considered to be due to an unknown viral etiology based on review of medical records.
- The greatest incidence of encephalitis was in persons 65 years old and older (3.9 cases per 100,000) followed by those 55-64 years of age (2.2 cases per 100,000 population). The peak incidence in persons 65 years and older corresponds to age as a risk factor for WNV-associated neuroinvasive disease. The average age of WNV encephalitis cases in 2014 was 66.7 years.
- The highest encephalitis incidence rates were documented within SPAs 5 and 7, which also matches the SPAs with highest incidence rates for WNV-associated encephalitis (Figure 1).

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2009-2014

	2010 (N=51)			2011 (N=59)			2012 (N=75)			2013 (N=79)			2014 (N=92)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	2.0	0.7	3	5.1	2.5	1	1.3	0.8	1	1.3	0.8	1	1.1	0.8
1-4	4	7.8	0.7	4	6.8	0.8	3	4.0	0.6	4	4.0	0.6	2	2.2	0.4
5-14	21	41.2	1.6	10	16.5	0.8	8	10.7	0.7	7	10.7	0.7	4	4.3	0.3
15-34	11	21.6	0.4	8	13.6	0.3	6	8.0	0.2	6	8.0	0.2	5	5.4	0.1
35-44	1	2.0	0.1	2	3.4	0.2	0	0.0	-	1	0.0	-	3	3.3	0.2
45-54	4	7.8	0.3	9	15.7	0.7	9	12.0	0.7	13	12.0	0.7	10	11.0	0.8
55-64	6	11.8	0.6	8	13.5	0.8	12	16.0	1.2	19	16.0	1.2	23	25.3	2.2
65+	3	5.9	0.3	15	25.4	1.4	36	48.0	3.2	28	48.0	3.2	44	48.3	3.9
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	6	11.8	0.4	0	-	-	8	10.7	0.6	6	10.7	0.4	8	7.7	0.6
Black	3	5.9	0.4	4	6.8	0.5	3	4.0	0.4	2	4.0	0.3	3	3.3	0.4
Hispanic	27	52.9	0.6	33	55.9	0.7	23	30.7	0.5	20	30.7	0.4	24	25.3	0.5
White	7	13.7	0.2	14	23.7	0.5	31	41.3	1.2	36	41.3	1.4	40	43.9	1.5
Other	1	2.0	-	1	1.7	-	5	6.7	-	3	6.7	-	0	-	-
Unknown	7	13.7	-	7	11.9	-	5	6.7	-	12	6.7	-	17	19.8	-
SPA															
1	2	3.9	0.5	2	3.4	0.5	6	8.0	1.5	6	8.0	1.5	1	1.1	0.3
2	10	19.6	0.5	20	33.9	0.9	22	29.3	1.0	27	29.3	1.2	21	22.8	1.0
3	7	13.7	0.4	9	15.2	0.6	24	32.0	1.5	11	32.0	0.7	14	15.2	0.9
4	4	7.8	0.3	4	6.8	0.4	10	13.3	0.9	3	13.3	0.3	12	13.0	1.0
5	2	3.9	0.3	1	1.7	0.2	2	2.7	0.3	2	2.7	0.3	11	12.0	1.7
6	13	25.5	1.2	4	6.8	0.4	4	5.3	0.4	3	5.3	0.3	5	5.4	0.5
7	5	9.8	0.4	8	13.5	0.6	5	6.7	0.4	11	6.7	0.8	18	19.6	1.4
8	4	7.8	0.4	5	8.2	0.5	2	2.7	0.2	13	2.7	1.2	9	9.8	0.8
Unknown	4	7.8	-	6	10.2	-	0	-	-	0	-	-	1	1.1	-

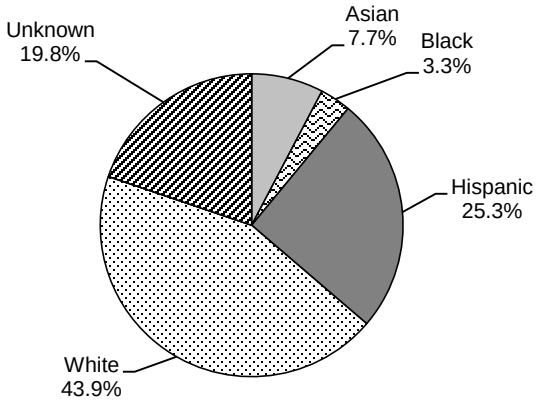
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis LAC, 2010-2014



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity LAC, 2014 (*N=92)



* 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, 2014 (N=92)

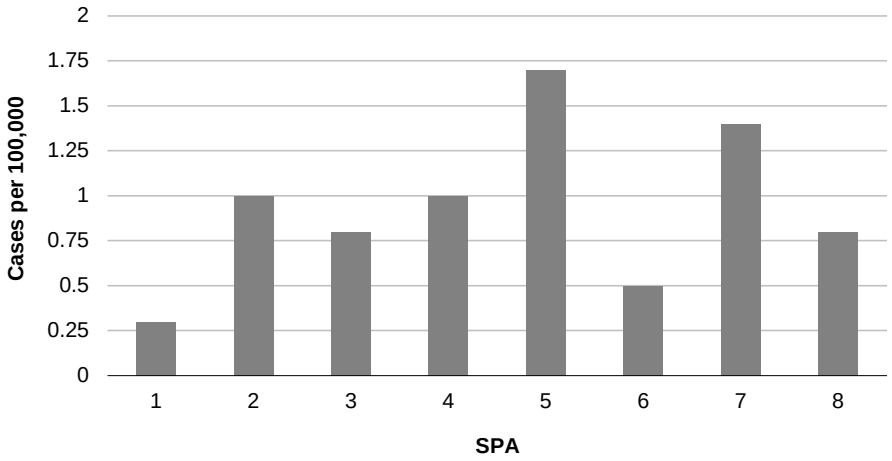


Figure 4. Reported Encephalitis Cases by Month of Onset LAC, 2014 (N=92)

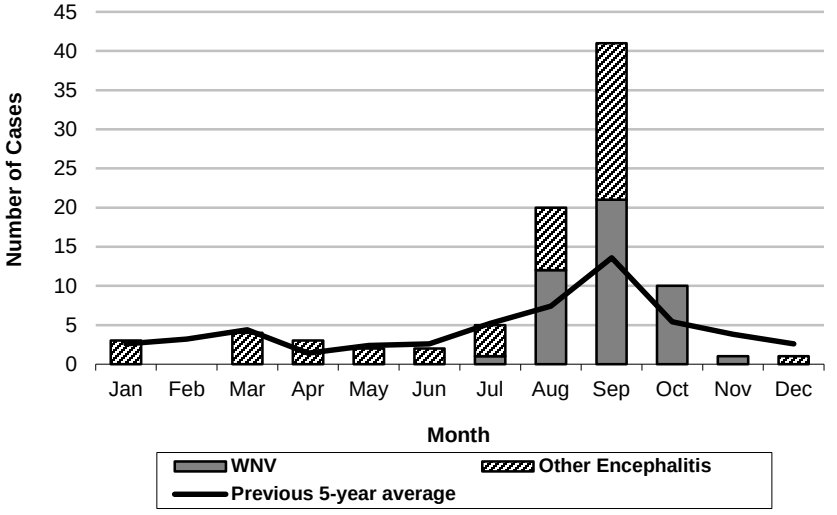
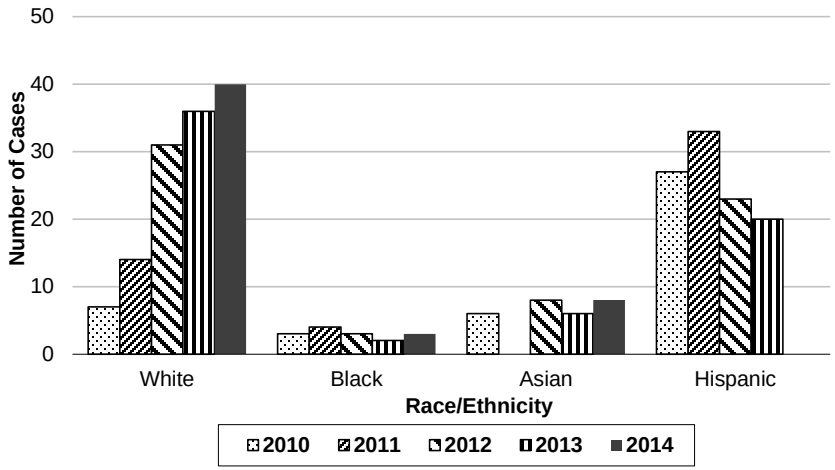
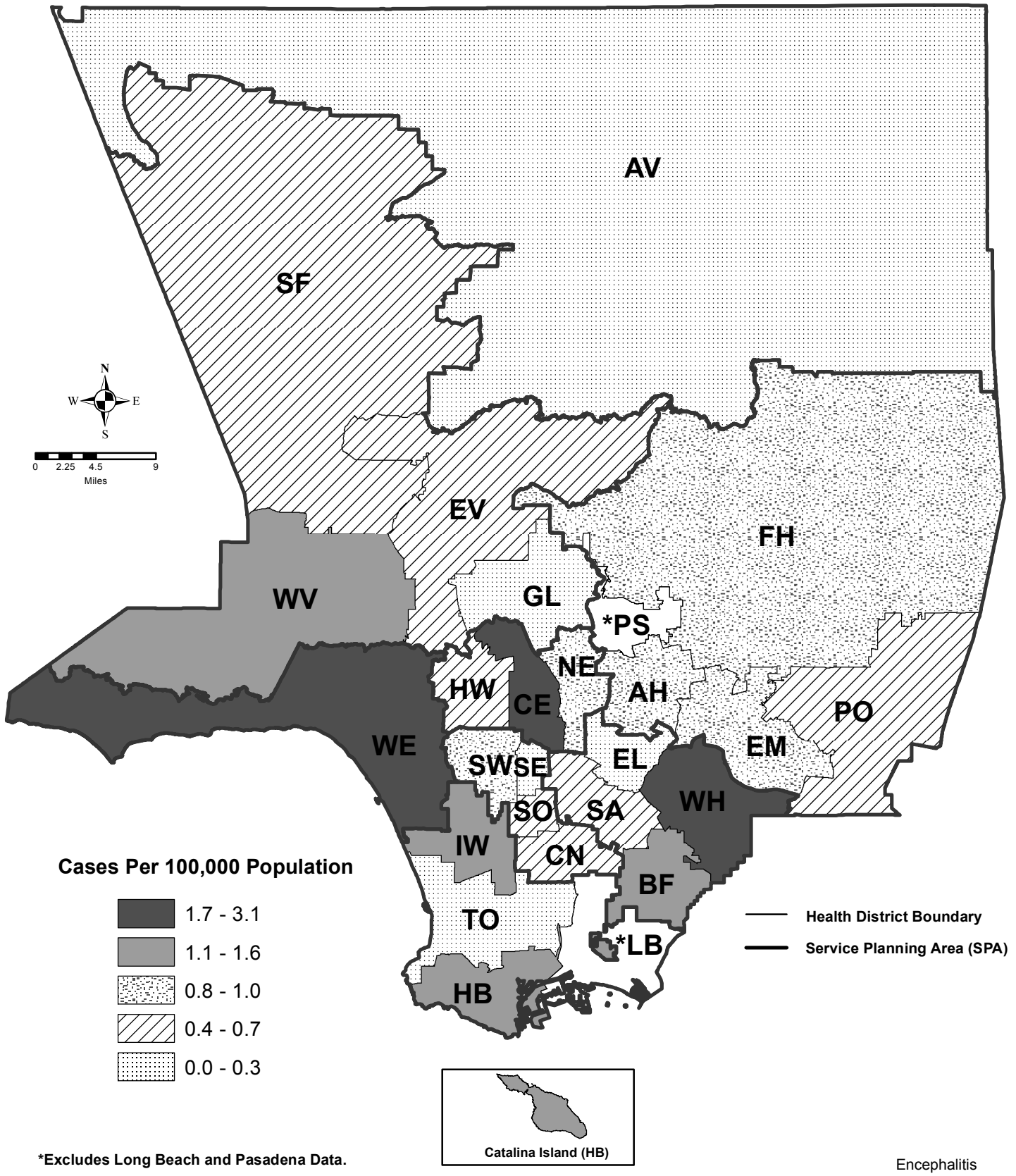


**Figure 5. Reported Encephalitis Cases by Race/Ethnicity
LAC, 2010-2014**



Map 5. Encephalitis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7, Other STEC

CRUDE DATA			
Type	O157:H7	Other Serotypes	All Serotypes
Number of Cases	22	68	90
Annual Incidence[a]			
LA County	0.23	0.72	0.95[c]
California[b]	N/A	N/A	1.82[c]
United States[b]	N/A	N/A	1.94[c]
Age at Diagnosis			
Mean	21	16	17
Median	13	4	6
Range	1-80 years	0-80 years	0-83 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.
[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. Gastrointestinal infection with a shiga toxin-producing *E. coli* (STEC) serotype causes abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. The 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 U.S. is *E. coli* O157:H7, but several other serotypes occur and cause illness. In LAC, 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 LAC Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disorder characterized by hemolytic anemia, kidney failure, and thrombocytopenia. Approximately 5-10% of those diagnosed with an STEC infection will develop HUS. HUS may develop 7 days after the first symptoms, when diarrhea is improving. Clinical symptoms that may be present upon evaluation include decreased frequency of urination, fatigue, and evidence of anemia. 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.

2014 TRENDS AND HIGHLIGHTS

- There was an 83% increase in the frequency of confirmed *E. coli* O157:H7 cases in 2014 compared with 2013. However the 2014 rate was similar to that of 2011 and 2012 (Figure 1).
- The number of confirmed cases of *E. coli* non-O157:H7 (“other serotypes”) infections decreased 24% compared with 2013. Eight different serotypes were identified with serotypes O103, O111, O26 being predominant.
- Cases of infection with "other serotypes" had a younger mean age than O157:H7 cases (16 vs. 21 years). One possible rationale is

that cases with other serotypes are largely Hispanic (72.3%), a group that has historically had less access to health care 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. By contrast, for serotype O157:H7, infections are associated with undercooked ground beef and salads which are less frequently consumed by the Hispanic population which contributes a lower proportion of cases among that serotype.

- For serotype O157:H7, the highest incidence of infection occurred among persons from 1-4 years old (Table 1). Infection with *E. coli* O157:H7 continues to be most often observed among whites (Figures 3, 6). Cases were reported from all SPAs except SPA 5 and 6. (Table 2, Figure 4).
- For all other serotypes of STEC, the highest incidence also was among children aged 1-4 years (Figure 2) and in the Hispanic population (Figures 3, 7).
- No death associated with STEC infection occurred.
- There was one LAC outbreak of O157:H7 in 2014 involving a petting zoo investigated by ACDC. Three cases were identified during the investigation who reported exposure to sheep, goats and other animals. No case reported hospitalization.
- ACDC participated in three multistate cluster investigations assisting with these investigations by administering supplemental questionnaires and reviewing case history forms to identify additional cases. No source was identified among the three clusters.

Table 1. Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2010-2014

	2010 (N=12)			2011 (N=21)			2012 (N=19			2013 (N=12)			2014 (N=22)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	3	25.0	0.6	6	28.5	1.0	3	15.7	0.6	2	16.6	0.4	6	27.2	1.2
5-14	2	16.6	0.2	6	28.5	0.5	5	26.3	0.4	0	0	0	7	31.8	0.6
15-34	5	41.6	0.2	3	14.2	0.1	5	26.3	0.2	7	58.3	0.2	4	18.1	0.1
35-44	0	0	0	2	9.5	0.1	1	5.2	0.1	1	8.3	0.1	3	13.6	0.2
45-54	1	8.3	0.1	0	-	-	1	5.2	0.1	0	0	0	0	-	-
55-64	0	0	0	2	9.5	0.2	1	5.2	0.1	0	0	0	0	-	-
65+	1	8.3	0.1	2	9.5	0.2	3	15.7	0.3	2	16.6	0.2	2	9.0	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	3	25.0	0.2	1	4.7	0.1	5	26.3	0.4	0	0	0	2	9.0	0.1
Black	1	8.3	0.1	1	4.7	0.1	1	5.2	0.1	0	0	0	2	9.0	0..3
Hispanic	2	16.6	--	8	38.0	0.2	1	5.2	0.0	4	33.3	0.1	7	31.8	0.2
White	6	50.0	0.2	11	52.3	0.4	12	63.1	0.5	8	66.6	0.3	11	50.0	0.4
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	1	4.7	0.3	0	-	-	0	-	-	1	4.5	0.3
2	5	41.6	0.2	4	19.0	0.2	4	21.0	0.2	3	25.0	0.1	7	31.8	0.3
3	0	-	-	3	14.2	0.2	1	5.2	0.1	1	8.3	0.1	6	27.2	0.4
4	0	-	-	5	23.8	0.4	3	15.7	0.3	1	8.3	0.1	2	9.0	0.2
5	3	25.0	0.5	1	4.7	0.2	3	15.7	0.5	5	41.6	0.8	0	-	-
6	0	-	-	3	14.2	0.3	1	5.2	0.1	0	-	-	0	-	-
7	2	16.1	0.2	1	4.7	0.1	4	21.0	0.3	1	8.3	0.1	2	9.0	0.2
8	2	16.1	0.2	3	14.2	0.2	3	15.7	0.3	1	8.3	0.1	4	18.1	0.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

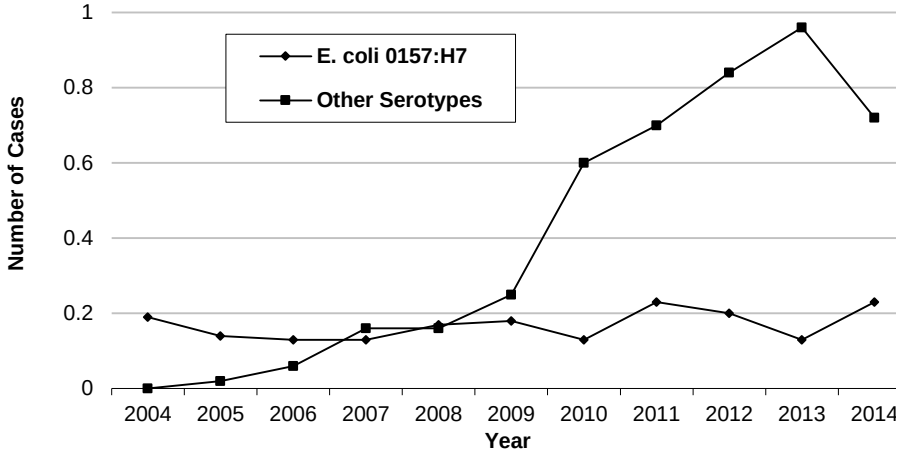
*Rates calculated based on less than 19 cases or events are considered unreliable

Table 2. Reported *Escherichia coli* Non O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA Los Angeles County, 2010-2014

	2010 (N=45)			2011 (N=67)			2012 (N=78)			2013 (N=90)			2014 (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	4	8.8	3.3	8	11.9	5.7	6	7.6	5.0	5	5.5	4.1	1	1.4	0.8
1-4	23	51.1	4.7	30	44.7	5.2	39	50.0	8.2	41	45.5	8.4	36	52.9	7.4
5-14	2	4.4	0.2	8	11.9	0.6	10	12.8	0.8	17	18.8	1.4	10	14.7	0.8
15-34	8	17.8	0.3	12	17.9	0.4	11	14.1	0.4	17	18.8	0.6	6	8.8	0.2
35-44	1	2.2	0.1	2	2.9	0.1	3	3.8	0.2	3	3.3	0.2	1	1.4	0.1
45-54	6	13.3	0.5	0	0	0	4	5.1	0.3	3	3.3	0.2	8	11.7	0.6
55-64	1	2.2	0.1	3	4.4	0.3	5	6.4	0.5	1	1.1	0.1	4	5.8	0.4
65+	0	-	-	4	5.9	0.4	0	-	-	3	3.3	0.3	2	2.9	0.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	2.2	0.1	5	7.4	0.4	1	1.2	0.1	2	2.2	0.1	3	4.4	0.2
Black	2	4.4	0.3	2	2.9	0.2	3	3.8	0.4	5	5.5	0.6	1	1.4	0.1
Hispanic	31	68.8	0.7	42	62.6	0.9	49	62.8	1.1	53	58.8	1.2	47	69.1	1.0
White	10	22.2	0.4	17	25.3	0.6	22	28.2	0.8	28	31.1	1.1	14	20.5	0.5
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	1	2.2	0.1	1	1.4	0.1	0	-	-	2	2.2	0.1	3	4.4	0
SPA															
1	1	2.2	0.3	2	2.9	0.5	1	1.2	0.3	5	5.5	1.3	1	1.4	0.3
2	14	31.1	0.7	14	20.8	0.6	23	29.4	1.1	26	28.8	1.2	16	23.5	0.7
3	7	15.5	0.4	8	11.9	0.5	11	14.1	0.7	11	12.2	0.7	14	20.5	0.9
4	6	40.0	0.5	4	5.9	0.3	10	12.8	0.9	10	11.1	0.9	6	8.8	0.5
5	3	6.6	0.5	7	10.4	1.1	5	6.4	0.8	7	7.7	10.1	2	2.9	0.3
6	4	8.8	0.4	8	11.9	0.7	8	10.2	0.8	13	14.4	1.3	7	10.2	0.7
7	6	13.1	0.5	20	29.8	1.5	11	14.1	0.8	12	13.3	0.9	15	22.0	1.1
8	4	8.8	0.4	4	5.9	0.4	3	3.8	0.3	6	6.6	0.6	7	10.2	0.6
Unknown	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, 2004-2014



*Other STEC data not available before 2005

Figure 2. Reported Cases of Shiga Toxin-producing *E. coli*
by Serotype and Age Group
LAC, 2014

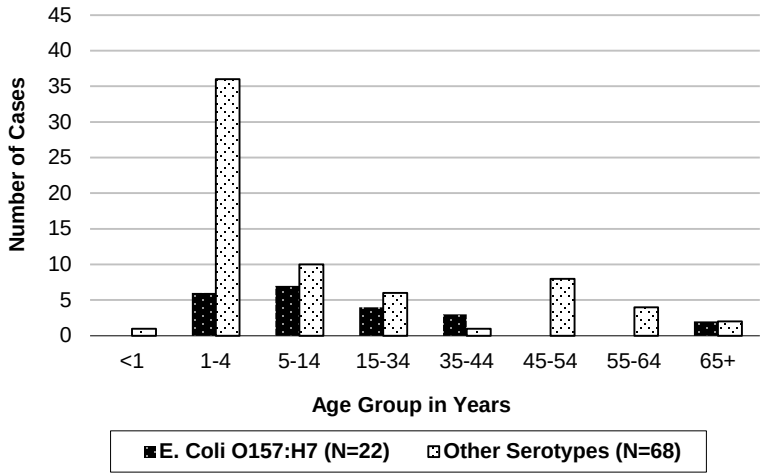


Figure 3. Percent Cases of Shiga Toxin-producing *E. coli*,
by Race/Ethnicity, LAC, 2014

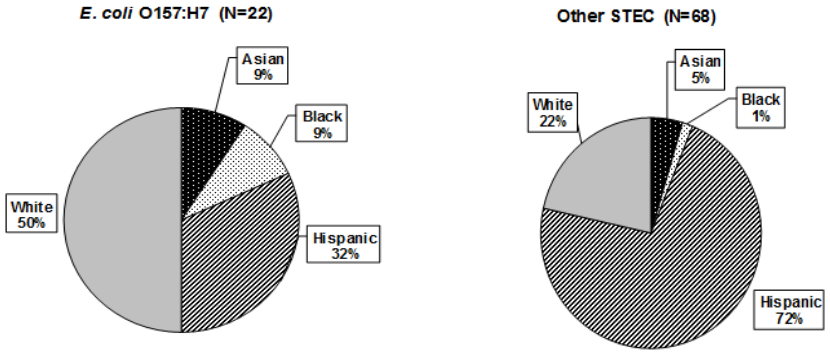


Figure 4. Reported Cases of Shiga Toxin-producing
***E. coli* by Serotype and SPA**
LAC, 2014

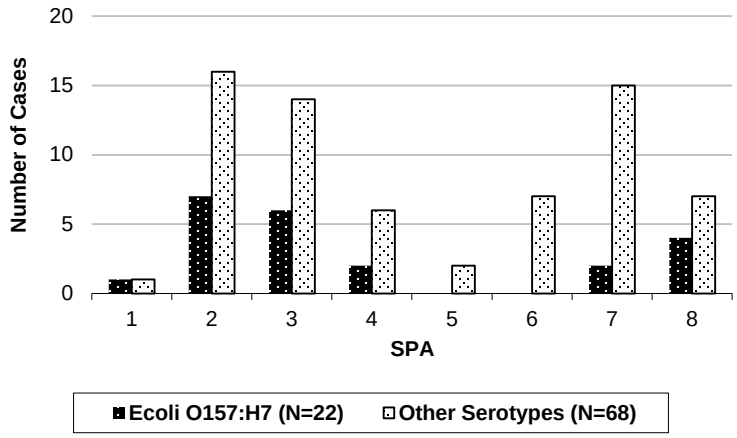


Figure 5. Reported Shiga Toxin-producing *E. coli* Cases by Serotype Month of Onset, LAC, 2014

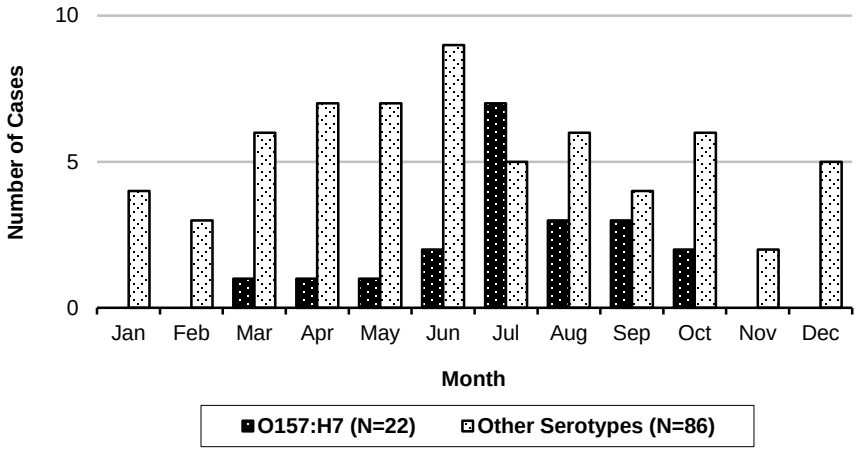


Figure 6. Reported *E. coli* O157:H7 Cases by Race/Ethnicity LAC, 2009-2014

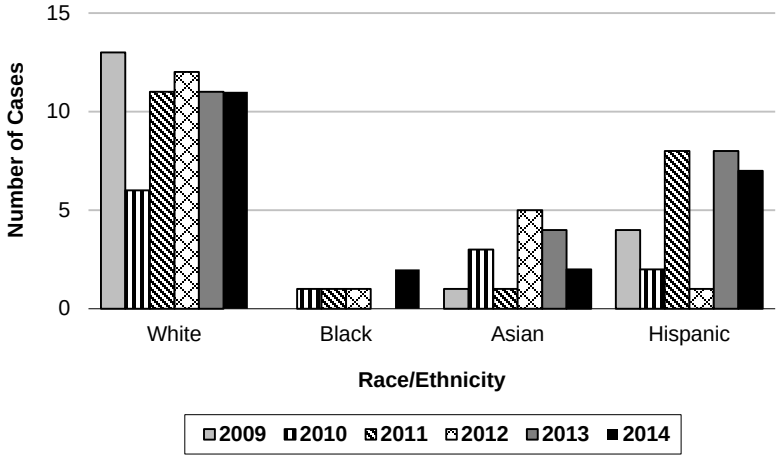
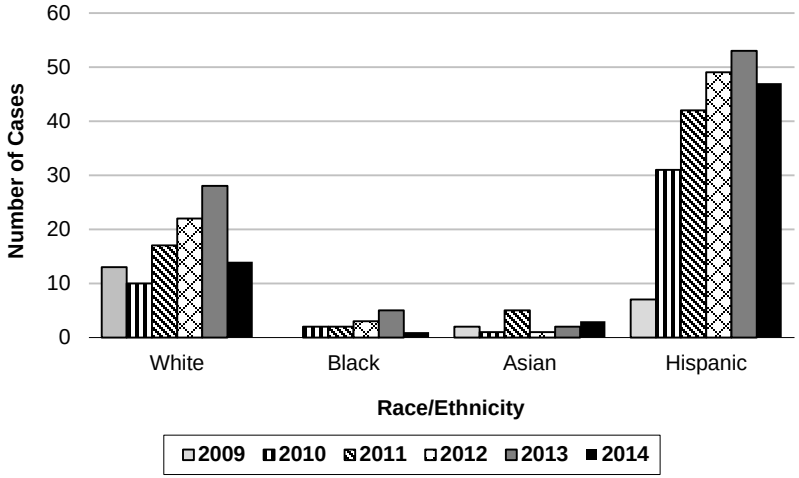
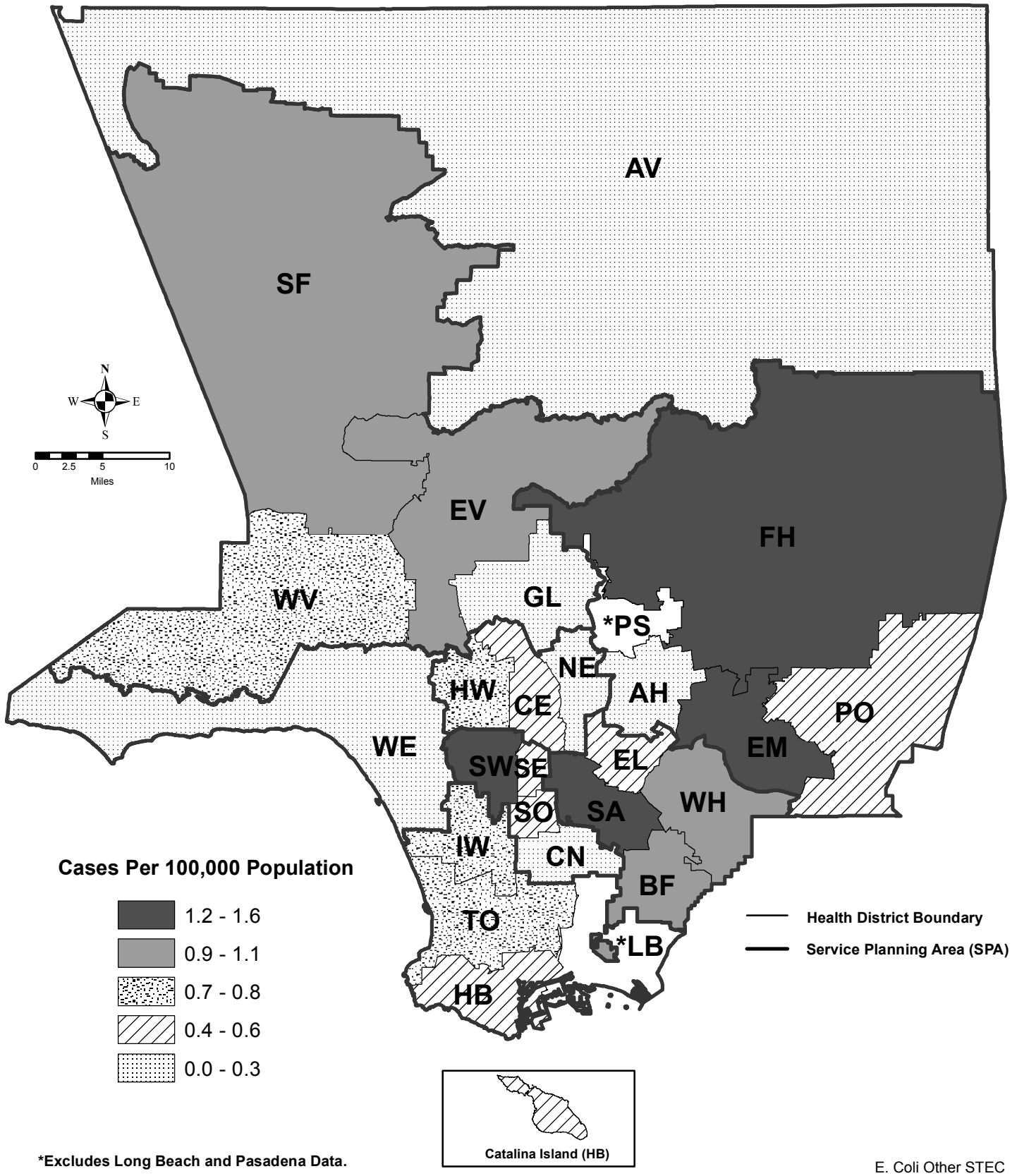


Figure 7. Reported Cases of *E. coli* Non-O157:H7 Serotype by Race/Ethnicity LAC, 2009-2014



Map 6. E. Coli Other Stec
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

GIARDIASIS

CRUDE DATA	
Number of Cases	346
Annual Incidence	
LA County[a]	3.66
California[b]	4.87
United States[b]	4.56
Age at Diagnosis	
Mean	38
Median	38
Range	1–85 yearsp

[a]Cases per 100,000 population.

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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. People should shower before recreational water use and avoid accidental swallowing of recreational water. Persons with diarrhea should avoid swimming in recreational waters in order to prevent transmission to others. Fecal exposure during sexual activity, anal intercourse and oral-anal sexual practices, should also be avoided.

2014 TRENDS AND HIGHLIGHTS

- In 2014, only laboratory confirmed symptomatic Giardia infections continued to be counted as confirmed cases of giardiasis in LAC.
- Giardiasis disease incidence slightly decreased in LAC from 4.2 cases per 100,000 in 2013 to 3.7 cases per 100,000 in 2014 (Figure 1).
- The highest age-specific incidence rate occurred among adults aged 35-44 years with 5.3 cases per 100,000. In 2013, the incidence was highest among 45-54 year olds, and from 2010-12, the highest incidence was among the 1-4 year old age group. (Figure 2, Table).
- Whites continue to have the highest race/ethnicity-specific incidence rates compared to other races (Figure 6). The greatest proportion of cases were reported among whites (50%) and Hispanics (33%) (Figure 3).
- Service Planning Area (SPA) 4 and 5 both reported the highest incidence rate of giardiasis with 7.1 cases per 100,000 in 2014 (Figure 4).
- The number of cases reported in 2014 peaked from August to September which was consistent with the previous 5 year average (Figure 5).
- Males have consistently accounted for a larger proportion of cases. Similarly, in 2014, males accounted for 69% and females 31% of cases. The incidence rate of cryptosporidiosis in males was 5.1 per 100,000, and females was 2.2 cases per 100,000.
- Complete risk factor data were available for all cases. More than one risk factor was identified for many cases. The most frequently reported risk factor was contact with animals (46%), predominantly dogs. Travel to another country was also frequently reported (28%) followed by exposure to recreational waters (25%), and MSM (men who have sex with men) activity (21%). Other reported risk factors were hiking (12%), drinking untreated water (10%), being a recently arrived immigrant or refugee (11%), and consumption of unpasteurized milk, and cheese (4%).

Reported Giardiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=308)			2011 (N=292)			2012 (N=294)			2013 (N=392)			2014 (N=346)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	5	0.2	3.6	1	0.3	0.7	0	-	-	3	0.7	2.5	0	-	-
1-4	41	13.3	7.1	22	7.5	3.8	30	10.2	6.3	20	5.1	4.1	19	5.5	3.9
5-14	37	12	2.8	39	13.7	2.9	29	9.9	2.4	41	10.5	3.4	27	7.8	2.2
15-34	81	26.3	2.7	84	28.7	2.8	86	29.3	3.1	114	29.1	4	96	27.7	3.4
35-44	46	14.9	3.2	49	16.8	3.4	52	17.7	3.9	65	16.6	4.9	70	20.2	5.3
45-54	36	11.7	2.7	44	15	3.3	39	13.3	3	72	18.4	5.6	63	18.2	4.8
55-64	37	12	3.8	29	9.8	3	35	11.9	3.4	51	13	5	42	12.1	4
65+	24	7.8	2.3	23	7.9	2.2	22	7.5	2	26	6.6	2.3	29	8.4	2.6
Unknown	0	-	-	1	0.3	-	1	0.3	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	23	7.5	1.7	20	6.8	1.5	18	6.1	1.4	25	6.4	1.8	24	7.2	1.7
Black	28	9.1	3.3	18	6.2	2.1	17	5.8	2.2	27	6.9	3.5	25	7.2	3.2
Hispanic	90	29.2	1.9	89	30.5	1.9	84	28.6	1.9	124	31.6	2.7	113	32.7	2.5
White	137	44.5	4.8	146	50	5.1	125	42.5	4.7	210	53.6	7.9	175	50.6	6.6
Other	8	27.3	-	2	0.7	-	1	0.3	-	2	0.5	-	3	0.9	-
Unknown	22	7.1	-	17	5.8	-	49	16.3	-	4	1	-	6	1.7	-
SPA															
1	11	3.6	2.9	8	2.7	2.1	5	1.7	1.3	9	2.3	2.3	10	2.9	2.5
2	10	3.2	0.5	102	35	4.6	96	32.7	4.5	95	24.2	4.4	89	25.7	4.1
3	27	8.8	1.6	22	7.5	1.3	27	9.2	1.7	50	12.8	3.1	26	7.5	1.6
4	49	15.9	3.9	47	16.1	3.7	57	19.4	5.1	71	18.1	6.2	82	23.7	7.1
5	31	10	4.7	37	12.7	5.6	39	13.3	6.1	49	12.5	7.6	46	13.3	7.1
6	21	6.8	2	20	6.8	1.9	17	5.8	1.7	39	9.9	3.8	24	7.2	2.3
7	31	10.1	2.3	26	8.9	1.9	25	8.5	1.9	42	10.7	3.2	31	8.9	2.4
8	26	8.4	2.3	28	9.6	2.5	28	9.4	2.6	37	9.5	3.4	38	11	3.5
Unknown	0	-	-	2	0.7	-	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, 2005-2014**

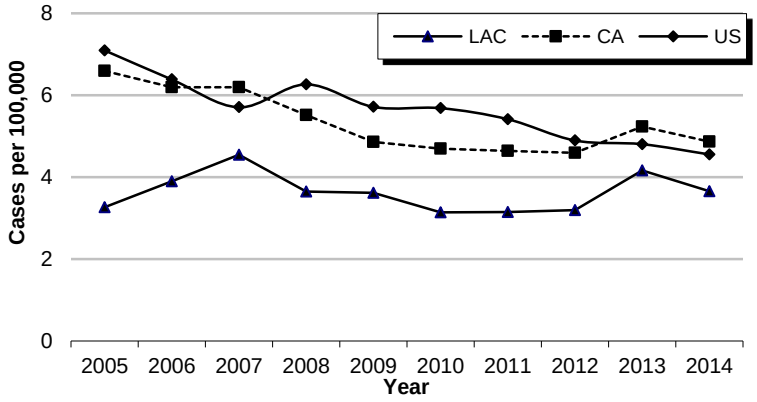


**Figure 2. Incidence Rates of Giardiasis by Age Group
LAC, 2014 (N=346)**

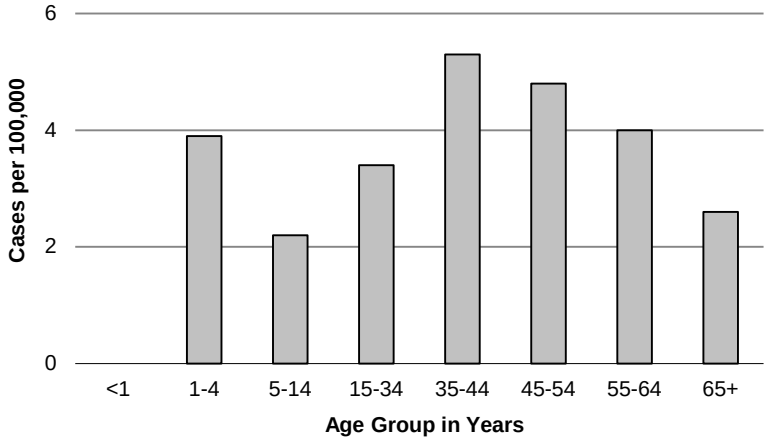
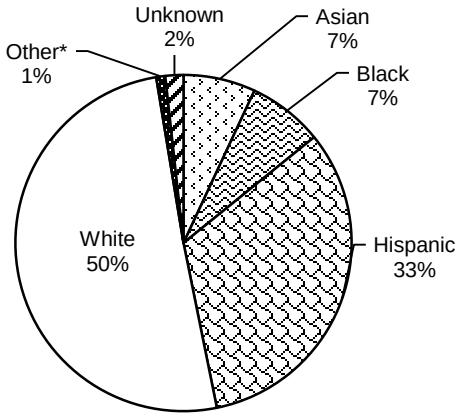


**Figure 3. Percent of Giardiasis Cases by
Race/Ethnicity LAC, 2014 (*N=346)**



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

**Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2014 (N=346)**

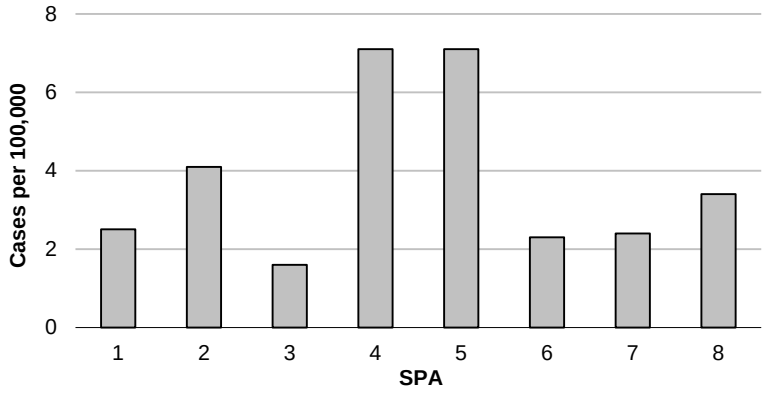


Figure 5. Reported Giardiasis Cases by Month of Onset LAC, 2014 (N=346)

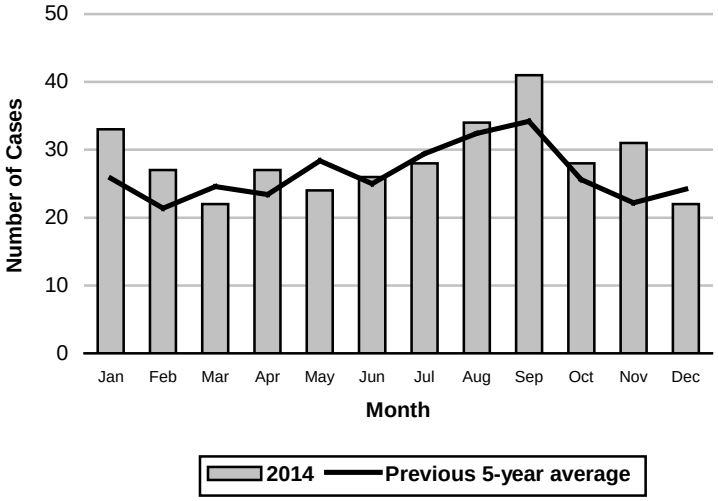
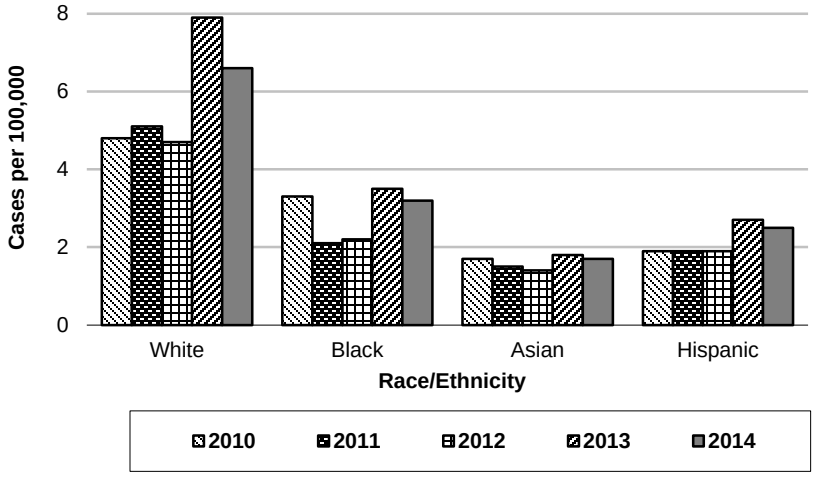
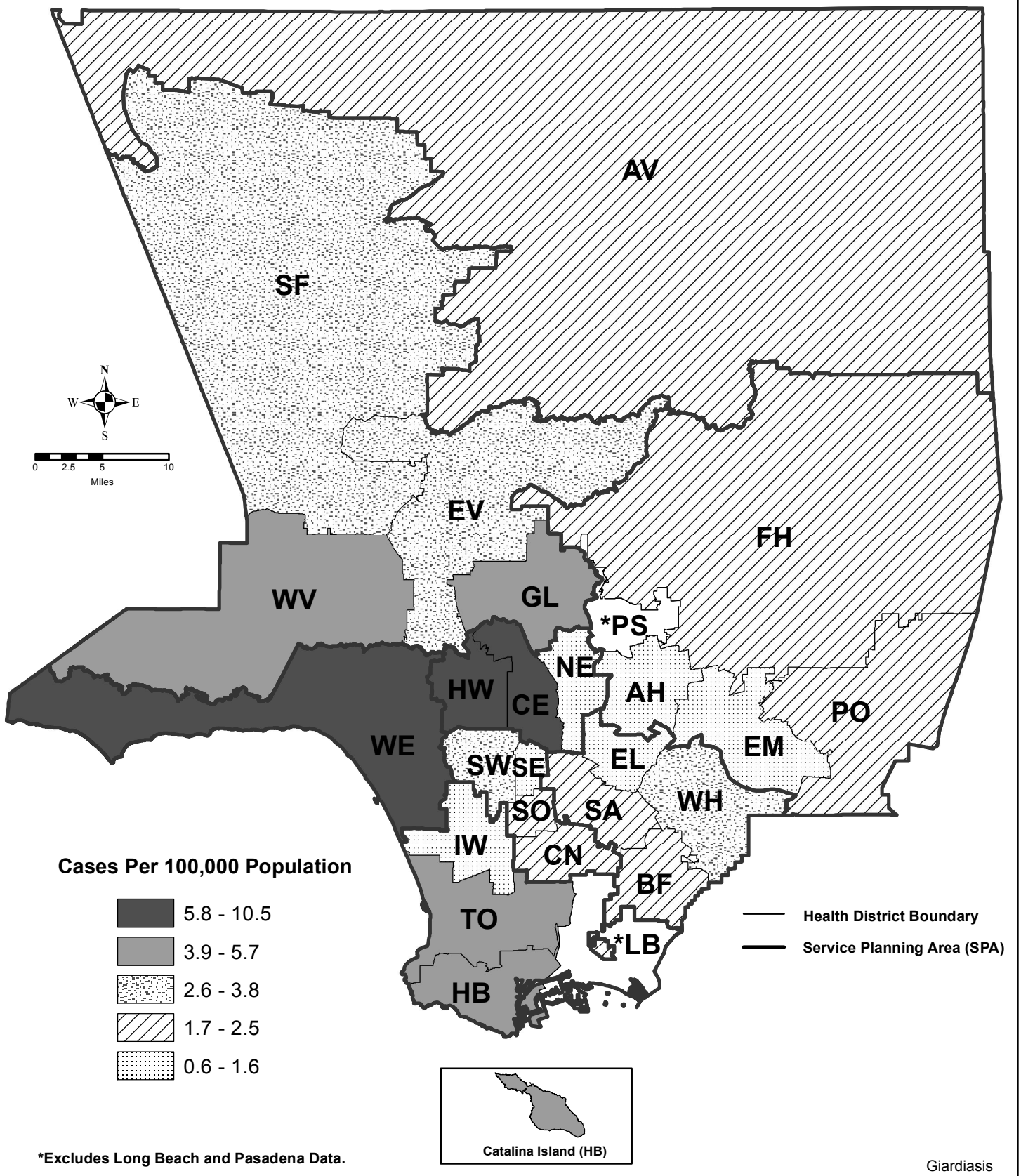


Figure 6. Incidence Rates of Giardiasis by Race/Ethnicity LAC, 2010-2014



Map 7. Giardiasis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	64
Annual Incidence[a]	
LA County <15	0.44
LA County all ages	0.68
California	0.11
United States all ages[b]	0.49
Age at Diagnosis	
Mean	59.9 years
Median	68.0 years
Range	Birth–101 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 persons who are infected or have nasopharyngeal colonization. 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. Prior to the introduction of the Hib conjugate vaccine in 1990, the large majority of invasive disease cases in children were caused by serotype B. Thus, determining the serotype on laboratory isolates 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 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:

- 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.

2014 TRENDS AND HIGHLIGHTS

- For the fifth year in a row, a serotype B case was not identified; thus, none of the *H. influenzae* cases were vaccine-preventable (Figures 6 and 7, and Table 2).
- The LAC annual incidence rate increased for the first time in 5 years. However, the US rate decreased by more than half (Figure 1).
- Since 2009, the highest incidence rates of *H. influenzae* were in the younger than 1 and the 65 years and older age groups (Figure 2).
- The proportion of cases peaked in the first quarter of the year, with the highest proportion occurring in the month of March. This is in contrast to the five years prior to 2014 when the proportion of cases typically increased starting in February and peaked in April (Figure 5).

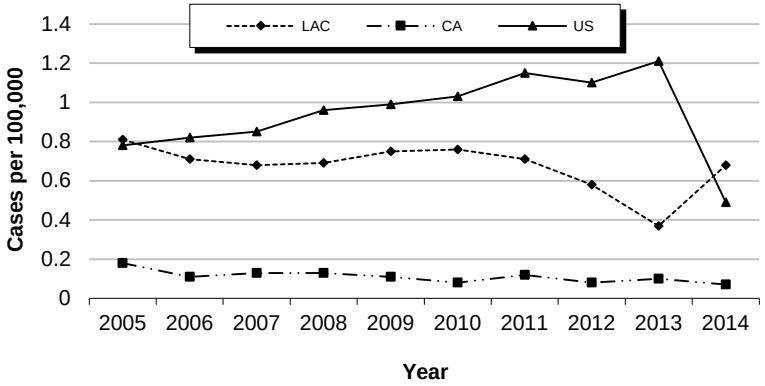
- Reported cases were either non-B or unknown serotypes (Figures 6 and 7, and Table 2). Per protocol, non-type B cases ≥15 years of age are not investigated further. Therefore, serotype testing was not requested on 56 cases and many cases may be missing additional demographic information (Figure 3, 4, and 7).

Reported *H. Influenzae* Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014**

	2010 (N=70)			2011 (N=66)			2012 (N=54)			2013 (N=35)			2014 (N=64)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	9	12.8	7.5	3	4.5	2.5	4	7.4	3.4	7	20.0	5.8	5	7.8	4.2
1-4	3	4.3	0.6	4	6.1	0.8	3	5.6	0.6	4	11.4	0.8	1	1.6	0.2
5-14	4	5.7	0.3	7	10.6	0.6	0	0.0	0.0	1	2.9	0.1	2	3.1	0.2
15-34	3	4.3	0.1	6	9.1	0.2	4	7.4	0.1	5	14.3	0.2	5	7.8	0.2
35-44	6	8.6	0.4	6	9.1	0.5	7	13.0	0.5	1	2.9	0.1	2	3.1	0.2
45-54	9	12.9	0.7	4	6.1	0.3	4	7.4	0.3	1	2.9	0.1	6	9.4	0.5
55-64	8	11.4	0.8	7	10.6	0.7	5	9.3	0.5	3	8.6	0.3	4	6.2	0.4
65+	28	40.0	2.8	29	43.9	2.8	27	50.0	2.4	13	37.1	1.2	38	59.4	3.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	1	1.6	-
Race / Ethnicity															
Asian	0	-	-	3	4.6	0.2	4	7.4	0.3	1	2.9	0.1	3	4.7	0.2
Black	2	2.9	0.3	3	4.6	0.4	3	5.6	0.4	3	8.6	0.4	3	4.7	0.4
Hispanic	15	21.4	0.3	12	18.2	0.3	8	14.8	0.2	5	14.3	0.1	10	15.6	0.2
White	20	28.6	0.8	9	13.6	0.3	10	18.5	0.4	9	25.7	0.3	12	18.7	0.5
Other	0	-	-	0	-	-	0	-	-	0	-	-	16	25.0	-
Unknown	33	47.1	-	39	59.1	-	29	53.7	-	17	48.6	-	20	31.3	-
SPA															
1	0	-	-	0	-	-	2	3.7	0.5	3	8.6	0.8	1	1.6	0.3
2	28	40.0	1.3	20	30.3	0.9	10	18.5	0.5	8	22.9	0.4	8	12.5	0.4
3	5	7.1	0.3	6	9.1	0.4	6	11.1	0.4	5	14.3	0.3	7	10.9	0.4
4	8	11.4	0.7	5	7.6	0.4	8	14.8	0.7	6	17.1	0.5	6	9.4	0.5
5	2	2.9	0.3	5	7.6	0.8	4	7.4	0.6	0	-	-	4	6.2	0.6
6	4	5.7	0.4	4	6.1	0.3	9	16.7	0.9	3	8.6	0.3	7	10.9	0.7
7	6	8.6	0.5	8	12.1	0.5	3	5.6	0.2	5	14.3	0.4	3	4.7	0.2
8	7	10.0	0.7	9	13.6	0.7	8	14.8	0.8	3	8.6	0.3	6	9.4	0.5
Unknown	10	14.3	-	9	13.6	-	4	7.4	-	2	5.7	-	22	34.4	-

*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 LAC 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, 2005-2014*



*The incidence rates for CA only includes cases aged <30 years (2005-2006) and cases aged <15 years (2007-2014). The incidence rates for the US include cases of all ages. The data are not representative of all *H. influenzae* cases in LAC 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, 2014* (N=64)

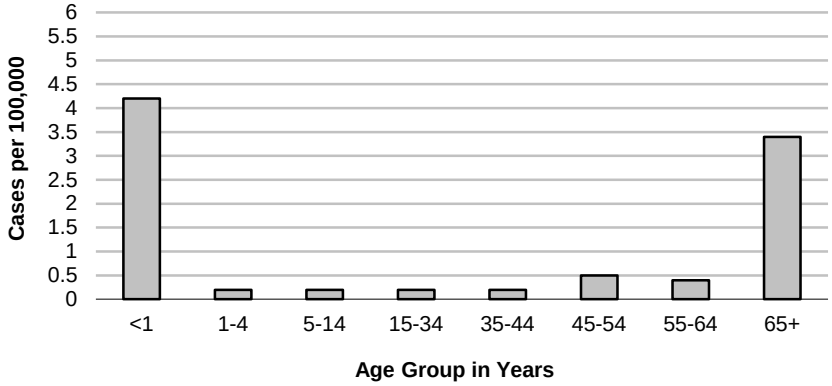


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2014 (N=64)

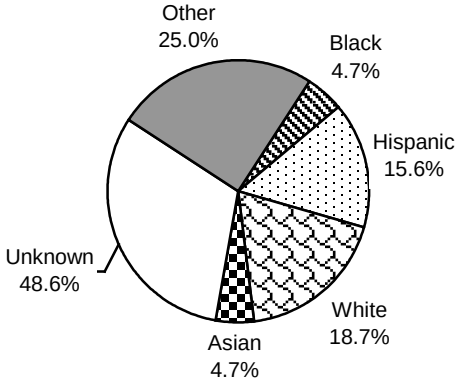
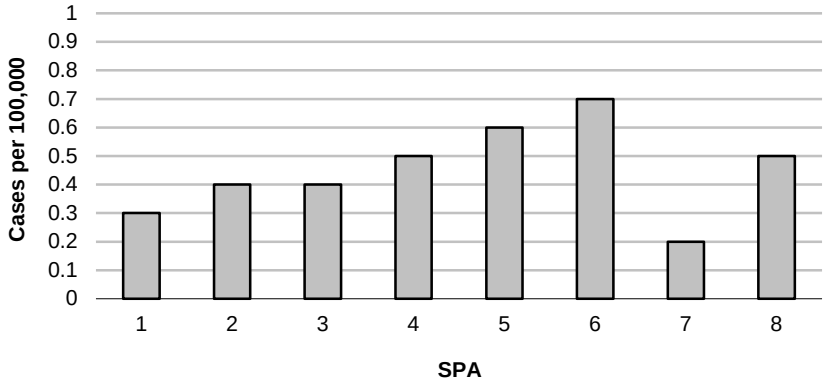


Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2014* (N=64)



* The data are not representative of all *H. influenzae* cases in LAC 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, 2014* (N=64)

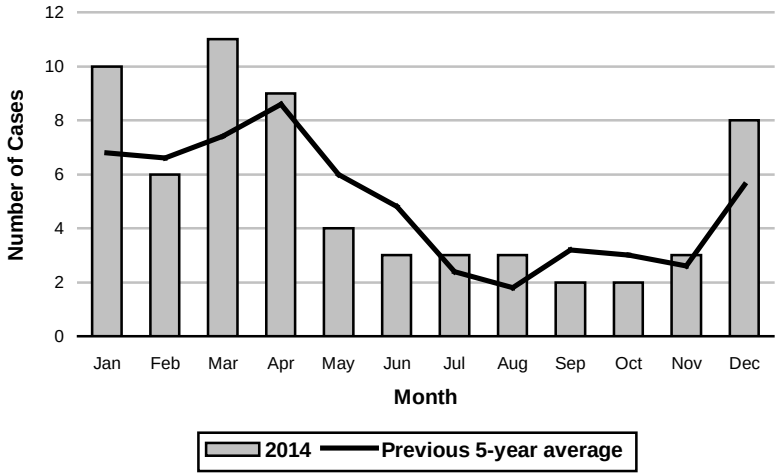


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 2005-2014*

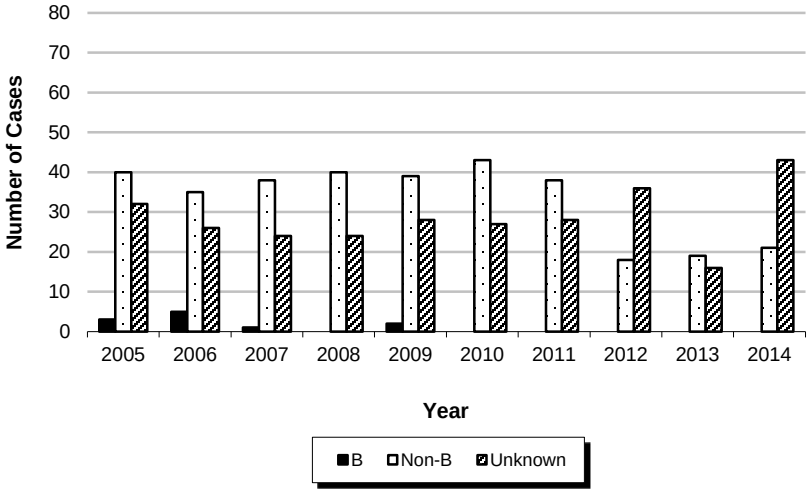
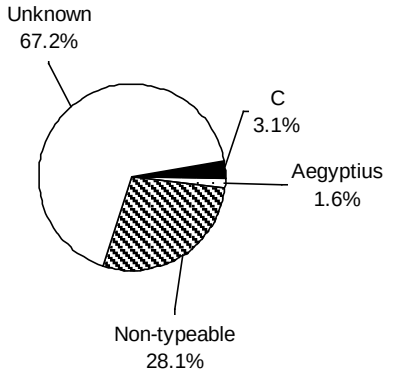


Table 2. Reported H. Influenzae Invasive Disease Cases by Serotype 2014* (N=64) vs. Previous 5-Year Average

	Serotype					
	B		Non-B		Unknown[1]	
	2014	Previous 5-Year Avg.	2014	Previous 5-Year Avg.	2014	Previous 5-Year Avg.
Total Cases	0	0.4	21	31.4	43	27.0
Age at Onset (yrs.)						
- Mean	-	52.5	48.7	40.6	65.2	61.1
- Median	-	52.5	70.5	42.6	68.0	64.1
- Range	-	48–57	<1–92	<1–99	16–101	<1–99
Case Fatality	-	0.0%	4.8%	3.2%	4.7%	4.6%

[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, 2014* (N=64)



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

HEPATITIS A

CRUDE DATA	
Number of Cases	42
Annual Incidence[a]	
LA County	0.44
California[b]	0.37
United States[b]	0.39
Age at Diagnosis	
Mean	43
Median	37
Range	14–86 years

[a]Cases per 100,000 population

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 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 between their first and second birthdays (12 through 23 months of age), anyone 1 year of age and older traveling to or working in countries with high or intermediate prevalence of hepatitis A such as those located in Central or South America, Mexico, Asia (except Japan), Africa, and eastern Europe, children and adolescents 2 through 18 years of age who live in states or communities where routine vaccination has been implemented because of high disease incidence, men who have sex with men, people who use street drugs, people with chronic liver disease, people who are treated with clotting factor concentrates, people who work with HAV-infected primates or who work with HAV in research laboratories, and members of households planning to adopt a child, or care for a newly arriving adopted child from a country where hepatitis A is common.

LAC DPH uses the CDC 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.

2014 TRENDS AND HIGHLIGHTS

- The 2014 incidence rate of acute hepatitis A was lower than 2013, 0.44 per 100,000 versus 0.64 per 100,000, respectively. This decrease was due to a multistate outbreak in 2013 (Figure 1). There were no hepatitis A outbreaks investigated in 2014.
- Similar to 2013, the incidence rate was highest among those between the ages of 55-64 years (0.8 per 100,000) (Figure 2).
- The male-to-female ratio was 1.6:1.
- Similar to previous years, in 2014 the highest incidence rate was seen in Asians (0.8 per 100,000) (Figure 3).
- Three Service Planning Areas (SPAs) had incidence rates greater than the overall county incidence rate of 0.44 per 100,000: SPA 4 (1.0 per 100,000), SPA 1 (0.5 per 100,000), and SPA 2 (0.5 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 2014 were South/Central America and Asia/South Pacific (Figure 4).

- Thirty-three percent of acute hepatitis A cases were hospitalized, and the remainder were managed as outpatients.
- Risk factors were identified in 67% (of the 42 confirmed cases (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=14, 50%) was the most frequently reported risk factor (Figure 5).

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=51)			2011 (N=45)			2012 (N=47)			2013 (N=60)			2014 (N=42)		
	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	2	3.9	0.4	1	2.2	0.2	0	-	-	0	-	-	0	-	-
5-14	3	5.9	0.2	3	6.7	0.2	3	6.4	0.3	2	3.3	0.2	1	2.4	0.1
15-34	27	52.9	1.0	18	40.0	0.6	24	51.0	0.9	22	36.7	0.8	17	40.5	0.6
35-44	6	11.8	0.4	11	24.4	0.8	9	19.1	0.7	12	20.0	0.9	9	21.4	0.7
45-54	3	5.9	0.2	5	11.1	0.4	3	6.4	0.2	8	13.3	0.6	0	-	-
55-64	3	5.9	0.3	3	6.7	0.3	5	10.6	0.5	13	21.7	1.3	8	19.0	0.8
65+	7	13.7	0.7	4	8.9	0.4	3	6.4	0.3	3	5.0	0.3	7	16.7	0.6
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	12	23.5	0.9	13	28.9	1.0	8	17.0	0.6	15	25.0	1.1	11	26.2	0.8
Black	3	5.9	0.4	2	4.4	0.3	0	0	0	1	1.7	0.1	4	9.5	0.5
Hispanic	22	43.1	0.5	8	17.8	0.2	20	42.6	0.4	18	30.0	0.4	14	33.3	0.3
White	14	27.4	0.5	22	48.9	0.8	14	29.8	0.5	26	43.3	1.0	12	28.6	0.5
Other	0	-	-	0	-	-	0	-	-	0	-	-	1	2.4	-
Unknown	0	-	-	0	-	-	5	10.6	-	0	-	-	0	-	-
SPA															
1	3	5.9	0.8	2	4.4	0.5	2	4.3	0.5	3	5.0	0.8	2	4.8	0.5
2	18	35.3	0.8	17	37.8	0.8	17	36.1	0.8	17	28.3	0.8	12	28.6	0.5
3	3	5.9	0.2	10	22.2	0.6	4	8.5	0.2	5	8.3	0.3	5	11.9	0.3
4	9	17.6	0.8	6	13.3	0.5	8	17.0	0.7	8	13.3	0.7	12	28.6	1.0
5	6	11.8	0.9	2	4.4	0.3	4	8.5	0.6	9	15.0	1.4	1	2.4	0.2
6	4	7.8	0.4	3	6.7	0.3	0	0	0	1	1.7	0.1	4	9.5	0.4
7	6	11.8	0.5	1	2.2	0.1	7	14.9	0.5	12	20.0	0.9	3	7.1	0.2
8	1	2.0	0.1	4	8.9	0.4	5	10.6	0.5	5	8.3	0.5	3	7.1	0.3
Unknown	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, 2010- 2014**

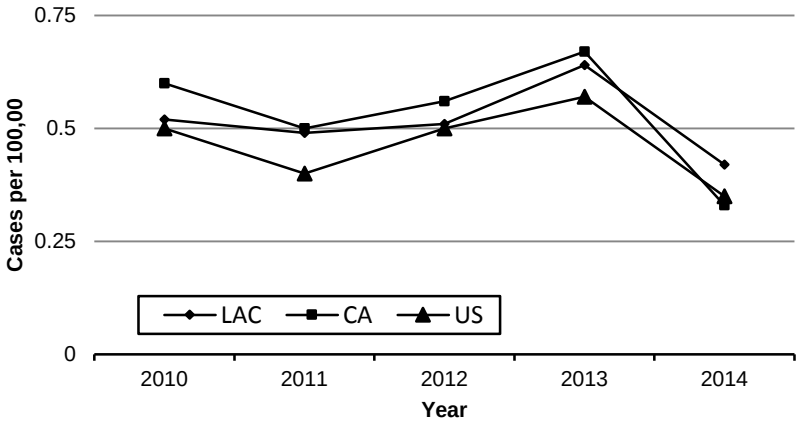


**Figure 2. Incidence Rates* of Hepatitis A by Age Group
LAC, 2012-2014**

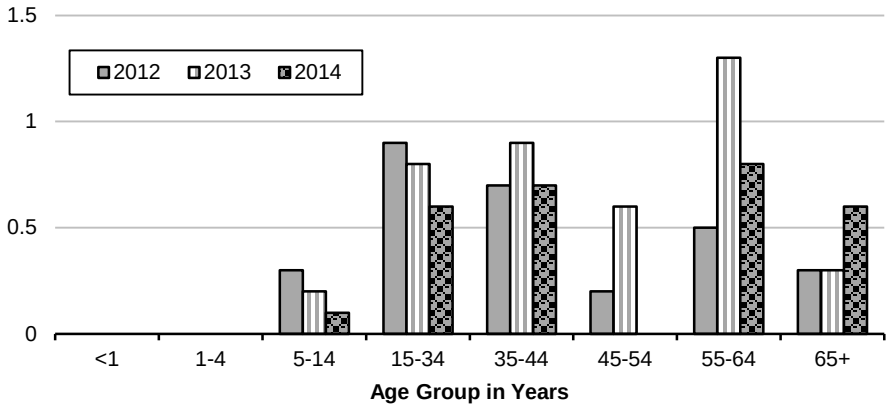


**Figure 3. Hepatitis A Incidence Rates* by Race/Ethnicity
LAC, 2012-2014**

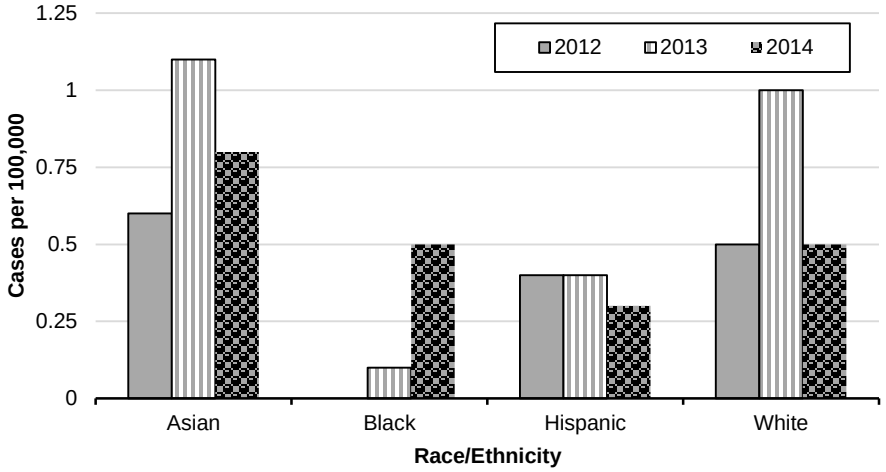
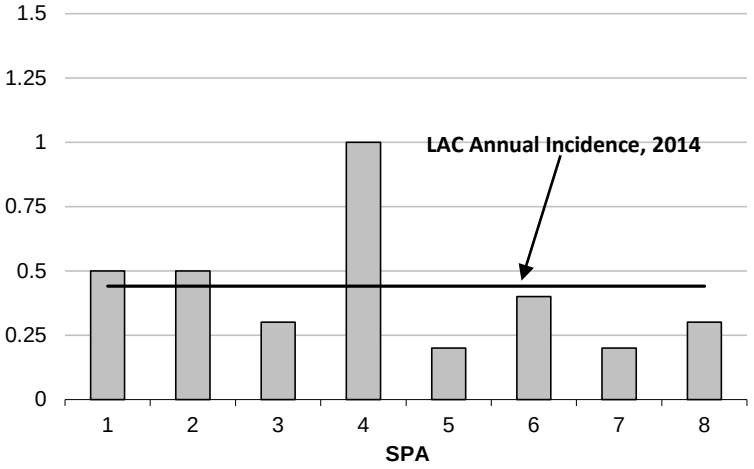
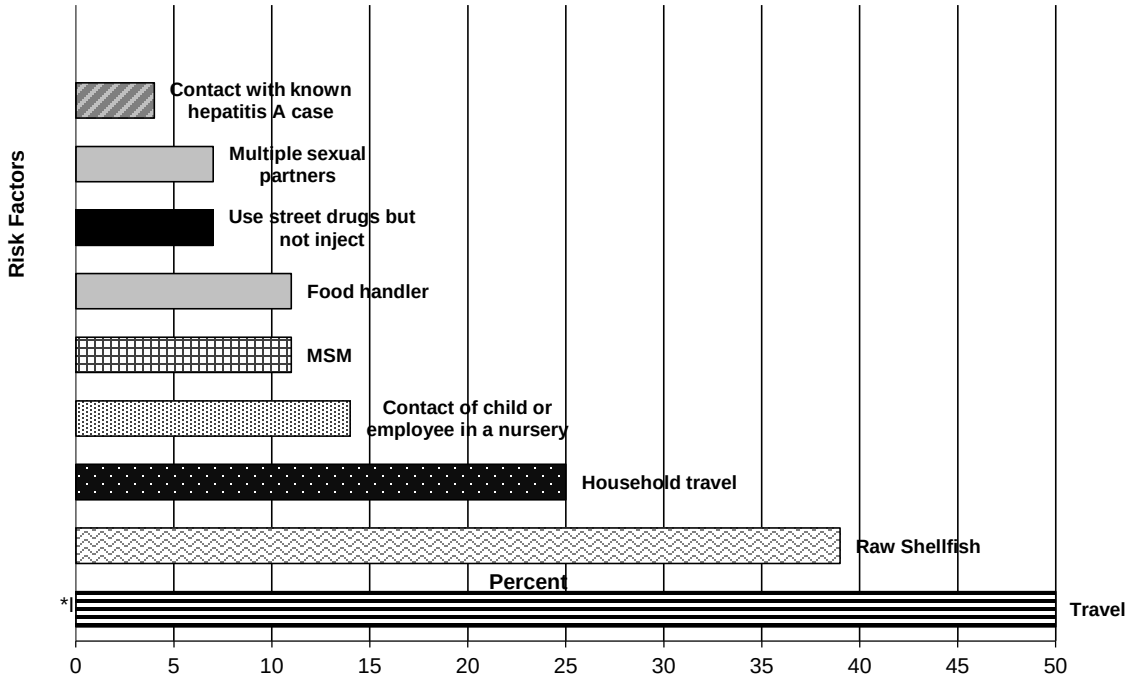


**Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 2014 (N=42)**



* Rates based on fewer than 19 cases are unreliable

Figure 5. Hepatitis A Reported Risk Factors*
LAC, 2014 (N=28)



HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	42
Annual Incidence[a]	
LA County	0.44
California[b]	0.29
United States[b]	0.93
Age at Diagnosis	
Mean	46
Median	44
Range	22–73 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 transmission 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 US; identifying and investigating healthcare associated cases is important to detect outbreaks and implement measures to prevent further cases.

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 the age of 19 years 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), persons with a history of multiple sex partners, injection drug users, persons seeking treatment for sexually transmitted disease; household and sex contacts of persons with chronic HBV infection, 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, the LAC DPH uses the 2012 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.

2014 TRENDS AND HIGHLIGHTS

- The 2014 incidence rate decreased from the previous year (0.44 per 100,000 versus 0.58 per 100,000) (Figure 1).
- Similar to the previous two years, the 2014 incidence rate was highest in persons between the ages of 35-44 years old (1.2 per 100,000, Figure 2).
- The male-to-female ratio was 2.2:1.
- Blacks had the highest incidence rate in 2014 (0.8 per 100,000) which is consistent with previous years (Figure 3).
- Five Service Planning Areas (SPA) had rates greater than the overall county mean rate of 0.44 per 100,000)—SPA 4 (1.0 per 100,000), SPA 6 (0.6 per 100,000), SPA 1 (0.5 per 100,000), SPA 2 (0.5 per 100,000) and SPA 7 (0.5 per 100,000) (Figure 4).
- Risk factors were identified in 67% (n=28) of the 42 confirmed cases (including some cases with multiple risk factors). The most frequently reported risk factor was having multiple sexual partners (n=15, 54%) (Figure 5).
- Two healthcare associated investigations were completed in 2014. During March 2014, two residents of a subacute care facility were reported to ACDC with acute Hepatitis B infection. The investigation identified four acute, two chronic and three resolving cases in the facility. Genotyping of available viruses revealed that four acute cases and one chronic case shared an identical genotype. This finding supported that person-to-person spread or

transmission through one or more common medical procedures had occurred within the facility. ACDC was not able to implicate a definite source of Hepatitis B transmission for this outbreak. For more information about this investigation, see the Special Report section.

- In September 2014, ACDC was notified of a breach in infection control following a hemodialysis session of a patient recently diagnosed with chronic hepatitis B virus (HBV) infection. After inadequate disinfection, the same dialysis machine was used on three consecutive patients without completing a bleaching procedure between patients during dialysis sessions. ACDC conducted an investigation and, although ACDC did not identify additional cases of chronic or newly diagnosed cases of HBV, the ACDC investigation team identified a number of faulty administrative and infection control practices that contributed to this infection control breach and made several recommendation to prevent similar breaches in the future.

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=54)			2011 (N=60)			2012 (N=38)			2013 (N=55)			2014 (N=42)		
	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	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
15-34	18	33.3	0.6	12	20.0	0.4	10	26.3	0.4	20	36.3	0.7	5	11.9	0.2
35-44	13	24.1	1.0	10	16.7	0.8	13	34.2	1.0	15	27.3	1.1	16	38.1	1.2
45-54	11	20.4	0.9	21	35.0	1.6	10	26.3	0.8	12	21.8	0.9	14	33.3	1.1
55-64	7	13.0	0.7	12	20.0	1.2	3	7.9	0.3	5	9.1	0.5	3	7.2	0.3
65+	5	9.2	0.5	5	8.3	0.5	2	5.3	0.2	3	5.4	0.3	4	9.5	0.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	11	20.4	0.8	3	5.0	0.2	1	2.6	0.1	6	10.9	0.4	3	7.1	0.2
Black	14	25.9	1.8	13	21.7	1.7	5	13.2	0.6	12	21.8	1.5	6	14.3	0.8
Hispanic	14	25.9	0.3	19	31.7	0.4	13	34.2	0.3	21	38.2	0.5	20	47.6	0.4
White	14	25.9	0.5	23	38.3	0.9	14	36.8	0.5	15	27.3	0.6	10	23.8	0.4
Other	1	1.8	-	0	-	-	0	-	-	0	-	-	1	2.4	-
Unknown	0	-	-	2	3.3	-	5	13.2	-	1	1.8	-	2	4.8	-
SPA															
1	2	3.7	0.5	0	0	0.0	2	5.3	0.5	1	1.8	0.3	2	4.8	0.5
2	5	9.3	0.2	13	21.7	0.6	5	13.2	0.2	9	16.4	0.4	12	28.5	0.5
3	10	18.5	0.6	8	13.3	0.5	8	21.0	0.5	9	16.4	0.6	1	2.4	0.1
4	8	14.8	0.7	15	25.0	1.3	9	23.7	0.8	9	16.4	0.8	11	26.2	1.0
5	4	7.4	0.6	1	1.7	0.2	3	7.9	0.5	7	12.7	1.1	1	2.4	0.2
6	8	14.8	0.8	10	16.7	1.0	2	5.3	0.2	10	18.1	1.0	6	14.3	0.6
7	7	13.0	0.5	3	5.0	0.2	6	15.8	0.5	6	10.9	0.5	6	14.3	0.5
8	10	18.5	0.9	8	13.3	0.8	3	7.9	0.3	2	3.6	0.2	3	7.1	0.3
Unknown	0	-	-	2	3.3	-	0	-	-	2	3.6	-	0	-	-

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

**Figure 1. Incidence Rate of Acute Hepatitis B
LAC, CA and US, 2010-2014**

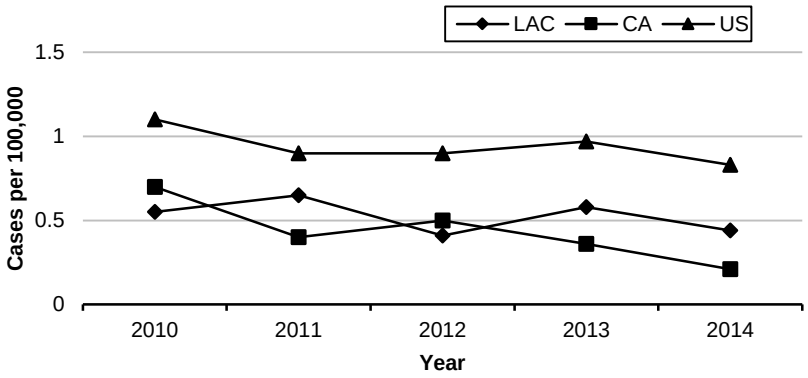
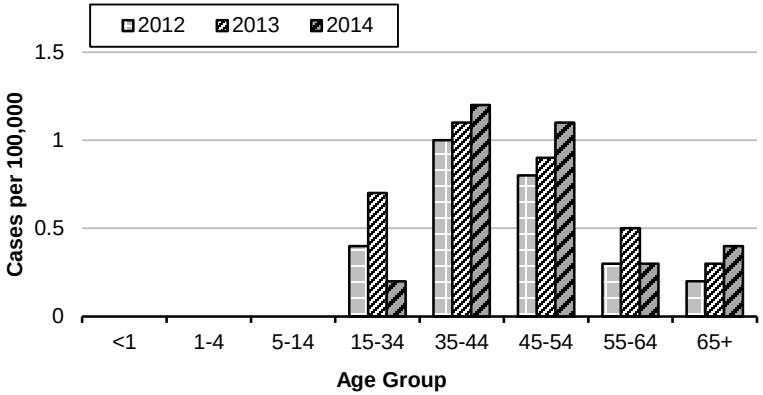
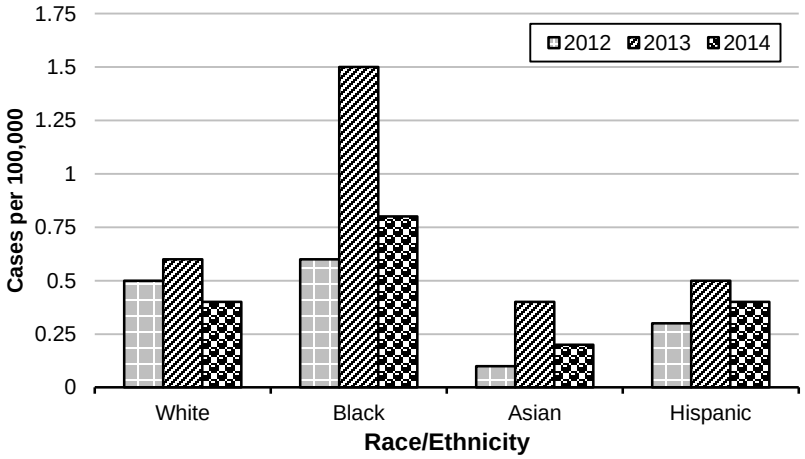


**Figure 2. Incidence Rates* of Acute Hepatitis B by Age Group
LAC, 2012-2014**



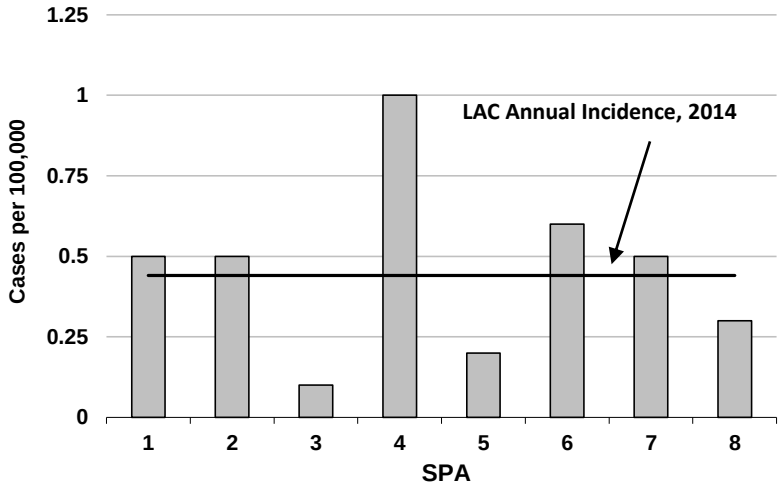
* Rates based on fewer than 19 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence Rates* by Race/Ethnicity
LAC, 2012-2014**



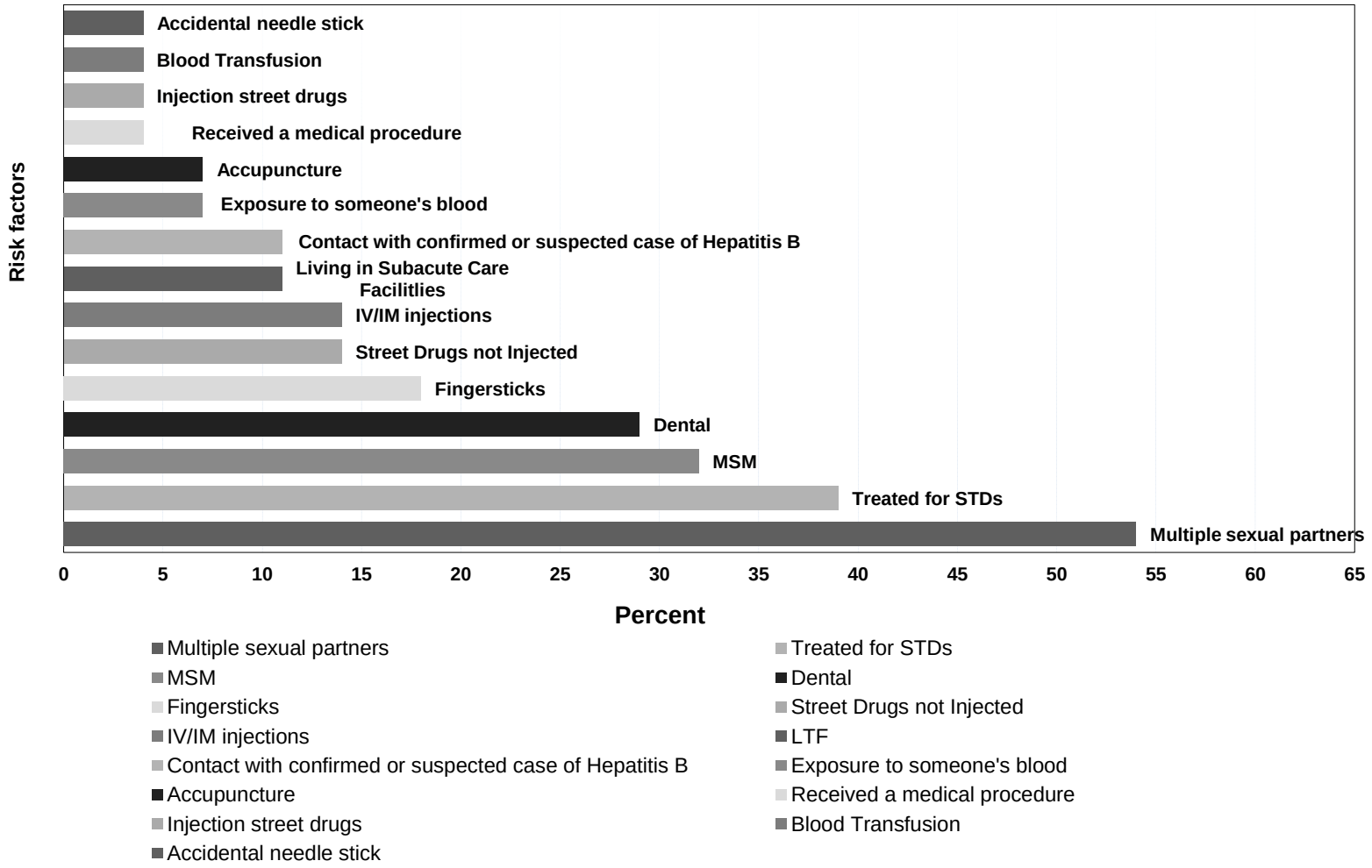
* Rates based on fewer than 19 cases are unreliable

**Figure 4. Incidence Rates* of Hepatitis B by SPA
LAC, 2014 (N=42)**



* Rates based on fewer than 19 cases are unreliable

Figure 5. Hepatitis B Reported Risk Factors*
LAC, 2014 (n=28)



*Includes cases with multiple risk factors

HEPATITIS B, PERINATAL

CRUDE DATA	
HBsAg+ Mothers	938
Maternal Age at Diagnosis	36 years
Infants Born to HBsAg+ Mothers	967
Incidence of Exposure[a]	7.1
HBsAg+ Infant[b]	1
Infant Age at Diagnosis	10 months

[a]Number of infants born to HBsAg-positive mothers per 1000 live births in 2014.
[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 delivery. In LAC, it is estimated that over 40% of infants born to hepatitis B surface antigen (HBsAg) positive women will become infected without prophylaxis. An estimated 90% of infants who become infected by perinatal transmission develop chronic HBV infection and up to 25% will die from chronic liver disease as adults. Post-exposure prophylaxis (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. 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).

2014 TRENDS AND HIGHLIGHTS

- The incidence of exposure increased by 6% from 6.7 to 7.1 per 1000 infants born in 2014 compared to 2013. The increase is due to increased compliance with testing and reporting (Figure 1).
- Sixty-three percent of women screened for HBsAg were 15-34 years of age (Table 1).
- Eighty-seven percent (n=819) of HBsAg+ women were born outside of the US.
- Eighty-six percent of HBsAg+ women were Asian followed by 5.5% Hispanic, 2.9% black, 2.9% white, 1.9% other and 0.5% unknown (Figures 2 and 3).
- Approximately sixty-eight percent of the HBsAg+ women reside in Service Planning Area (SPA) 3, which has a large Asian population (Figure 4).
- Ninety-five percent of infants received the first dose of Hepatitis B vaccine and HBIG within 12 hours of birth (Figure 5).

- Nearly nine percent (n=83) of infants born to HBsAg+ women received post-vaccination serology (PVS) testing to determine immunity to hepatitis B after receipt of one dose of HBIG and completion of the three dose hepatitis B vaccination series. Infants born in the later part of 2014 are too young for PVS testing. One infant was HBsAg+, indicating infection (Figure 6).

Table 1: Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Maternal Age Group, Race/Ethnicity, and SPA Los Angeles County, 2010-2014

	2010 (N=653)			2011 (N=700)			2012 (N=854)			2013 (N=891)			2014 (N=938)		
	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	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
15-34	448	68.6	15.2	476	68	16.1	589	69.0	20.0	544	61.1	19.2	590	62.9	20.9
35-44	204	31.2	14.2	219	31.3	15.2	263	31.0	18.3	339	38.0	25.4	309	32.9	23.4
45-54	0	-	-	2	0.3	0.1	1	0.1	0.1	8	0.9	0.6	5	0.5	0.4
55-64	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
65+	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	1	0.2	-	3	0.4	-	1	0.1	-	0	-	-	34	3.6	-
Race/Ethnicity															
Asian	491	75.2	37.4	555	79.3	42.3	678	79.0	51.7	712	79.9	52.7	809	86.2	59.6
Black	22	3.4	2.6	25	3.6	2.9	30	4.0	3.5	33	3.6	4.1	27	2.9	3.4
Hispanic	50	7.7	1.1	55	7.9	1.2	46	5.0	1.0	44	4.9	1.0	52	5.5	1.1
White	38	5.8	1.3	33	4.7	1.2	41	5.0	1.4	24	2.7	0.9	27	2.9	1.0
Other	19	2.9	40.4	13	1.9	34.9	20	2.3	82.4	28	2.7	15.5	18	1.9	-
Unknown	33	5.1	-	19	2.7	-	39	5.0	-	51	5.7	-	5	0.5	-
SPA															
1	9	1.4	2.4	10	1.4	2.7	15	1.8	4.0	8	0.9	2.0	12	1.3	3.1
2	85	13	3.8	78	11.1	3.5	93	10.9	4.2	76	8.5	3.5	83	8.8	3.8
3	329	50.4	19.0	369	52.7	21.3	491	57.5	28.3	580	65.1	35.5	642	68.4	39.1
4	83	12.7	6.6	74	10.6	5.9	82	9.6	6.5	64	7.2	5.6	60	6.4	5.2
5	19	2.9	2.9	30	4.3	4.5	34	4.0	5.2	36	4.0	5.6	35	3.7	5.4
6	19	2.9	1.8	29	4.1	2.7	24	2.8	2.2	19	2.1	1.8	21	2.2	2.0
7	42	6.4	3.0	46	6.6	3.3	34	4.0	2.5	47	5.3	3.6	39	4.2	3.0
8	58	8.9	5.2	47	6.7	4.2	69	8.1	6.1	60	6.7	5.6	42	4.5	3.9
Unknown	9	1.4	-	17	2.4	-	12	1.4	-	1	0.1	-	4	0.4	-

*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, 2004-2014**

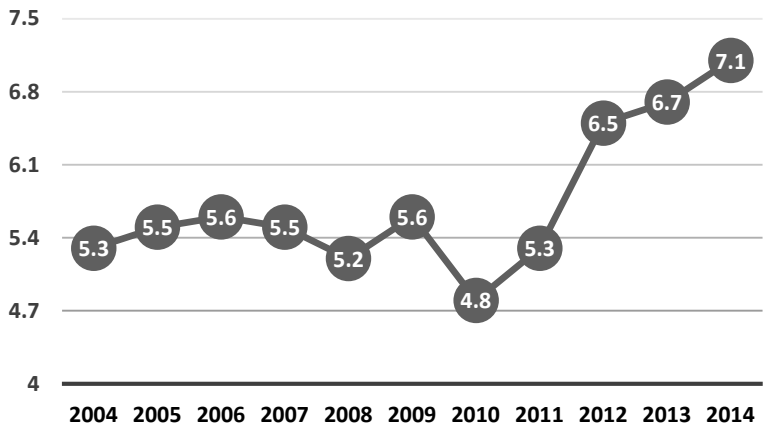
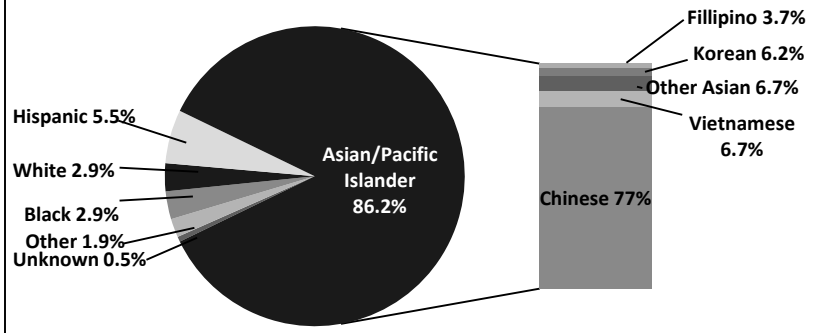


**Figure 2. Perinatal Hepatitis B, Maternal Race/Ethnicity
LAC, 2014 (N=938)**



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. Percentages may not add up to 100 due to rounding.

**Figure 3. Perinatal Hepatitis B, Maternal Race/Ethnicity
LAC, 2010-2014**

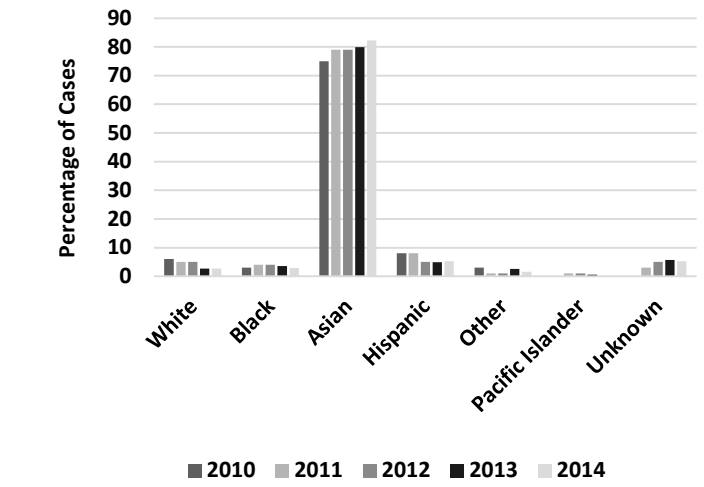


**Figure 4. Perinatal Hepatitis B, Maternal HBsAg+ by SPA
LAC, 2014 (N=938)**

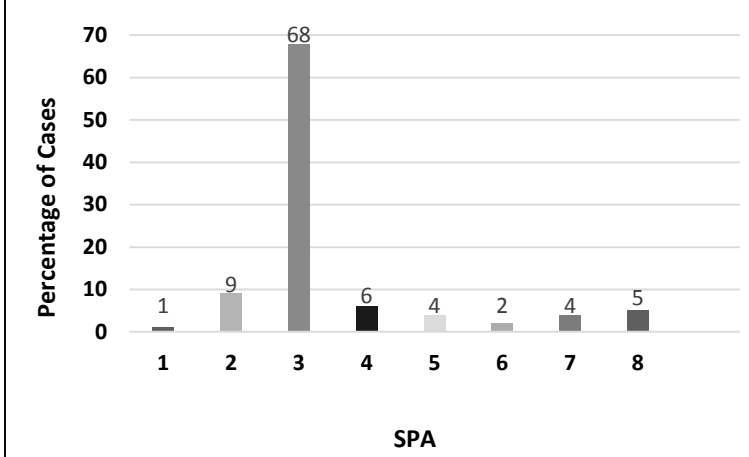
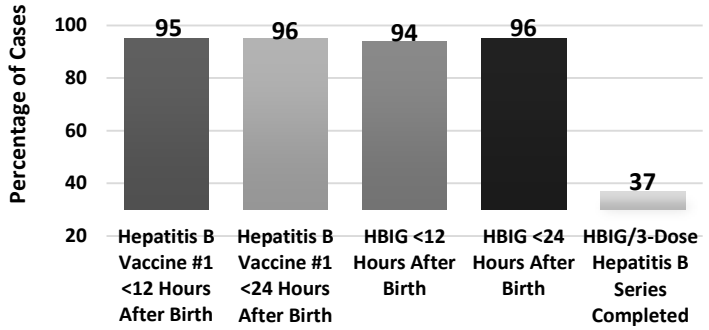
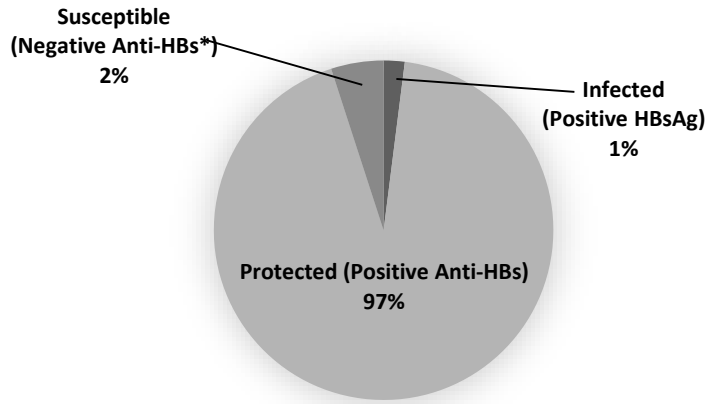


Figure 5. Perinatal Hepatitis B, Infant Hepatitis B Immunoprophylaxis LAC, 2014 (N=967)



Note: As of the date of this report, many infants born in the later part of 2014 are not due to receive the 3rd dose hepatitis B vaccine.

Figure 6. Perinatal Hepatitis B, Infant Post Vaccination Serology (PVS) Results LAC, 2014 (N=105)



***Antibody to Hepatitis B Surface Antigen**
Note: As of the date of this report, many infants born in the later part of 2014 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.

HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	5
Annual Incidence	
LA County	0.05[a]
California[b]	0.19
United States[b]	0.69
Age at Diagnosis	
Mean	36
Median	37
Range	22–51 years

[a]Rates calculated based on less than 19 cases or events are considered unreliable.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

DESCRIPTION

Hepatitis C virus (HCV) is a RNA-virus primarily transmitted through 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, a 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. Long term 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 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. Screening and testing of blood donors and persons born during 1945 through 1965 is recommended to identify persons with chronic infection so they can modify their behaviors to decrease progression of disease or receive treatment. 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, LAC DPH 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; 2) jaundice or alanine aminotransferase (ALT) levels >400IU/L; 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; and 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).

2014 TRENDS AND HIGHLIGHTS

- In 2014, only 5 cases were reported that met the definition for acute hepatitis C. This is consistent with the previous four years when an average of 6.5 cases was reported. This reflects substantial underreporting of incident cases.
- Of the five reported cases in 2014, two each occurred in the 15-34 and 35-44 year old age groups (Figure 2) and two each were white and Hispanic (Figure 3).
- The male to female ratio was 1:4.
- There were no healthcare associated investigations of Hepatitis C in 2014.
- Risk factors were identified in all of the five confirmed cases (including some having multiple risk factors). Sexual contact with a suspected case (n=3) was the most common risk factor reported followed by exposure to someone's blood (n=2), using injection street drugs (n=2), having multiple sexual partners

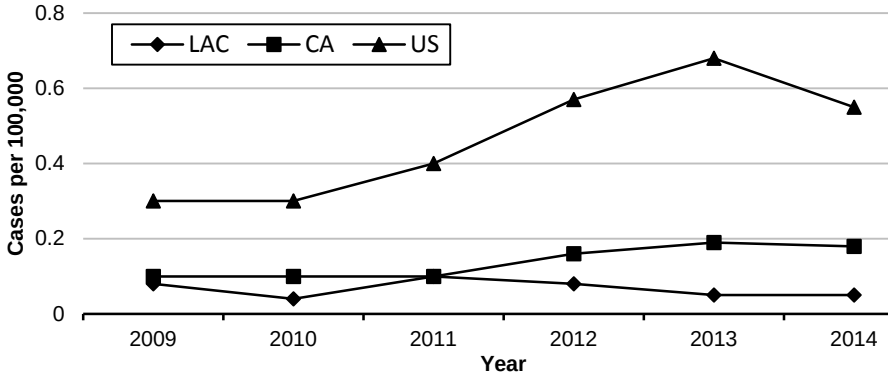
(n=2), and other exposures (n = 1 each) (Figure 4).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=4)			2011 (N=10)			2012 (N=7)			2013 (N=5)			2014 (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	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
15-34	1	25.0	-	4	40.0	0.1	4	57.1	0.1	2	40	0.1	2	40	0.1
35-44	2	50.0	0.1	2	20.0	0.1	1	14.3	0.1	1	20	0.1	2	40	0.2
45-54	1	25.0	0.1	1	10.0	0.1	2	28.6	0.2	1	20	0.1	1	20	0.1
55-64	0	-	-	1	10.0	0.1	0	-	-	1	20	0.1	0	-	-
65+	0	-	-	2	20.0	0.2	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	0	-	-	1	10.0	0.1	0	-	-	0	-	-	1	20	0.1
Black	0	-	-	0	-	-	1	14.3	0.1	0	-	-	0	-	-
Hispanic	1	25.0	-	6	60.0	0.1	3	42.9	0.1	1	20	-	2	40	-
White	3	75.0	0.1	2	20.0	0.1	2	28.6	0.1	4	80	0.2	2	40	0.1
Other	0	-	-	0	-	-	1	14.3	-	0	-	-	0	-	-
Unknown	0	-	-	1	10.0	0.1	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	0	-	-	2	28.6	0.5	0	-	-	0	-	-
2	3	75.0	0.1	1	10.0	-	1	14.3	0.0	1	20	-	3	60	0.1
3	0	-	-	2	20.0	0.1	0	-	-	1	20	0.1	2	40	0.1
4	0	-	-	3	30.0	0.2	1	14.3	0.1	0	-	-	0	-	-
5	0	-	-	1	10.0	0.2	1	14.3	0.2	1	20	0.2	0	-	-
6	0	-	-	0	-	-	1	14.3	0.1	0	-	-	0	-	-
7	0	-	-	2	20.0	0.1	0	-	-	1	20	0.1	0	-	-
8	1	25.0	0.1	1	10.0	0.1	1	14.3	0.1	1	20	0.1	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

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

Figure 1. Incidence Rates* of Acute Hepatitis C
LAC, CA and USA , 2009-2014



*Rates based on fewer than 19 cases are unreliable

Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2012-2014

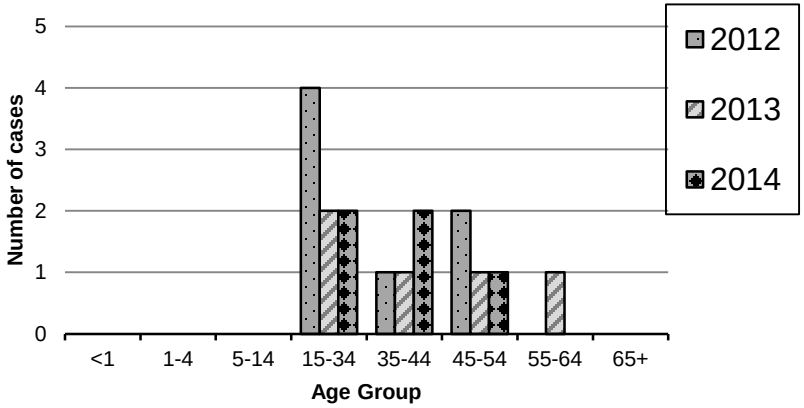


Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2014 (N=5)

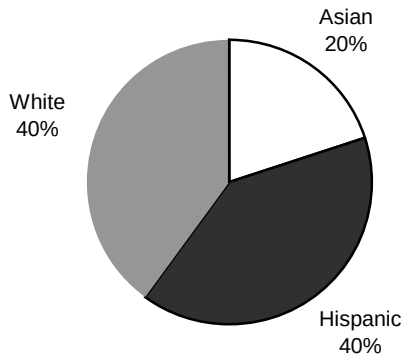
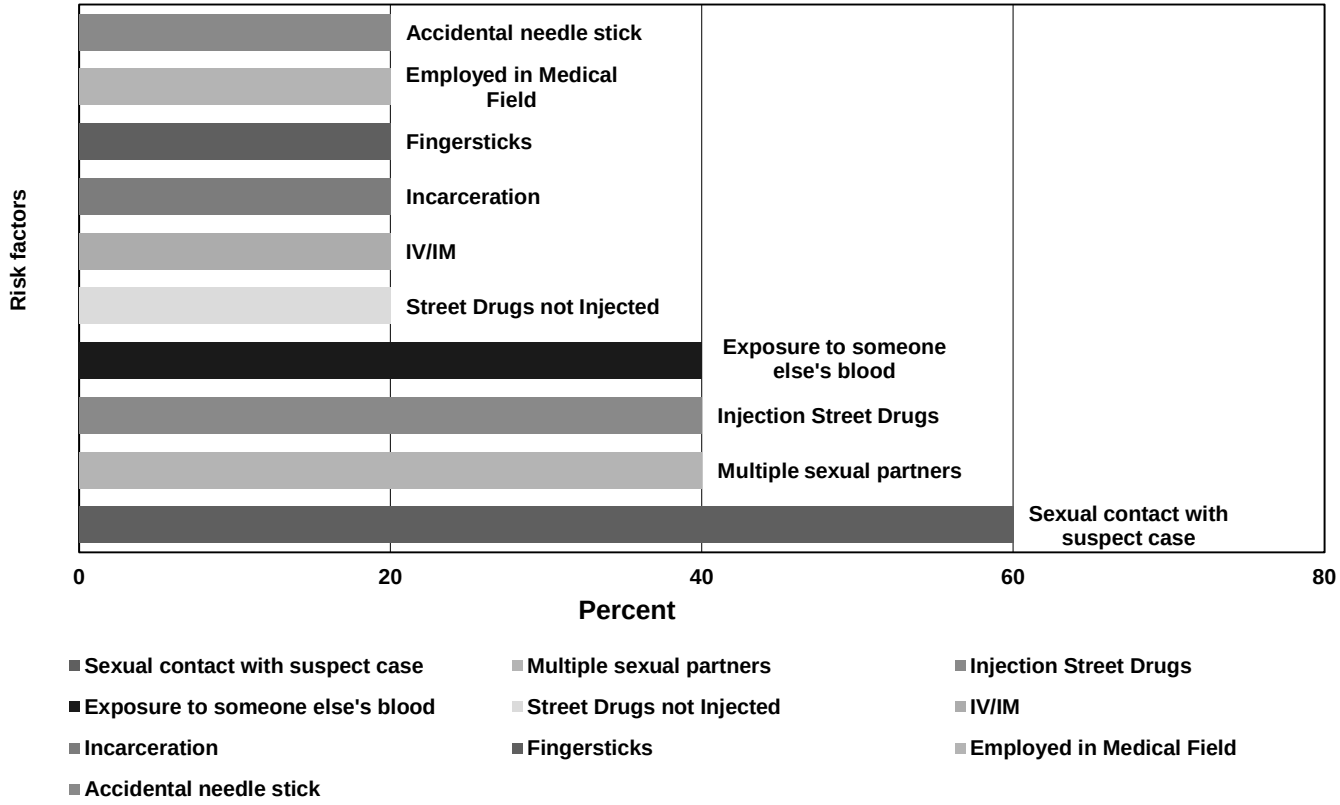


Figure 4. Hepatitis C Reported Risk Factors*
LAC, 2014 (N=5)



LEGIONELLOSIS

CRUDE DATA	
Number of Cases	140
Number of Deaths	21
Annual Incidence[a]	
LA County	1.48
California[b]	0.92
United States[b]	0.69
Age at Diagnosis	
Mean	67.4
Median	67
Range	28–99 years

[a]Cases per 100,000 population.

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 measures 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. Approaches 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-associated LD case reports are investigated to identify potential outbreak situations. Early recognition and investigation is crucial for timely implementation of control measures.

2014 TRENDS AND HIGHLIGHTS

- In 2014, there were 140 cases reported (incidence 1.48/100,000) which is 65% higher than 2013 (Figure 1) but consistent with national rates.
- No Pontiac fever was reported.
- The case fatality rate increased from 8.2% in 2013 to 15% in 2014.
- The most affected age group in LAC was persons 65 years of age and older (Figure 2), which is consistent over a 5 year period.
- Service Planning Area (SPA) 2 had the highest incidence this year followed by SPA 4 (Figure 3).
- The greatest number of cases was reported in December, consistent with the five-year average being highest during this month (Figure 4).
- The highest incidence rate occurred among blacks (2.7 per 100,000) followed by whites (2.3 per 100,000) (Figure 5).
- Travelers staying overnight in commercial lodging during the incubation period accounted for 5.0% of cases in 2014, compared to 12.9% of cases in 2013. No LAC resident was linked to multi-state outbreaks reported by CDC.
- Healthcare-associated legionellosis cases in skilled nursing facilities increased from 2.3% to 5.7% of cases with three fatalities, and from 0% to 2.1% in assisted living facilities with two fatalities. Healthcare-associated legionellosis cases in acute care facilities increased from 5.9% in 2013 to 8.6% of cases.
- One nosocomial legionellosis outbreak investigation involved three cases in an acute care hospital oncology unit. Two of the three patients had sputum specimens confirmed with LP6 at CDC. The third patient had only a urine antigen, which was positive for LP1. Water specimens collected from the room sinks of patients with sputum positive LP6 were also positive for LP6. Based on the investigation, two out of the three cases were epidemiologically

linked and likely exposed to *Legionella* from an environmental source in the facility. Recommendations were made to chlorinate per hospital protocol, and to work with an outside consultant to find a permanent solution to ensure adequate free chlorine levels.

- Another acute care hospital outbreak investigation involved four cases. Urine antigen for three of the four cases was positive for LP1. LP1 was not detected in the environment, but two *Legionella* spp., *L. anisa* and *L. feelei* were detected. Further water management and monitoring were recommended.
- One outbreak investigation involving three cases in a skilled nursing facility was conducted. All cases were urine antigen positive. LP1 was also detected in the environment, and it was determined that the cause of the legionellosis outbreak was the facility's water system. The facility will follow the legionella mitigation plan and EH recommendations.
- One outbreak investigation involved two cases in an assisted living facility. Both cases were culture positive for *Legionella pneumophila* and identified as LP6 by CDC. All water samples and swabs were negative for *Legionella* species. The source of this outbreak remains unknown.
- Two fatal cases from the same community, who used the community's hot tub during the incubation period were reported. One case tested positive for LP1 by PCR, post-mortem. The second case's cause of death was noted as respiratory failure and community acquired pneumonia, but no testing was done to confirm LP. A joint ACDC/EH investigation of the community was conducted, and all environmental samples were negative for *Legionella*. Whereas the investigation suggests the hot tub as the possible source for these infections, laboratory tests of samples from the hot tub were negative.
- Six cases, 4.3% of confirmed cases, were associated with different gyms. This includes one LAC resident who was linked to a gym outbreak investigated out of LAC jurisdiction.
- Three new cases were associated with a 2013 spa outbreak, which led to re-opening the investigation. The spa voluntarily closed the facility. After two hyper-chlorination and superheating procedures, water samples still tested positive for LP. Water filters were placed on high risk water features and after negative culture results, the spa reopened. Filters were removed after installation of a chlorine dioxide system, and follow-up water testing was negative for Legionella.

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=108)			2011 (N=116)			2012 (N=111)			2013 (N=85)			2014 (N=140)		
	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	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	1	0.9	0.1	0	-	-	0	-	-
15-34	3	2.8	0.1	5	4.0	0.2	4	3.6	0.1	3	3.5	0.1	3	2.1	0.1
35-44	9	8.4	0.7	7	6.0	0.5	6	5.4	0.5	4	4.7	0.3	11	7.9	0.8
45-54	25	23.1	1.9	21	18	1.6	21	18.9	1.6	12	14.1	0.9	17	12.1	1.3
55-64	27	25.0	2.8	22	19	2.3	18	16.2	1.8	19	22.4	1.0	29	20.7	2.7
65+	44	40.7	4.4	61	53	5.8	61	55.0	5.5	47	55.3	4.2	80	57.1	7.1
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	15	13.9	1.1	8	7.0	0.6	7	6.3	0.5	7	8.2	0.5	16	11.4	1.2
Black	25	23.1	3.2	20	17.2	2.3	16	14.4	2.1	16	18.8	2.1	21	15.0	2.7
Hispanic	25	23.1	0.6	37	32	0.8	32	28.8	0.7	24	28.2	0.5	39	27.9	0.8
White	41	38.0	1.5	47	40.5	1.6	49	44.1	1.8	34	40.0	1.3	62	44.3	2.3
Other	2	1.9	-	2	1.7	-	5	4.5	-	1	1.2	-	0	-	-
Unknown	0	-	-	2	1.7	-	2	1.8	-	3	3.5	-	2	1.4	-
SPA															
1	2	1.9	0.5	2	1.7	0.5	3	2.7	0.8	2	2.4	0.5	3	2.1	0.8
2	22	20.4	1.0	19	16.3	0.9	21	18.9	1.0	27	31.8	1.2	46	32.9	2.1
3	13	12.0	0.8	15	13	0.9	17	15.3	1.1	8	9.4	0.5	16	11.4	1.0
4	15	13.9	1.3	13	11.2	1.0	13	11.7	1.2	18	21.2	1.6	23	16.4	2.0
5	12	11.1	1.9	8	7.0	1.2	10	9.0	1.6	6	7.1	0.9	12	8.6	1.8
6	12	11.1	1.2	23	19.8	2.2	17	15.3	1.7	9	10.6	0.9	10	7.1	1.0
7	13	12.0	1.0	15	13	1.1	14	12.6	1.1	3	3.5	0.2	14	10.0	1.1
8	16	14.8	1.5	19	16.3	1.7	14	12.6	1.3	12	14.1	1.1	14	10.0	1.3
Unknown	3	2.7	-	2	1.7	0.5	2	1.8	-	0	-	-	2	1.4	-

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

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 2005-2014

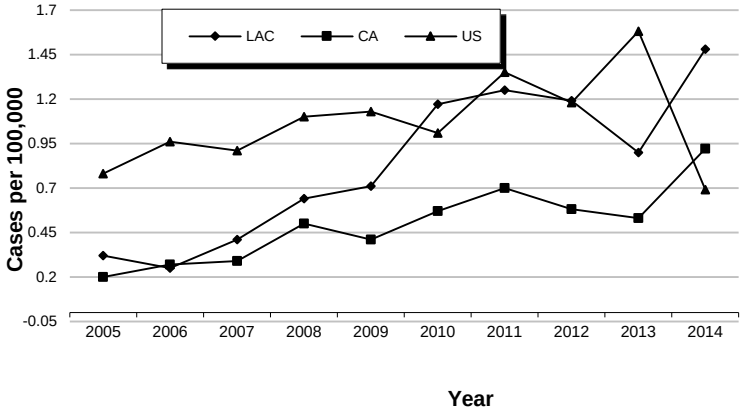


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2010 - 2014

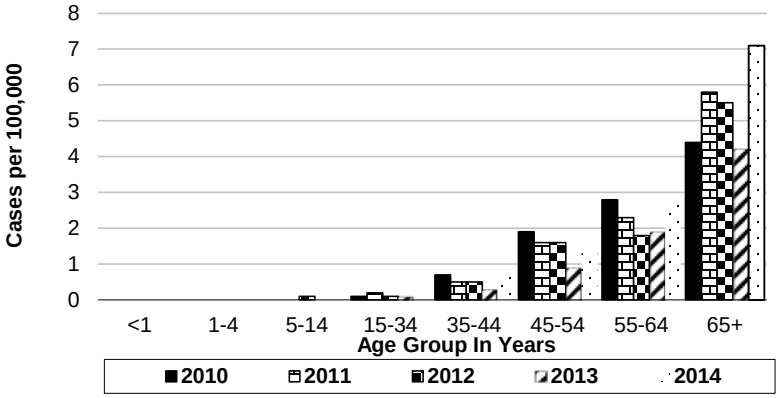


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2010-2014

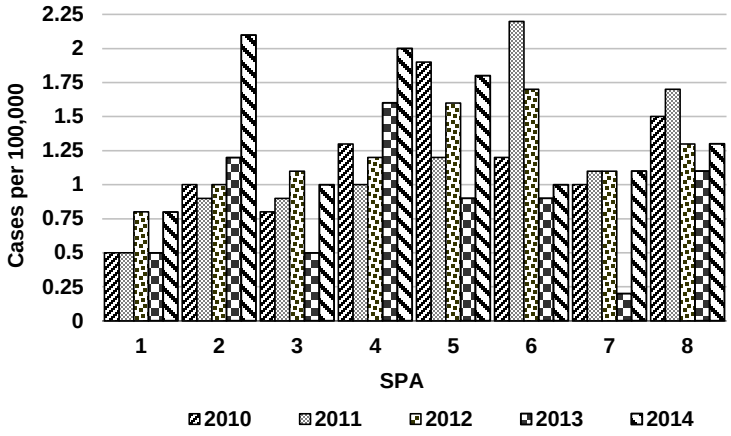


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2014 (N=140)

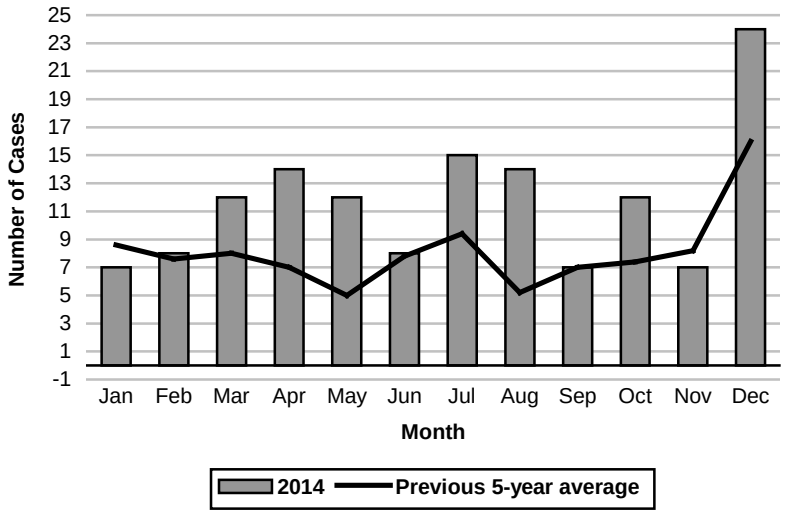
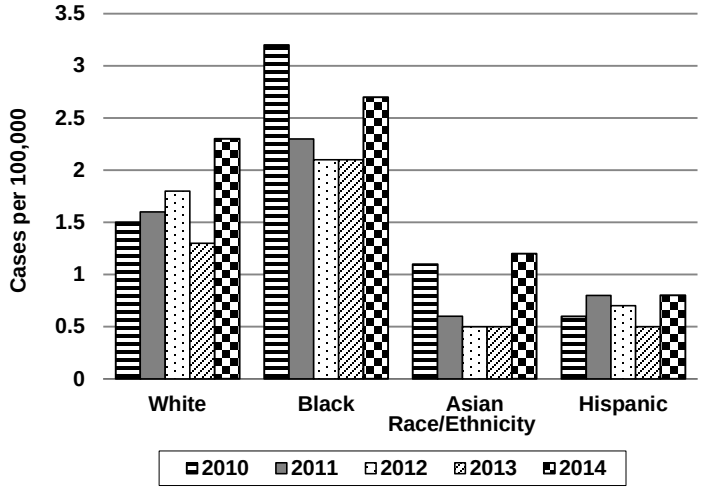
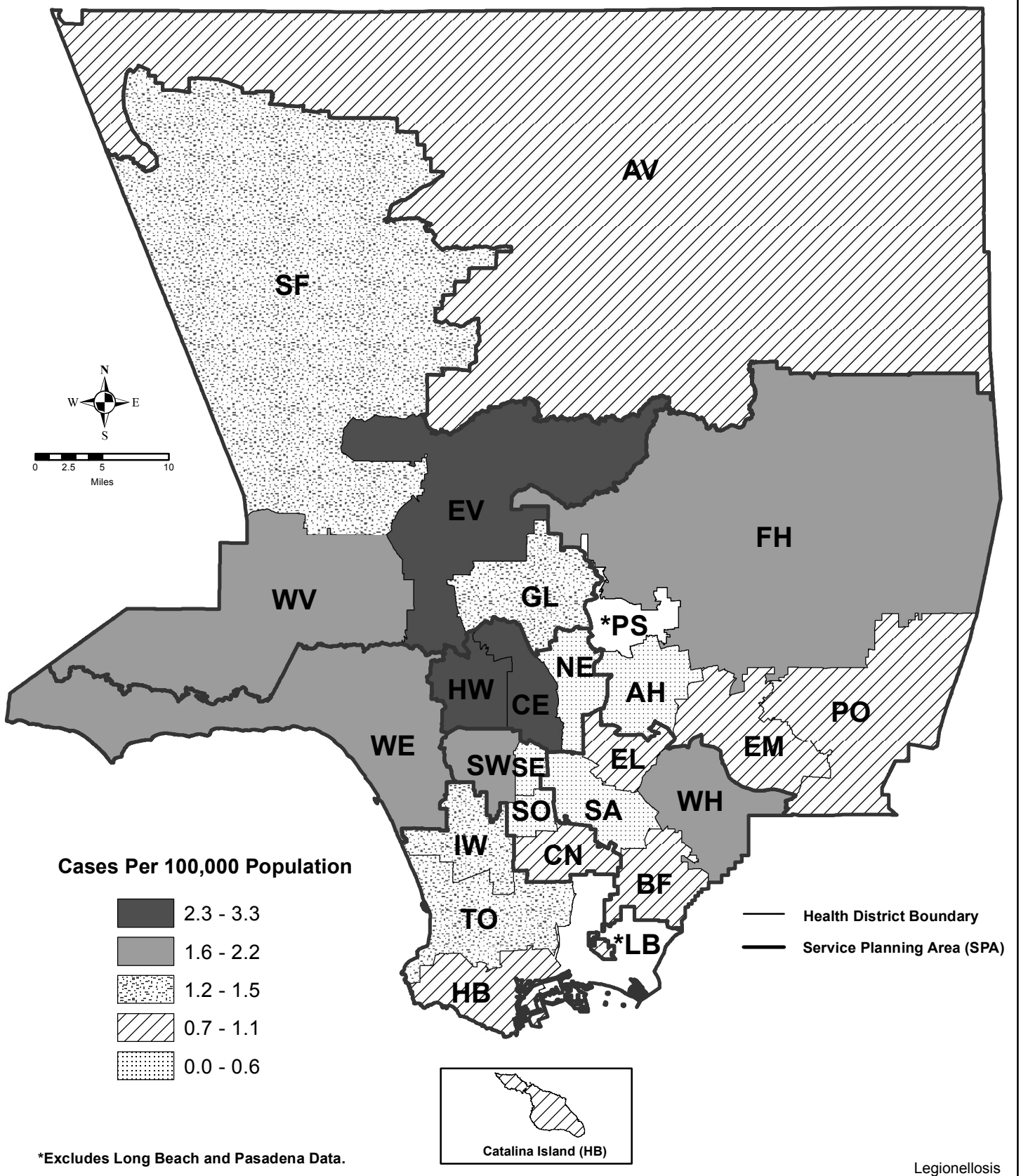


Figure 5. Legionellosis Rates by Race/Ethnicity
LAC, 2010- 2014



Map 8. Legionellosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	27
Annual Incidence[a]	
LA County[b]	0.29
California	N/A
United States	N/A
Age at Diagnosis	
Mean	69.8
Median	75
Range	14–97 years

[a]Cases per 100,000 population.

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.

2014 TRENDS AND HIGHLIGHTS

- By race/ethnicity, the highest incidence of listeriosis cases occurred among Asians (0.7 cases per 100,000); this was consistent with data from the previous two years. The greatest proportion of cases occurred among Hispanics (37%) who also comprise the largest proportion of the LAC population (Figure 3).
- Despite having a higher prevalence of immunosuppressive conditions that predispose them to listeriosis, blacks consistently make up a smaller than expected proportion of cases.
- In 2014, there were four Listeria outbreaks (associated with caramel apples, wholesome soy products, cheese, and dairy products) noted by the Centers for Disease Control and Prevention. No LAC cases were known to be connected to any of these outbreaks.
- By age, the incidence of cases among persons older than 65 years of age is substantially greater than any other age group, and the rate in this population has increased every year since 2010.
- The occurrence of listeriosis cases in 2014 peaked in July (Figure 5) and the five-year average shows more disease occurring during the late-summer months (August and September)
- Individuals with pre-existing health conditions are disproportionately affected. Twenty-six cases (96%) had one or more other medical conditions before receiving a diagnosis of listeriosis.

- There were two deaths due to non-perinatal listeriosis, a case-fatality rate of 7.4%. This is down 9.9% percent from 2013. The fatal cases had underlying diseases including cancer, diabetes, autoimmune disorder, and organ failure.

Reported Listeriosis, Nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=14)			2011 (N=19)			2012 (N=26)			2013 (N=23)			2014 (N=27)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate*/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	1	7.1	0.1	0	-	-	1	3.8	0.1	0	-	-	1	3.8	0.1
15-34	2	14.1	0.1	0	-	-	1	3.8	0.0	0	-	-	0	0.0	0.0
35-44	2	14.1	0.1	0	-	-	0	-	-	1	4.3	0.1	2	7.4	0.2
45-54	2	14.1	0.2	4	21.1	0.3	8	30.8	0.6	3	13.0	0.2	1	3.8	0.1
55-64	2	14.1	0.2	5	26.3	0.5	1	3.8	0.1	3	13.0	0.3	3	11.0	0.3
65+	5	35.7	0.5	10	52.6	0.9	15	57.7	1.4	16	69.5	1.4	20	74.0	1.8
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	1	7.1	0.1	2	10.5	0.1	5	19.2	0.4	7	30.4	0.5	9	33.3	0.7
Black	1	7.1	0.1	0	-	-	1	3.8	0.1	1	4.3	0.1	1	3.7	0.1
Hispanic	7	50.0	0.2	4	21.1	0.2	8	30.8	0.2	8	34.7	0.2	10	37.0	0.2
White	5	35.7	0.2	13	68.4	4.5	11	42.3	0.4	6	26.0	0.2	4	14.8	0.2
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	1	3.8		1	4.3	-	3	11.1	-
SPA															
1	0	-	-	0	-	-	1	3.8	0.3	0	-	-	0	-	-
2	5	35.7	0.2	5	26.3	0.2	9	34.6	0.4	7	30.4	0.3	9	33.3	0.4
3	1	7.1	0.1	4	21.1	0.2	2	7.7	0.1	2	8.7	0.2	5	18.5	0.3
4	4	28.6	0.4	1	5.3	0.1	3	11.5	0.3	4	17.4	0.4	2	7.4	0.2
5	0	-	-	4	21.1	0.6	5	19.2	0.8	1	4.3	0.2	2	7.4	0.3
6	1	7.1	0.1	0	-	-	3	11.5	0.3	2	8.6	0.2	3	11.1	0.3
7	1	7.1	0.1	2	10.5	0.2	0	-	-	5	21.7	0.4	2	7.4	0.2
8	2	14.1	0.2	3	15.8	0.3	3	11.5	0.3	1	4.3	0.3	4	14.8	0.4
Unknown	0	-	-	0	-	-	0	-	-	1	4.3	-	0	-	-

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

**Figure 1. Reported Cases of Nonperinatal Listeriosis
LAC, 2005-2014**

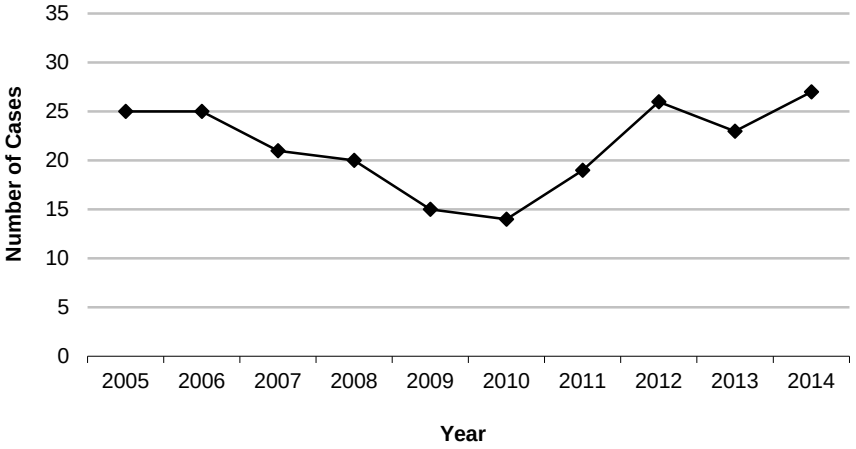


**Figure 2. Reported Cases of Nonperinatal Listeriosis
by Age Group, LAC, 2014 (N=27)**

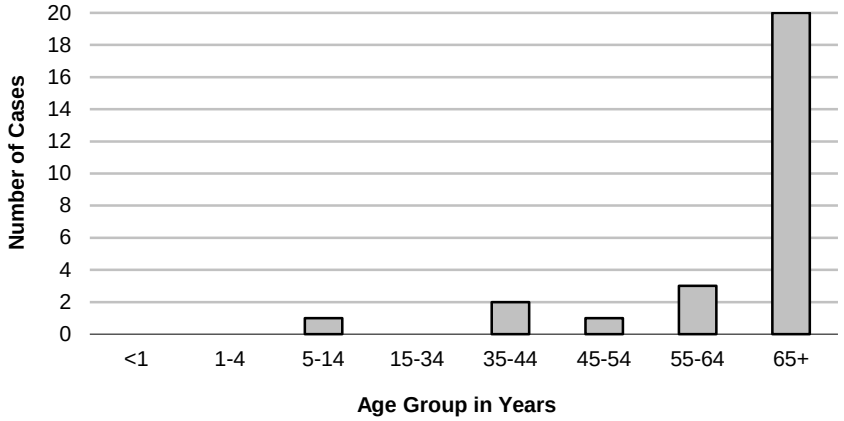


**Figure 3. Percent Cases of Nonperinatal Listeriosis
by Race/Ethnicity, 2014 LAC(N=27)**

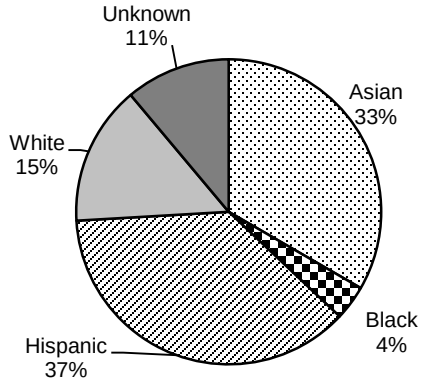


**Figure 4. Reported Cases of Nonperinatal Listeriosis by SPA
LAC, 2014 (N=27)**

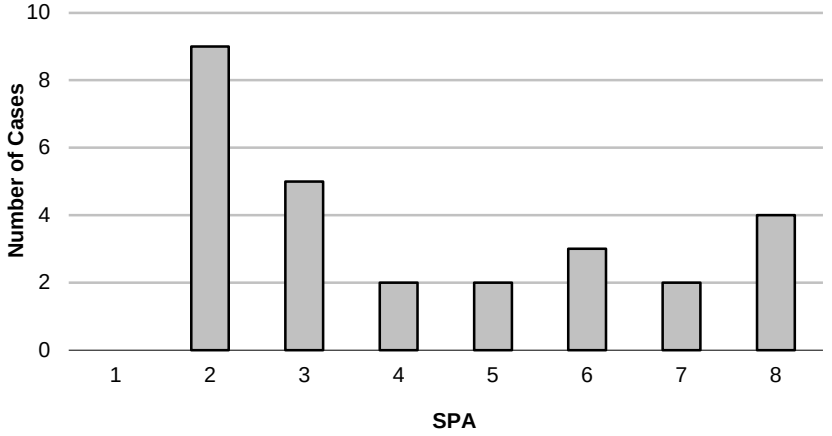
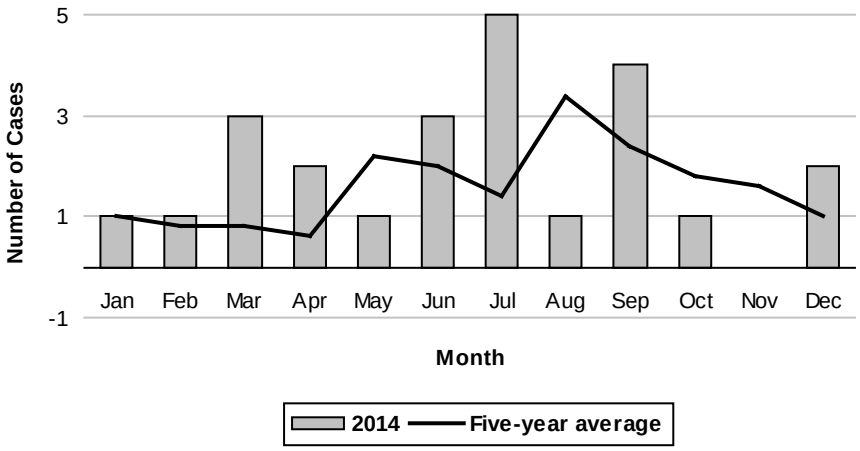


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset
LAC, 2014 (N=27)



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	5
Annual Incidence[a]	
LA County[b]	4.11
California	N/A
United States	N/A
Age at Diagnosis	
Mean	32
Median	34
Range	20–41 years

[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.

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 (where the number of cases has been higher and consumption of unpasteurized soft cheeses may be more common), and food safety notices at food and deli markets.

2014 TRENDS AND HIGHLIGHTS

- Of the five cases of perinatal listeriosis four were single gestations and one was multiple gestation. A total of six babies were exposed in utero; three were born with signs of sepsis, two did not acquire the disease, and one suffered neonatal fatality.
- Two mothers were not diagnosed with listeriosis but their newborn infants tested positive. The symptomatic maternal case with multiple gestation affected only one of the twins.
- Maternal ages ranged from 20 to 41 years with a median of 34 years.
- The number of perinatal listeriosis cases in 2014 is consistent that of the past ten years, except for a greater number of cases in 2006 (Figure 1).
- Hispanic women had the highest number of cases of perinatal listeriosis, consistent across the past five years with the exception of 2012, when non-Hispanic white mothers comprised the majority of cases (Figure 2). Incidence of perinatal listeriosis remains consistent among Hispanic mothers. There have been no cases of perinatal listeriosis reported in black expectant mothers since 2006.
- Three of the mothers reported eating Mexican cheese, two reported pre-packaged

cold cuts and deli salads, and one had pre-prepared dips while pregnant.

- All five mothers were hospitalized and released. There were no maternal deaths.

Reported Perinatal Listeriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=4)			2011 (N=6)			2012 (N=7)			2013 (N=4)			2014 (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	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
15-34	3	75.0	0.1	3	50.0	-	4	57.0	-	4	100.	4.3	4	80.0	0.1
35-44	1	25.0	0.1	3	50.0	-	3	42.9	-	0	-	-	1	20.0	0.1
45-54	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
55-64	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
65+	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	25.0	0.1	2	33.3		1	14.3	-	0	-	-	2	40.0	0.2
Black	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Hispanic	2	50.0	-	5	50.0	-	2	28.6	-	3	75.0	4.4	3	60.0	0.1
White	1	25.0	-	1	16.7	-	4	57.1	-	1	25.1	4.5	0	-	-
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
2	2	50.0	0.1	0	-	-	2	28.6	-	1	25.0	0.2	1	20.0	0.2
3	0	-	-	3	50.0	-	2	28.6	-	1	25.0	0.3	1	20.0	0.3
4	0	-	-	0	-	-	1	14.3	-	0	-	-	1	20.0	0.4
5	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
6	1	25.0	0.1	1	16.7		0	-	-	0	-	-	1	20.0	0.5
7	1	25.0	0.1	0	-	-	1	14.3	-	1	25.0	0.3	0	-	-
8	0	-	-	2	33.3	-	1	14.3	-	1	25.0	0.4	1	20.0	0.5
Unknown	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, 2005-2014**

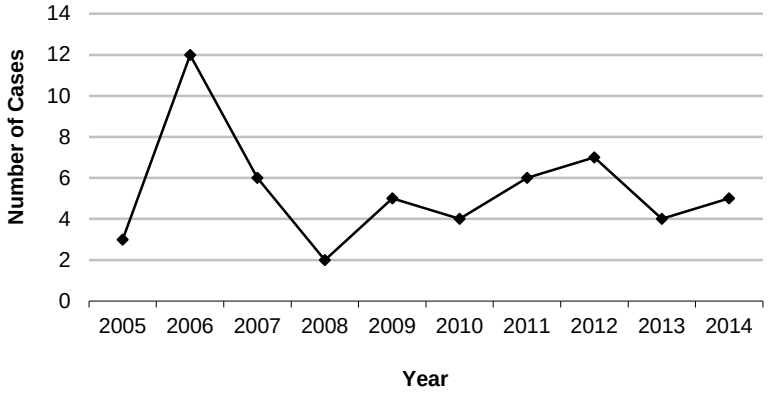


**Figure 2. Perinatal Listeriosis Cases by Race/Ethnicity
LAC, 2010-2014**

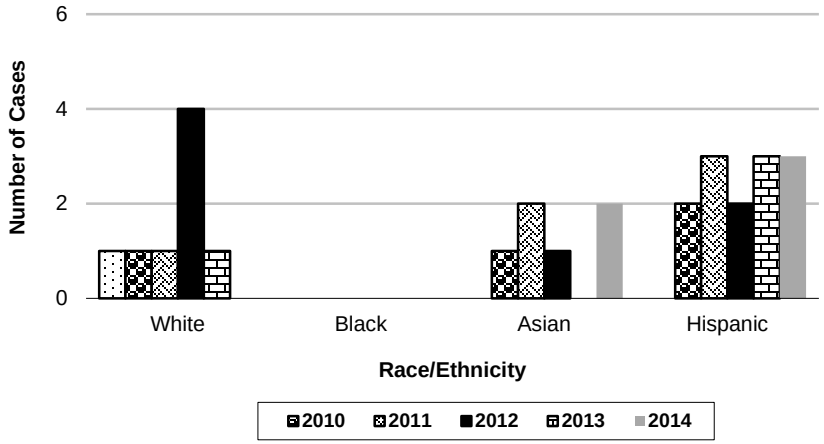
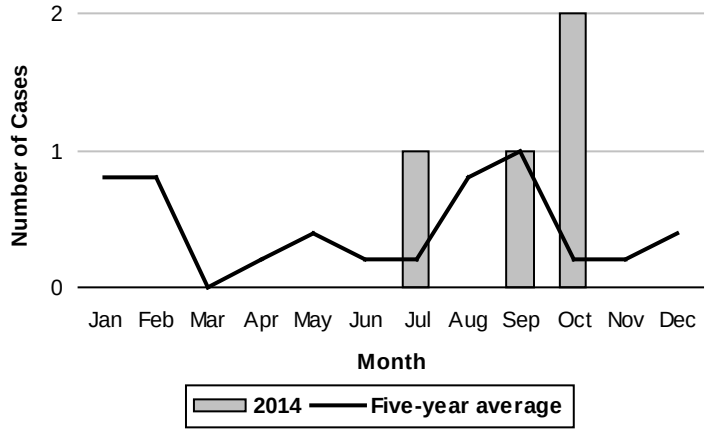


**Figure 3. Reported Perinatal Listeriosis Cases
by Month of Onset, LAC, 2014 (N=5)**



LYME DISEASE

CRUDE DATA	
Number of Cases	5
Annual Incidence [a]	
LA County [b]	0.05
California [c]	0.14
United States [c]	7.95
Age at Diagnosis	
Mean	29.8
Median	20
Range	3–82 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 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 LAC due to the low prevalence of Lyme-infected ticks. Between 1985 and 2013, 0.2% of adult ticks and 0% of nymphal ticks tested positive for Lyme.[1] Most reported cases have been acquired in known endemic regions in the 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 CDC requires a confirmed case of LD to have:

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

Laboratory criteria for case confirmation include a positive culture for *B. burgdorferi* or demonstration of diagnostic IgM or IgG to *B. burgdorferi* in serum or cerebral spinal fluid. A coalition of several public health and medical organizations recommends a two-step serologic testing procedure for LD: an initial enzyme immunoassay or immunofluorescent antibody screening test, and if positive or equivocal, followed by IgM and IgG Western immunoblotting. [2]

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.

2014 TRENDS AND HIGHLIGHTS

- LAC continues to document much lower rates (less than 1 per 100,000) than the national rate. Only 5 cases were reported in LAC in 2014 and since 2014, annual totals ranged between 1 and 11 reported cases.
- Cases were reported only through July, and occurred sporadically. Most cases in the previous 5 years occurred during the summer months (Figure 2).
- Most cases reported an outdoor exposure outside of LAC, but within the US (n=3, 60%) (Figure 3). These cases recalled exposure in New England and Midwestern states. Two cases with no travel outside California, reported outdoor exposure in Malibu and Torrance, but did not recall a tick bite. Only one case recalled a tick bite, which occurred in Maine.

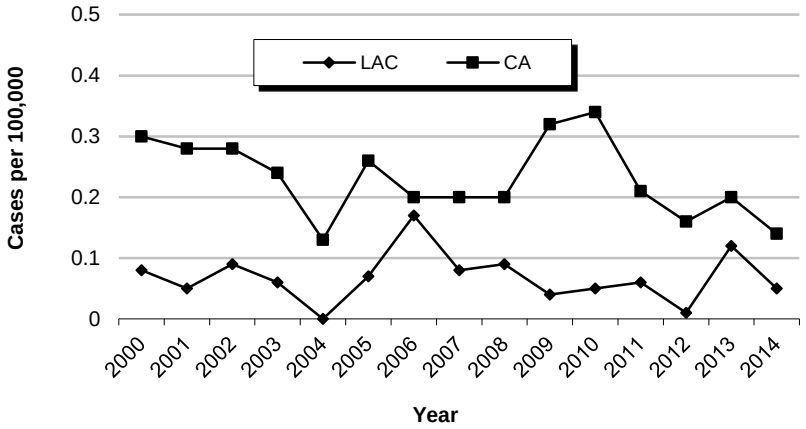
- There were 720 suspected cases of Lyme disease reported to LAC DPH in 2014, up from 564 reported in 2013. The large majority of these were reported as a result of positive laboratory results. Less than 1% of these reports met the CDC case definition for a confirmed case. The number of suspected cases 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.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=5)			2011 (N=6)			2012 (N=1)			2013 (N=11)			2014 (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	-	-
1-4	0	-	-	0	-	-	0	-	-	1	9.1	-	1	20.0	-
5-14	1	20.0	-	0	-	-	0	-	-	3	27.3	-	1	20.0	-
15-34	2	40.0	-	1	16.7	-	0	-	-	5	45.5	-	2	40.0	-
35-44	1	20.0	-	0	-	-	0	-	-	0	-	-	0	-	-
45-54	0	-	-	3	50.0	-	0	-	-	1	9.1	-	0	-	-
55-64	1	2.0	-	1	16.7	-	0	-	-	1	9.1	-	0	-	-
65+	0	-	-	1	16.7	-	1	100.0	-	0	-	-	1	20.0	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	0	-	-	0	-	-	0	-	-	0	-	-	1	20.0	-
Black	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Hispanic	1	20.0	-	0	-	-	0	-	-	0	-	-	0	-	-
White	4	80.0	-	6	100.0	-	1	100.0	-	8	72.7	-	3	60.0	-
Other	0	-	-	0	-	-	0	-	-	1	9.1	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	1	9.1	-	1	20.0	
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
2	0	-	-	2	33.3	-	1	100.0	-	3	27.3	-	0	-	-
3	0	-	-	1	16.7	-	0	-	-	0	-	-	1	20.0	-
4	2	40.0	-	0	-	-	0	-	-	2	18.2	-	1	20.0	-
5	2	40.0	-	3	50.0	-	0	-	-	4	36.4	-	2	40.0	-
6	1	20.0	-	0	-	-	0	-	-	0	-	-	0	-	-
7	0	-	-	0	-	-	0	-	-	1	9.1	-	0	-	-
8	0	-	-	0	-	-	0	-	-	1	9.1	-	1	20.0	-
Unknown	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, 2000-2014



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

Figure 2. Reported Lyme Disease Cases by Month of Onset LAC, 2014

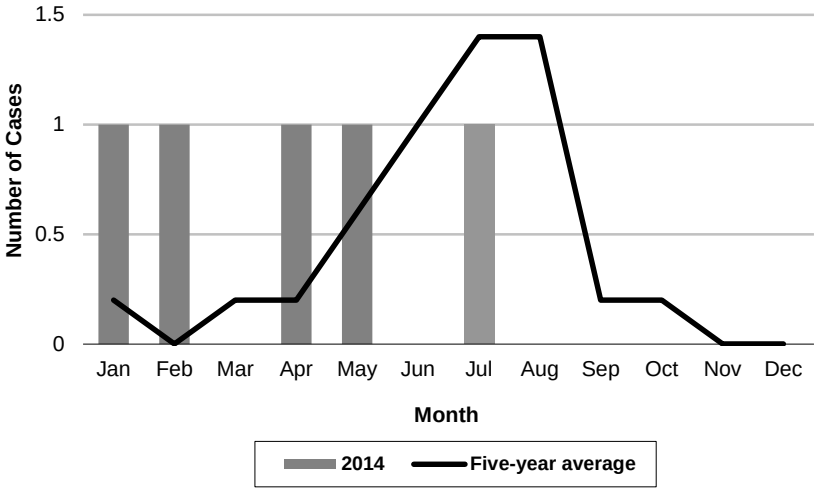
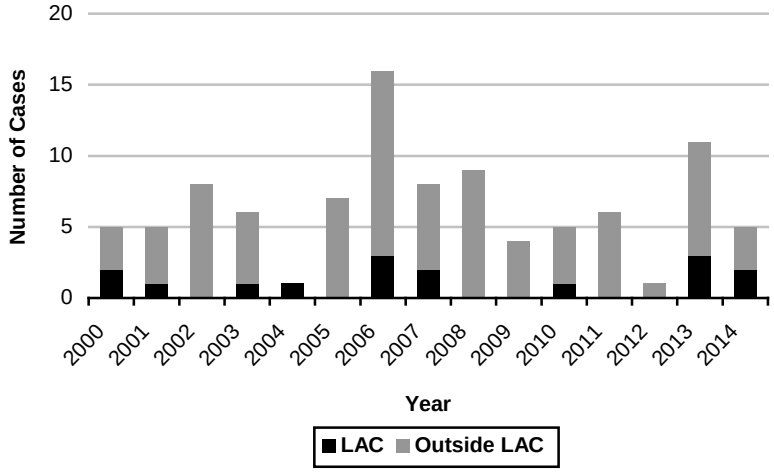


Figure 3. Locations of Tick and Outdoor Exposure in Lyme Disease Cases LAC, 2000-2014



MEASLES

CRUDE DATA	
Number of Cases	13
Annual Incidence[a]	
LA County[b]	0.14
California[c]	0.24
United States[c]	0.21
Age at Diagnosis	
Mean	13.3 years
Median	6.0 years
Range	0 – 51 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 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 (via an RT-PCR test).

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.

2014 TRENDS AND HIGHLIGHTS

- Thirteen cases were reported in LAC in 2014, the highest annual count in the past 10 years. Likewise, the incidence in the US was the highest in the past 10 years (Figure 2). Cases were exposed in the following settings:
- **Travel-Related:** Similar to previous years, many of the 2014 cases in LAC were associated with international travel. Seven (53.8%) developed measles due to travel-related exposures. Of these, three acquired infection while travelling abroad (one to the Philippines, one to Vietnam, and one to India). The remaining four cases were exposed by the case who traveled to the Philippines: One sibling in the same household and three patients at a naturopathic clinic visit while the case from the Philippines was also present.
- **Amusement Park Outbreak-Related:** Three other cases (23.1%) were part of the outbreak that began at Disneyland from December 2014 through April 2015, where a total of 131 cases were reported across 12 counties in California during this period. Approximately 88% of the cases reported in this outbreak reside in Southern California. For the three LAC cases that were part of this outbreak with onset in December 2014, two of the cases (both under 4 years of age) were unvaccinated, one due to personal beliefs and the other due to an

alternate vaccination schedule selected by choice. The third case was over 50 years of age and self-reported an up-to-date immunization status, although documentation was not provided.

- **School Outbreak-related**: Two additional cases (15.4%) were students at an elementary school, one of whom had an unknown vaccination status and transmitted measles to an unvaccinated student. The reason the student was not vaccinated against measles is unknown. The index case for this cluster was not identified.
- **Unknown Exposure:** One case (7.7%) had an unknown source of exposure. The vaccination status of this case is unknown.
- Most of the cases (76.9%) were under 18 years of age, with two cases under one year old (Figure 3).
- Eleven of the cases (84.6%) were eligible but not up-to-date on their immunizations. One of the cases self-reported an up-to-date immunization status and another case self-reported having received one dose of the vaccine, but documentation was not provided by either case. Six cases made a personal choice not to be vaccinated by the time of exposure. Of these, four cited a personal belief exemption and an additional two delayed the start of their immunization series. Two additional cases were too young to be vaccinated. One other case was not vaccinated and the reason is unknown. The vaccination status of two cases was unknown (Figure 6).
- A majority of the cases occurred during the first quarter of the year. This coincided with an increase in cases throughout California and the U.S. related to travel to the Philippines where measles is endemic (Figure 5).

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=8)			2011 (N=8)			2012 (N=6)			2013 (N=3)			2014 (N=13)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	12.5	0.8	0	-	-	0	-	-	0	-	-	2	15.4	1.7
1-4	1	12.5	0.2	3	37.5	0.6	0	-	-	0	-	-	3	23.1	0.6
5-14	2	25.0	0.2	0	-	-	3	50.0	0.3	0	-	-	4	30.8	0.3
15-34	2	25.0	0.1	5	62.5	0.2	1	16.7	-	1	33.3	-	1	7.7	0.0
35-44	2	25.0	0.1	0	-	-	1	16.7	0.1	0	-	-	2	15.4	0.2
45-54	0	-	-	0	-	-	0	-	-	1	33.3	0.1	1	7.7	0.1
55-64	0	-	-	0	-	-	1	16.7	0.1	1	33.3	0.1	0	-	-
65+	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	0	-	-	4	50.0	0.3	0	-	-	0	-	-	3	23.1	0.2
Black	2	25.0	0.3	0	-	-	0	-	-	0	-	-	0	-	-
Hispanic	4	50.0	0.1	2	25.0	-	0	-	-	0	-	-	2	15.4	0.0
White	2	25.0	0.1	1	12.5	-	6	100	0.2	3	100	0.1	7	53.8	0.3
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	1	12.5	-	0	-	-	0	-	-	1	7.7	-
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
2	4	50.0	0.2	1	12.5	-	5	83.3	0.2	0	-	-	7	53.8	0.3
3	0	-	-	2	25.0	0.1	0	-	-	0	-	-	4	30.8	0.2
4	0	-	-	2	25.0	0.2	1	16.7	0.1	0	-	-	0	-	-
5	1	12.5	0.2	2	25.0	0.3	0	-	-	3	100	0.5	0	-	-
6	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
7	3	37.5	0.2	0	-	-	0	-	-	0	-	-	0	-	-
8	0	-	-	0	-	-	0	-	-	0	-	-	2	15.4	0.2
Unknown	0	-	-	1	12.5	-	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, 2005-2014**

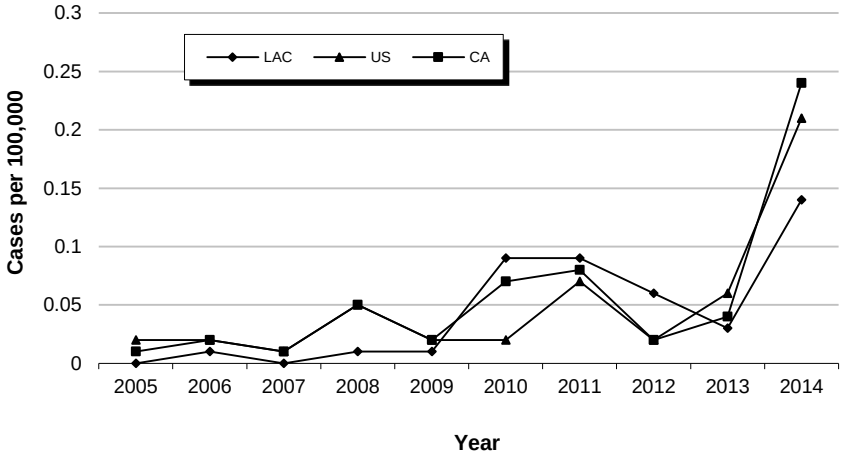


**Figure 2. Reported Measles Cases
LAC, 2005-2014**

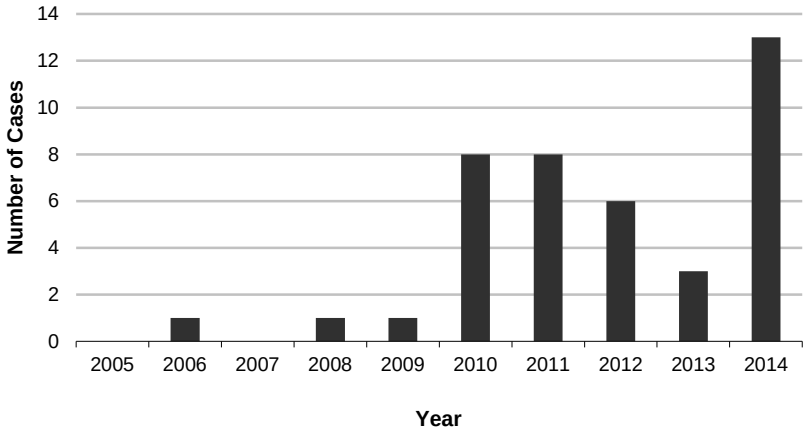


**Figure 3. Reported Confirmed Measles Cases by Age Group
LAC, 2014 (N=13)**

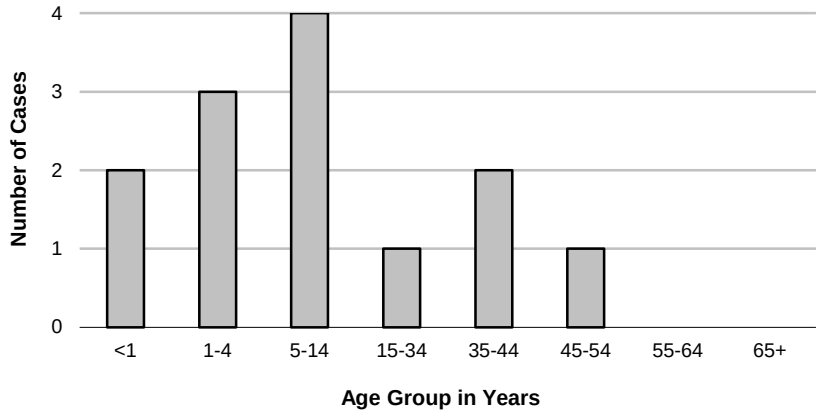


**Figure 4. Reported Confirmed Measles Cases by SPA
LAC, 2014 (N=13)**

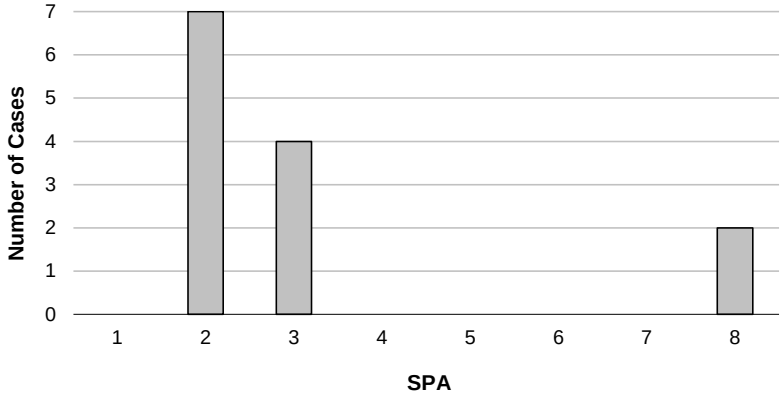


Figure 5. Reported Confirmed Measles Cases by Month of Onset LAC, 2014 (N=13) vs. Previous Five-Year Average

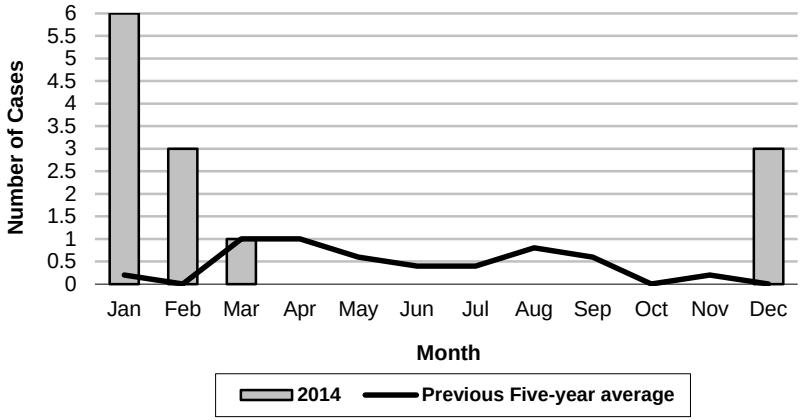


Figure 6. Vaccination Status of Reported Measles Cases LAC, 2014

	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=8)
No.	**13**	**2**	**0**	**11**	**6**
%	**100%**	**15.4%**	**0.0%**	**84.6%**	**75.0%**

[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	400
Annual Incidence[a]	
LA County	4.23
Age at Diagnosis	
Mean	33.2
Median	30.5
Range	0–91 years

[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).

Antiviral agents are available for HSV and VZV, however, in most cases, only supportive measures are available for the treatment of viral meningitis. Recovery is usually complete and associated with low mortality rates.

Several types of viral meningitis are vaccine-preventable including VZV, mumps, influenza, and measles. Good personal hygiene, especially hand washing and avoiding contact with oral secretions of others, is the most practical and effective preventive measure for nonpolio enteroviruses.

2014 TRENDS AND HIGHLIGHTS

- In 2014, viral/aseptic meningitis incidence was 4.2 cases per 100,000. There has been a small rise in incidence each year since 2012 when a rate of 3.3 per 100,000 was documented. However, the incidence was previously as high as 9.6 per 100,000 in 2002 and the current rate is lower than the average over the past 15 years (Figure 1).
- SPA 1 (Antelope Valley) continued to report the highest rate of viral meningitis in LAC, and has increased from 4.6 cases per 100,000 in 2012 to 8.4 per 100,000 in 2014. The Varicella Active Surveillance Project, a national surveillance study conducted in the Antelope Valley from January 1996 to September 30, 2012, likely contributed by enhancing communicable disease reporting to LAC DPH.
- The distribution of viral/aseptic meningitis by age groups remains similar to previous years with the <1 year old age group experiencing the highest age-specific incidence rate at 39.7 per 100,000 (Figure 3).
- The etiologies of 131 cases were identified (33%). Of those, over half (n=74, 56%) were caused by WNV. Thirty percent (n=39) were caused by an enterovirus (Figure 6).
- Two deaths were reported (<1%), one of which was determined to be caused by enterovirus. Both patients were in their thirties.
- An outbreak of enteroviral meningitis was documented among ten children associated with a high school football team in August 2014. Five were hospitalized. The enterovirus was identified as echovirus 30 and determined to be most likely spread by the sharing of water bottles, inadequate washing of water bottles, and poor hand hygiene[1] (see Special Studies Report for additional details).

[1] Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Notes from the Field: Aseptic Meningitis Outbreak Associated with Echovirus 30 Among High School Football Players – Los Angeles County, California, 2014. 2 Jan 2015, 63 (51): 1228.

Reported Viral Meningitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=570)			2011 (N=317)			2012 (N=303)			2013 (N=355)			2014 (N=400)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	89	15.6	63.8	33	10.4	23.6	28	9.2	23.5	43	12.1	35.6	47	11.8	39.7
1-4	33	5.8	5.7	6	1.9	1.0	4	1.3	0.8	9	2.5	1.8	8	2.0	1.6
5-14	138	24.2	10.4	53	16.7	4.0	24	7.9	2.0	57	16.1	4.7	54	13.5	4.5
15-34	164	28.8	5.6	102	32.2	3.5	93	30.7	3.4	105	29.6	3.7	114	28.5	4.0
35-44	56	9.8	3.9	39	12.3	2.7	45	14.9	3.4	27	7.6	2.0	43	10.8	3.3
45-54	39	6.8	2.9	41	12.9	3.0	40	13.2	3.1	44	12.4	3.4	43	10.8	3.3
55-64	17	3.0	1.8	24	7.6	2.5	32	10.6	3.1	35	9.9	3.4	42	10.5	4.0
65+	33	5.8	3.1	18	5.7	1.7	37	12.2	3.3	31	8.7	2.8	44	11.0	3.9
Unknown	1	0.2	-	0	-	-	0	-	-	4	1.1	-	5	1.3	-
Race/Ethnicity															
Asian	36	6.3	2.7	21	6.6	1.6	23	7.6	1.7	21	5.9	1.5	22	5.5	1.6
Black	64	11.2	7.5	37	11.7	4.3	36	11.9	4.7	26	7.3	3.3	26	6.5	3.3
Hispanic	259	45.4	5.5	147	46.4	3.1	131	43.2	2.9	158	44.5	3.4	186	46.5	4.0
White	112	19.6	3.9	78	24.6	2.7	86	28.4	3.2	88	24.8	3.3	99	24.8	3.7
Other	13	2.3	-	7	2.2	-	10	3.3		19	5.4	-	12	3.0	-
Unknown	86	15.1	-	27	8.5	-	17	5.6		43	12.1	-	55	13.8	-
SPA															
1	45	7.9	12.1	33	10.4	8.8	18	5.9	4.6	29	8.2	7.4	33	8.3	8.4
2	86	15.1	3.9	67	21.1	3.0	63	20.8	2.9	67	18.9	3.1	73	18.3	3.3
3	98	17.2	5.6	75	23.7	4.3	68	22.4	4.2	64	18.0	3.9	97	24.3	5.9
4	29	5.1	2.3	14	4.4	1.1	16	5.3	1.4	32	9.0	2.8	34	8.5	3.0
5	13	2.3	2.0	15	4.7	2.3	10	3.3	1.6	7	2.0	1.1	14	3.5	2.1
6	76	13.3	7.1	26	8.2	2.4	29	9.6	2.9	43	12.1	4.2	38	9.5	3.7
7	92	16.1	6.7	48	15.1	3.5	57	18.8	4.4	56	15.8	4.3	71	17.8	5.4
8	121	21.2	10.8	35	11.0	3.1	36	11.9	3.4	52	14.7	4.8	37	9.3	3.4
Unknown	10	1.8	-	4	1.3	-	6	2.0	-	5	1.4	-	3	1.0	-

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

**Figure 1. Incidence Rates of Viral Meningitis
LAC, 2000-2014**

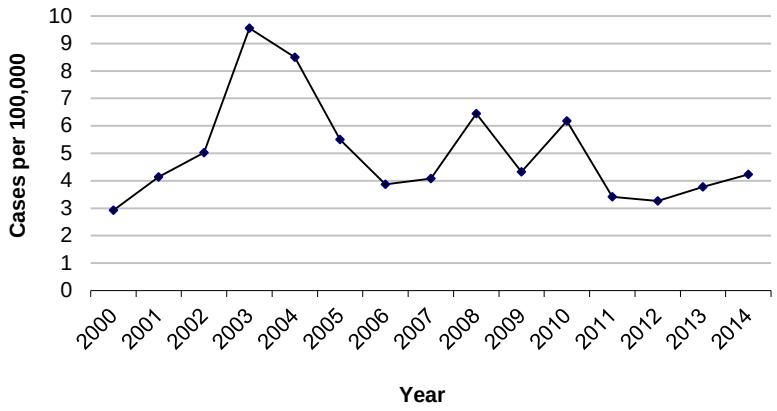


**Figure 2. Incidence Rates of Viral Meningitis by SPA
LAC, 2010-2014**

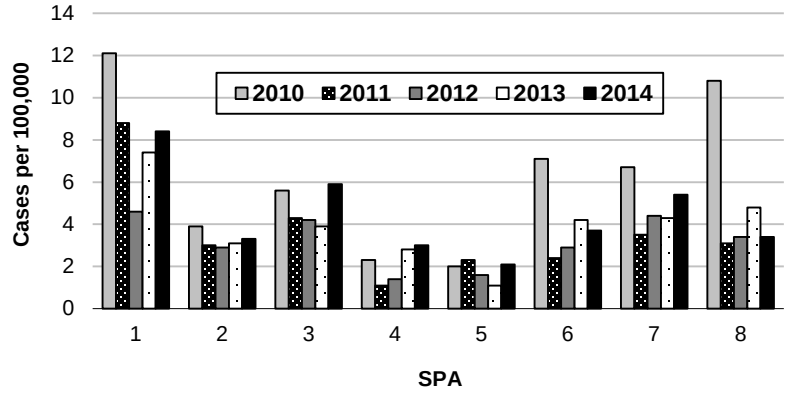


**Figure 3. Incidence Rates of Viral Meningitis by Age Group
LAC, 2010-2014**

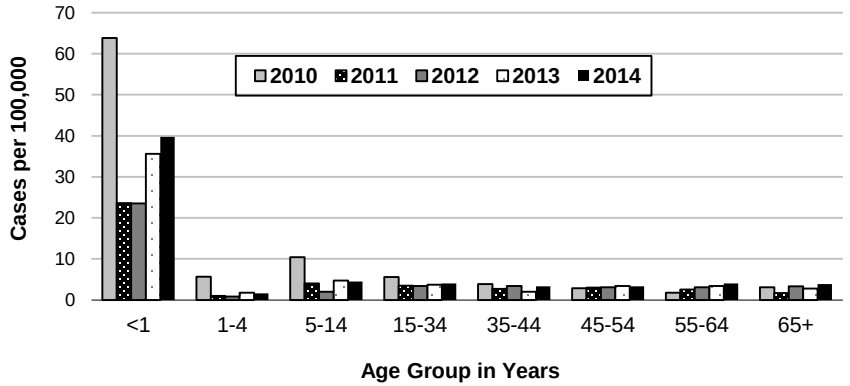
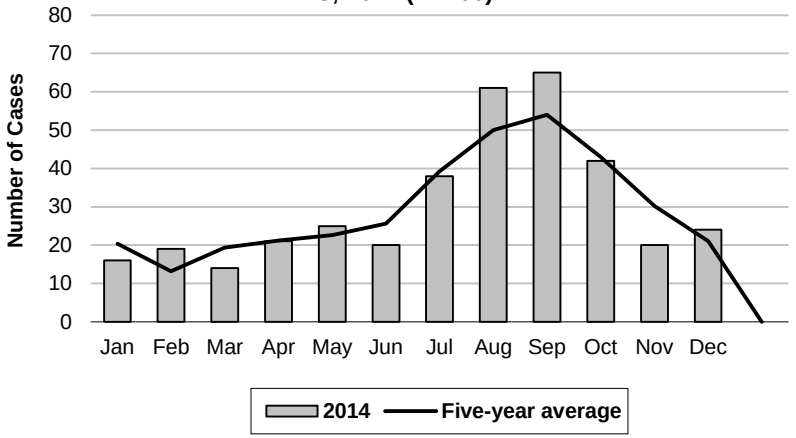


**Figure 4. Reported Viral Meningitis Cases by Month of Onset
LAC, 2014 (N=400)***



*35 cases missing onset date.

Figure 5. Incidence Rates of Viral Meningitis by Race/Ethnicity LAC, 2010-2014

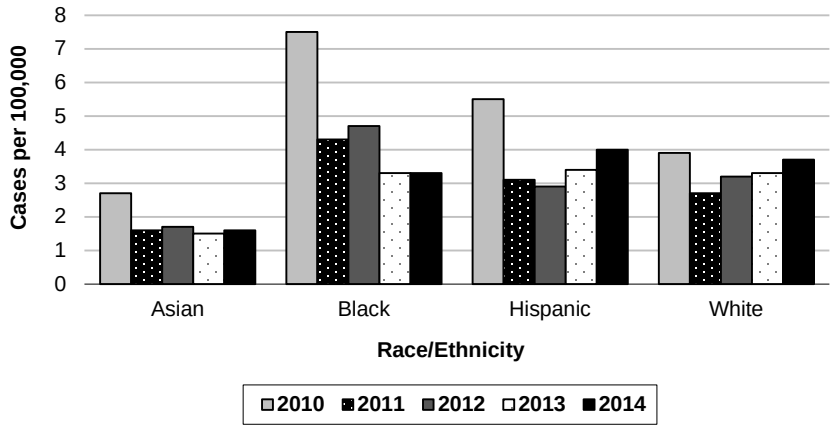
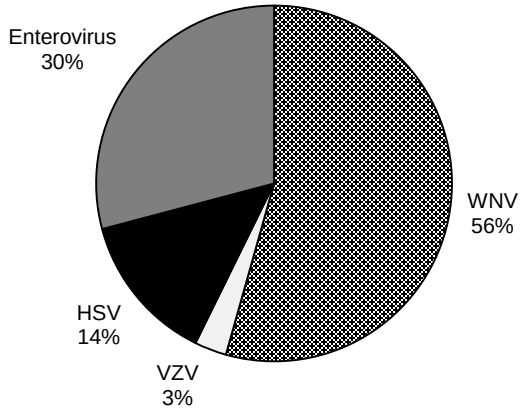
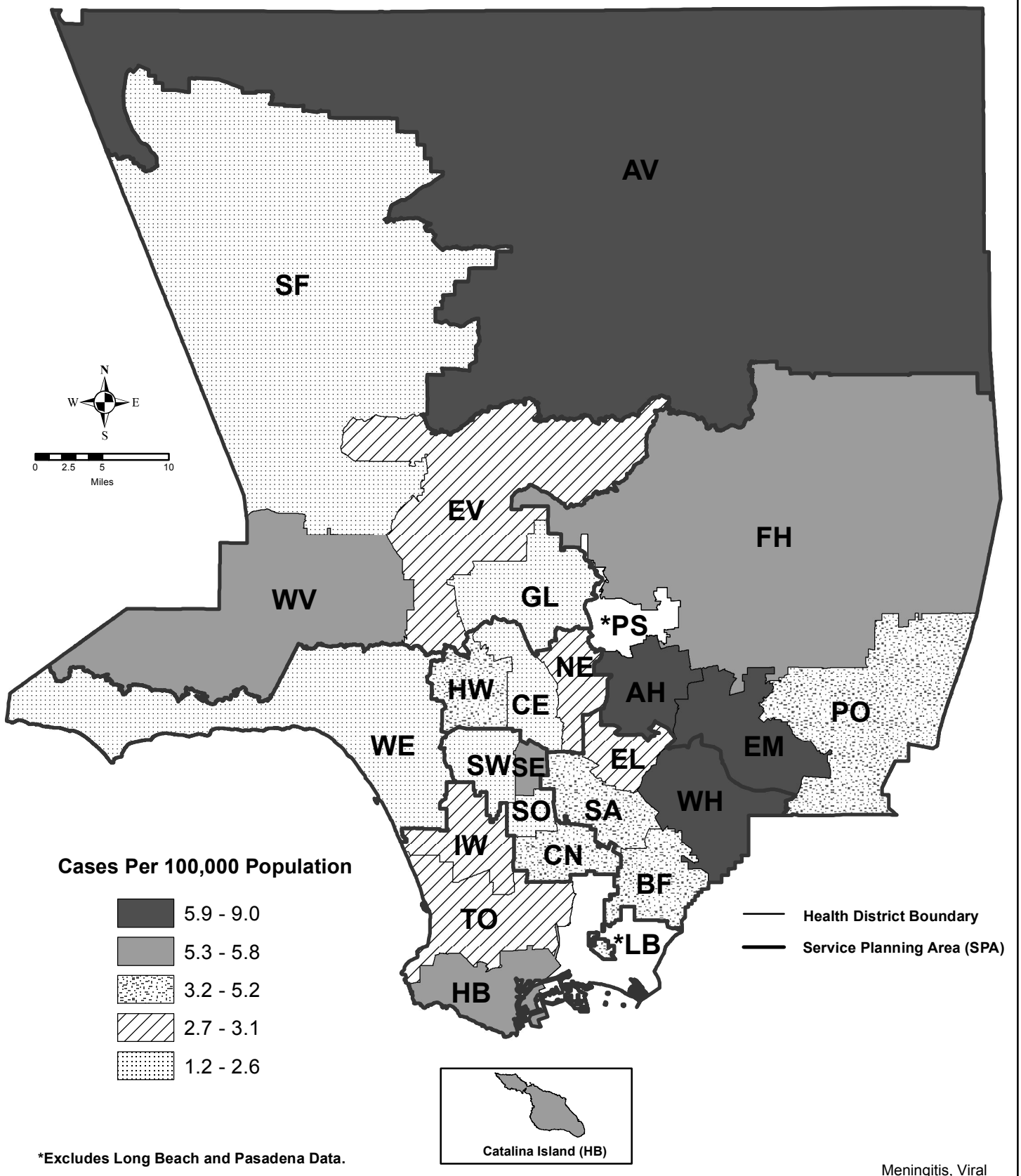


Figure 6. Percent Cases of Viral Meningitis by Etiology, LAC, 2014 (N=400)



Map 9. Meningitis, Viral
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	11
Annual Incidence[a]	
LA County	0.12
California[b]	0.15
United States[b]	0.14
Age at Diagnosis	
Mean	38.8
Median	34
Range	22–62 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

DESCRIPTION

Meningococcal disease (MD) occurs most often as meningitis, cerebrospinal fluid (CSF) infection, or meningococcemia, a bloodstream infection. 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. Symptoms include sudden onset of fever, headache, nausea, vomiting, stiff neck, petechial rash and lethargy and can progress to overwhelming sepsis, shock and death within hours. Despite effective antibiotic therapy, mortality rates are between 10% and 15%. Long-term sequelae are significant neurologic or orthopedic complications (deafness or amputation). This disease affects all age groups and historically occurred most often in infants. Of the 13 serogroups, A, B, C, Y, and W-135 are responsible for causing nearly all cases of MD.

For surveillance, the LAC DPH defines reports of invasive MD 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 LAC DPH. All cases are investigated by public health nurses who complete a standardized case report. In December 2012, a supplemental form documenting additional risk factors was added to assess 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]

Four vaccines are available in the US that protect against serogroups A, C, Y, and W-135. A quadrivalent unconjugated polysaccharide meningococcal vaccine (MPSV4) 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 and MenACWY-CRM, 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 MD. 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, has been licensed for infants 6 weeks to 18 months old, but only protects against serogroups C and Y disease.[3] In 2014, a serogroup B vaccine, MenB-FHbp, was approved for persons 10 through 25 years of age.[4]

1 Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Meningococcal Disease (Neisseria meningitidis), 2010 Case Definition. 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.
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.
4 Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Use of Serogroup B Meningococcal Vaccines in Persons Aged ≥10 Years at Increased Risk for Serogroup B Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2015. 12 Jun 2015, 64 (22): 608-11.

In addition to ACIP recommended groups, beginning 2014 DPH recommends meningococcal vaccination for MSM at increased risk for IMD. The vaccine should be offered to:

- All HIV-infected gay/MSM
- Gay/MSM, regardless of HIV status, who regularly have close or intimate contact with multiple partners or who seek partners through the use of digital applications ("apps"), particularly those who share cigarettes or marijuana or use illegal drugs.

Antimicrobial chemoprophylaxis of close contacts of sporadic cases of meningococcal disease remains the primary means for prevention of MD among close contacts, who include: a) household members, b) daycare center contacts, and c) anyone directly exposed to the patient's oral secretions (e.g., through kissing, mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management). Because the rate of secondary disease for close contacts is highest during the first few days after onset of disease in the primary patient, antimicrobial chemoprophylaxis should be administered as soon as possible (ideally within 24 hours after the case is identified). Conversely, chemoprophylaxis administered >10 days after onset of illness in the index case-patient is probably of limited value. Prophylactic treatment and follow-up of close contacts are routinely handled by the LAC DPH Community Health Services.

2014 TRENDS AND HIGHLIGHTS

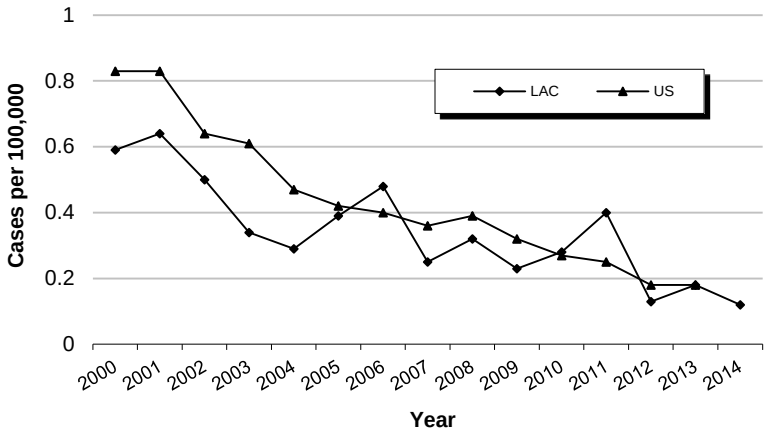
- The incidence of MD in LAC has followed the national incidence for the past decade, and has decreased from a peak of 0.64 cases per 100,000 in 2001 to 0.12 cases per 100,000 in 2014 (Figure 1). In fact, LAC documented its lowest incidence and case count in 2014 with only 11 cases.
- There were no cases reported among persons less than 22 years old in 2014. The highest proportion of cases (55%) occurred among those 15 to 34 years old (Figure 2). Traditionally, the peak incidence of MD had occurred among infants <1 year old. However, in LAC there have been no cases of MD in children <1 year old since 2010 and no cases in children 1 year old through 14 years old since 2011.
- The onset of disease by month followed the typical seasonal trend for MD of peaking in the winter season (January). The highest numbers of cases usually occurs in January and February with very low or no cases in the summer. However, LAC has experienced atypical seasonality in the past five years as shown in the five-year average (Figure 4).
- All cases except one (91%) were culture-confirmed: 6 (55%) were cultured from blood, one from (9%) from cerebrospinal fluid (CSF), two from blood and CSF (18%) and one from synovial fluid (7%). The single case not culture-confirmed was diagnosed by PCR and was classified as probable MD. All cases, including those diagnosed by PCR, had serogroup identified; 4 (36%) were serogroup C, 4 (36%) were serogroup B, and 3 (27%) were serogroup Y (Figure 6). One of the serogroup B isolates was identified by PCR. This is the largest percentage of serogroup B cases LAC has documented in the past few years.
- The case fatality rate, 27% (n=3), is much higher than what has been usually recorded for LAC. Two fatalities were due to serogroup C and one to serogroup Y disease.
- An increase of MD among MSM occurred beginning December 2012. An additional 6 cases were added in 2014 for a total of 13 between October 2012 and September 2014. Due to increases in fatalities and HIV co-morbid cases, among other factors, LAC DPH recommended vaccination against MD among certain risk groups in the MSM community beginning April 2014 (see Special Studies Report for full details).

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=26)			2011 (N=37)			2012 (N=12)			2013 (N=17)			2014 (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	2	7.7	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	2	7.7	-	1	2.7	-	0	-	-	0	-	-	0	-	-
5-14	1	3.8	-	1	2.7	-	0	-	-	1	5.9	-	0	-	-
15-34	8	30.8	-	12	32.4	-	4	33.3	-	7	41.2	-	6	54.5	-
35-44	4	15.3	-	10	27.0	-	0	-	-	3	17.9	-	1	9.1	-
45-54	5	19.2	-	3	8.1	-	2	16.7	-	2	11.8	-	3	27.3	-
55-64	1	3.8	-	5	13.5	-	2	16.7	-	1	5.9	-	1	9.1	-
65+	3	11.5	-	5	13.5	-	4	33.3	-	3	17.6	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	3.8	-	4	10.8	-	2	16.7	-	0	0.0	-	2	18.2	-
Black	7	26.9	-	12	32.4	-	2	16.7	-	4	23.5	-	2	18.2	-
Hispanic	11	42.3	-	11	29.7	-	5	41.7	-	6	35.3	-	6	54.5	-
White	7	26.9	-	10	27.0	-	3	25.0	-	6	35.3	-	1	9.1	-
Other	0	-	-	0	0.0	-	0	0.0	-	1	5.9	-	0	0.0	-
Unknown	0	-	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
SPA															
1	1	3.8	-	1	2.7	-	0	0.0	-	0	0.0	-	0	0.0	-
2	3	11.5	-	9	24.3	-	2	16.7	-	5	29.4	-	3	27.3	-
3	3	11.5	-	2	5.4	-	0	0.0	-	1	5.9	-	1	9.1	-
4	2	7.7	-	5	13.5	-	5	41.7	-	4	23.5	-	6	54.5	-
5	2	7.7	-	1	2.7	-	2	16.7	-	2	11.8	-	0	0.0	-
6	6	23.1	-	9	24.3	-	3	25.0	-	1	5.9	-	0	0.0	-
7	3	11.5	-	4	10.8	-	0	-	-	3	17.9	-	0	0.0	-
8	6	23.1		6	16.2	-	0	-	-	1	5.9	-	1	9/1	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

*Rates have not been calculated because there are too few cases to unreliable findings.

Figure 1. Incidence Rates* of Meningococcal Disease LAC and US, 2000-2014**



*Rates calculated based on less than 19 cases or events are considered unreliable.
**US rates for 2014 unavailable as of November 2015.

Figure 2. Meningococcal Disease Cases by Age Group, LAC, 2014 (N=11)

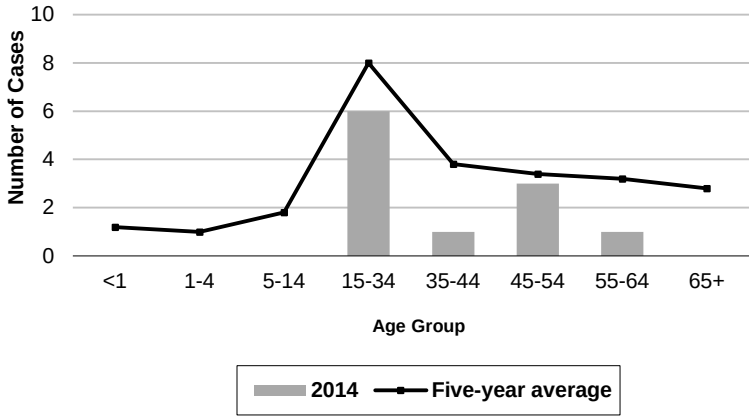


Figure 3. Meningococcal Disease Cases by Race/Ethnicity, LAC, 2010-2014

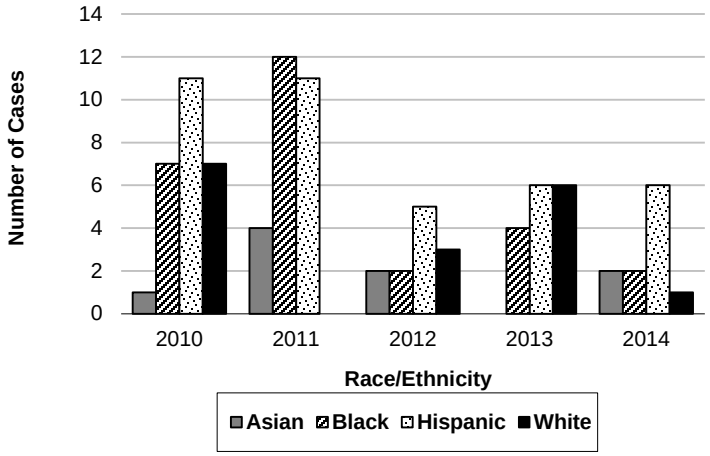


Figure 4. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2014 (N=11)

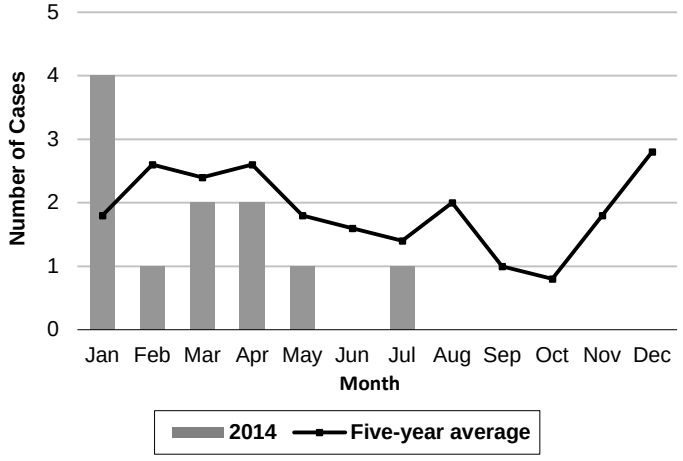


Figure 5. Meningococcal Disease Cases by SPA
LAC, 2014 (N=11)

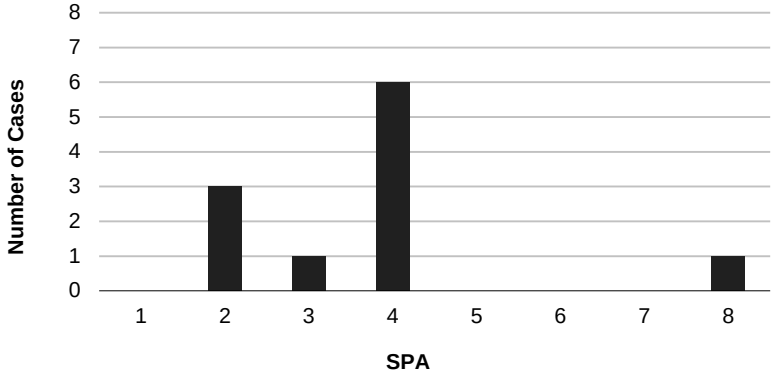
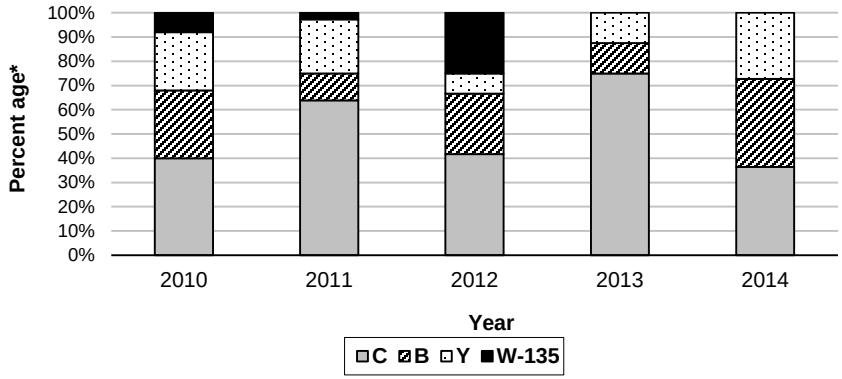


Figure 6. Meningococcal Disease by Serogroup*
LAC, 2010–2014



*Among cases with known serogroup.

MOSQUITO-BORNE DISEASES OF TRAVELERS

CRUDE DATA			
Diseases	Malaria	Dengue	Chikungunya
Number of Cases	21	31	50
Annual Incidence[a]			
LA County	N/A	N/A	N/A
California	N/A	N/A	N/A
United States	N/A	N/A	N/A
Age at Diagnosis			
Mean	28.8	42.1	49.8
Median	24	47.5	53
Range	0-73 years	5-67 years	4-84 years

[a] Not applicable as there is no local risk.

DESCRIPTION

Overview

Malaria, dengue, and chikungunya are the three most frequent mosquito-borne diseases affecting travelers in LAC. These diseases are mainly found in the tropical and subtropical areas of the world. Though the mosquito vectors for all three diseases have been found in LAC, local transmission has not been documented in recent history. These pathogens are not currently found in mosquitoes in LAC. Malaria is transmitted by the bite of an infected *Anopheles* mosquito. Both dengue and chikungunya are transmitted by the mosquitoes *Aedes aegypti and A. albopictus*.

The best methods to prevent infection from mosquito-borne diseases is to eliminate mosquito breeding sources and avoid mosquito bites. People visiting or residing in regions where there is risk of mosquito-borne disease should take precautions by using mosquito repellants and wearing protective clothing as well as avoiding outdoor activities between dusk and dawn when mosquito activity is at its peak. Travelers to countries where malaria is endemic should additionally take precautions by taking the appropriate antimalarial prophylaxis as prescribed and utilizing bednets.

Unlike malaria, there is no prophylactic medicine or vaccine available to prevent dengue and chikungunya.

Malaria

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.

Malaria 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.

Dengue

Dengue, a flavivirus related to the West Nile virus (WNV), is the most common vector-borne viral disease in the world. Infection with dengue virus has a range of clinical presentations from asymptomatic infection to severe systemic febrile illness. Treatment is supportive.

No cases of dengue acquired within the continental US were reported between 1946 and 1980. Since 1980, locally-acquired outbreaks have been documented in Texas, Hawaii, and most recently in Florida in 2009. Concern for the reemergence of dengue in Florida as well as

increases in dengue among returning US travelers over the past 20 years has prompted heightened vigilance among the medical and public health community.

Dengue was added to the list of Nationally Notifiable Infectious Conditions in 2009 though it has been a notifiable condition in California and LAC for several decades. Confirmation of dengue requires a clinically compatible case be laboratory confirmed with testing of paired serological specimens or molecular testing. Probable cases require only a single serologically positive specimen.

Chikungunya

The most common symptoms of chikungunya virus infection are fever and joint pain. Other symptoms may include headache, muscle pain, joint swelling, or rash. Treatment is supportive.

Outbreaks have occurred in countries in Africa, Asia, Europe, and the Indian and Pacific Oceans. In late 2013, chikungunya virus was found for the first time in the Americas on islands in the Caribbean. On July 16, 2014, the first locally acquired cases in the continental US were identified in Florida.

For purposes of surveillance, confirmation of chikungunya requires a clinically compatible case be laboratory confirmed with testing of paired serological specimens or molecular testing. Probable cases require only a single serologically positive specimen.

2014 TRENDS AND HIGHLIGHTS

Malaria

- The number of reported malaria cases has been declining in LAC since it peaked in 2003 with 60 cases (Figure 1). Though there were more cases in 2014 (n=21) than 2013 (n=16) (Figure 1), the number of cases has remained relatively similar over the last five years.
- All cases with known travel history (n=18) reported recent travel to a country with endemic malaria (Table 1). Aside from one who travelled to Indonesia, all travelled to or from countries in Africa (n=17, 81%). The limited diversity in travel destinations coincides with the limited diversity of malaria species identified. Nearly two-thirds of cases (71%) were due to *P. falciparum*. Aside from one with unknown travel history, all falciparum malaria cases recently traveled to Africa.
- Among the cases who were not recent immigrants, 7 (35%) used prophylaxis during their travels (Figure 3). Two of the 7 (29%) reported completing their regimen. One case was a recent immigrant from Nigeria.

Dengue

- Of the 32 reported cases of dengue, 7 were confirmed and 25 were probable. Past annual summaries have documented only 1 to 2 confirmed cases per year. The increase in documented cases is likely attributable to the emergence of chikungunya in the Americas in 2014, along with an increase in laboratory evaluation for both dengue and chikungunya infection. Because dengue and chikungunya are clinically and epidemiologically similar, it is recommended that dengue also be tested when diagnostic tests are conducted for chikungunya.
- Cases reported recent travel to countries endemic for dengue including those in Central and South America, the South Pacific, and the Philippines. The most frequent travel destination was Mexico (25%), followed by El Salvador (19%) (Table 1).

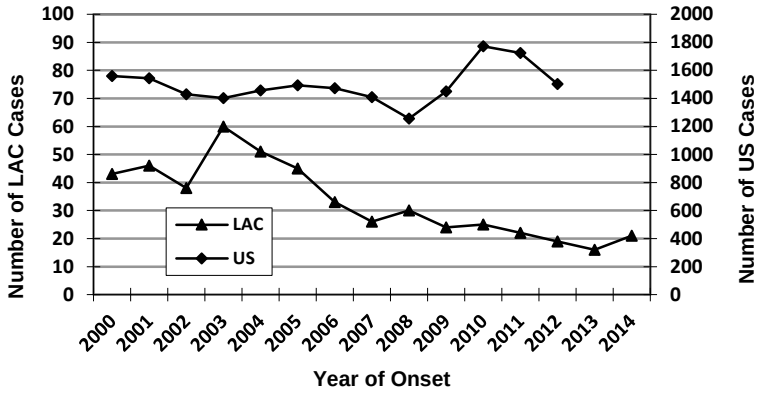
Chikungunya

- The 50 reported cases of chikungunya comprised of 17 confirmed and 33 probable cases. The first case in 2014 had onset in May and reported recent travel to the Caribbean. Prior to 2014, the last reported case of chikungunya in a LAC resident occurred in 2007 in a traveler to India. A large outbreak on the Asian subcontinent was occurring during that time.
- Most cases (62%) reported travel to El Salvador (Table 1). The remaining cases traveled to other countries in Central America, the Caribbean, South America, the South Pacific, and India. None reported travel to Mexico.
- One fatality due to chikungunya was documented, the only fatality reported in the US.

Summary

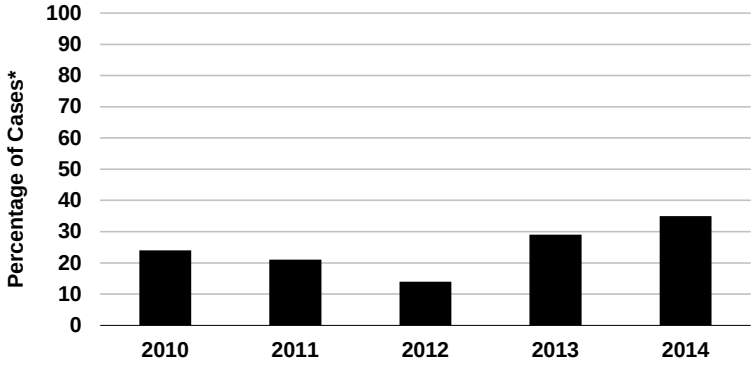
- Malaria, dengue, and chikungunya can affect patients of all ages; in 2014, the mean ages for each disease were 28.8, 42.1, and 49.8 years, respectively. The largest proportion of malaria cases by far occurred among 15-34 year old patients (48%) (Figure 4). Chikungunya presented more commonly as age increased, with the largest proportion among 55-64 year olds.
- Mosquito-borne travel-associated diseases affected mostly patients of black or Hispanic/Latino race/ethnicity. Specifically, 67% of malaria cases were black; 38% of dengue cases and 84% of chikungunya cases were Hispanic/Latino (Figure 5). This pattern is likely due to patients travelling to countries from which they or their families originate. Of malaria patients with known reasons for travel, 50% travelled to visit friends and family.
- Cases of malaria and dengue occurred in all months of the year, with slight increases during the summer months of July and August, likely a result of peak travel among LAC residents (Figure 6). Chikungunya increased from its first detection in May to a peak of 17 cases in October, following the spread of the chikungunya outbreak in the Americas.
- Most cases of the *Aedes*-transmitted infections, dengue and chikungunya, reported travel to Latin America and the Caribbean, whereas most cases of malaria reported travel to Africa (Table 1). The countries/regions where LAC travelers acquired their infections are not only a reflection of their social ties to these areas but also current outbreaks and levels of endemicity of each disease. Dengue endemicity is relatively widespread across tropical and subtropical areas of the world while chikungunya tends to occur in large outbreaks. Malaria has higher levels of endemicity in Africa compared to other regions where it is found.
- Local infestations of *A. aegypti* have been documented in 2014, and *A. albopictus* since 2011, in several cities in the central and eastern parts of LAC. With the vectors of dengue and chikungunya present in the county, there is heightened concern and vigilance for possible local transmission of these two diseases.

Figure 1. Number of Malaria Cases LAC and US*, 2000-2014



*US data for 2013 and 2014 not available as of November 2015.

Figure 3. Prophylaxis Use Among Malaria Cases* LAC, 2010-2014



*Among cases who were not recent refugees/immigrants to the US.

Table 1. Mosquito-Borne Diseases of Travelers by County of Travel LAC, 2014

Continent/Area	Country of Origin	Disease			
		Dengue	Chikungunya	Malaria	Total Cases
Central and South America	El Salvador	6	31	0	37
	Mexico	8	0	0	8
	Honduras	4	3	0	7
	Guatemala	4	2	0	6
	Brazil	3	0	0	3
	Colombia	1	1	0	2
	Costa Rica	1	0	0	1
	Peru	1	0	0	1
	Guyana	0	1	0	1
	Other Central America	0	1	0	1
Africa	Nigeria	0	0	7	7
	Ghana	0	0	3	3
	Ivory Coast	0	0	3	3
	Cameroon	0	0	2	2
	Sierra Leone	0	0	1	1
	Uganda	0	0	1	1
Caribbean	Jamaica	0	4	0	4
	Puerto Rico	0	3	0	3
	St. Bart's	1	0	0	1
	Dominica	0	1	0	1
	Dominican Republic	0	1	0	1
	Haiti	0	1	0	1
Asia and South Pacific	Philippines	1	0	0	1
	Tahiti	1	0	0	1
	Tikehau	1	0	0	1
	India	0	1	0	1
	Indonesia	0	0	1	1

Figure 4. Mosquito-Borne Disease of Travelers by Age Group LAC, 2014

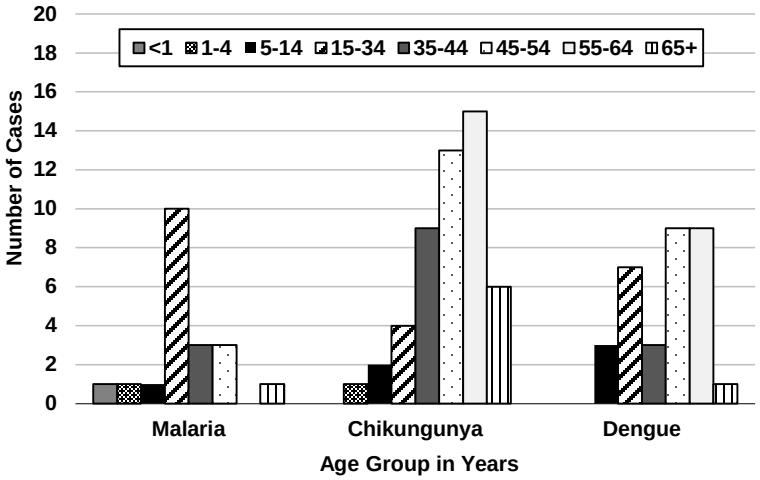


Figure 5. Mosquito-Borne Diseases of Travelers by Race/Ethnicity LAC, 2014

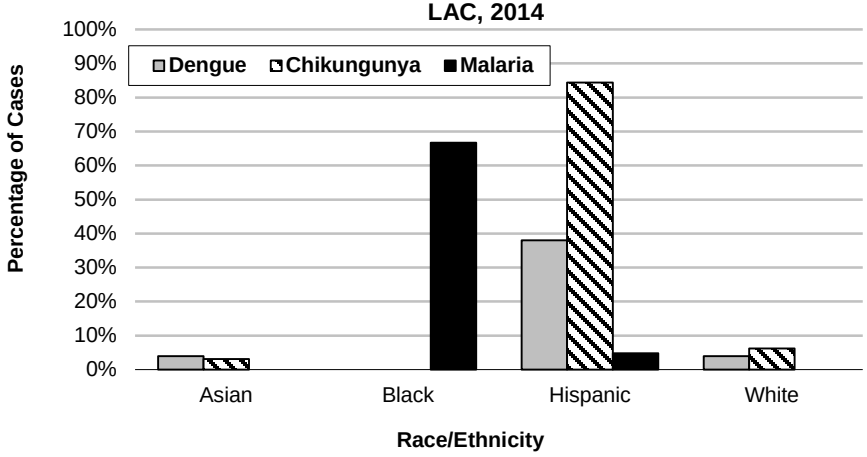
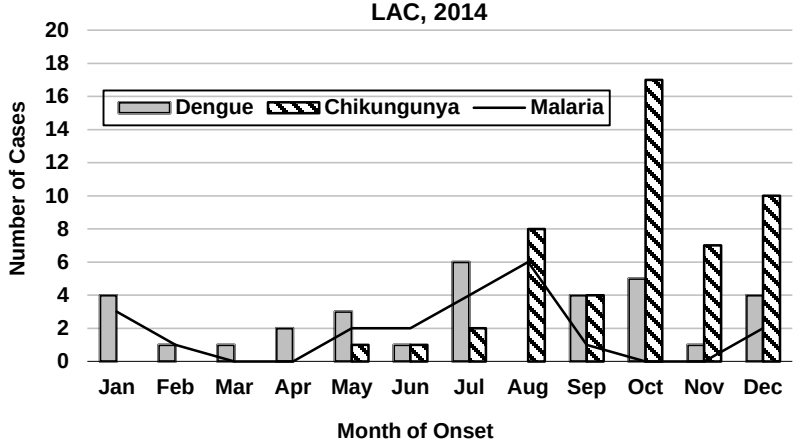


Figure 6. Mosquito-Borne Diseases of Travelers, by Month of Onset LAC, 2014



MUMPS

CRUDE DATA	
Number of Cases	10
Annual Incidence[a]	
LA County[b]	0.11
California[c]	0.10
United States[c]	0.38
Age at Diagnosis	
Mean	34 years
Median	36 years
Range	10–69 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 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 (via an RT-PCR test).

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. In addition, women should avoid becoming pregnant for 28 days after MMR vaccination.

2014 TRENDS AND HIGHLIGHTS

- In 2012, the laboratory criteria used in the classification of a confirmed and probable case of mumps was 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, 2013 and 2014 are included in the analysis to be comparable to previous years.
- Of the ten reported mumps cases in 2014, two (20.0%) were classified as confirmed and eight (80.0%) as probable. Five of the probable cases were laboratory confirmed by a positive IgM titer. The remaining three probable cases were never tested but were epidemiologically linked to a laboratory-confirmed case. Both cases classified as confirmed had an RT-PCR positive lab result. The number of reported mumps cases in 2014 is similar to the average annual count reported since 2006 (Figure 2).
- Four cases in 2014, including one confirmed case, were epidemiologically linked. All 4 cases

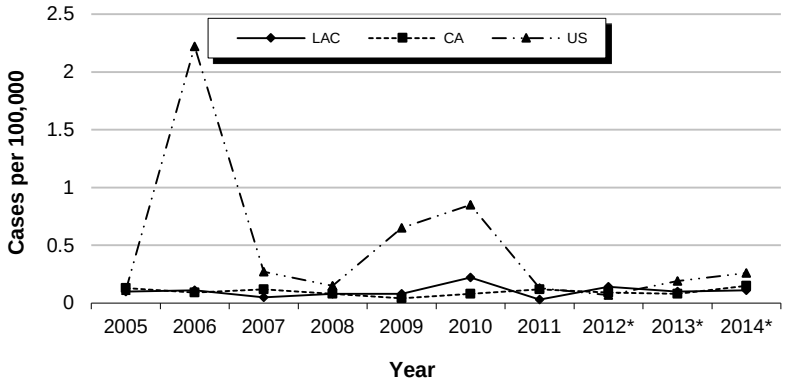
- in this cluster visited a same venue at the same time and developed symptoms concurrently during the expected time frame after exposure. The index case who may have exposed this cluster was never identified. The last cluster of cases occurred in 2012 and was the result of a woman infecting her husband and child and the child then infecting a fellow classmate.
- All of the 2014 cases were eligible for vaccination, but none of the cases were known to be up-to-date according to the immunization recommendation for their age (Table 2). Six cases self-reported a history of receiving immunizations; however, none of the cases were able to provide documentation of their immunizations. One case was unvaccinated due to personal beliefs. The remaining three cases had an unknown vaccination status.
- Although persons born prior to 1957 are generally considered to be immune to mumps, one of the cases was in the 65 and older age group (Figure 3). At least one mumps case born before 1957 has been reported annually since 2011.
- Half of the 2014 cases were African-American/Black. This is attributed to the cluster of cases that were previously mentioned to be epidemiologically linked. Whites have comprised the majority of the mumps cases reported from 2010-2012, but their proportion declined in 2013 to 33%.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=20)			2011 (N=3)			2012 (N=13)**			2013 (N=9)**			2014 (N=10)**		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
1-4	1	5.0	0.2	0	0.0	-	3	23.1	0.6	3	23.1	0.6	0	0.0	-
5-14	8	40.0	0.6	0	0.0	-	1	7.7	0.1	1	7.7	0.1	1	10.0	0.1
15-34	8	40.0	0.3	2	66.7	0.1	2	15.4	0.1	2	15.4	0.1	3	30.0	0.1
35-44	0	0.0	-	0	0.0	-	2	15.4	0.2	2	15.4	0.2	5	50.0	0.4
45-54	2	10.0	0.2	0	0.0	-	1	0.0	0.1	1	0.0	0.1	0	0.0	-
55-64	1	5.0	0.1	0	0.0	-	2	15.4	0.2	2	15.4	0.2	0	0.0	-
65+	0	0.0	-	1	33.3	0.1	2	15.4	0.2	2	15.4	0.2	1	10.0	0.1
Unknown	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0		0	0.0	-
Race / Ethnicity															
Asian	0	0.0	-	0	0.0	-	2	15.4	0.2	2	15.4	0.2	1	10.0	0.1
Black	1	5.0	0.1	0	0.0	-	0	0.0	-	0	0.0	-	5	50.0	0.6
Hispanic	3	15.0	0.1	0	0.0	-	1	7.7	-	1	7.7	-	1	10.0	0.0
White	16	80.0	0.6	3	100	0.1	10	76.9	0.4	10	76.9	0.4	2	20.0	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	10.0	-
SPA															
1	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	1	10.0	0.3
2	4	20.0	0.2	0	0.0	-	4	30.8	0.2	4	30.8	0.2	1	10.0	0.0
3	1	5.0	0.1	1	33.3	0.1	1	7.7	0.1	1	7.7	0.1	1	10.0	0.0
4	7	35.0	0.6	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-
5	2	10.0	0.3	1	33.3	0.2	5	38.5	0.8	5	38.5	0.8	0	0.0	-
6	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0	-	3	30.0	0.3
7	0	0.0	-	0	0.0	-	1	7.7	0.1	1	7.7	0.1	1	10.0	0.1
8	6	30.0	0.6	1	33.3	0.1	2	15.4	0.2	2	15.4	0.2	3	30.0	0.3
Unknown	0	0.0	-	0	0.0	-	0	0.0	-	0	0.0		0	0.0	-

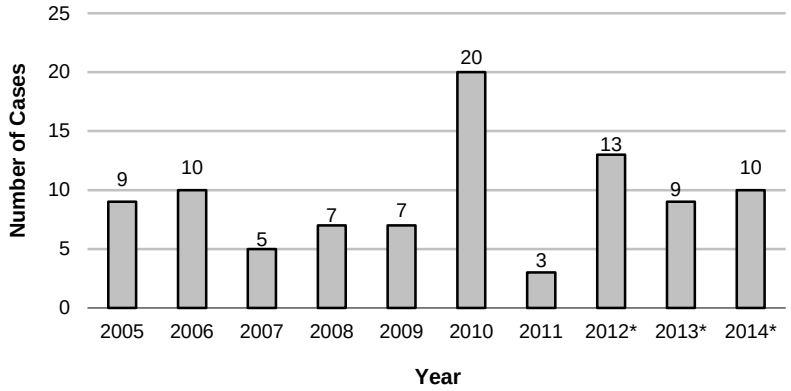
*Rates calculated based on less than 19 cases or events are considered unreliable. A zero rate is reported with a dash ("-").
**Includes newly defined probable cases.

Figure 1. Incidence Rates of Confirmed Mumps LAC, CA and US, 2005-2014*



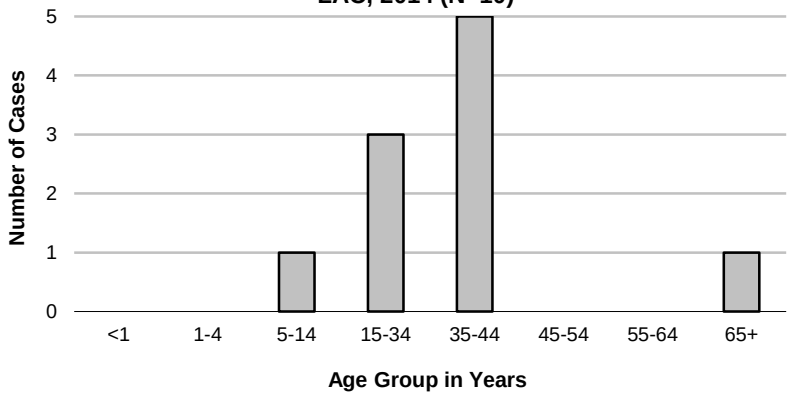
*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

Figure 2. Reported Confirmed Mumps Cases LAC, 2005-2014*



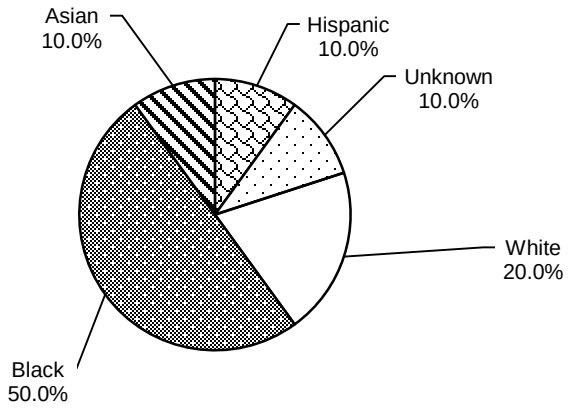
*Confirmed and probable case classifications were revised in 2012, so probable cases are included in the analysis to be comparable to previous years.

Figure 3. Reported Confirmed* Mumps Cases by Age Group LAC, 2014 (N=10)



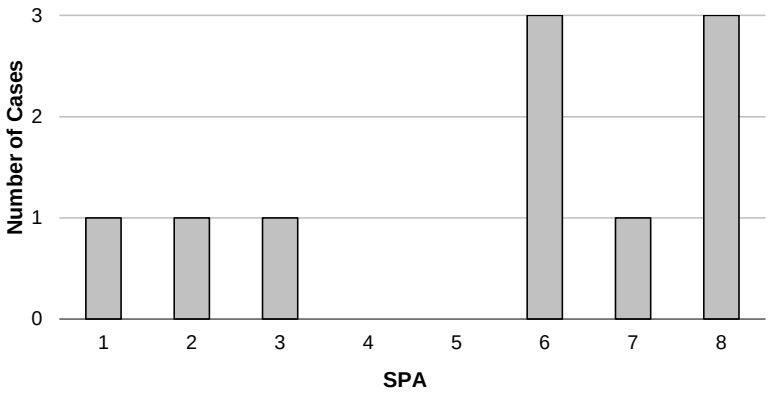
*Includes probable cases.

Figure 4. Percent Cases of Confirmed* Mumps by Race/Ethnicity LAC, 2014 (N=10)



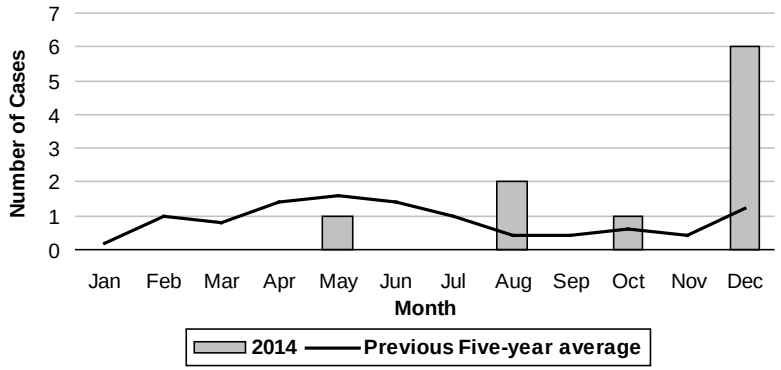
*Includes probable cases.

Figure 5. Reported Confirmed* Mumps Cases by SPA
LAC, 2014 (N=10)



*Includes newly defined probable cases.

Figure 6. Reported Confirmed* Mumps Cases by Month of Onset
LAC, 2014 (N=10) vs. Previous Five-Year Average



*Includes newly defined probable cases.

Table 2. Vaccination Status of Reported Confirmed* Mumps Cases LAC, 2014

	No.	%
Reported Cases	10	100%
Cases Too Young to be Vaccinated†	0	0%
Cases Eligible for Vaccination and Up-to-Date‡	0	0%
Cases Eligible for Vaccination and Not Up-to-Date§	10	100%
Personal Beliefs Exemption School Vaccine Waivers Among Cases Age <18 Years (n=2)	1	50%

* Includes probable cases.
† Cases less than 12 months of age.
‡ Cases 12 months of age and older who are up-to-date with mumps immunization for their age.
§ Cases 12 months of age and older who are not up-to-date with mumps immunization for their age. Includes cases that have unknown immunization status, have personal belief exemption school waivers, or have no valid documentation of receiving mumps vaccines prior to disease onset.

Table 3. Reported Confirmed* Mumps Cases LAC 2014* (N=64) vs. Previous 3-Year Average

	2014	Previous 5-Year Avg.
Total Cases	10	8.3
Age at Onset (yrs.)		
- Mean	34.0	36.4
- Median	36.0	36.0
- Range	10.0–69.0	1.0–73.0

*Because confirmed and probable case classifications were revised in 2012, probable cases are included in this analysis to be comparable to previous years.

PERTUSSIS (WHOOPING COUGH)

CRUDE DATA	
Number of Cases	1,558
Annual Incidence[a]	
LA County	16.48
California[b]	22.48
United States[b]	10.34
Age at Diagnosis	
Mean	11.5 years
Median	10.0 years
Range	Birth – 80 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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.

2014 TRENDS AND HIGHLIGHTS

- The epidemiology of pertussis exhibits cyclical peaks in cases every 3-5 years. In 2010, Los Angeles County (LAC) experienced a pertussis resurgence that had not been observed in over 50 years. As part of a state-wide epidemic, the LAC incidence in 2014 surpassed the 2010 incidence by 60%. A total of 1,558 LAC pertussis cases (1,420 confirmed, 138 probable) (16.48 cases per 100,000) with illness onset in 2014 was reported. A total of 11,203 cases was reported in California in 2014 with a state rate of 29.3 cases per 100,000. Compared to 2013, LAC experienced over a 400% increase in cases in 2014 (Figures 1 and 2).
- As has been the trend, an increasing number of 2014 cases was identified in February and peaked in the Summer. The peak that occurred in June 2014, with over 225 reported cases, coincided with the state-wide declaration of the pertussis epidemic by the California Department of Public Health. Over 200 cases continued to be reported in July 2014. From February to July, almost 60% of the cases were reported (Figure 7). During this same period, a total of three large-scale school-related outbreaks were reported. In addition to these outbreaks, clusters of cases were also reported during this period in a local Boy Scout Troop and eleven other schools. In prior years, pertussis activity has declined in the latter half of the year (Figure 7). However, in 2014, slight peaks were observed in October and December. The increase in cases in these months is attributable to the school outbreaks/clusters that continued to occur when school resumed from summer break. Four school outbreaks occurred during the Fall, and clusters of cases were also reported within twelve other schools. This marks the third year in a row in which multiple pertussis school outbreaks have occurred in the Fall season. In contrast, prior to Fall 2012, which includes the 2010 epidemic, there were no outbreaks of pertussis reported in schools.
- Similar to previous years, LAC infants less than one year of age experienced the highest incidence rate (211.4 cases per 100,000) (Figure 3). An incidence level this high was last observed in the previous pertussis 2010 epidemic. Although

incidence rates for infants are similar between the two epidemics, the proportion of cases among infants in 2014 (16.1%) is about half of the proportion of cases in 2010. Since 2011, infants have continued to account for a smaller proportion of annual reported cases. However, pertussis morbidity in infants, who are too young to be vaccinated, remains severe as there was one LAC death reported during the 2014 epidemic in an infant less than 4 weeks old. The highest combined proportion (63.5%) of 2014 cases was reported in the 5-14 and 15-34 year age groups, primarily due to the waning immunity of the vaccine. In comparison to 2010, these age groups accounted for 43.8% of the cases. Beginning in 2012, the 5-14 and 15-34 year age groups on average have accounted for 56.5% of the annual number of cases. The less than 18 year old age group accounted for 1,405 (90.2%) cases in 2014. (Figure 8).

- As has been the trend, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5). All of the race/ethnicity groups had an age-adjusted incidence rate in 2014 that was greater than the previous five year average. The increase in the 2014 age-adjusted incidence rates for all of the race/ethnicity groups can be attributed to the pertussis epidemic impacting all the groups as was observed in the 2010 epidemic. The 'Other' race category was comprised primarily of multi-race cases. An incidence rate for this race category was not provided for the purposes of this report.
- All the SPAs experienced at least a four-fold increase in 2014 incidence in comparison to 2013. The highest incidence rate was observed in SPA 8 (21.3 cases per 100,000). In 2014 and for the fifth year in a row, SPA 2 had the highest proportion of reported cases (23.9%). SPA 2 also tied with SPA 3 as the third highest incidence rate amongst all SPAs (17.0 cases per 100,000) (Figure 6). Of the 31 outbreaks/clusters reported in schools in 2014, eleven (35%) were located in SPA 2 which contributed to the high SPA 2 case numbers.
- Due to these school-related outbreaks/clusters, over 50% of cases that resided in SPA 2 (n=87) and SPA 3 (n=60) were epidemiologically linked. For SPA 2 and 3 combined, 78% (n=115) of the cases with links to other cases were less than eighteen years old. However, because of the scale of the 2014 epidemic, all the SPAs had epidemiological linkages. In contrast, in 2013, only five out of the eight SPAs reported cases having epidemiological linkages to other cases.
- Of the total 1,558 cases, only 4.2% (n=66) were too young to be vaccinated. An additional 563 cases (36.1%) were not up-to-date with the immunization recommendations for their age and could have benefited from vaccination. In addition, 3.9% of the cases less than 18 years of age had personal belief vaccine exemption school waivers, which is a decrease in the rising trend observed since 2011. However, the proportion is similar to the value reported in 2010 (4.2%) (Figure 8). This is due to the large-scale spread of the epidemic across the County.

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=972)			2011 (N=453)			2012 (N=154)			2013 (N=296)			2014 (N=1,558)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	273	28.1	227.2	139	30.7	117.0	30	19.5	25.2	59	19.9	48.8	250	16.1	211.4
1-4	158	16.2	32.6	73	16.1	15.1	22	14.3	4.6	33	11.2	6.8	219	14.1	44.8
5-14	304	31.3	24.6	133	29.4	11.0	53	34.4	4.4	88	29.7	7.3	664	42.6	54.9
15-34	122	12.5	4.4	48	10.6	1.7	23	14.9	0.8	75	25.3	2.6	325	20.9	11.5
35-44	40	4.1	3.0	26	5.7	2.0	8	5.2	0.6	15	5.1	1.1	41	2.6	3.1
45-54	28	2.9	2.2	14	3.1	1.1	6	3.9	0.5	13	4.4	1.0	26	1.7	2.0
55-64	24	2.5	2.5	9	2.0	0.9	6	3.9	0.6	6	2.0	0.6	18	1.2	1.7
65+	23	2.4	2.3	11	2.4	1.0	6	3.9	0.5	7	2.4	0.6	15	0.9	1.3
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	32	3.3	2.4	17	3.8	1.3	8	5.2	0.6	8	2.7	0.6	58	3.7	4.2
Black	50	5.1	6.5	24	5.3	3.1	10	6.5	1.3	5	1.7	0.6	76	4.9	9.7
Hispanic	655	67.4	14.7	286	63.1	6.4	71	46.1	1.6	146	49.3	3.2	1013	65.0	22.0
White	216	22.2	8.1	110	24.3	4.1	54	35.1	2.0	129	43.7	4.9	359	23.0	13.5
Other	2	0.2	11.4	0	0.0	-	1	0.6	5.6	1	0.3	5.6	15	0.9	-
Unknown	17	1.8		16	3.5		10	6.5		7	2.4		37	2.4	
SPA															
1	19	1.9	4.9	19	4.2	4.9	7	4.5	1.8	14	4.7	3.6	63	4.0	16.0
2	209	21.5	9.8	99	21.8	4.6	43	27.9	2.0	121	40.9	5.6	373	23.9	17.0
3	147	15.1	9.2	86	19.0	5.3	25	16.2	1.5	27	9.1	1.7	279	17.9	17.0
4	162	16.7	14.5	51	11.3	4.6	18	11.7	1.6	19	6.4	1.7	129	8.3	11.2
5	57	5.8	9.0	27	6.0	4.2	22	14.3	3.4	19	6.4	2.9	74	4.8	11.3
6	158	16.3	15.8	63	13.9	6.2	10	6.5	1.0	24	8.1	2.3	165	10.6	16.0
7	129	13.3	10.0	60	13.2	4.6	16	10.4	1.2	39	13.2	3.0	243	15.6	18.5
8	90	9.3	8.5	48	10.6	4.5	13	8.4	1.2	33	11.2	3.1	231	14.8	21.3
Unknown	1	0.1		0	0.0		0	0.0		0	0.0		1	0.1	

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

**Figure 1. Incidence Rates of Pertussis
LAC, CA and US, 2005-2014**

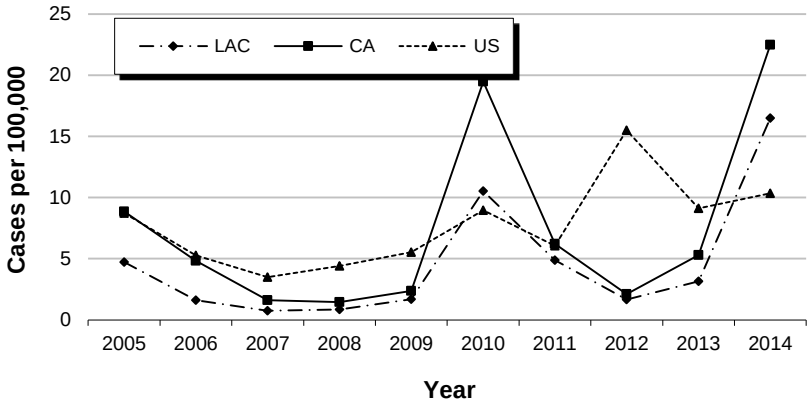


**Figure 2. Reported Cases of Pertussis
LAC, 2005-2014**

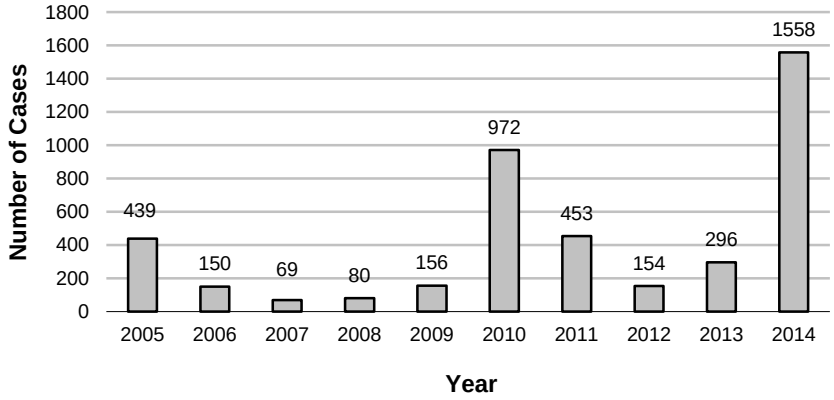


**Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2014 (N=1,558)**

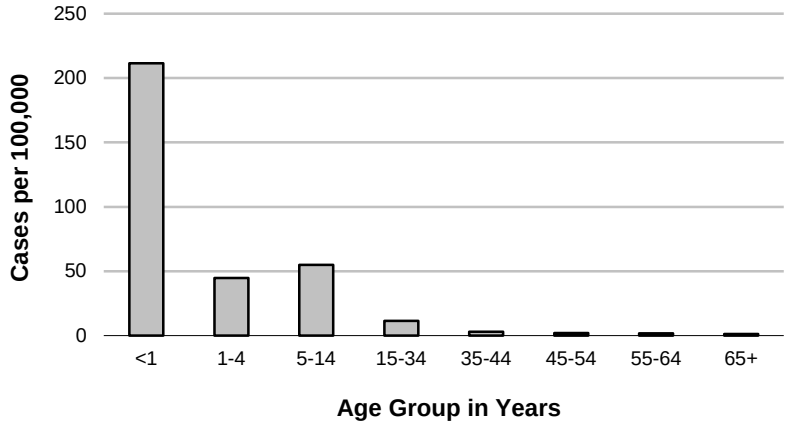
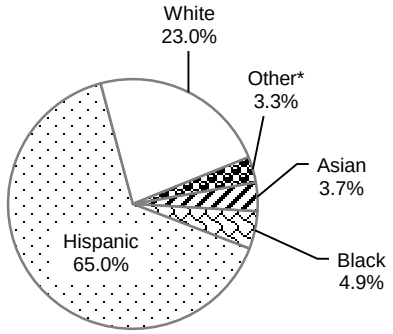
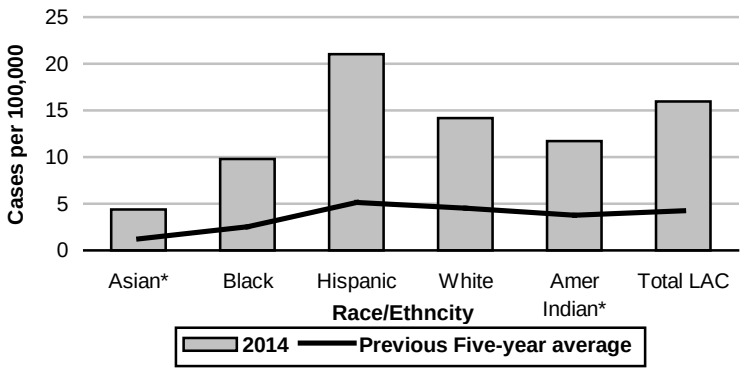


**Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2014 (N=1,558)**



*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, 2014 (N=1,558) vs. Previous Five-Year Average



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

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2014 (N=1,558)

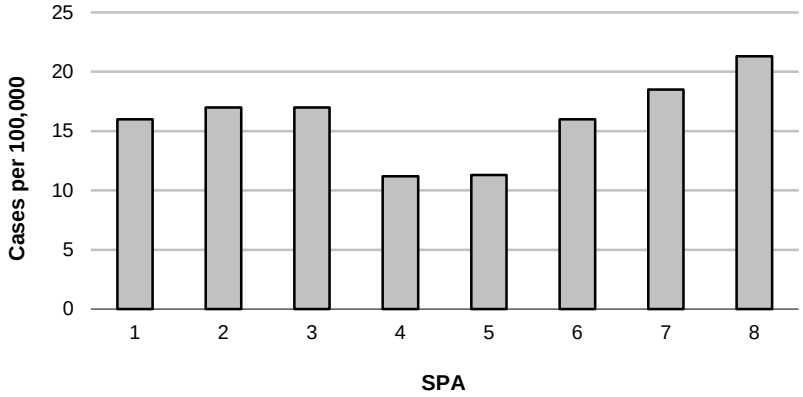


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2014 (N=1,558) vs. Previous Five-year Average

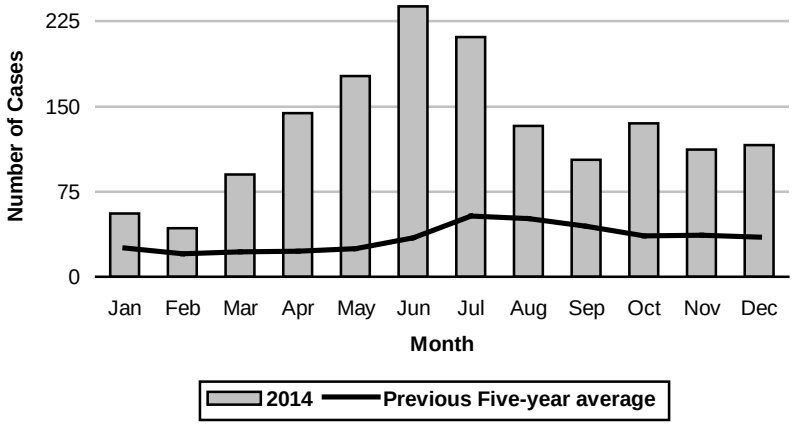
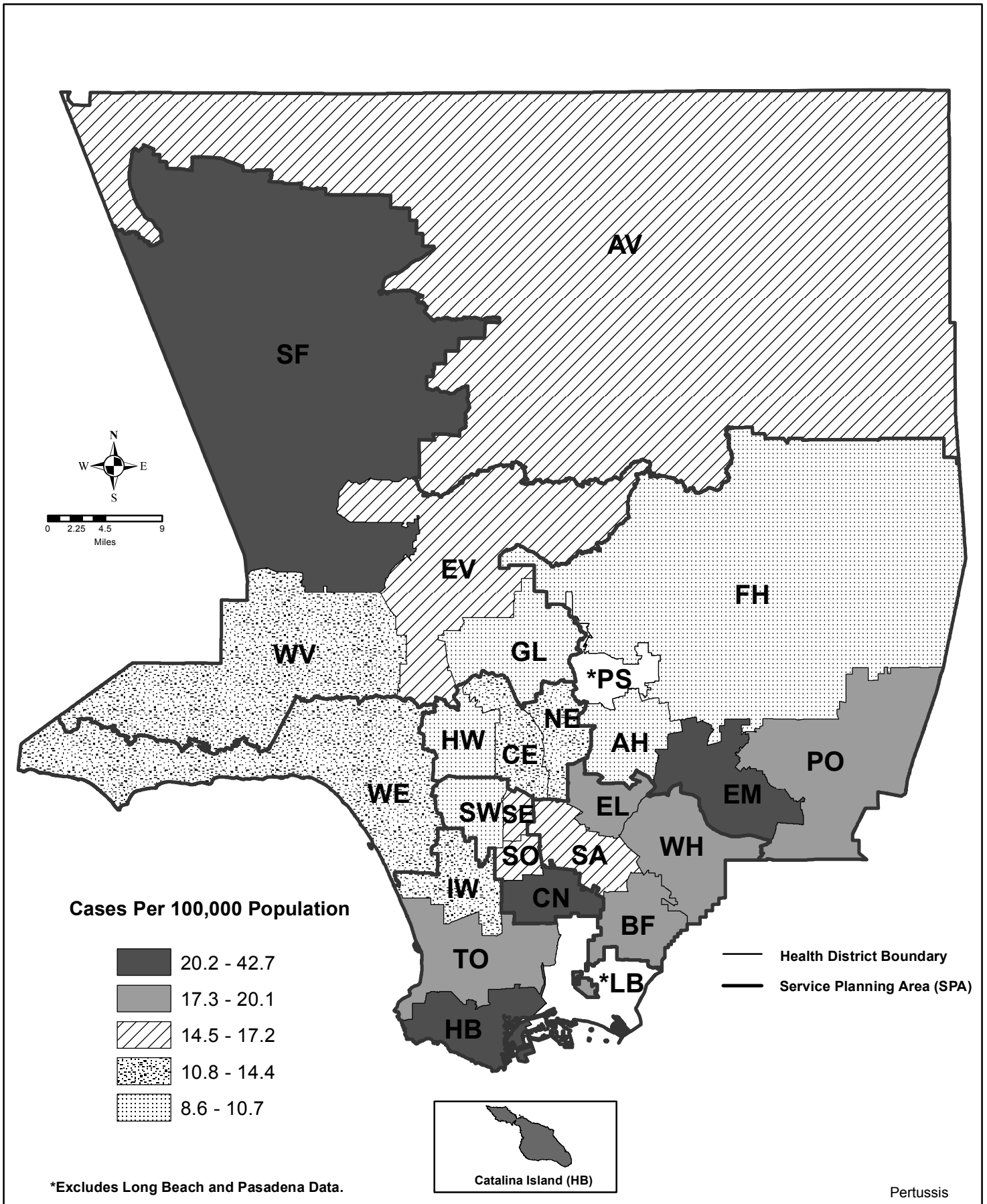


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2014

	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=1,405)
No.	1,558	66	929	563	55
%	100%	4.2%	59.6%	36.1%	3.9%

[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 10. Pertussis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	460
Annual Incidence[a]	
LA County	4.87
California[b]	N/A
United States[b]	10.7
Age at Diagnosis	
Mean	57
Median	60
Range	0–98 years

[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 (exclusion of bacteremic community acquired pneumonia) 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 tracked IPD as part of 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 *S. pneumoniae* isolate collected from a normally sterile site (e.g., blood, cerebrospinal fluid).

In 2010, 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. This has led to substantial improvements in IPD surveillance data quality.

Pneumococcal isolates from persons with IPD are sent to the LAC Public Health Laboratory for antimicrobial susceptibility, determined by disk or dilution diffusion. Minimum inhibitory concentration (MIC) breakpoints used 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 non-susceptible 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, children ≥6 years with certain risk factors for invasive pneumococcal infections, and adults 65 years and older. The 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults 65 years and older and those less than 2 years of age who are at high risk of IPD.

2014 TRENDS AND HIGHLIGHTS

- The incidence rate this year of 4.87 cases per 100,000 people was lower than the average annual incidence of 6.5 cases per 100,000 people over the past five years (range 5.4-8.0 cases per 100,000) (Figure 1) and is 15% lower than last year's rate (5.6 cases per 100,000).
- Mortality in 2014 (16.1%, n=74 deaths) was fairly consistent compared to the annual mortality during 2009-2013 which ranged from 12.8% to 17.4% among cases with known disease outcome.
- In 2014, 93% of reported cases were hospitalized, which is similar to the previous five-year average of 89%.
- Incidence rates decreased amongst all age groups, compared to the previous five-year average (Figure 2). Amongst cases <1 year old, the incidence rate decreased 37% (from 9.4 to 5.9 cases per 100,000). Amongst cases aged 1 to 4 years old, the incidence rate was 51% lower (from 7.5 to 3.7 cases per 100,000. These age groups are part of the target population for the 13-valent pneumococcal conjugate vaccine released in

the spring of 2010. The decrease in incidence in these two age groups is indicative of vaccine effectiveness (Table).

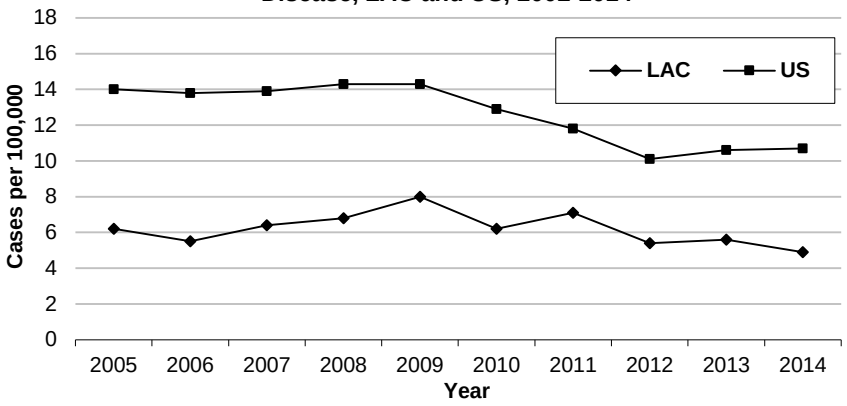
- All age groups decreased despite no or little conjugate vaccination, indicating decreased transmission in the population.
- Cases aged 65 years and older and 55-64 years had the highest incidence rates (16.6 and 9.1 cases per 100,000, respectively) (Table, Figure 2). High rates among the elderly may be indicative of lower vaccination rates among the elderly (65 years and older) compared to children less than 5 years old. More research is required to further assess this.
- Incidence rates decreased across all race/ethnic groups from 25% (Whites) up to 31% (Blacks) (Table, Figure 3), compared to 2010-2013 (the years for which good data on race/ethnicity are available).
- Similar to previous years, the 2014 incidence rate in blacks was substantially higher than rates among other race/ethnic groups (Table, Figure 3).
- Similar to previous years, Service Planning Area (SPA) 6 had the highest incidence rate of IPD (5.8 cases per 100,000; Table, Figure 4). Compared to the rest of LAC, SPA 6 has historically had a high number of Hispanics and African Americans along with high numbers of individuals with low income and lack of access to care. These may be contributory factors for the high number of cases in this SPA. More data is needed to study this (1, 2).
- In all SPAs, the incidence rate was lower than the previous five-year average. The largest incidence rate decrease among the SPAs occurred in SPA 5. This incidence rate decreased by 36% (from 6.1 to 3.8 cases per 100,000) compared to the previous five-year average (Table, Figure 4).
- The percentage of isolates susceptible to penicillin, erythromycin, cefotaxime, ceftriaxone, levofloxacin and TMP-SMZ was fairly consistent with 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, 2010-2014

	2010 (N=576)			2011 (N=658)			2012 (N=504)			2013 (N=525)			2014 (N=460)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	12	2.1	10	7	1.1	5.9	13	2.6	10.9	7	1.3	5	7	1.5	5.9
1-4	48	8.3	9.9	36	5.5	7.5	24	4.8	5.1	24	4.6	4.9	18	3.9	3.7
5-14	21	3.6	1.7	31	4.7	2.6	17	3.4	1.4	23	4.4	1.9	12	2.6	1.0
15-34	38	6.6	1.4	64	9.7	2.3	32	6.3	1.2	32	6.1	1.1	31	6.7	1.1
35-44	47	8.2	3.5	57	8.7	4.3	38	7.5	2.9	40	7.6	2.9	42	9.1	3.2
45-54	84	14.6	6.5	107	16.3	8.3	82	16.3	6.4	63	12.0	4.9	65	14.1	5.0
55-64	108	18.8	11.3	128	19.5	12.9	89	17.7	8.7	108	20.6	10.5	97	21.1	9.1
65+	218	37.8	21.7	227	34.5	21.5	209	41.5	18.8	228	43.4	20.5	188	40.9	16.6
Unknown	0	-	-	1	0.2	-	0	-	-	0	-	-	0	-	-
Race / Ethnicity															
Asian	46	8.0	3.5	49	7.4	3.7	36	7.1	2.7	32	6.1	2.3	34	7.4	2.5
Black	83	14.4	10.7	130	19.8	16.8	96	19.0	12.4	96	18.3	12.2	70	15.2	8.9
Hispanic	213	37.0	4.8	244	37.1	5.4	192	38.1	4.2	209	39.8	4.5	161	35.0	3.5
White	209	36.3	7.8	234	35.6	8.8	172	34.1	6.5	174	33.1	6.5	154	33.5	5.8
Other	2	0.3	11.4	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	23	4.0	-	1	0.2	-	8	1.6		14	2.7	-	41	8.7	-
SPA															
1	13	2.3	3.4	31	4.7	8.0	18	3.6	4.6	25	4.8	6.4	16	3.5	4.1
2	130	22.6	6.1	117	17.8	5.5	111	22.0	5.2	99	18.9	4.5	102	22.2	4.7
3	80	13.9	5	85	12.9	5.3	79	15.7	4.9	75	14.3	4.6	66	14.3	4.0
4	70	12.2	6.3	87	13.2	7.8	72	14.3	6.4	66	12.6	5.8	55	12.0	4.8
5	44	7.6	6.9	49	7.4	7.7	28	5.6	4.4	20	3.8	3.1	25	5.4	3.8
6	79	13.7	7.9	86	13.1	8.5	72	14.3	7.1	74	14.1	7.2	60	13.0	5.8
7	69	12.0	5.3	81	12.3	6.3	54	10.7	4.1	73	13.9	5.5	56	12.2	4.3
8	77	13.4	7.3	94	14.3	8.9	57	11.3	5.3	75	14.3	6.9	53	11.5	4.9
Unknown	14	2.4	-	28	4.3	-	13	2.6		18	3.4	-	27	5.9	-

*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, 2002-2014



* United States incidence rate estimate from Active Bacterial Core Surveillance [3]

Figure 2. Annual Incidence Rates of Invasive Pneumococcal Disease 2009-2014

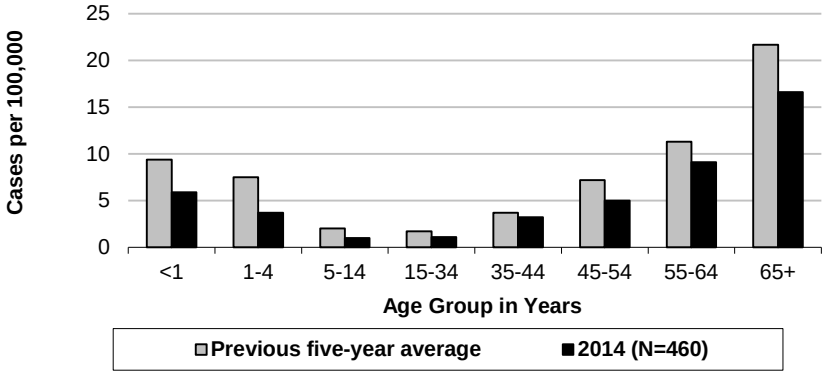
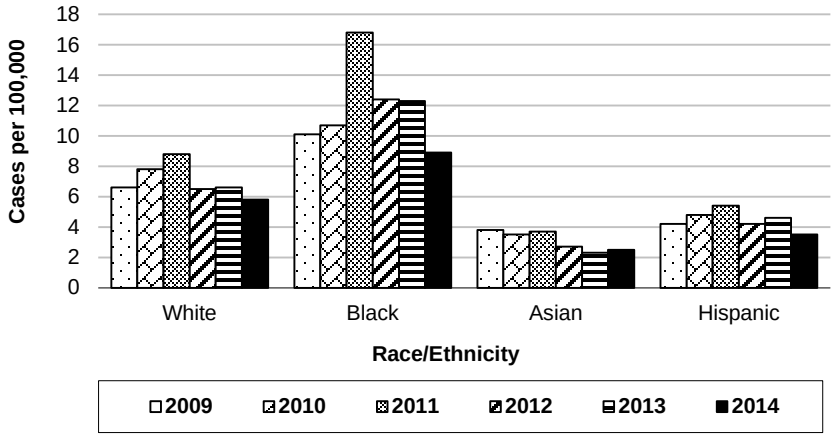


Figure 3. Annual Incidence Rates of Invasive Pneumococcal Disease by Race/Ethnicity, LAC, 2009-2014*



* For 2009, 2010, 2011, 2012, 2013, and 2014 total numbers of cases (and percent with race-ethnicity missing) were 785 (32%), 576 (4%), 658 (0%), 504 (2%), 525 (3%), and 460 (10%), respectively.

Figure 4. Annual Incidence Rates of Invasive Pneumococcal Disease by SPA, LAC, 2009-2014

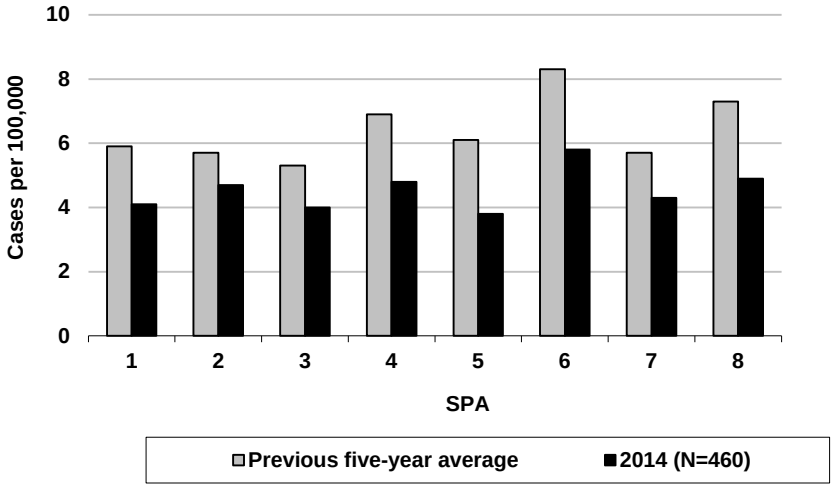


Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2009-2014

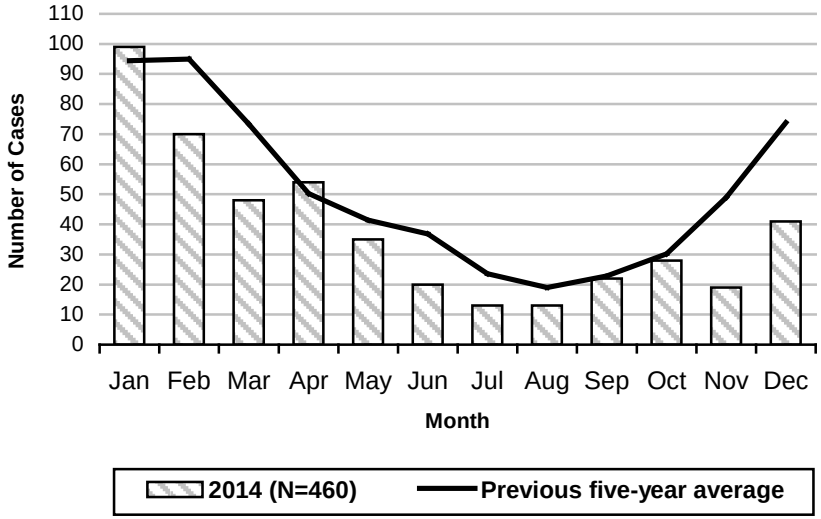
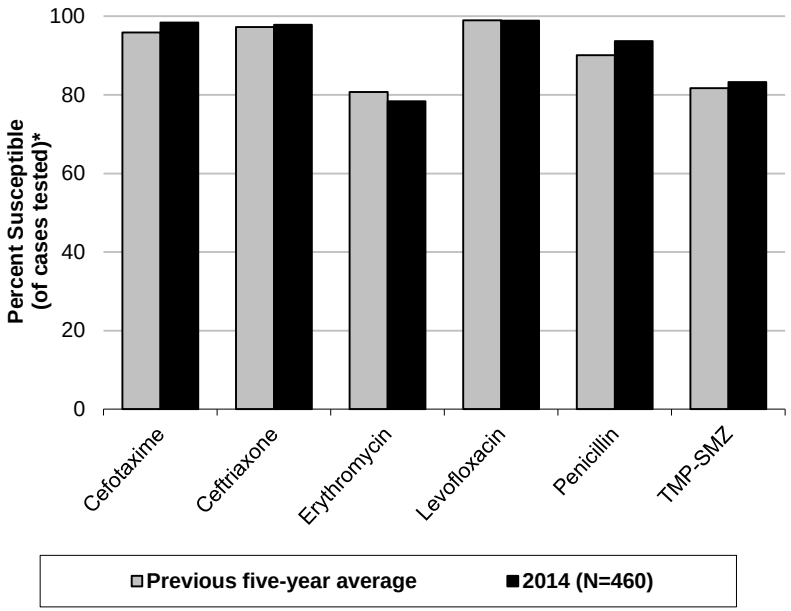


Figure 6. Reported Antibiotic Susceptibility of Invasive Pneumococcal Disease Cases, LAC, 2009-2014

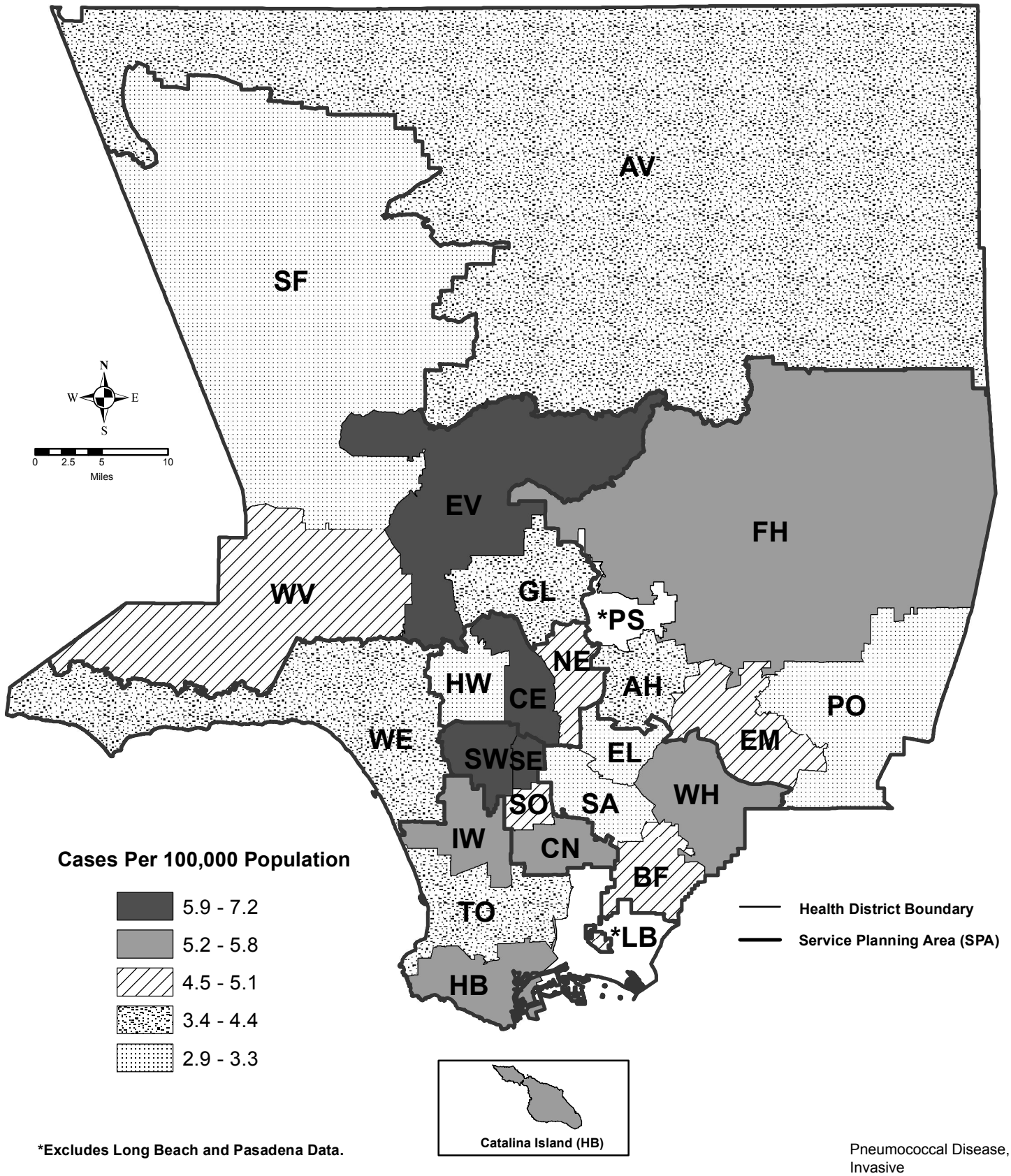


*Range of number of isolates tested 2009-2014: Cefotaxime (245-389), Ceftriaxone (325-485), Erythromycin (243-455), Levofloxacin (276-394), Penicillin (403-667), and TMP-SMZ (211-330).

Reference:

1. Accessed on 7/21/2015 from the Los Angeles County Department of Public Health, LA HealthDataNow!: https://dqs.publichealth.lacounty.gov/
2. Senterfitt JW, Long A, Shih M, Teutsch SM. How Social and Economic Factors Affect Health. Social Determinants of Health, Issue no.1. Los Angeles: Los Angeles County Department of Public Health; January 2013.
3. Active Bacterial Core Surveillance Reports from 2005 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 11. Pneumococcal Disease, Invasive
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

SALMONELLOSIS

CRUDE DATA	
Number of Cases	1141
Annual Incidence[a]	
LA County	12.07
California[b]	16.14
United States[b]	14.10
Age at Diagnosis	
Mean	31.97
Median	27
Range	<0–96 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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.

LAC review of investigation reports shows that many persons engage in high-risk 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.

2014 TRENDS AND HIGHLIGHTS

- There were a total of three LAC salmonellosis outbreaks investigated in 2014; all three were foodborne outbreaks investigated by ACDC. For more information see the Foodborne Outbreak summary in this ACDC Annual Morbidity Report 2014.
- By age group, the highest incidence rate was seen in those who were less than one year old (52.4 cases per 100,000, Figure 2).
- By race/ethnicity, in 2014 and prior years, the highest incidence rates occurred among whites and Hispanics.
- Incidence rates by SPA ranged from 7.4 in SPA 1 to 14.3 in SPA 3 (Figure 4).
- Travel was reported by 15.2% of the cases: 39% traveled to Mexico and 26% reported foreign travel to countries other than Mexico.
- There were 6.7% reptile-associated salmonellosis (RAS) cases in 2014. Among RAS cases, 55% were related to turtle exposures and 32% were related to lizard exposures. Seven LAC residents were part of a national outbreak related to lizard exposures.
- Twenty-two percent of cases were hospitalized for two or more days.
- There were eight deaths in persons diagnosed with salmonellosis. Ages ranged from 50 to 86 years with a mean of 66 and median of 70 years. All eight cases had comorbidities.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=1142)			2011 (N=900)			2012 (N=1041)			2013 (N=1010)			2014 (N=1141)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	56	4.9	46.6	61	6.8	43.7	73	7.0	61.4	59	5.8	48.8	62	5.4	52.4
1-4	186	16.2	38.3	134	14.9	22.9	153	14.7	32.2	141	14.0	29.0	162	14.3	33.2
5-14	174	15.2	14.1	148	16.4	11.1	158	15.2	13.2	185	18.3	15.3	181	15.9	15.0
15-34	262	22.9	9.4	186	20.7	6.3	224	21.5	8.1	227	22.5	8.0	248	21.7	8.8
35-44	131	11.5	9.8	93	10.3	6.5	95	9.1	7.2	89	8.8	6.7	110	9.6	8.3
45-54	87	7.6	6.8	86	9.5	6.4	108	10.4	8.4	82	8.1	6.3	111	9.7	8.5
55-64	100	8.8	10.5	86	9.5	8.9	88	8.5	8.6	84	8.3	8.2	99	8.7	9.3
65+	146	12.8	14.5	106	11.8	10.0	142	13.6	12.8	143	14.2	12.9	168	14.7	14.8
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	115	10.0	8.8	64	7.1	4.8	92	8.8	7.0	73	7.2	5.3	140	12.3	10.2
Black	50	4.4	6.5	53	5.9	6.2	56	5.4	7.2	69	6.8	8.9	67	5.9	8.5
Hispanic	570	50.1	12.8	465	51.7	9.8	503	48.3	11.1	538	53.3	11.7	575	50.4	12.5
White	387	33.9	14.5	279	31.0	9.7	247	23.7	9.3	318	31.5	12.0	344	30.1	12.9
Other	3	0.3	-	8	0.9	-	11	1.1	-	5	0.5	-	9	0.8	-
Unknown	17	1.5	-	132	12.6	-	132	12.6	-	7	0.7	-	6	0.5	-
SPA															
1	36	3.2	9.4	24	2.7	6.4	38	3.7	9.8	40	4.0	10.2	29	2.5	7.4
2	303	26.5	14.3	215	23.9	9.7	228	21.9	10.6	262	26.0	12.1	238	20.9	10.9
3	221	19.4	13.8	162	18.0	9.3	164	15.8	10.1	155	15.3	9.5	235	20.6	14.3
4	156	13.7	14.0	80	8.9	6.4	162	15.6	14.4	106	10.5	9.3	130	11.4	11.3
5	86	7.5	13.5	70	7.8	10.6	71	6.8	11.1	74	7.3	11.4	62	5.4	9.5
6	86	7.5	8.6	107	11.9	10.0	109	10.5	10.7	109	10.8	10.6	142	12.5	13.7
7	140	12.3	10.8	122	13.5	8.9	145	13.9	11.2	155	15.3	11.8	176	15.4	13.4
8	114	10.0	10.8	117	13.0	10.4	123	11.8	11.5	109	10.8	10.1	129	11.3	11.9
Unknown	0	-	-	3	0.33	-	1	0.09	-	0	-	-	0	-	-

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

**Figure 1. Reported Salmonellosis Rates by Year
LAC, CA and US, 2005-2014**

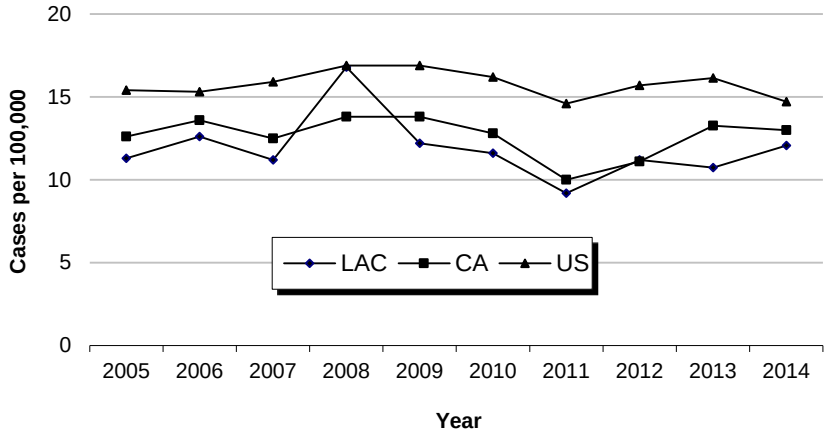


**Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2014 (N=1141)**

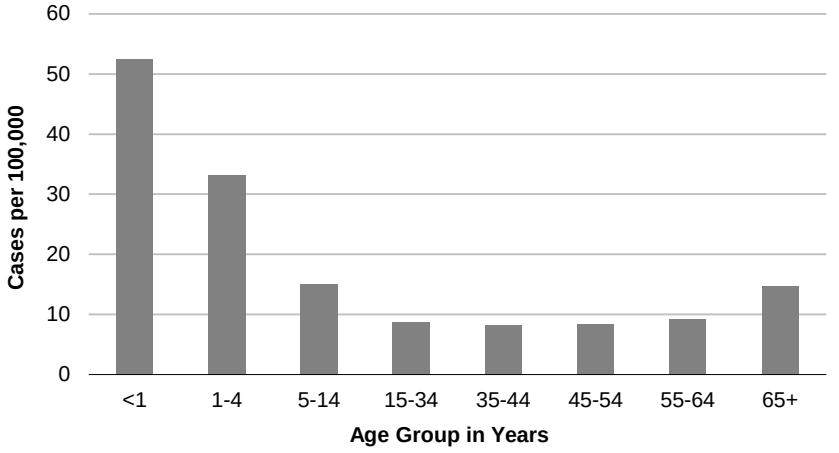
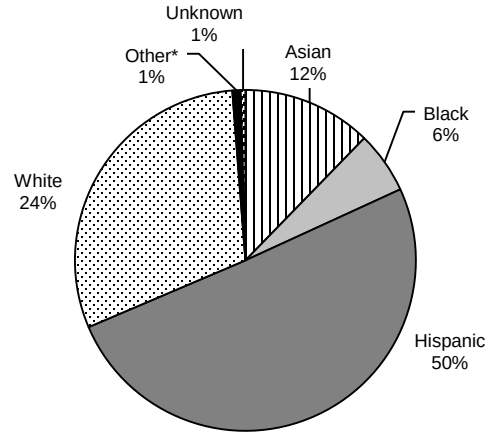


**Figure 3. Reported Salmonellosis by Race/Ethnicity
LAC, 2014 (N=1141)**



*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, 2014 (N=1141)**

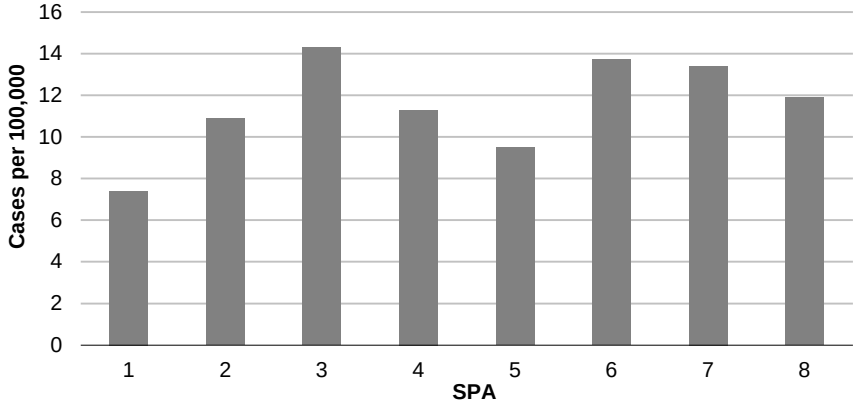
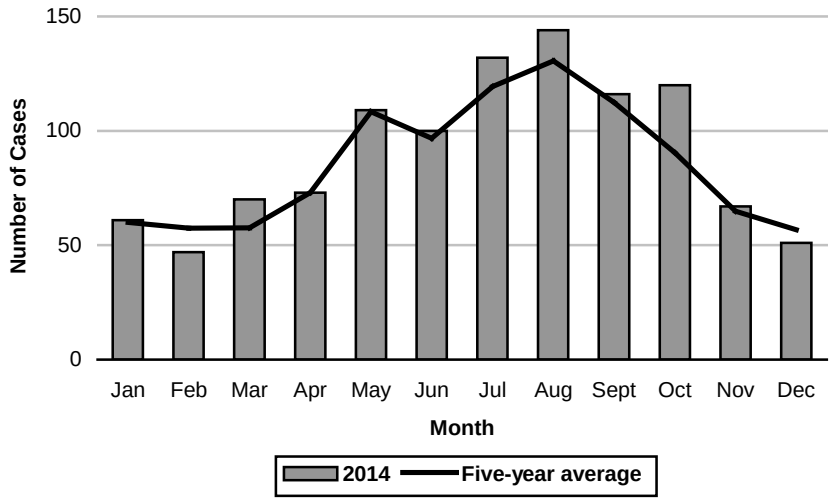
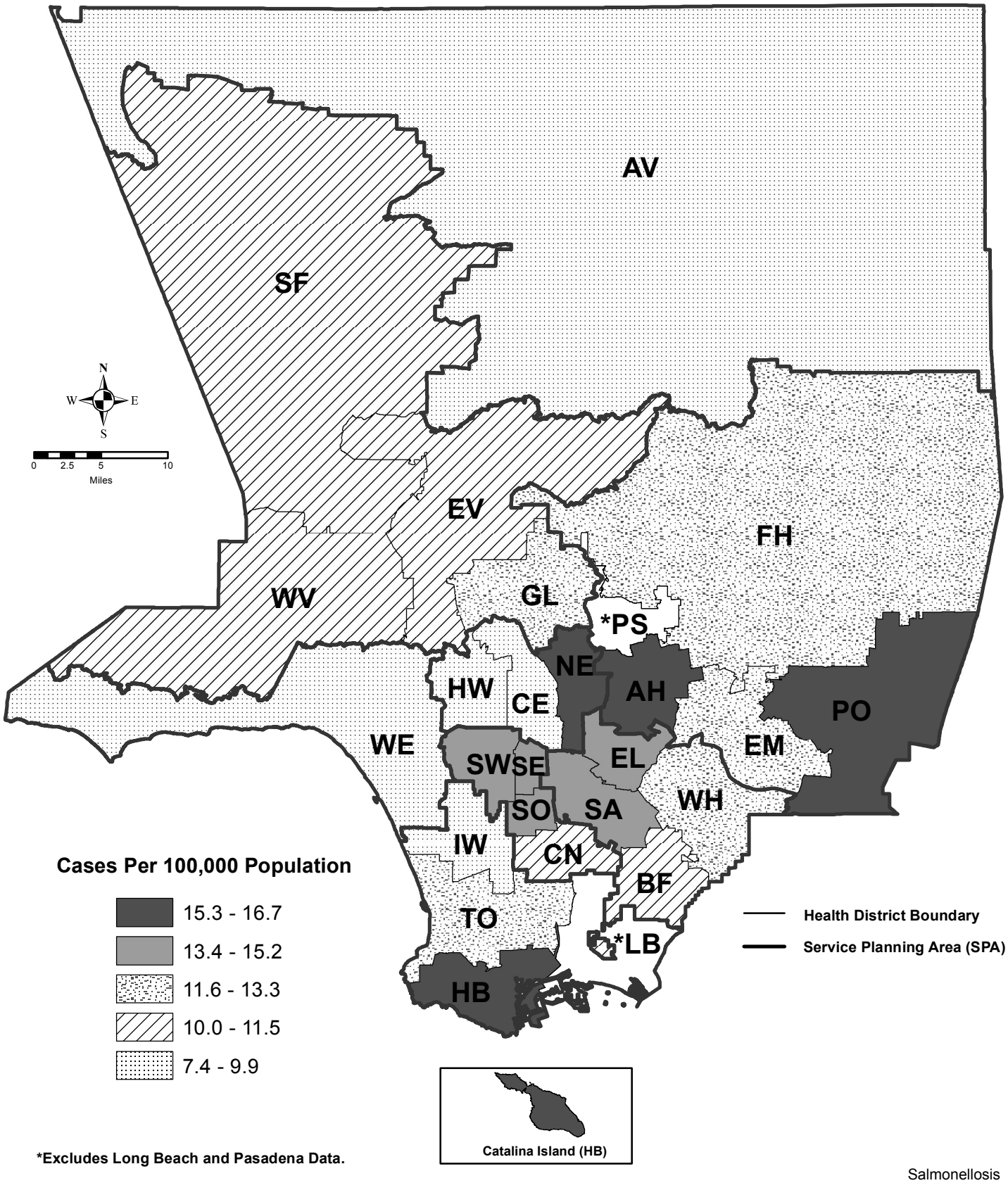


Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2014 (N=1141)



Map 12. Salmonellosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	350
Annual Incidence[a]	
LA County	3.70
California[b]	4.36
United States[b]	6.51
Age at Diagnosis	
Mean	30.5
Median	31
Range	0–87 years

[a]Cases per 100,000 population.

[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 then 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 LAC, cases and symptomatic contacts in sensitive situations or occupations (e.g., food handlers, daycare and healthcare workers) are routinely removed from work or the situation until their stool specimen cultures are negative when tested by the LAC Public Health Laboratory.

2014 TRENDS AND HIGHLIGHTS

- The incidence of shigellosis cases in LAC increased from 2.41 to 3.70 cases per 100,000 in 2014 compared to 2013 (Figure 1).
- The highest incidence rate by age was observed in the 1 to 4 years age group (6.1 per 100,000) followed by the 35-44 age group at 4.8 per 100, 000 (Figure 2). The 1 to 4 year old age group has consistently had the highest incidence rate; in 2006 the incidence rate for the 1-4 year old age group peaked at16.3 cases per 100,000.
- In 2014, white cases had the highest incidence rate of all race/ethnicity groups, 5.0 per 100,000 (Figure 6). In prior years, rates were similar among whites, blacks and Hispanics with lower rates among the Asian population.
- Service Planning Area (SPA) 4 sustained the highest rate (9.4 per 100,000), followed by SPA 6 (3.9 per 100,000) (Figure 4). This is similar to past years and may reflect a greater population of MSM who are at increased risk.
- In 2014, the percentage of shigellosis cases hospitalized for at least two days increased to 24% (n=84) from 16.3% (n=37) in 2013. The number of cases among men who report having sex with men (MSM) in 2014 increased to 24% (n=84) from 10% (n=23) in 2013. No deaths were reported among diagnosed shigellosis cases.
- No outbreaks were identified in 2014.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=355)			2011=(N=264)			2012(N=306)			2013 (N=227)			2014 (N=350)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	1.1	0.8	4	1.5	2.9	4	1.3	3.4	1	0.4	0.8	2	0.5	1.7
1-4	79	22.2	16.3	30	11.3	5.2	32	10.5	6.7	26	11.4	5.3	30	8.5	6.1
5-14	68	19.1	5.5	37	14.0	2.8	54	17.6	4.5	49	21.5	4.1	51	14.5	4.2
15-34	75	21.1	2.7	80	30.3	2.7	68	22.2	2.5	55	24.2	1.9	85	24.2	3.0
35-44	63	17.7	4.7	41	15.5	2.8	39	12.7	2.9	31	13.6	2.3	64	18.2	4.8
45-54	36	10.1	2.8	44	16.6	3.3	31	10.1	2.0	30	13.2	2.3	57	16.2	4.4
55-64	17	4.7	1.8	15	5.6	1.6	25	8.2	2.5	19	8.3	1.9	30	8.5	2.8
65+	15	4.2	1.5	12	4.5	1.1	52	17.0	4.7	15	6.6	1.4	31	8.8	2.7
Unknown	1	0.2	-	0	-	-	1	0.3	-	1	0.4	-	0	-	-
Race/Ethnicity															
Asian	15	4.2	1.1	4	1.5	0.6	2	0.6	0.2	5	2.2	0.4	17	4.8	1.2
Black	31	8.7	4.0	24	9.0	2.8	29	9.4	3.7	25	11.0	3.2	19	5.4	2.4
Hispanic	203	57.1	4.6	149	56.4	3.1	153	50.0	3.4	107	47.1	2.3	167	47.7	3.6
White	94	26.4	3.5	78	29.5	2.7	104	33.9	3.9	82	36.1	3.1	132	37.7	5.0
Other	0	-	-	0	-	-	0	-	-	2	0.88	-	1	0.2	-
Unknown	12	3.3	-	9	3.4	-	18	5.9	-	6	2.6	-	14	4.0	-
SPA															
1	3	0.8	0.8	7	2.6	1.9	3	0.9	0.8	4	1.7	1.0	5	1.4	1.3
2	61	17.2	2.9	40	15.1	1.8	52	1.6	2.4	39	17.1	1.8	59	16.8	2.7
3	33	9.2	2.1	32	12.1	1.8	26	8.4	1.6	16	7.0	1.0	29	8.2	1.8
4	91	25.6	8.1	82	31.0	6.5	85	27.7	7.6	58	25.5	5.1	108	30.8	9.4
5	30	8.4	4.7	14	5.3	2.1	48	15.6	7.5	18	7.9	2.8	25	7.1	3.8
6	58	16.3	5.8	38	14.3	3.6	37	12.0	3.6	44	19.3	4.3	40	11.4	3.9
7	54	15.2	4.2	24	9.1	1.7	33	10.7	2.5	33	54.1	2.5	43	12.2	3.3
8	25	7.0	2.4	26	9.8	2.3	22	7.1	2.1	15	6.6	1.4	41	11.7	3.8
Unknown	0	-	-	1	0.3	-	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, 2004-2014

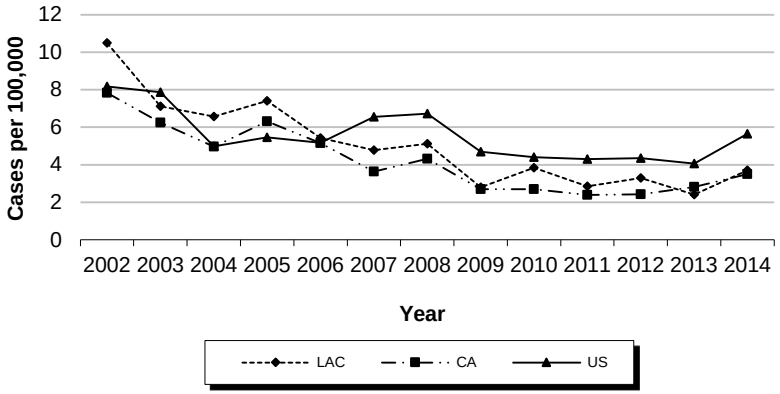


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2014 (N=350)

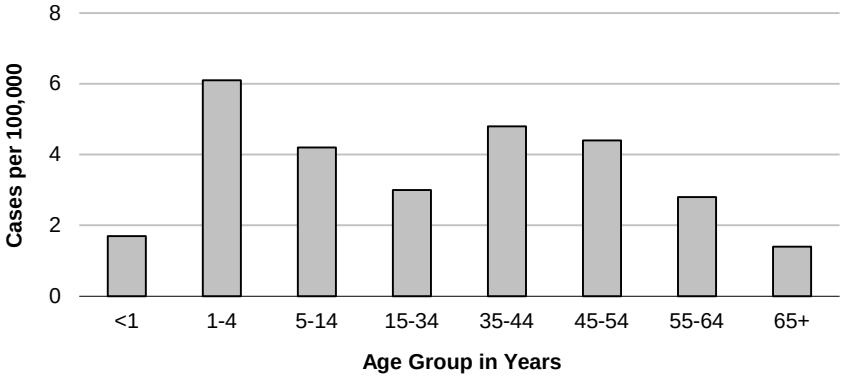


Figure 3. Percent Cases of Shigellosis by Race/Ethnicity
LAC, 2014 (N=350)

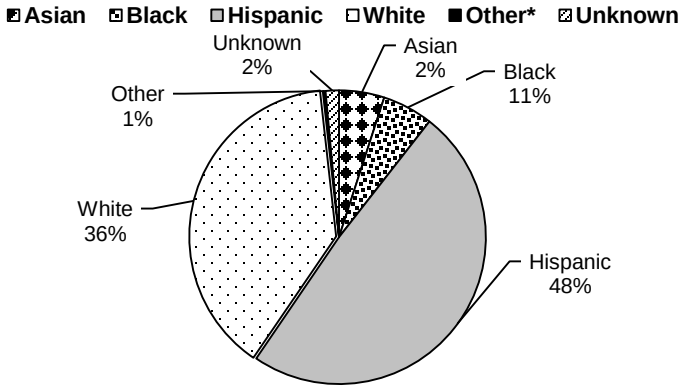


Figure 4. Reported Shigellosis Rates by SPA
LAC, 2014 (N=350)

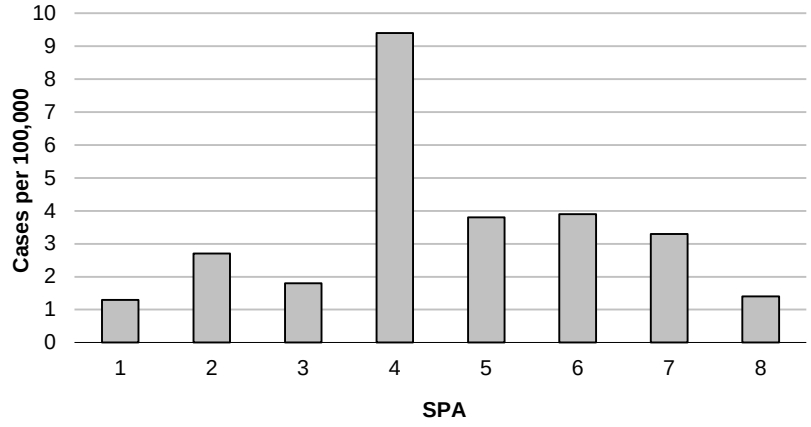


**Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2014 (N=350)**

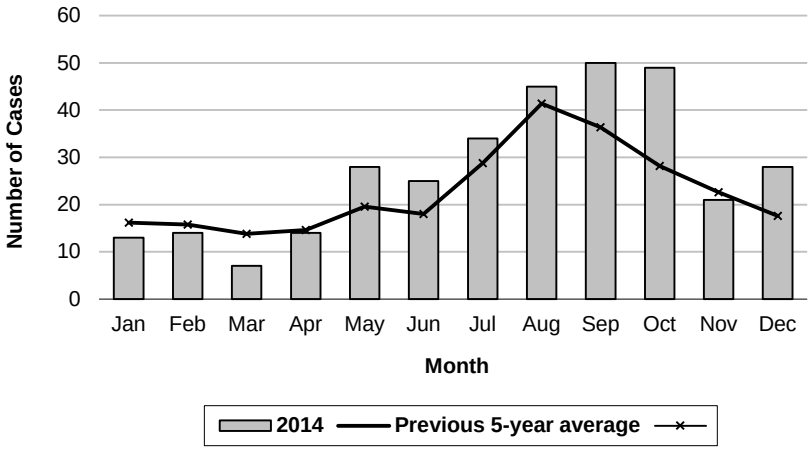
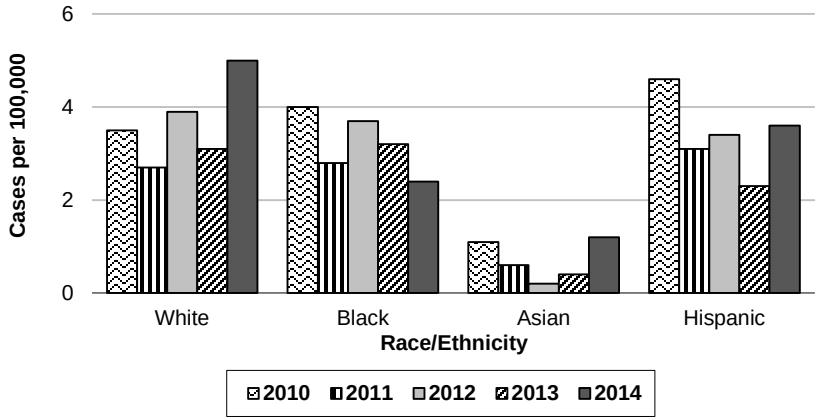
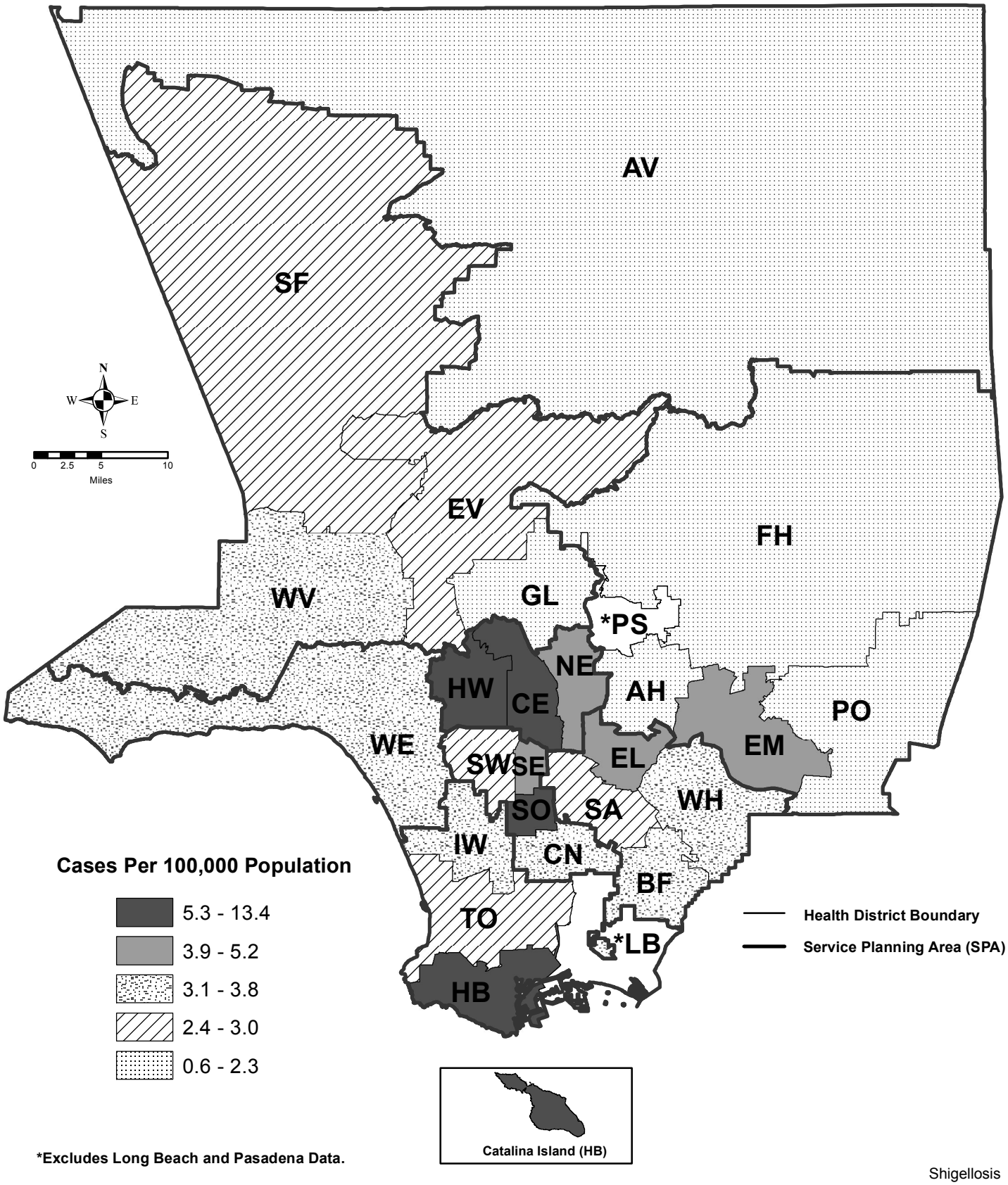


**Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2010-2014**



Map 13. Shigellosis
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

STAPHYLOCOCCUS AUREUS, SEVERE INFECTIONS IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	17
Annual Incidence	
LA County[a]	0.18
California[b]	0.30
United States[c]	N/A
Age at Diagnosis	
Mean	55
Median	50
Range	23–97 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/CDdata.aspx (2013 data)
[c]Not notifiable.

DESCRIPTION

Staphylococcus aureus (S. aureus) is bacteria that can cause a number of infections and syndromes as a result of its ability to infect various tissues of the body and to produce toxins. *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, necrotizing pneumonia, and toxic shock syndrome.

Certain groups of people are at greater risk of getting *S. aureus* infections. This includes: injection drug users, those with skin injuries or disorders, those with intravenous catheters or surgical incisions, and those with a weakened immune system due either to disease or a result of immune suppressing medications. Risk also is increased among people with chronic conditions such as diabetes, cancer, vascular disease, and lung disease.

In February 2008 in response to the significant public health burden and potential severity of community-associated *S. aureus* infections, the California Department of Public Health added severe cases of *S. aureus* infections, including methicillin-resistant *S. aureus* (MRSA), to the state list of reportable diseases and conditions. This is not a nationally notifiable disease.

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 a person who died and 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.

Because the large majority of *S. aureus* infections not result in an ICU admission or death, the data presented in this report substantially underestimates all disease caused by this organism in LAC.

2014 TRENDS AND HIGHLIGHTS

- Because of the low number of reported cases each year, interpreting trends and associations is difficult as rates may be significantly affected by the occurrence of a small number of cases. For example, whereas in 2014 there were no cases among infants, in 2010, 2012 and 2013, a single infant case resulted in the incidence rate among those <1 year old being higher than for any other age group. In 2014, cases aged 65 years and older had the highest rate (0.4 per 100,000) and each year, after infancy rates have increased with age (Figure 1).
- Blacks and Asians had the highest rate (0.6 per 100,000) (Figure 2).
- The male to female ratio in 2014 was 1:0.6.
- The incidence rate was highest in SPAs 3 and 4 (0.4 per 100,000) (Figure 3).
- Cases were distributed throughout the year with the peak months being December, February and August (Figure 4).
- Four (24%) of the reported *S. aureus* infections were resistant to methicillin (Figure 5).
- The most frequently reported risk factors were diabetes and being a current smoker (Table 1). Intravenous drug use was present

for about 20% of cases in each of 2013 and 2014.

- Reported severe *S. aureus* cases presented most often with pneumonia, bacteremia, and/or the toxic shock syndrome (Table 2).
- Thirty percent of cases were reported from the LAC coroner and >50% of cases came from two reporting sources. 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, 20010-2014

	2010 (N=28)			2011 (N=44)			2012 (N=24)			2013 (N=26)			2014 (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	4.0	0.8	0	-	-	1	4.2	0.8	1	3.8	0.8	0	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	3	10.7	0.2	2	4.5	0.2	1	4.2	0.1	0	-	-	0	-	-
15-34	6	21.4	0.2	6	13.6	0.2	3	12.5	0.1	7	26.9	0.2	3	17.6	0.1
35-44	3	10.7	0.2	6	13.6	0.5	2	8.3	0.2	2	7.7	0.2	3	17.6	0.2
45-54	7	25.0	0.5	9	20.4	0.7	3	12.5	0.2	6	23.0	0.5	3	17.6	0.2
55-64	3	10.7	0.3	8	18.2	0.8	5	20.8	0.5	5	19.2	0.5	3	17.6	0.3
65+	5	17.9	0.5	13	29.5	1.2	9	37.5	0.8	5	19.2	0.5	5	29.4	0.4
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	4	14.2	0.3	7	15.9	0.5	4	16.7	0.3	3	11.5	0.2	4	23.5	0.3
Black	4	14.2	0.5	3	6.8	0.4	4	16.7	0.5	5	19.2	0.6	2	11.8	0.3
Hispanic	7	25.0	0.2	17	38.6	0.4	4	16.7	0.1	10	38.5	0.2	3	17.6	0.1
White	13	46.4	0.5	15	34.1	0.6	10	41.7	0.4	8	30.8	0.3	0	-	-
Other	0	-	-	1	2.3	-	1	4.2	-	0	-	-	1	5.9	-
Unknown	0	-	-	1	2.3	-	1	4.2	-				7	41.2	-
SPA															
1	1	4.0	0.3	0	-	-	2	8.3	0.5	1	7.7	0.3	0	-	-
2	6	21.4	0.3	12	27.3	0.6	1	4.2	0.0	6	23.0	0.3	2	11.8	0.1
3	6	21.4	0.4	7	15.9	0.4	8	33.3	0.5	1	3.8	0.1	6	35.3	0.4
4	4	14.2	0.4	2	4.5	0.2	2	8.3	0.2	4	15.4	0.4	5	29.4	0.4
5	2	7.1	0.3	5	11.4	0.8	1	4.2	0.2	2	7.7	0.3	1	5.9	0.2
6	2	7.1	0.2	11	25.0	1.1	5	20.8	0.5	5	19.2	0.5	1	5.9	0.1
7	4	14.2	0.3	5	11.4	0.4	4	16.7	0.3	3	11.5	0.2	0	-	-
8	2	7.1	0.2	1	2.3	0.1	0	-	-	2	7.7	0.2	2	11.8	0.2
Unknown	1	4.0	-	1	2.3	-	1	4.2	-	2	7.7	-	0	-	-

*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, 2012-2014

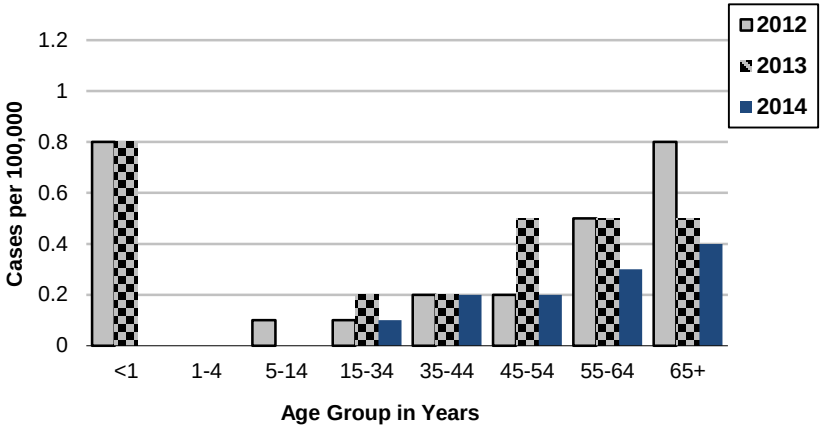


Figure 2. Severe S. *aureus* Infection Incidence Rates* by Race/Ethnicity LAC, 2012-2014

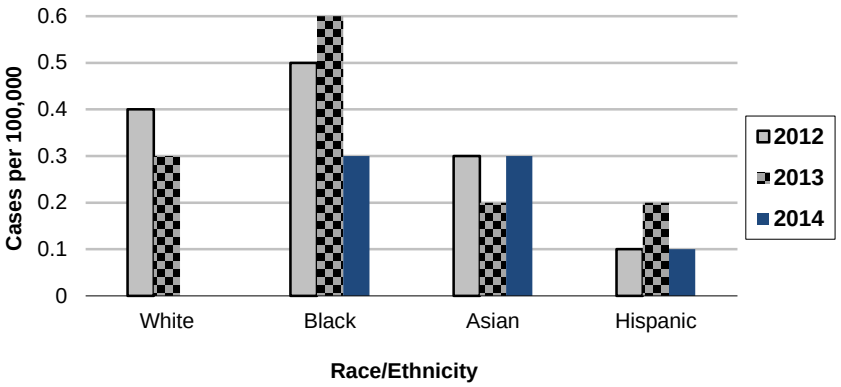


Figure 3. Incidence Rates* of Severe S. *aureus* Infection by SPA LAC, 2012-2014

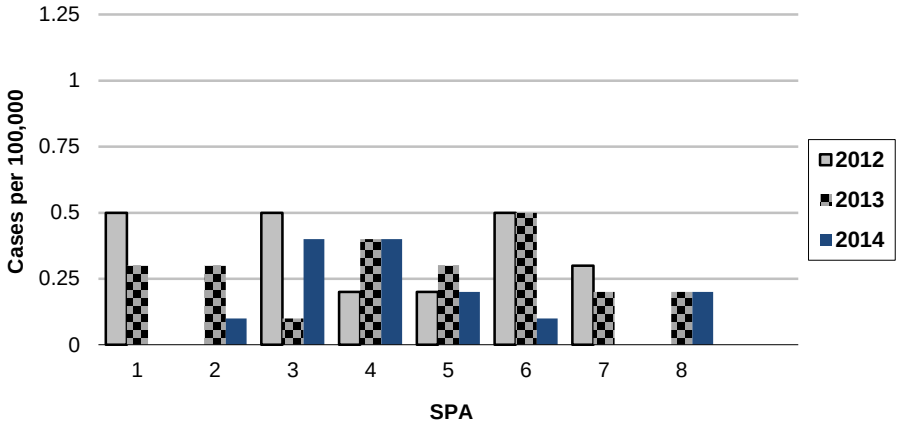
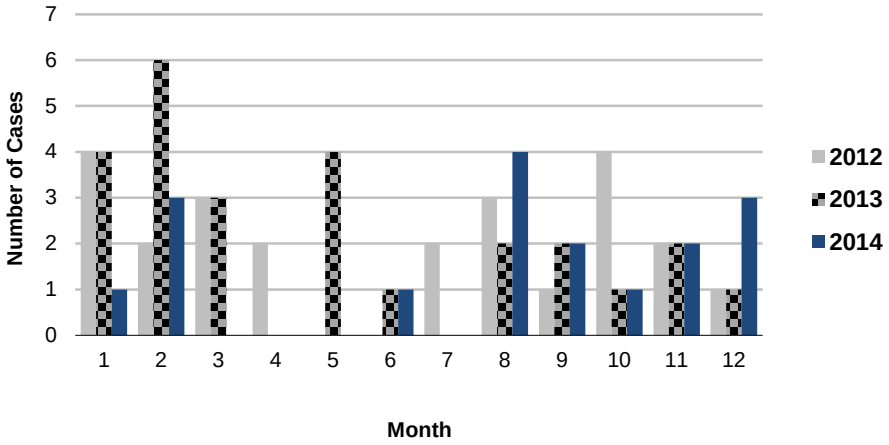
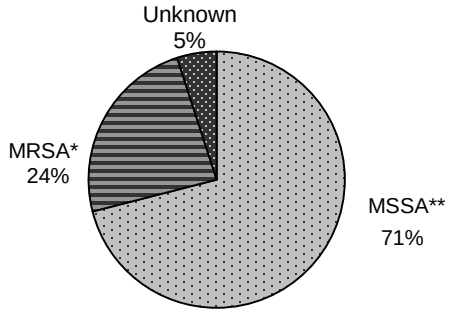


Figure 4. Reported Severe S. *aureus* Cases by Month of Onset LAC, 2012-2014



*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, 2014 (N=17)



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

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2014

Syndrome	Number	Percent*
Pneumonia	7	41
Bacteremia (without focus)	5	29
Toxic Shock Syndrome	5	29
Endocarditis	3	18
Septic emboli	3	18
Skin Infection	2	12
Other	1	6
Meningitis	0	0
Septic arthritis	0	0

*Overlapping syndromes will total over 100%.

Table 1. Severe *S. aureus* Medical Conditions by Year of Onset, 2013-2014

	2013 N=26		2014 N=17	
	N	(%)	N	(%)
Diabetes	7	(27)	6	(35)
Other	8	(31)	5	(29)
Current Smoker	6	(23)	3	(18)
Intravenous Drug Use	5	(19)	3	(18)
Emphysema	2	(8)	3	(18)
HIV/AIDS	2	(8)	2	(12)
Malignancy-Solid	1	(4)	2	(12)
None	7	(27)	2	(12)
Alcohol Abuse	3	(12)	1	(6)
Chronic Dermatitis	0	0	1	(6)
Liver Disease	8	(31)	0	0
Heart Failure/CHF	3	(12)	0	0
Chronic Renal Insufficiency	2	(8)	0	0
Malignancy-Hem	1	(4)	0	0
Asthma	0	0	0	0
Eczema	0	0	0	0

*Overlapping risk factors will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	222
Annual Incidence[a]	
LA County	2.35
California[b]	N/A
United States[bc]	4.4
Age at Diagnosis	
Mean	47
Median	49
Range	0–95 years

[a]Cases per 100,000 population.

[b]Not notifiable.

[c] National projection of IGAS incidence from Active Bacterial Core Surveillance Areas data, 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 the streptococcal toxic shock syndrome (STSS). 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 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 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 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.

2014 TRENDS AND HIGHLIGHTS

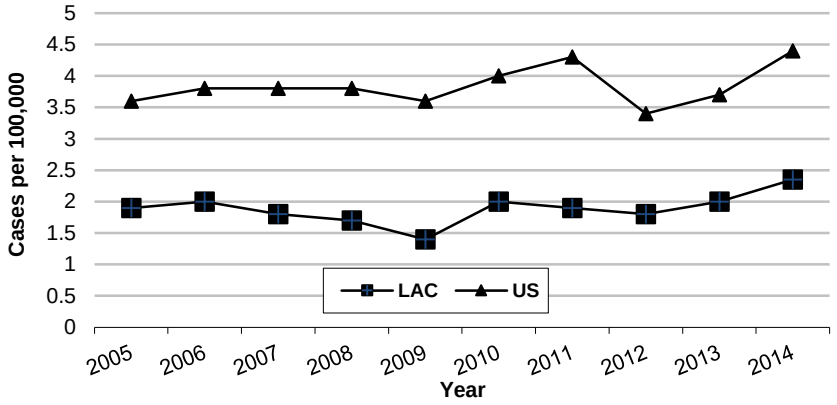
- The incidence rate of reported IGAS was 2.35 cases per 100,000 during 2014, which is the highest it has been in the last ten seasons (Figure 1). This increase may be attributable to an increase in reporting due to the development of electronic laboratory reporting systems.
- Cases <1 year old had the highest rate of any age group with 5.9 cases per 100,000; however, this group only contributed 3.2% of all cases reported. The next highest incidence was among persons aged 65 years and older with 4.9 cases per 100,000 and 25.2% of all reported cases.
- In 2014, whites had the highest IGAS incidence among racial/ethnic groups (1.9 per 100,000); from 2010-13, blacks consistently had the highest rate (Figure 3). Fifty one percent of cases had an unknown race/ethnicity.
- SPA 3 and 4 had the highest incidence rate at 3.0 and 3.8 cases per 100,000, respectively (Figure 4). SPA 3 had the largest incidence rate increase, from 1.4 to 3.0 per 100,000 in 2013 and 2014, respectively.
- The greatest number of cases occurred in winter through spring. July, August and September had the lowest number of reported cases (Figure 5). 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 2005 (Figure 1).
- IGAS cases presented most often with bacteremia (without focus) and cellulitis (Table 1).
- Diabetes was reported more than any other risk factor (29%) followed by chronic heart disease (15%). Twenty nine percent of cases reported having none of the traditional risk factors (Table 2).

Reported Invasive Group A Streptococcus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=191)			2011 (N=175)			2012 (N=168)			2013 (N=195)			2014 (N=222)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	2.1	3.3	1	0.6	0.7	3	1.8	2.5	5	2.6	4.1	7	3.2	5.9
1-4	6	3.1	1.2	6	3.4	1	5	3	1.1	4	2.1	0.8	7	3.2	1.4
5-14	6	3.1	0.5	10	5.7	0.8	7	4.2	0.6	10	5.1	0.8	16	7.2	1.3
15-34	33	17.3	1.2	16	9.1	0.5	27	16.1	1	29	14.9	1.0	34	15.3	1.2
35-44	21	11.0	1.6	28	16	1.9	20	11.9	1.5	20	10.3	1.5	24	10.8	1.8
45-54	34	17.8	2.6	32	18.3	2.4	31	18.5	2.4	41	21.0	3.2	43	19.4	3.3
55-64	29	15.2	3.0	36	20.6	3.7	35	20.8	3.4	31	15.9	3.0	35	15.8	3.3
65+	58	30.4	5.8	46	26.3	4.3	39	23.2	3.5	54	27.7	4.9	56	25.2	4.9
Unknown	0	-	-	0	-	-	0	-	-	1	0.5	-	0	-	-
Race / Ethnicity															
Asian	16	8.4	1.2	13	7.4	1	8	4.8	0.6	8	4.1	0.6	6	2.7	0.4
Black	25	13.1	3.2	22	12.6	2.6	24	14.3	3.1	29	14.9	3.7	10	4.5	1.3
Hispanic	52	27.2	1.2	49	28	1	58	34.5	1.3	29	14.9	0.6	29	13.1	0.6
White	53	27.7	2.0	45	25.7	1.6	44	26.2	1.7	50	25.6	1.9	51	23.0	1.9
Other	3	1.6	11.6	0	-	-	2	1.2	-	5	2.6	-	11	50.5	-
Unknown	42	22.0	-	46	26.3	-	32	19	-	74	37.9	-	115	51.8	-
SPA															
1	2	1.0	0.5	3	1.7	0.8	0	-	-	4	2.1	1.0	5	2.3	1.3
2	34	17.8	1.6	34	19.4	1.5	32	19	1.5	38	19.5	1.7	38	17.1	1.7
3	30	15.7	1.9	22	12.6	1.3	17	10.1	1.1	23	11.8	1.4	49	22.1	3.0
4	38	19.9	3.4	31	17.7	2.5	38	22.6	3.4	33	16.9	2.9	44	19.8	3.8
5	12	6.3	1.9	14	8	2.1	10	6	1.6	18	9.2	2.8	11	5.0	1.7
6	29	15.2	2.9	22	12.6	2.1	24	14.3	2.4	23	11.8	2.2	25	11.3	2.4
7	12	6.3	0.9	20	11.4	1.5	17	10.1	1.3	16	8.2	1.2	21	9.5	1.6
8	13	6.8	1.2	28	16	2.5	21	12.5	2	24	12.3	2.2	24	10.8	2.2
Unknown	0	-	-	1	0.5	-	9	5.4	-	16	8.2	-	5	2.3	-

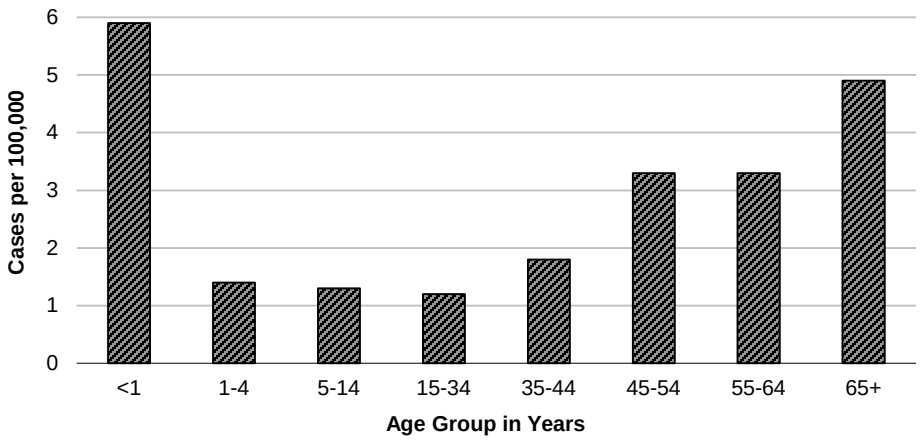
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Invasive Group A Streptococcus LAC and US, 2005-2014*



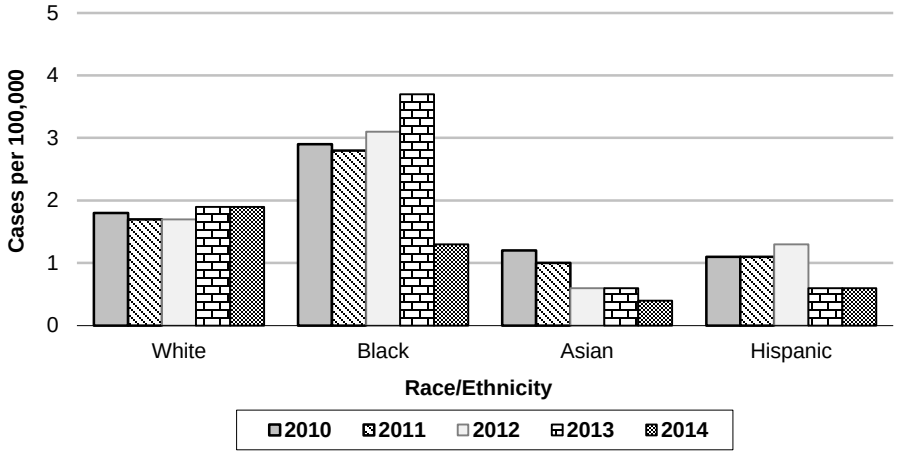
*US incidence for 2014 not available.
**National projection of IGAS incidence from Active Bacterial Core Surveillance areas data, 2014 [1].

Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2014 (N=222)



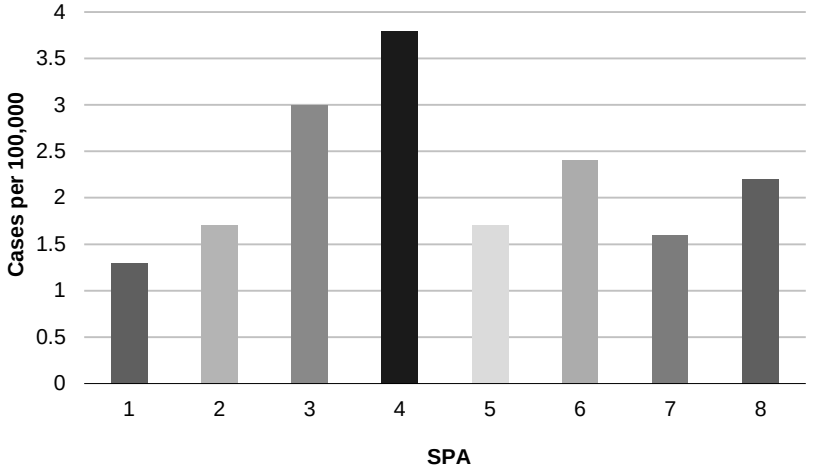
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence Rates* by Race/Ethnicity LAC, 2010-2014



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates* of Invasive Group A Streptococcus by SPA LAC, 2014 (N=222)



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2014 (N=222)

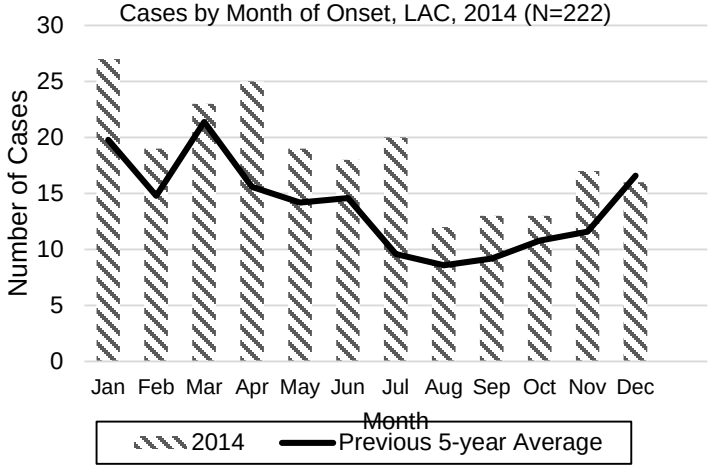


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2014 (N=181)

Syndrome	Number	Percent*
Bacteremia (without focus)	56	31
Cellulitis	49	27
Other	30	17
Pneumonia	29	16
STSS	29	16
Necrotizing Fasciitis	15	8
Non-surgical wound infection	12	7
Osteomyelitis	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 1/1/12–12/31/14

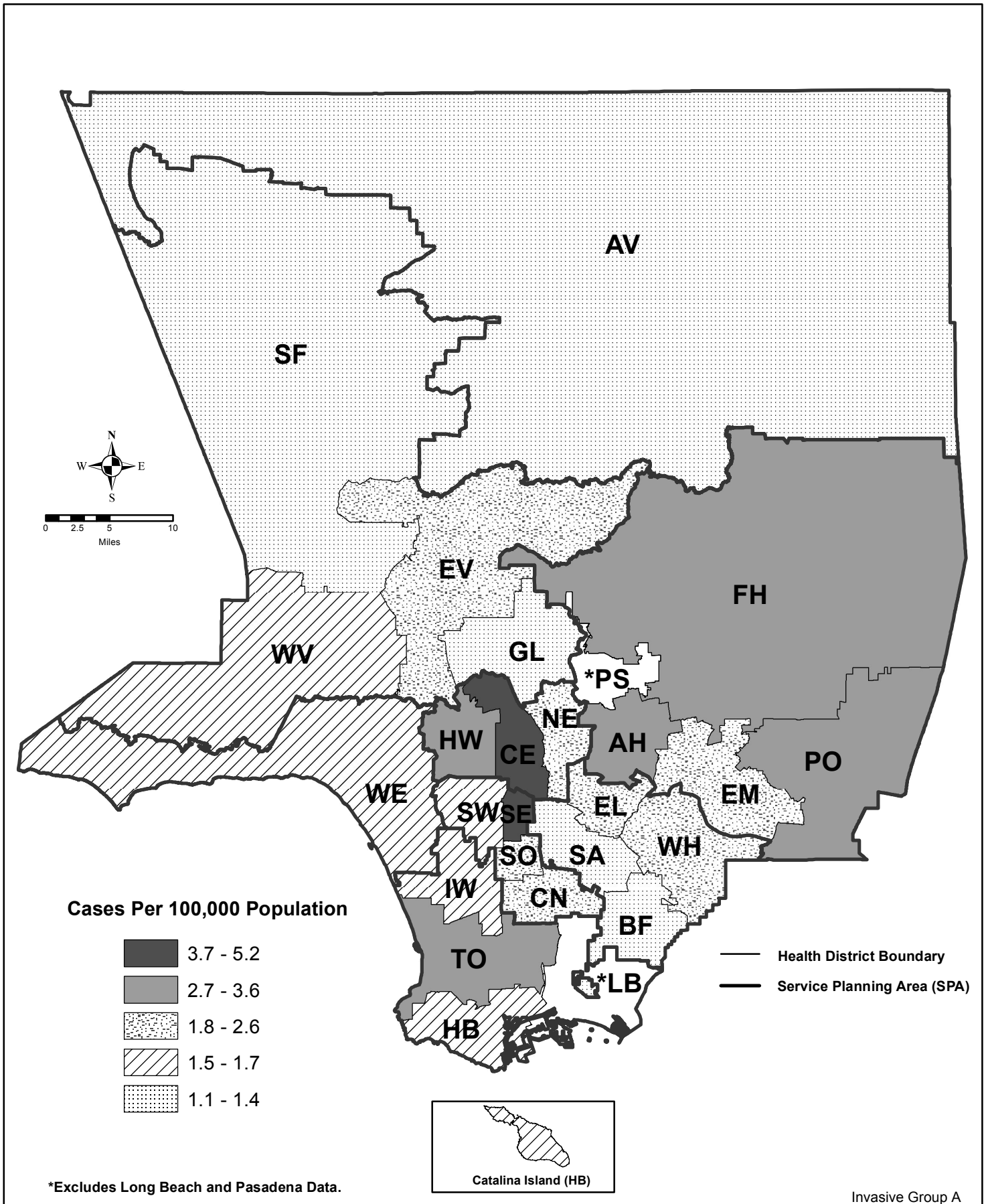
Risk Factors*	2012 (N=168) %**	2013 (N=195) %**	2014 (N=182) %**
Alcohol Abuse	13	13	8
Chronic Heart Disease	11	14	15
Chronic Lung Disease	3	6	6
Cirrhosis	9	5	7
Diabetes	26	28	30
History of Blunt Trauma	10	17	4
HIV/AIDS	1	2	2
IV Drug Use	6	7	2
Malignancy	4	13	9
Other	1	15	7
None	26	30	29

*Overlapping risk factors will total over 100%.
**Cases with unknown risk factors excluded.

References

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: www.cdc.gov/abcs/reports-findings/surv-reports.html. Accessed 6/05/2015.

Map 14. Streptococcus, Group A Invasive Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

TYPHOID FEVER, ACUTE AND CARRIER

ACUTE TYPHOID CRUDE DATA	
Number of Cases	15
Annual Incidence[a]	
LA County[b]	0.16
California[c]	0.17
United States[c]	0.11
Age at Diagnosis	
Mean	34.0
Median	29
Range	8–88 years

[a]Cases per 100,000 population.

[b]Rates based on less than 19 observations are considered unreliable.

[c]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 who travel to developing 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 are important methods of preventing the spread of typhoid. When visiting 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 visiting endemic areas. LAC 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 isolation orders and offers the case the chance to clear the infection with antibiotics.

2014 TRENDS AND HIGHLIGHTS

- In 2014, 80% (n=12) of acute typhoid cases reported visiting countries with endemic typhoid fever.
- Asians accounted for the largest proportion of cases (67%) and had the highest incidence rate. All other reported cases occurred among Hispanics (33%). (Figure 3).
- Service Planning Areas (SPA) 3 and 4 both had the highest incidence rates for typhoid fever, with 0.3 cases per 100,000.
- In 2014, the majority of cases (60%) were observed during the summer but across years, there appears to be little seasonality (Figure 5).
- LAC continues to semi-annually monitor existing carriers who are on the state typhoid registry until they are cleared of infection (Figure 6). There were no new carriers reported for the past three years.
- Three paratyphoid cases were reported in 2014. One reported travel to Asia.

Reported Acute Typhoid Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=15)			2011 (N=15)			2012 (N=6)			2013 (N=17)			2014 (N=15)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	1	6.6	0.7	0	-	-	0	-	-	0	-	-
1-4	3	20.0	0.6	0	-	-	0	-	-	3	17.6	0.6	0	-	-
5-14	4	26.6	0.3	1	6.6	0.1	1	16.7	0.1	3	17.6	0.2	2	13.3	0.2
15-34	5	33.3	0.2	6	40.0	0.2	3	50.0	0.1	7	41.1	0.2	7	46.6	0.2
35-44	1	6.6	0.1	2	13.3	0.1	1	16.7	0.1	1	5.8	0.1	2	13.3	0.2
45-54	1	6.6	0.1	3	20.0	0.2	1	16.7	0.1	2	11.7	0.2	2	13.3	0.2
55-64	1	6.6	0.1	1	6.6	0.1	0	-	-	1	5.8	0.1	1	6.6	0.1
65+	0	-	-	1	6.6	0.1	0	-	-	0	-	-	1	6.6	0.1
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	11	73.3	0.8	7	46.6	0.5	2	33.3	0.2	12	70.5	0.9	10	66.6	0.7
Black	0	-	-	0	0	0.0	0	-	-	0	-	-	0	-	-
Hispanic	3	20	0.1	8	53.3	0.2	4	66.7	0.1	5	29.4	0.1	5	33.3	0.1
White	1	0	0.0	0	-	-	0	-	-	0	-	-	0	-	-
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	1	6.6	0.3	1	6.6	0.3	0	-	-	0	-	-	0	-	-
2	6	40.0	0.3	4	26.6	0.2	1	16.7	0.0	4	23.5	0.2	1	6.6	0
3	2	13.3	0.1	0	-	-	1	16.7	0.0	3	17.6	0.2	5	33.3	0.3
4	2	13.3	0.2	4	26.6	0.3	2	33.3	0.1	2	11.7	0.2	4	26.6	0.3
5	1	6.6	0.2	3	20.0	0.5	0	-	-	3	17.6	0.5	0	-	-
6	2	13.3	0.2	1	6.6	0.1	0	-	-	2	11.7	0.2	2	13.3	0.2
7	1	6.6	0.1	1	6.6	0.1	1	16.7	-	0	-	-	1	6.6	0.1
8	0	-	-	1	6.6	0.1	1	16.7	-	3	17.6	0.3	2	13.3	0.2
Unknown	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, 2010-2014

	2010 (N=4)			2011 (N=3)			2012 (N=0)			2013 (N=0)			2014 (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	-	-
1-4	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
15-34	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
35-44	2	50.0	0.1	1	33.3	0.1	0	-	-	0	-	-	0	-	-
45-54	0	-	-	1	33.3	0.1	0	-	-	0	-	-	0	-	-
55-64	2	50.0	0.2	1	33.3	0.1	0	-	-	0	-	-	0	-	-
65+	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	2	50.0	0.2	0	-	-	0	-	-	0	-	-	0	-	-
Black	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Hispanic	2	50.0	0.0	3	100.	0.1	0	-	-	0	-	-	0	-	-
White	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
2	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
3	1	25.	0.1	0	-	-	0	-	-	0	-	-	0	-	-
4	2	50.	0.2	1	33.3	0.1	0	-	-	0	-	-	0	-	-
5	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
6	1	25.	0.1	1	33.3	0.1	0	-	-	0	-	-	0	-	-
7	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
8	0	-	-	1	33.3	0.1	1	-	-	0	-	-	0	-	-
Unknown	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, 2004-2014**

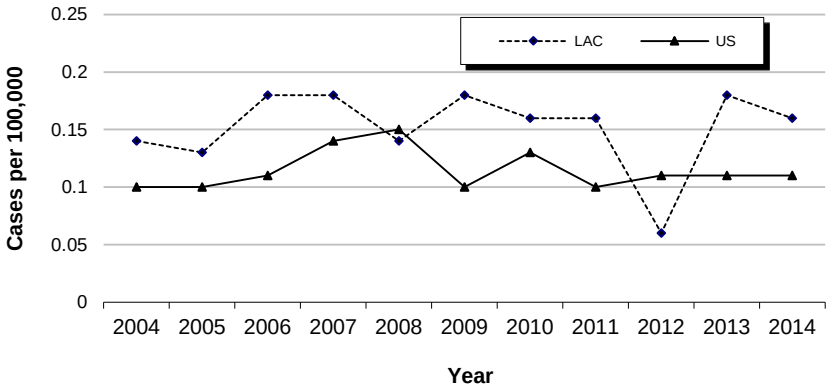


**Figure 2. Acute Typhoid Fever Cases by Age Group
LAC, 2014 (N=15)**

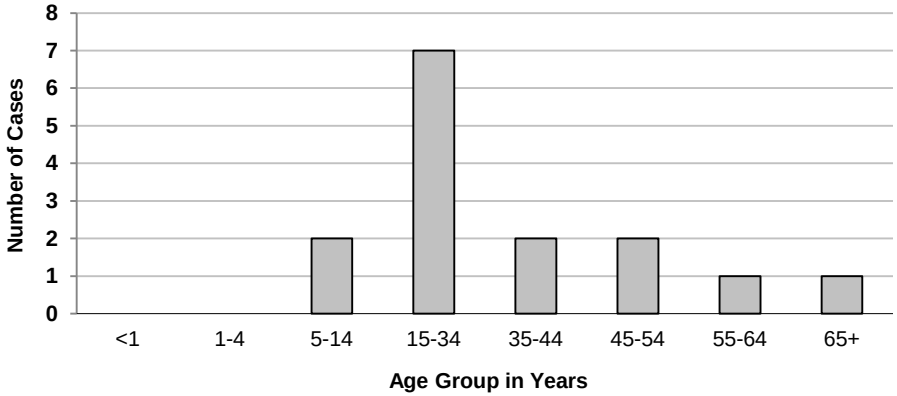


**Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity
LAC, 2014 (N=15)**

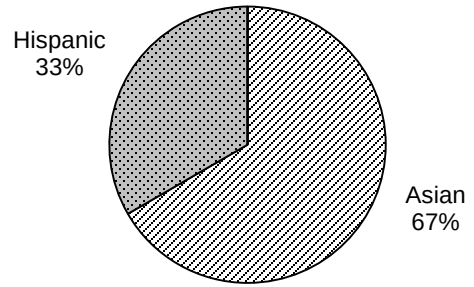


**Figure 4. Reported Acute Typhoid Fever Cases by SPA
LAC, 2013 (N=15)**

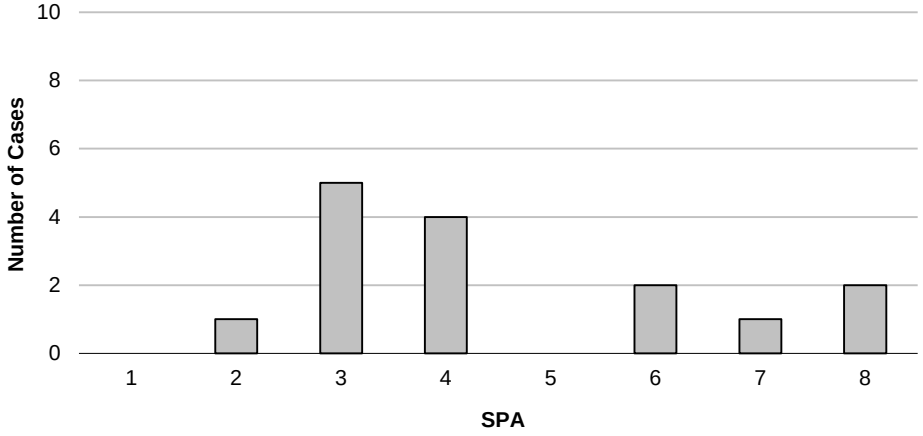


**Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2014 (N=15)**

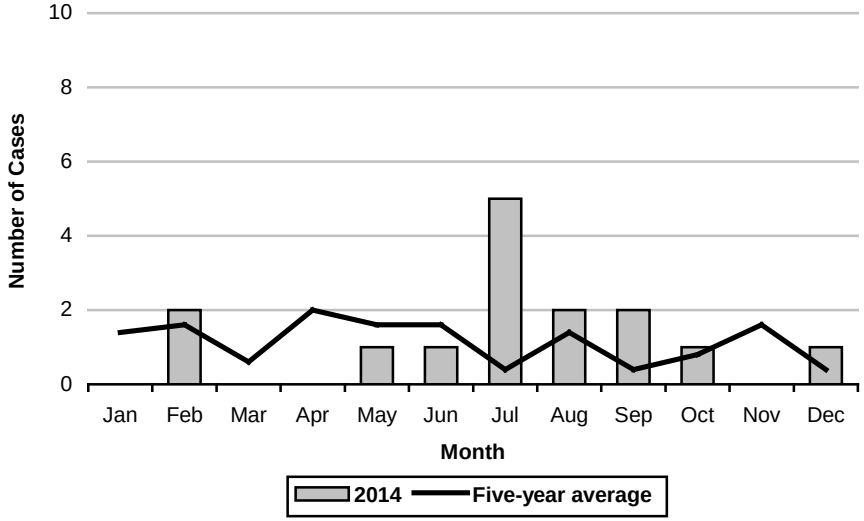
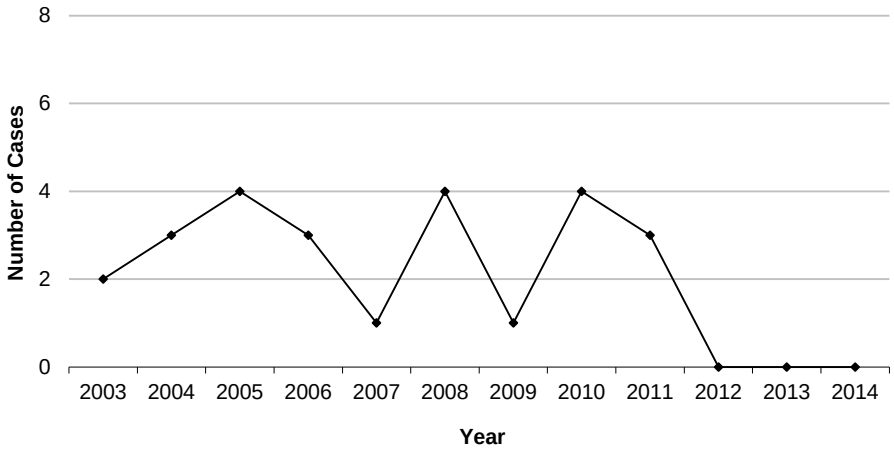


**Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 2003-2014**



FLEABORNE TYPHUS

CRUDE DATA	
Number of Cases	44
Annual Incidence[a]	
LA County	0.47
California	N/A
United States[b]	N/A
Age at Diagnosis	
Mean	45.8
Median	50
Range	4–73 years

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

DESCRIPTION

Fleaborne typhus (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 feral cats, opossums, and rats. In LACf, most reported cases of typhus have historically occurred in residents of the foothills of central LAC. However, since 2006 the distribution of typhus has expanded to other regions of LAC. Symptoms include fever, severe headache, chills, and myalgia. A fine, macular rash may appear three to five days after onset. Occasionally, complications such as pneumonia or hepatitis may occur. Fatalities are uncommon, occurring in less than 1% of cases, but increase with age. The disease is typically mild in young children. Typhus is not vaccine preventable, but can be treated with antibiotics.

Because fleaborne typhus 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 disease 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 *Rickettsia* typhi, along with the appropriate symptoms.

Typhus infection prevention includes controlling fleas on pets and reducing exposure to feral cats, opossums and rats. This may be done by reducing habitat (trimming brush, removing rocks and wood piles) and food sources for these animals. Screens can be placed on windows and crawl spaces to prevent entry of animals and their fleas into homes.

2014 TRENDS AND HIGHLIGHTS

- LAC documented a decrease in reported typhus cases in 2014 (n=44) after several years of increased case counts. The case count began rising in 2010 with 31 cases and peaked in 2013 with 68 cases (Figure 1). However, the case count in 2014 remains much higher than the baseline prior to 2010. Most reported cases were hospitalized (n=38, 86%), indicating that milder cases may not have been diagnosed and reported. Surveillance likely substantially undercounts the true number of cases.
- The mean age of cases was 45.8 years. Although cases are rarely reported among young children <5 years old, one case was documented in a 4 year old (Figure 2).
- The large majority of cases were of white or Hispanic/Latino race/ethnicity (both with 17 cases each, 39%). Asians and blacks have been consistently underrepresented in comparison to the general LAC population.
- The highest number of typhus cases occurred in SPA 3 (n=17) (Figure 3), which historically has had high case counts. Typhus has been an increasing problem in SPA 4 in recent years and likely contributed to spikes in 2012 and 2013. However, in 2014 it decreased in this area to 5 cases (11%). Typhus cases identified in 2014 resided in all SPAs with the exception of SPA 1, indicating that typhus has established itself in new areas where it has not often been usually seen for decades.
- This year followed the typical seasonal curve with the highest monthly case count in August (n=8) (Figure 4). However, cases were documented in all months of the year. Physicians and residents should assume that there is risk of typhus infection throughout the entire year in LAC.

- Only eight cases (18%) recalled any flea exposure at or around their home. Animal exposures at cases' places of employment were minimal. None reported exposure to animals and insects directly due to occupational activities.
- Over half of cases reported an exposure to cats at or around their home (54%) (Table 1). Reported exposure to cats, and feral cats in particular, has increased in the last few years (Figure 5). Overall exposure to cats increased from 26% of cases in 2010 to 66% of cases in 2014. Exposure to feral cats, extracted from interview notes beginning in 2012, increased from 16% of cases in 2012 to 45% of cases in 2014, accounting for over half of all cat exposures.
- The recent 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 (increasing temperatures) that favor flea survival; increased testing and reporting due to better educated physicians; and increased reporting to LAC DPH through electronic laboratory reporting.

Reported Fleaborne Typhus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=31)			2011 (N=38)			2012 (N=50)			2013 (N=68)			2014 (N=44)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
1-4	0	-	-	1	2.6	-	0	-	-	1	1.5	-	1	2.3	-
5-14	3	9.7	-	3	7.9	-	6	12.0	-	5	7.4	-	1	2.3	-
15-34	4	12.9	-	5	13.2	-	11	22.0	-	16	23.5	-	10	22.7	-
35-44	7	22.6	-	5	13.2	-	13	26.0	-	12	17.6	-	6	13.6	-
45-54	5	16.1	-	9	23.7	-	10	20.0	-	13	19.1	-	10	22.7	-
55-64	10	32.3	-	9	23.7	-	4	6.7	-	13	19.1	-	8	18.2	-
65+	2	6.5	-	6	15.8	-	6	12.0	-	8	11.8	-	8	18.2	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	2	6.5	-	1	2.6	-	0	-	-	3	4.4	-	3	6.8	-
Black	2	6.5	-	2	5.3	-	2	4.0	-	1	1.5	-	0	-	-
Hispanic	10	32.3	-	9	23.7	-	15	30.0	-	24	35.3	-	17	38.6	-
White	14	45.2	-	23	60.5	-	25	50.0	-	35	51.5	-	17	38.6	-
Other	0	0.0	-	0	-	-	3	6.0	-	1	1.5	-	1	2.3	-
Unknown	3	9.7	-	3	7.9	-	5	10.0	-	4	5.9	-	6	13.6	-
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
2	5	16.1	-	9	23.7	-	5	10.0	-	6	8.8	-	3	6.8	-
3	9	29.0	-	13	34.2	-	18	36.0	-	20	29.4	-	17	38.6	-
4	5	16.1	-	5	13.2	-	13	26.0	-	18	26.5	-	5	11.4	-
5	6	19.4	-	5	13.2	-	6	12.0	-	5	7.4	-	6	13.6	-
6	4	12.9	-	0	-	-	4	6.7	-	7	10.3	-	3	6.8	-
7	0	-	-	5	13.2	-	3	6.0	-	4	5.9	-	5	11.4	-
8	2	6.5	-	1	2.6	-	1	2.0	-	8	11.8	-	5	11.4	-
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

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

Figure 1. Fleaborne Typhus Cases by Year
LAC, 2000-2014

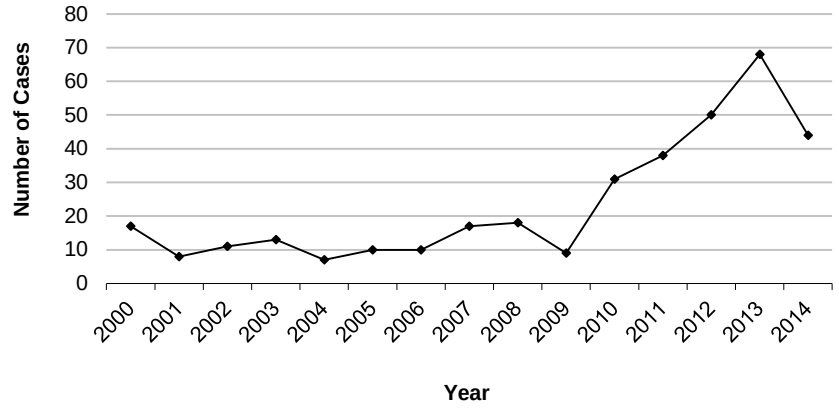


Figure 2. Fleaborne Typhus by Age Group
LAC, 2014 (N=44)

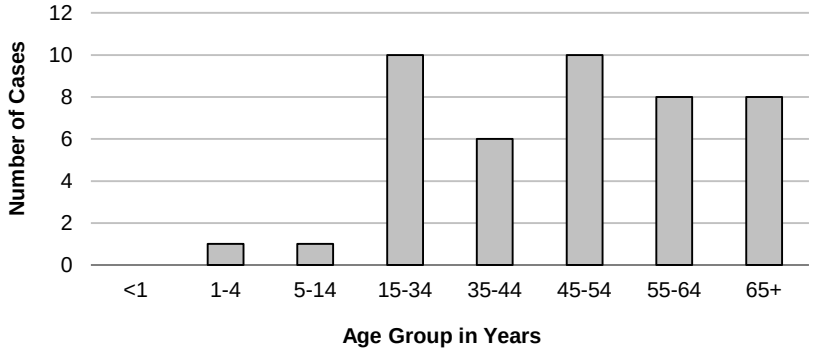


Figure 3. Fleaborne Typhus Cases by SPA
LAC, 2010-2014

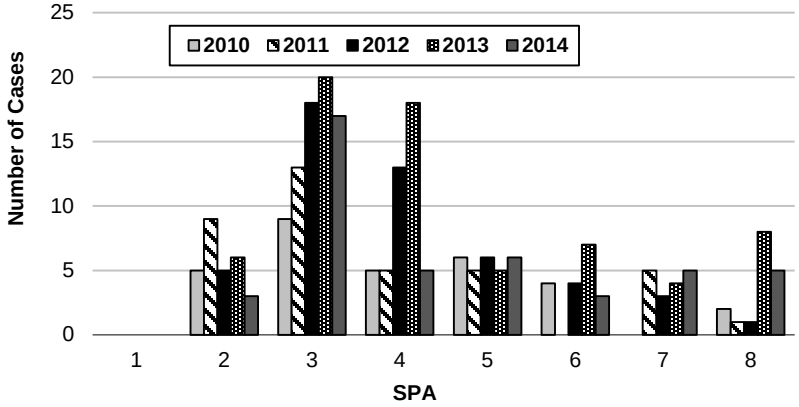


Figure 4. Fleaborne Typhus Cases by Month of Onset
LAC, 2014 (N=44)

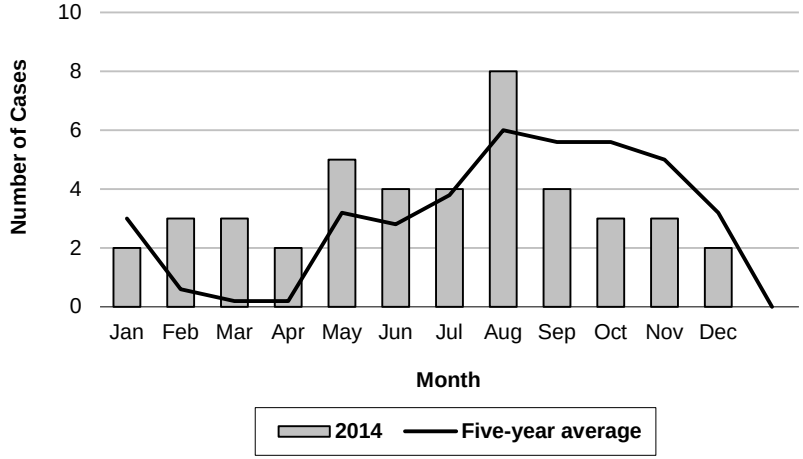
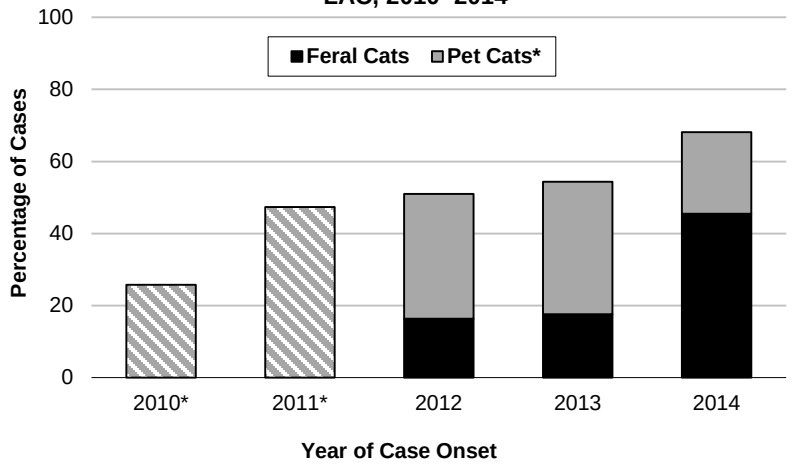


Figure 5. Fleaborne Typhus Cases with Reported Cat Exposure Near Home LAC, 2010 -2014



*Hash marked bars denotes all cats. Does not distinguish between feral or pet cats.

Table 1. Animal Exposure* of Fleaborne Typhus Cases LAC, 2014 (N=44)

	At or around Home n (%)	At or around Employment n (%)
Cat	30 (55)	3 (7)
Dog	19 (43)	0 (0)
Opossum	23 (53)	1 (3)
Rodent	7 (16)	1 (3)

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

VIBRIOSIS

CRUDE DATA	
Number of Cases	52
Annual Incidence[a]	
LA County[b]	0.55
California[b]	0.72
United States[b]	0.40
Age at Diagnosis	
Mean	42
Median	37
Range	9–88 years

[a]Cases per 100,000 population.
[b]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 a 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 1 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. Many vibriosis patients have recent history of travel to developing countries. Vibriosis is commonly associated with consumption of raw or undercooked seafood, particularly shellfish.

2014 TRENDS AND HIGHLIGHTS

- The number of Vibriosis cases reported to LAC doubled in 2014, compared to 2013 (Figure 1). This was also the most cases reported to LAC in the past 10 years. This could be due to warmer waters which increases the risk of *V. parahaemolyticus* infection; 2014 had the warmest summer on record to date.
- The majority of vibriosis cases were aged 15 to 44 years (Figure 2).
- SPA 2 had 11 confirmed cases of vibriosis in 2014 (Figure 4). SPAs 4 and 5 each had 9 confirmed cases. In all of these regions, raw oysters or other seafood were significant sources of vibriosis.
- Typically, vibriosis cases peak during July and August because *Vibrio* flourishes in warmer water temperatures (Figure 5).
- *V. parahæmolyticus* was the most common etiologic agent isolated (n=36). A total of 23 *V. parahæmolyticus* cases reported having eaten raw oysters prior to onset, and 23 cases reported eating other seafood, excluding oysters, but only 4 claimed that the seafood was eaten raw. Nine cases reported foreign travel to Mexico, Europe, Central America, and Turkey. Exposure history could not be determined for three cases.
- There were nine confirmed cases of *V. alginolyticus.* Five cases had a history of recreational water exposure. Exposure history could not be determined for four cases.
- *V. choleræ* non-O1, non-O139 was isolated from two persons.
- There were three confirmed cases of *V. fluvialis.* Two cases had unknown exposure and one case reported eating rawseafood, including oysters. One case of *V. vulnificus* reported travel to Cancun, Mexico.
- One case had a vibrio species that was unable to be identified.
- There were no vibriosis deaths in 2014.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=13)			2011 (N=19)			2012 (N=27)			2013 (N=26)			2014 (N=52)		
	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	-	-	0	-	-	0	-	-	0	-	-
5-14	2	15.4	0.2	1	5.3	0.1	3	11.1	0.3	3	11.5	0.2	2	3.8	0.2
15-34	5	38.5	0.2	5	26.3	0.2	7	25.9	0.3	4	15.3	0.1	18	34.6	0.6
35-44	0	-	-	3	15.8	0.2	4	14.8	0.3	7	26.9	0.5	13	25.0	1.0
45-54	3	23.1	0.2	5	26.3	0.4	5	18.5	0.5	6	23.0	0.5	6	11.5	0.5
55-64	2	15.4	0.2	3	15.8	0.3	4	14.8	0.4	2	7.6	0.2	7	13.5	0.7
65+	1	7.7	0.1	2	10.5	0.2	4	14.8	0.4	4	15.3	0.4	6	11.5	0.5
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	1	7.7	0.1	0	-	-	2	7.4	0.2	3	11.5	0.2	4	7.7	0.1
Black	0	-	-	1	5.3	0.1	1	3.7	0.1	0	0.0	0.0	3	5.8	0.4
Hispanic	4	30.8	0.1	9	47.4	0.2	9	33.3	0.2	6	23.1	0.1	16	30.7	0.3
White	4	30.8	0.2	9	47.4	0.3	13	48.1	0.6	15	57.7	0.6	12	23.1	0.5
Other	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Unknown	4	30.8	-	0	-	-	2	7.4	-	2	7.6	-	17	32.7	-
SPA															
1	0	-	-	0	-	-	0	-	-	0	-	-	2	3.8	0.5
2	1	7.7	-	4	21.1	0.2	6	22.2	0.3	7	26.9	0.3	11	21.2	0.5
3	2	0.0	0.4	2	10.5	0.1	2	7.4	0.2	3	11.5	0.2	5	9.6	0.3
4	2	7.7	0.2	4	21.1	0.3	5	18.5	0.4	5	19.2	0.4	9	17.3	0.8
5	4	30.8	0.6	1	5.3	0.2	6	22.2	0.9	5	19.2	0.8	9	17.3	1.4
6	2	15.4	0.2	4	21.1	0.3	2	7.4	0.3	2	7.7	0.2	6	11.5	0.6
7	1	7.7	0.1	2	10.5	0.1	2	7.4	0.2	0	0.0	0.0	3	5.8	0.2
8	3	23.1	0.3	2	15.8	0.2	4	14.8	0.4	4	15.4	0.4	5	9.6	0.5
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	2	3.8	-

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

**Figure 1. Reported Cases of Vibriosis
LAC, 2005-2014**

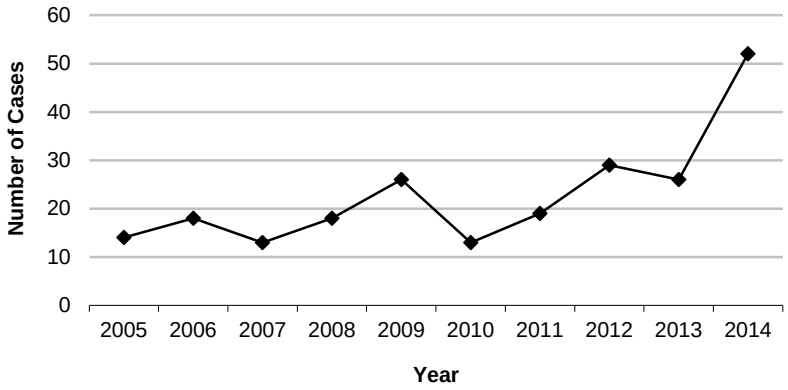


**Figure 2. Reported Cases of Vibrosis by Age Group
LAC, 2014 (N=52)**

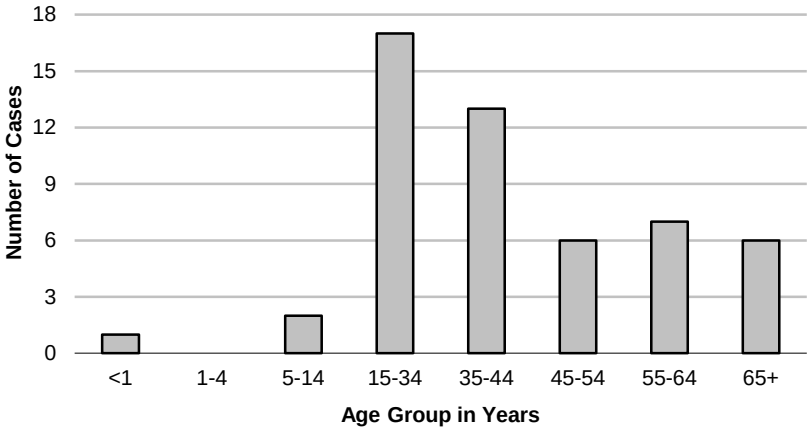


**Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2014 (N=52)**

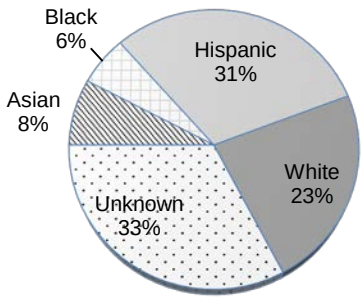


**Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2014 (N=52)**

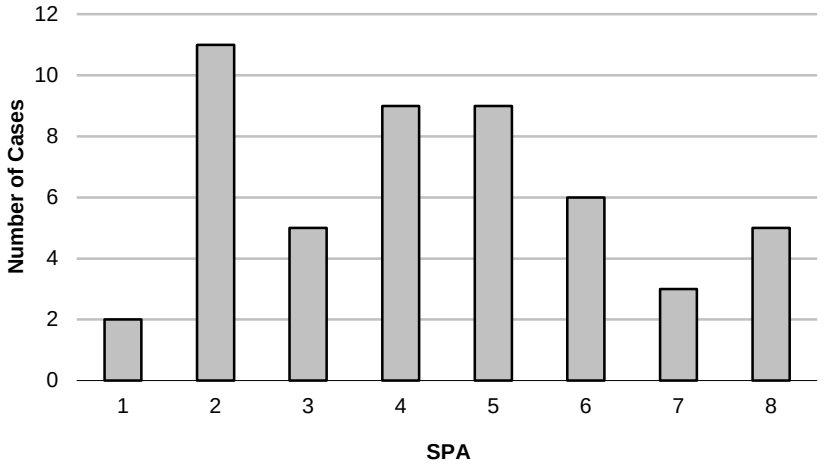


**Figure 5. Reported Vibriosis Cases by Month of Onset
LAC, 2014 (N=52)**

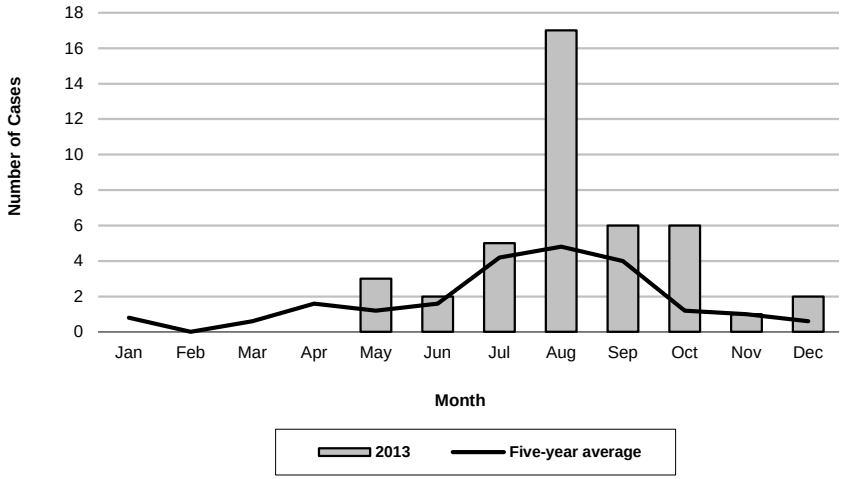
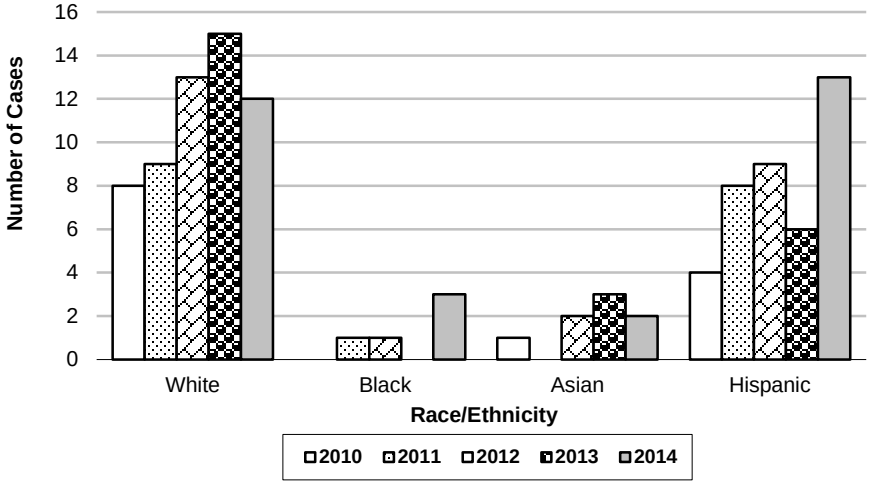
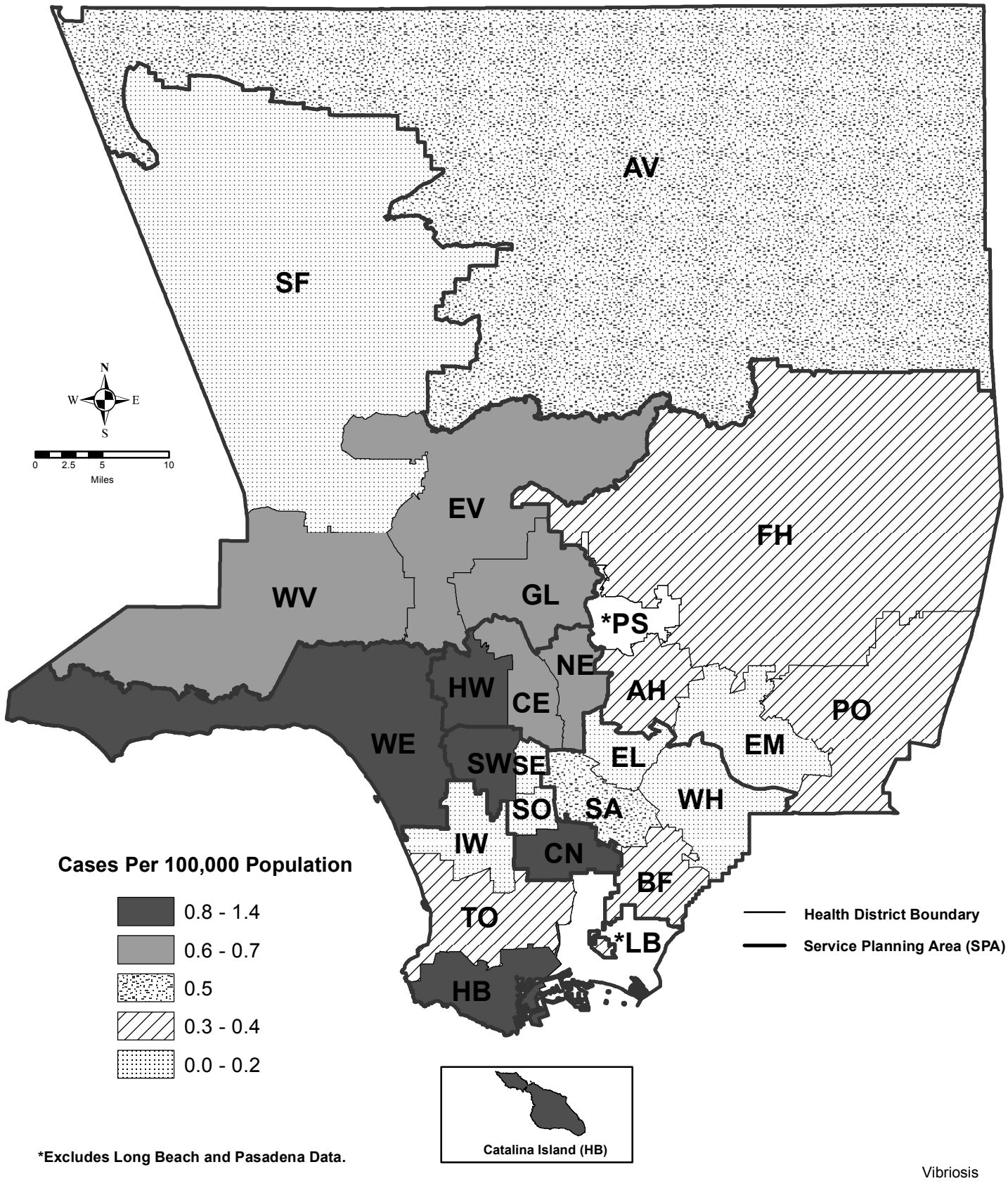


**Figure 6. Reported Cases of Vibriosis by Race/Ethnicity
LAC, 2010-2014***



*Does not include cases of unknown ethnicity.

Map 15. Vibrio
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

WEST NILE VIRUS

CRUDE DATA	
Number of Cases[a]	218
Annual Incidence[b]	
LA County[a]	2.31
California[c]	2.11
United States[c]	0.69
Age at Diagnosis	
Mean	58.7
Median	59
Range	17–94 years

[b]Includes asymptomatic infections.
[b]Cases per 100,000 population. CA and US rates do not include asymptomatic infections.
[c]Calculated from Final 2014 Reports of Nationally Notifiable Infectious Diseases. MMWR 64(36):1019–1033.

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 requires 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 LAC residents. However, four cases of WNV-associated infection including three with NID were documented to be transmitted from a LAC organ donor in 2011, who was 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 from occupational exposure.

Vector management programs are the most effective tools to prevent and control 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).

2014 TRENDS AND HIGHLIGHTS

- The incidence of WNV infections reported in 2014 (2.31 per 100,000 population) is the second highest documented in LAC since WNV appeared in 2003 (Figure 1). A high number of cases each year from 2012 to 2014 suggests that the 4-year periodicity previously seen may no longer be characteristic.
- Of 199 reported symptomatic WNV infections, there were 43 cases of WNV fever and 156 NID cases (74 with meningitis, 67 encephalitis, and 15 acute flaccid paralysis) (Figure 2). Seven WNV-associated deaths were reported among symptomatic cases (4%). Nineteen asymptomatic donors (9%) were reported from local blood banks (Figure 2).
- The mean age of all reported infections was 58.7 years with the largest proportion in the 65 years old and over age group (28%).. Incidence increased as age increased with no cases reported among children <15 years old (Figure 3). This likely reflects the increased occurrence of NID and more severe infection with increasing age.
- The highest incidence of reported WNV infections occurred among whites and persons of Hispanic/Latino race/ethnicity (3.6 and 1.6 per 100,000, respectively); disease in these populations consistently has been higher than for blacks and Asians.
- The male to female ratio was 1:8:1.
- WNV infections were distributed widely across all SPAs this year. The highest number of people infected with WNV continued to be residents of the San Fernando Valley area (28%), though geographic differences were less than in previous years (Figure 5). Record counts of human infections were documented in SPAs 4, 5, 6, and 7. In fact, the highest incidence rate occurred in the SPA 5 (western LAC area) with 3.7 cases per 100,000 (n=24).
- This year, human WNV infections occurred from July to November, with the last case experiencing illness onset on November 30, 2014 (Figure 6). This is the latest onset ever documented for LAC and continues a trend in which WNV transmission occurs through November. The human WNV season in LAC previously ran from June through the end of October. Peak onset in 2014 occurred in September, similar to the five-year average.
- Statewide in 2014, 892 human WNV infections were reported and nationally, 2,521 cases were reported.

Reported West Nile Virus Infections and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2010-2014

	2010 (N=4)			2011 (N=63)			2012 (N=174)			2013 (N=165)			2014 (N=218)		
	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	-	-	0	-	-	0	-	-	0	-	-
5-14	0	-	-	1	1.6	0.1	2	1.1	0.2	6	3.6	0.5	0	-	-
15-34	1	25.0	0.0	5	7.9	0.2	24	13.8	0.9	19	11.5	0.7	23	10.6	0.8
35-44	0	-	-	3	4.8	0.2	17	9.8	1.3	15	9.1	1.1	15	6.9	1.1
45-54	1	25.0	0.1	16	25.4	1.2	33	19.0	2.6	34	20.6	2.6	44	20.2	3.4
55-64	0	-	-	17	27.0	1.8	34	19.5	3.3	46	27.9	4.5	55	25.2	5.2
65+	2	50.0	0.2	21	33.3	2.0	64	36.8	5.8	45	27.3	4.0	81	37.2	7.2
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
Race/Ethnicity															
Asian	0	-	-	1	1.6	0.1	9	5.2	0.7	6	3.6	0.4	11	5.0	0.8
Black	0	-	-	1	1.6	0.1	3	1.7	0.4	3	1.8	0.4	3	1.4	0.4
Hispanic	1	25.0	0.01	26	41.3	0.5	59	33.9	1.3	50	30.3	1.1	73	33.5	1.6
White	3	75.0	0.1	30	47.6	1.0	91	52.3	3.4	80	48.5	3.0	97	44.5	3.6
Other	0	-	-	2	3.2	-	2	1.1	-	2	1.2	-	0	0.0	-
Unknown	0	-	-	3	4.8	-	10	5.7	-	24	14.5	-	34	15.6	-
SPA															
1	0	-	-	1	1.6	0.3	10	5.7	2.6	15	9.1	3.8	2	0.9	0.5
2	0	-	-	39	61.9	1.8	73	42.0	3.4	62	37.6	2.9	60	27.5	2.7
3	2	50.0	0.1	16	25.4	0.9	47	27.0	2.9	23	13.9	1.4	34	15.6	2.1
4	0	-	-	1	1.6	0.1	18	10.3	1.6	6	3.6	0.5	28	12.8	2.4
5	0	-	-	1	1.6	0.2	8	4.6	1.3	2	1.2	0.3	24	11.0	3.7
6	0	-	-	1	1.6	0.1	2	1.1	0.2	4	2.4	0.4	13	6.0	1.3
7	2	50.0	0.1	4	6.3	0.3	13	7.5	1.0	24	14.5	1.8	45	20.6	3.4
8	0	-	-	0	-	-	3	1.7	0.3	29	17.6	2.7	11	5.0	1.0
Unknown	0	-	-	0	-	-	0	-	-	0	-	-	1	0.5	-

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

**Figure 1. Incidence Rates* of West Nile Virus
LAC, 2004-2014**

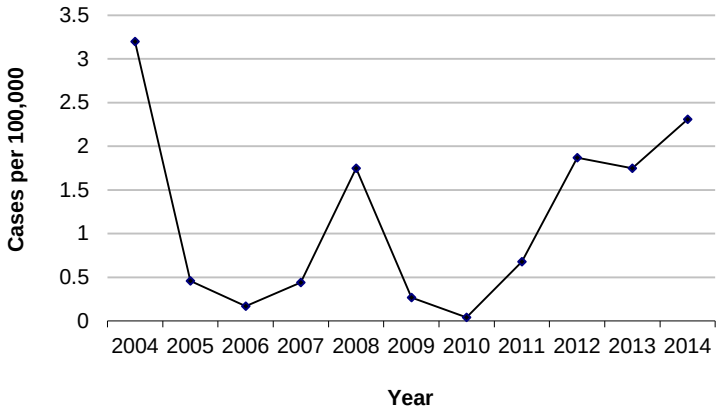


**Figure 2. Percentage of West Nile Virus Infections
by Presentation
LAC, 2014 (N=218)**

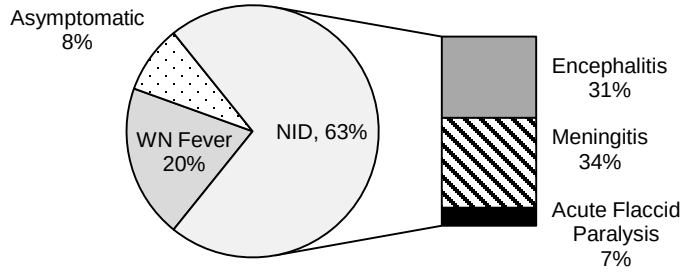


**Figure 3. Incidence Rates* of West Nile Virus Infection
by Age Group
LAC, 2014 (N=218)**

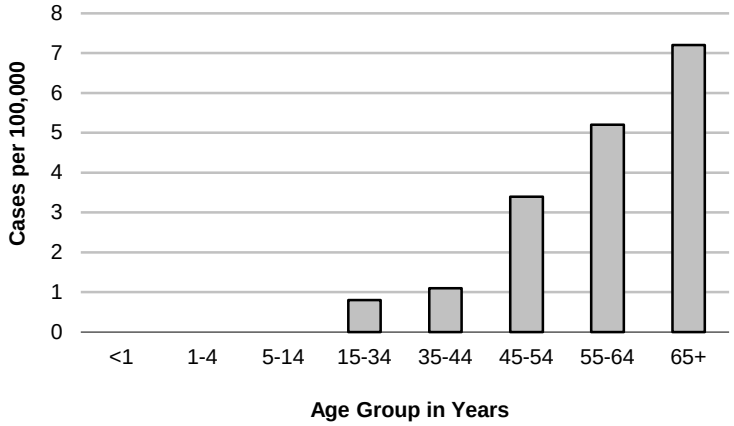
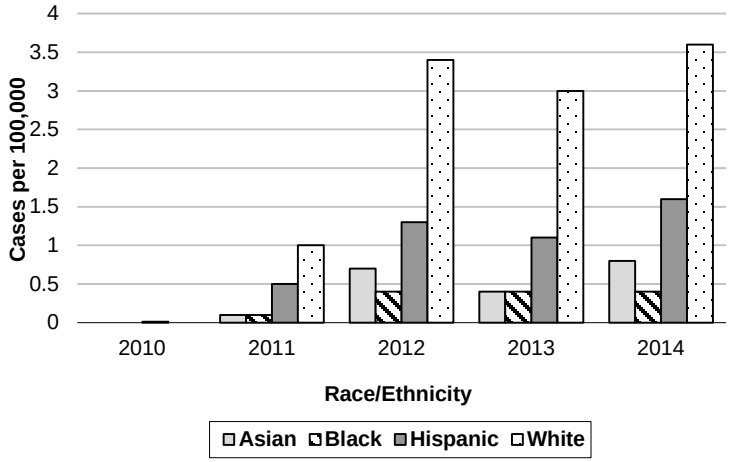


**Figure 4. West Nile Virus Incidence* by Race/Ethnicity
LAC, 2010-2014**



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

**Figure 5. Incidence Rates* of West Nile Virus by SPA
LAC, 2010-2014**

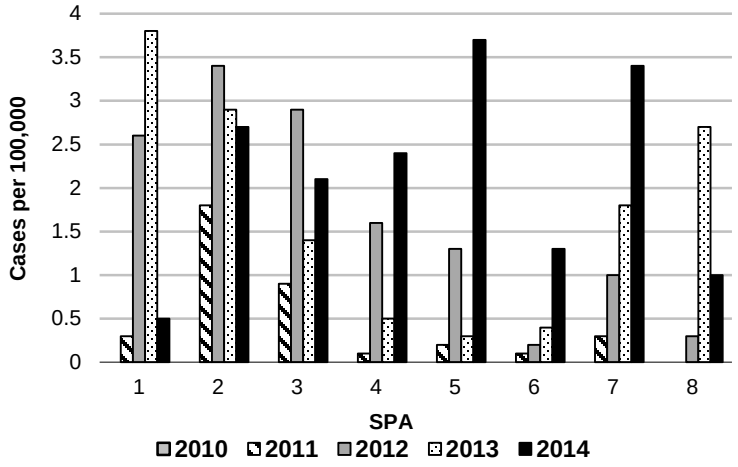
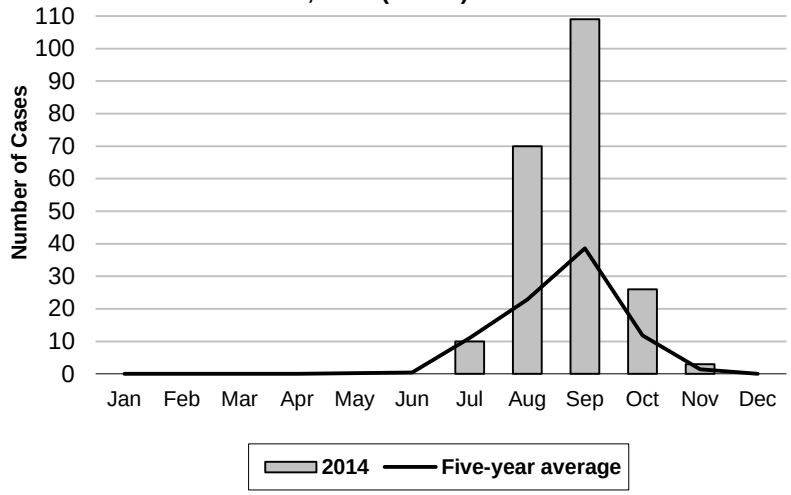
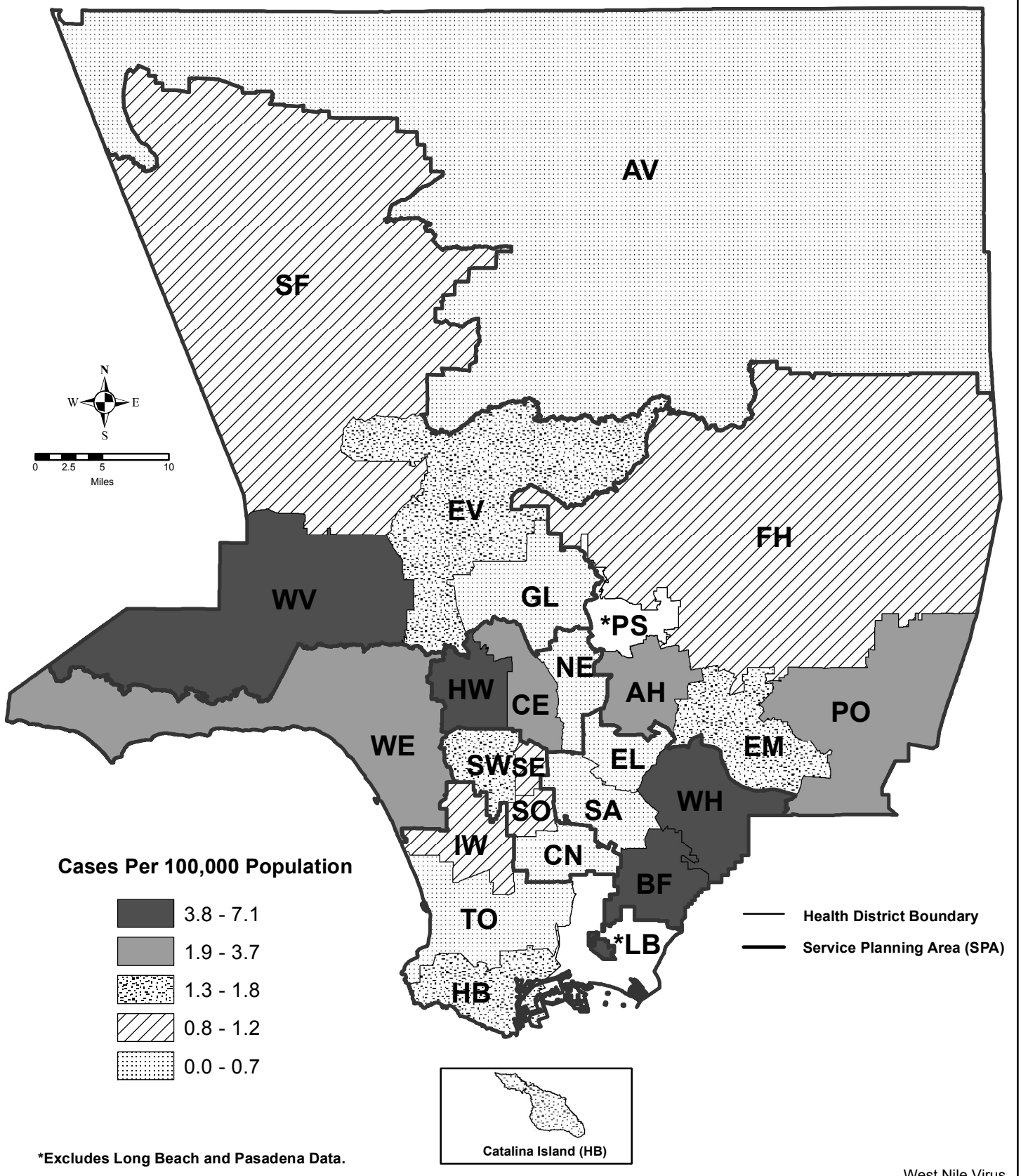


**Figure 6. Reported West Nile Virus Infections
by Month of Onset
LAC, 2014 (N=218)**



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

Map 16. West Nile Virus
Rates by Health District, Los Angeles County, 2014*



*Excludes Long Beach and Pasadena Data.

DISEASE OUTBREAK SUMMARIES

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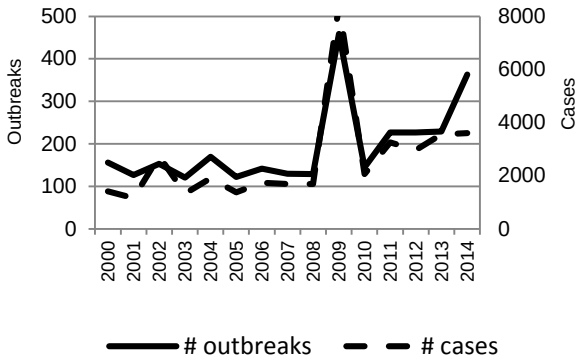
COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2014, 363 community-acquired disease outbreaks accounted for 3607 cases of illness (Figure 1).
- Three general disease categories accounted for 81% of all outbreak causes - Hand Foot and Mouth (HFM), 39%; ectoparasites, 26%; and Gastroenteritis (GE), 17%. (Figure 2, Table 2).
- Three outbreak settings accounted for almost all (94%) of the reported outbreaks – preschools, 56%; schools, 24%; and residential/assisted living settings, 14%. (Figure 3, Table 2)
- Only 4 percent of the outbreaks were caused by disease conditions that are individually reportable. (Tables 1, 2).

Figure 1
Community-Acquired Outbreaks
Number of Persons Affected
LAC 2000-2014

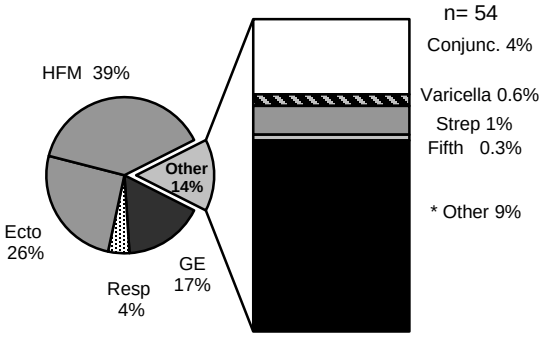


DATA

A disease outbreak is an infection/infestation cluster 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).

The etiologic agent which drove 2014 overall outbreak number up by almost 50% compared to 2013 (229 to 363) was **HFM** with 140 reported outbreaks. There was only 13 HFM reports in 2013. Fortunately, 2014 HFM outbreaks were relatively mild, and the number of cases per outbreak averaged 8, with a median of 6 and mode of 3. Figure 1 shows that while overall outbreak reports are up, the cumulative case count stayed fairly constant. HFM has a tendency to affect young children and 81% of the HFM outbreaks were in a preschool setting. (Table 2). The increase of HFM outbreak reports also help pushed the preschool setting to 56% of all reported outbreaks for 2014 (Figure 3).

Figure 2
Community-Acquired Outbreaks by Type of Disease* LAC, 2014 (N=363)

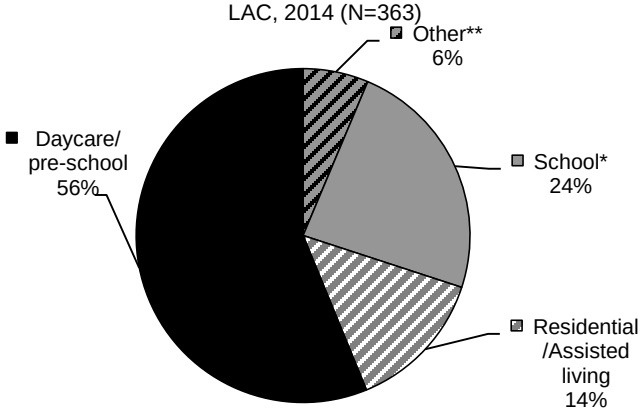


*Other includes: Cryptosporidiosis, herpangina, ringworm, impetigo, legionellosis, measles, viral/aseptic meningitis pertussis, unknown rash, and unspecified.

Reported **respiratory illness** outbreaks, either confirmed influenza or with an unspecified etiology, dropped drastically from 2013 to 2014. Confirmed influenza outbreaks decreased from 10 to 2, and unspecified outbreaks went from 54 to 14. Respiratory outbreaks averaged ten cases per outbreak, with one elementary school influenza outbreak involving 61 reported cases. The outbreaks occurred exclusively in the beginning and the end of the year, but most, 75%, were reported in the first 4 months; the 2 confirmed influenza outbreaks were in January. (Figure 5)

Ectoparasites – head lice and scabies - continue to be in the top three reported causes for outbreaks (n=93). Scabies outbreaks were more common in the older risk group with 8 of 13 reported in residential/assisted-living settings. (Table 2).

Figure 3
Community-Aquired Outbreaks by Setting
LAC, 2014 (N=363)

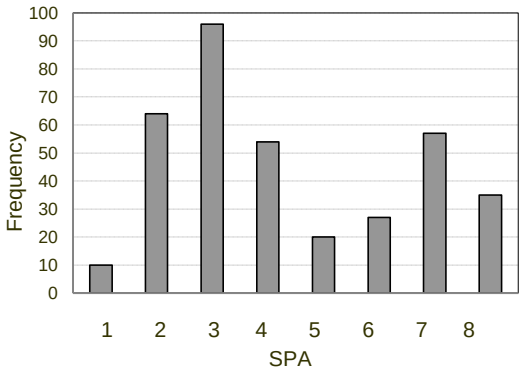


* Includes elementary (70) middle school (4) high school (9), and universities (3).
** Includes group homes (3) shelter (1), juvenile camp (1), maternal care center (14), worksite (1), camp (1), fair (1), and scout troop (1) .

Scabies outbreaks were distributed throughout the year, but were relatively small with an average of 3 cases per outbreak. Pediculosis (head lice) dominates the ectoparasite category with 80 reported outbreaks. Averaging 6 cases per outbreak, head lice tends to occur in the youngest age groups with 91% of the 80 outbreaks in preschool (55) or elementary school (18) settings.

The 60 **GE outbreaks** in 2014 were primarily caused by either norovirus (11) or of undetermined etiology (47); there was one reported outbreak of *E. coli*–O157:H7 and one of *Shigella*. GE outbreaks also had the high per outbreak case counts; norovirus outbreaks had a mean of 34 cases per outbreak and unspecified GE outbreaks had 21 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 older individuals in a residential/assisted living facility compared with a children in a school setting may be a factor why the majority (73%) of norovirus were confirmed in the former setting. The GE figures for 2014 highlight the continuing circulation of norovirus and reflect the ease this agent can be transmitted from person-to-person in community settings.

Figure 4
Community-Acquired Outbreaks by SPA
LAC, 2014 (N=363)



Outbreaks were reported from all eight SPAs (Figure 4). SPA 3, San Gabriel (96); SPA 2, San Fernando (64); and SPA 4, Metro (54) had the most outbreaks for the past 3 years. SPA 7, East (57) reported more outbreaks this year, due to mainly HFM and head lice in preschools and elementary schools, accounting for 57% of the outbreaks for the SPA.

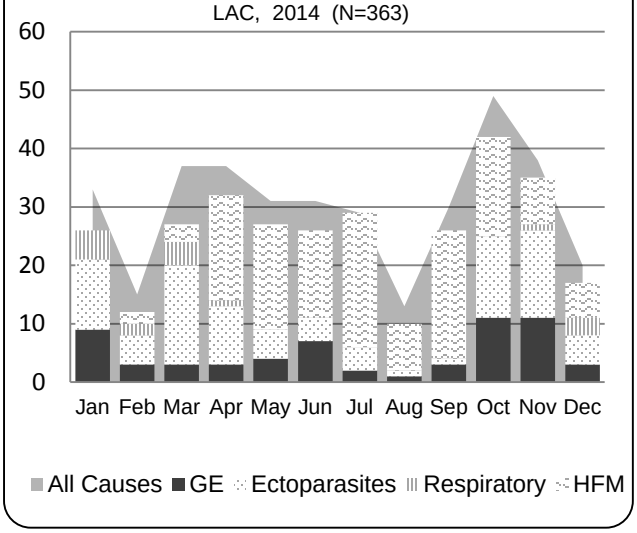
The graph of community-acquired outbreaks by report month (Figure 5) further illustrates the impact of GE, ectoparasite, respiratory, and HFM outbreaks. These four disease categories accounted for majority of outbreaks each month throughout the year.

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/knowledge to report to the local health department. This results in most community outbreaks being reported in preschools, schools and residential facilities.

Defining a cluster of illness as an outbreak can be problematic. With rare exception, a minimum of two cases occurring in time and exposure are required. An additional measure - above the usual number or background - is also used to define an outbreak situation. When ambiguity exists in terms of what constitutes ‘unusual’; the tendency is to call the situation an outbreak. For the Public Health Department, all initial reports are considered suspect and are rapidly investigated. Even in situations where an outbreak designation is not met, rapid public health intervention can result in the mitigation of future cases and good

Figure 5
Community-Acquired Outbreaks by Selected Disease and Report Month
LAC, 2014 (N=363)



relationships with facilities that may need public health assistance in the future.

There is a strong relationship between outbreak setting and the disease being reported. Characteristics of community-acquired outbreaks result from interactions among particular age groups, locations, and specific diseases. It is the epidemiologic characteristics of the three that lead to disease transmission and a potential outbreak. The predominance of outbreaks reported among children in educational settings (preschool to university) has been recognized in previous Annual Reports. In the preschool setting, two etiologies (HFM and pediculosis) accounted for 83% of all outbreak reports. While illness is often linked to schools, in some cases, the school association might be related to the reporting source rather than where illness is spread. 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, etc.). 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 effected age group is an older population associated with residential/assisted living settings. In this older age category, GE and scabies are the most common outbreak types (Table 2). While not having the same frequency of the school settings, GE outbreaks were dominant in the residential/assisted living sites; these facilities are the location of record for 45% of all GE outbreaks and 54% of the outbreaks reported from this setting. Nearly all of the confirmed norovirus outbreaks (73%) were in residential/assisted living sites.

Table 1. Community-Acquired Outbreaks by Disease— LAC, 2014

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Gastroenteritis:				
Norovirus	11	369	34	1-59
Shigella	1	8	8	8
Salmonella	0	0	0	0
e. coli	1	3	3	3
GE illness-Unknown	47	1008	21	2-141
Respiratory:				
Influenza	2	69	35	8-61
Streptococcal	5	47	9	2-18
Resp.-Unknown	14	98	7	2-15
Ectoparasites:				
Pediculosis	80	518	6	2-43
Scabies	13	34	3	2-4
Others:				
Hand, foot & mouth disease	140	1096	8	2-28
Conjunctivitis	13	75	7	2-18
Varicella	2	44	22	11-33
Fifth disease	1	8	8	8
Other*	33	230	7	2-20
Total	**363**	**3607**	**10**	**2-141**

* Includes: Unk. rash (12), pertussis (10), ringworm (2), cryptosporidiosis (1), herpangina (1), Impetigo (1) legionellosis (1) measles (1), meningitis viral/aseptic (1) and unspecified (3).

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2014

Disease	Residential/ assisted living	School[a]	Preschool or Daycare	Other[b]	TOTAL
Gastroenteritis:					
Norovirus	8	1	1	1	**11**
Shigella	0	0	1	0	**1**
Salmonella	0	0	0	0	**0**
e. coli	0	0	0	1	**1**
GE illness-Unknown	19	11	12	5	**47**
Respiratory:					
Influenza	0	2	0	0	**2**
Streptococcal	0	4	1	0	**5**
Respiratory-Unknown	5	3	3	3	**14**
Ectoparasites:					
Pediculosis	3	20	55	2	**80**
Scabies	8	0	2	3	**13**
Other:					
Hand, foot & mouth disease	0	24	114	2	**140**
Conjunctivitis	0	1	9	3	**13**
Varicella	0	1	1	0	**2**
Fifth disease	0	1	0	0	**1**
Other	7	18	5	3	**33**
Total	**50**	**86**	**204**	**23**	**363**

[a] Includes elementary (70) middle school (4) high school (9), and universities (3).
[b] Includes group homes (3) shelter (1), juvenile camp (1), maternal care center (14), worksite (1), camp (1), fair (1), and scout troop (1) .

FOODBORNE OUTBREAKS 2014

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 assessing 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 of public health importance. Typically, an epidemiologic investigation will 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.

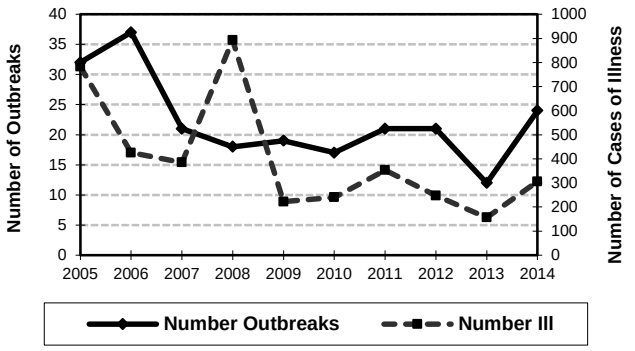
RESULTS

The number of FBIRs received in 2014 (1454) was lower than that received in 2013 (1591). Public reporting via the web accounted for 49% of FBIRs this year. WFS contacted each person making the FBIR and performed a site inspection on 26% of FBIR reports that were deemed high priority. Fifty-nine percent of the complaints were referred to district EHS offices and 10% 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 101 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 more than one program or agency.

The ACDC Food Safety Unit conducted 27 outbreak investigations this year. Twenty-three of these outbreaks were initiated by FBIR complaints and four were initiated through other surveillance activities. Of these 27 investigations, three (11%) were not considered to be foodborne as the evidence collected during the investigations did not support a foodborne source (OB# 217, 227, 301). 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) the illness pattern (i.e., epidemic curve) was consistent with person-to-person spread rather than point source infection; or 2) illness was only observed in the food handlers; no patrons complained of illness. Determining whether a food item was the source in these outbreaks can be challenging as well as time and resource consuming.

The 24 outbreaks determined to be foodborne are listed in Table 1 and summarized below. These outbreaks represent 306 cases of foodborne illness (Figure 1) and 6 hospitalizations. One death was identified. Outbreaks occurred throughout the year (Figure 2).

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



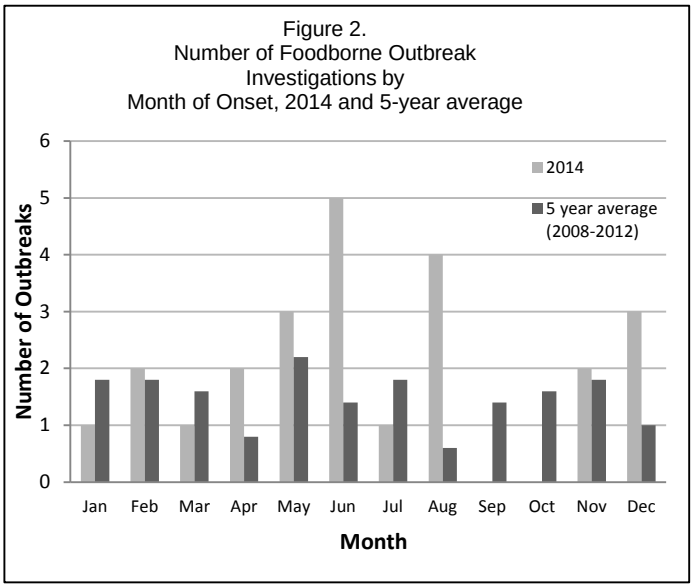
Etiology of Foodborne Outbreaks

Of the 24 outbreaks investigated, 17 (71%) involved a complaint regarding a restaurant. Upon investigation, one of these restaurants (OB#231) was determined to be an unlikely source of illness for the reported outbreak. A meal was epidemiologically implicated in 18 investigations during 2014 (75%) with a specific food item implicated in 10 of these. An ill food handler was implicated as the cause of 3 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 2014.

Cooked food items

Of the 10 outbreaks where a food item was found to be associated with illness, 3 involved cooked food items (OB#200, 262, 287). Two outbreaks were due to norovirus (OB#200 & 262). Although norovirus is not usually associated with cooked food items, the dishes associated with these two outbreaks may have been improperly handled during the plating or the service of the food.

Figure 2.
Number of Foodborne Outbreak
Investigations by
Month of Onset, 2014 and 5-year average



The third outbreak (OB#287) involved a cooked food item (daal) 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]

Uncooked food items

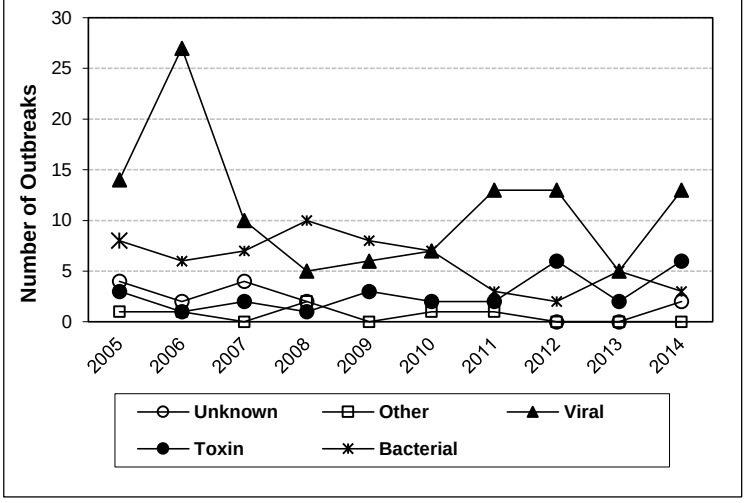
There were five outbreaks involving an uncooked food item (OB#63, 209, 239, 248, 452). In three of these the etiologic agent was suspected to be a calicivirus such as norovirus. These items included a green salad (OB#63), lettuce (OB#209), and chopped onions (OB#248). For OB#63, it is suspected that a food handler lacking proper hygiene and infected with the virus contaminated the green salad. This may have also been the case with OB#209 and 248. However, this theory could not be substantiated as food handlers from both outbreaks could not be tested: OB#209 food handlers lived in another health jurisdiction and the caterer for OB#248 was unlicensed and could not be located.

The other two outbreaks involving uncooked food items were OB#239 and OB#452. These outbreaks were suspected to be caused by a bacterial toxin.

Foodborne Agents

An etiological agent was identified in 22 of the 24 foodborne outbreak investigations this year and confirmed in 38% (n=9) (Figure 3). A viral agent was responsible for 13 outbreaks, bacterial agents for 3 outbreaks, and bacterial toxins for 6 outbreaks (Figure 3).

Figure 3.
Foodborne Outbreaks by Etiologic Agent Category
(Lab Confirmed and Suspect)
LAC, 2005–2014



Norovirus Outbreaks

Norovirus was confirmed or suspected in 13 foodborne outbreaks this year (54%), which is the more than that observed in 2013 but still considerably less than the peak number observed in 2006 (N=27).

The largest laboratory-confirmed foodborne norovirus outbreak this year involved at least 24 cases from a birthday party at a private residence that served food from an LAC restaurant (OB#63). The incubation times were consistent with a point-source outbreak and salad was significantly associated with illness. Two party attendees tested positive for norovirus. The source of this outbreak was likely food contaminated with norovirus by an ill food handler. All six food handlers denied illness but four of them tested positive for norovirus.

Another large laboratory-confirmed norovirus outbreak involved 17 cases who ate food from an office lunch meeting catered by an LAC restaurant (OB#262). Two restaurant employees and four meeting attendees tested positive for norovirus. The two restaurant employees with a positive norovirus laboratory result were responsible for preparing the chicken dish that was significantly associated with illness.

Bacterial Outbreaks

Salmonella was confirmed in three outbreaks this year (OB#59, 140, and 302). The first salmonellosis outbreak (OB#59) occurred in persons eating at a buffet-style restaurant. Two confirmed and one presumptive case ate at the restaurant during the same time period but no common food item was identified. Additionally, none of the food handlers tested positive for *Salmonella*.

The second salmonellosis outbreak was due to *Salmonella* Agona. Three coworkers shared food from home during their lunch hour. All three became ill, sought medical care, and tested positive for *S.* Agona. Two household contacts were also positive for *S.* Agona. The family that provided the suspected food item was not forthcoming with where the item was purchased.

The last salmonellosis outbreak was due to *Salmonella* Braenderup and occurred in persons eating at an LAC restaurant. The initial complaint was by a small group who seemed to have mild illness. Approximately one week later, a non-LAC resident with lab-confirmed salmonellosis reported eating at this restaurant. Ten ill persons were identified (8 laboratory-confirmed, 2 probable). A variety of food items was consumed by the ill persons; no food item was common across cases and no food item was statistically associated with illness. Three restaurant employees tested positive for *S*. Braenderup. Two of these employees were food handlers. It is unclear how the food handlers became infected, but it is likely that one, or both, of them were the source of illness for the restaurant patrons.

Other Foodborne Outbreaks

There were four outbreaks in which a bacterial toxin was identified as the source (OB#239, 287, 300 & 302). The largest outbreak due to a bacterial toxin involved 96 cases. An LAC restaurant provided food to three different office parties. 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 a bacterial toxin, with exposure occurring at the time that the attendees reported eating food at their respective office parties. The hummus provided by the restaurant was significantly associated with becoming ill and was eaten by 99% of the cases.

There were two scombroid outbreaks in LAC, one involved six cases (OB#66) and the other involved two cases (OB#221). Cases from both outbreaks ate tuna. The symptoms and durations of illness reported by cases were consistent with scombroid intoxication and the onset date of illness was consistent with a point-source outbreak. There were three health inspections for OB#66: one restaurant, one supermarket, and the fish supplier. No major violations were observed at any of the three sites. The inspector of the sushi restaurant involved in OB#221 found the grinding assembly of the mechanical grinder to have bits of fish still in the mechanism, which could have been the source of the histamine contamination.

State and National Investigation Involving Los Angeles County

LAC assisted state and federal investigators with 55 *Salmonella*, 7 STEC, 4 *Shigella* and 9 *Listeria* cluster investigations that required additional interviews by LAC DPH ACDC staff.

Outbreak Locations

Exposure locations for reported foodborne outbreaks included restaurants (12), the workplace (3), a residence (5), a banquet hall, a school, and an unknown location (2). This year, Service Planning Area (SPA) 3 reported the largest number of outbreaks (38%, Table 2). This is a departure from the last four years as SPA 2 has reported the largest proportion of foodborne outbreaks since 2010.

Table 1. Foodborne Outbreak Investigation 2014 (N=24)

	Agent	Lab Confirmed	OB#	Setting	Number of Cases	Health District	Food Implicated
1	Salmonella Typhimurium	YES	59	Restaurant	3	Antelope Valley	-*
2	Norovirus	YES	63	Restaurant	24	Harbor	Salad
3	Scombroid	NO	66	Unknown	6	West Valley	Tuna
4	Norovirus	YES	116	Restaurant	9	Bellflower	-
5	Norovirus	NO	125	School	7	Torrance	-
6	Salmonella Agona	YES	140	Workplace	5	Monrovia/ Foothill	-
7	Norovirus	YES	167	Restaurant	7	Alhambra	-
8	Norovirus	NO	199	Banquet Hall	6	Pomona	-
9	Norovirus	NO	200	Restaurant	7	Bellflower	Chicken Biryani/ Garlic naan
10	Norovirus	YES	209	Residence	23	Monrovia/ Foothill	Lettuce
11	Scombroid	NO	221	Unknown	2	West	Tuna
12	Norovirus	NO	231	Residence	5	West	-
13	Bact Toxin	NO	239	Residence	4	Alhambra	Potato salad
14	Norovirus	YES	248	Residence	23	West Valley	Chopped onions
15	Norovirus	YES	262	Workplace	17	Glendale	Chicken dish
16	Bact Toxin	NO	287	Residence	12	West Valley	Daal
17	Unknown	NO	296	Restaurant	4	Alhambra	-
18	Bact Toxin	NO	300	Restaurant	7	West Valley	-
19	Salmonella Braenderup	YES	302	Restaurant	10	Alhambra	-
20	Norovirus	NO	416	Restaurant	13	West	-
21	Norovirus	NO	426	Restaurant	8	Inglewood	-
22	Norovirus	NO	449	Restaurant	4	Whittier	-
23	Bact Toxin	NO	452	Workplace	96	Monrovia/ Foothill	Humus
24	Unknown	NO	2015-3	Restaurant	4	Whittier	-

*No food item was significantly associated with illness

Table 2. Frequency of Foodborne Outbreaks by Service Planning Area or Location, LAC, 2014 (N=24)

SPA	Frequency	Percent
1	1	4%
2	4	17%
3	9	38%
4	0	0%
5	3	12%
6	0	0%
7	4	17%
8	3	12%

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

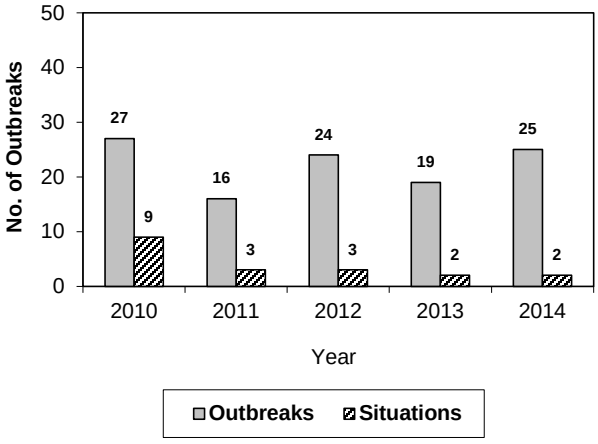
HEALTHCARE-ASSOCIATED OUTBREAKS GENERAL ACUTE CARE HOSPITALS

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 or colonizations 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 or colonizations 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, 2010–2014



ABSTRACT

There were 25 confirmed outbreaks reported in acute care hospitals in 2014 (Figure 1), an increase of 32% from 2013. Fifty-two percent (n=13) occurred in a unit providing intensive or focused specialized care (e.g., adult subacute unit and hematology/oncology). Eight NICU outbreaks occurred in 2014 as compared to three NICU outbreaks reported in 2013 and six NICU outbreaks reported in 2012. Twelve percent (n=3) occurred across multiple units within the acute care hospital (Table 1). Forty percent (n=10) of acute care hospital outbreaks were of bacterial etiology from a frequently reported multidrug-resistant organism (MDRO) such as methicillin-resistant *Staphylococcus aureus (S. aureus)* (Table 2 and Figure 2). Scabies accounted for the greatest number of outbreaks (n=7) followed by MRSA (n=5). There were two situation events reported in acute care hospitals in 2014 (Table 4).

Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2014

Outbreak Location	No. of Outbreaks
Hematology/oncology	3
Intensive Care – Adult	2
Intensive Care- Neonatal	8
Multiple units	3
Psychiatric	2
Rehabilitation	1
Sub-acute unit within a hospital – Adult	5
Sub-acute Unit within a Hospital - Pediatrics	1
Total	**25**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition/Etiologic agent—LAC, 2014

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
A. baumannii	1	7
Adenovirus 41	1	2
C. parapsilosis	1	9
Carbapenem-resistant *Klebsiella pneumoniae*	2	66
Clostridium difficile	1	4
E. coli	1	3
Impetigo	1	4
Legionellosis	2	7
MRSA	5	24
Parainfluenza	1	2
RSV	1	5
Scabies	7	80
Unknown Respiratory	1	5
Total	**25**	**218**

Table 3. General Acute Care Hospital Situation Events by Unit—LAC, 2014

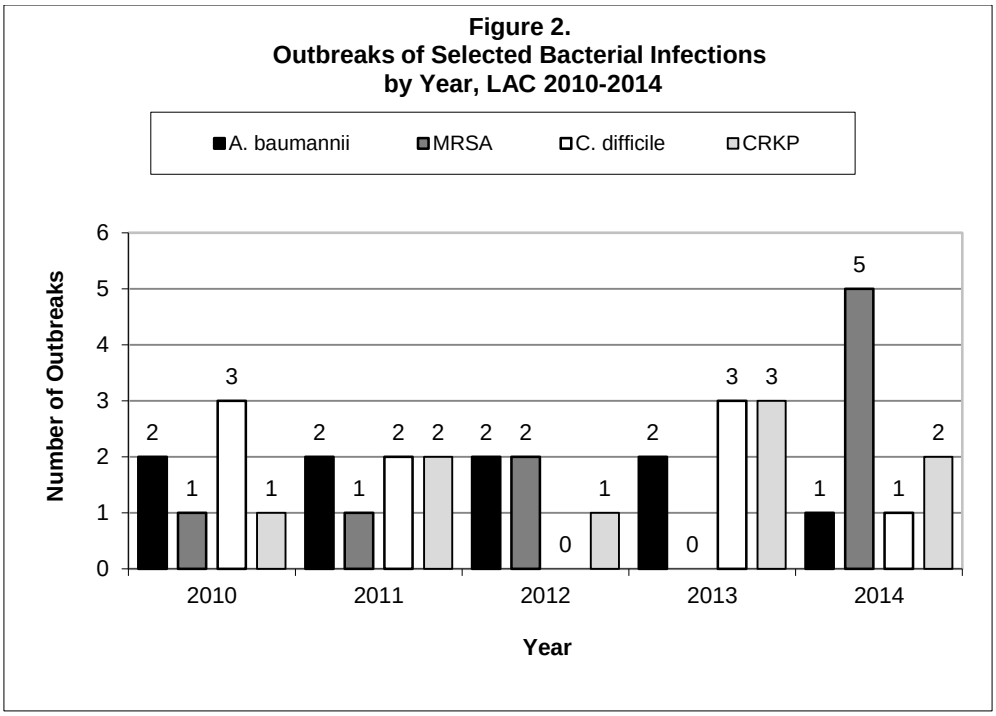
Outbreak Location	No. of Events
Multiple Units	1
Medical/Surgical	1
Total	**2**

Table 4. General Acute Care Hospital Situation Events by Disease/Condition—LAC, 2014

Disease/Condition/ Etiologic Agent	No. of Events	No. of Cases
Influenza	1	8
Hepatitis B	1	0*
Total	**2**	**8**

*Hepatitis B exposure after inadequate disinfection of dialysis machine. No human cases were identified.

Figure 2.
Outbreaks of Selected Bacterial Infections
by Year, LAC 2010-2014



COMMENTS

Acute care hospitals continue to struggle with the transmission of antibiotic resistant bacteria. A major component in the fight against microbial resistance is the creation of an antibiotic stewardship program (ASP). Public and private organizations, e.g. Centers for Disease Control and Prevention, American Hospital Association and Infectious Diseases Society of America have partnered together to present a standardized, multidisciplinary approach to ASPs in hospitals regardless of bed size.[1, 2] Federal, state and local public health continues to guide hospitals as they develop ASPs in an effort to reduce their MDRO rates and increase patient safety.[3, 4]

Twenty-three NICU outbreaks were reported from 2010-2014. Of these, 78% (n=18) were caused by a MDRO, including MRSA, *Pseudomonas aeruginosa* and ESBL *Escherichia coli*. In 2014, eight outbreaks occurred in a NICU. Seventy-five percent of these (n=6) were caused by a MDRO, including MRSA (n=5) and E. coli (n=1). Outbreaks that occur in most NICU settings are unique since infants have typically not been exposed to the outside world and transmission is either vertical, from mother to infant, or from family/friends or the healthcare worker. Neonatal age, preterm gestational age, underlying medical conditions, antibiotic use and immature immune system are all risk factors for healthcare acquired infection.[5]

Two Legionellosis outbreaks were reported in acute care hospitals in 2014 as compared to one Legionellosis outbreak reported in 2013. This increase may be due to an increase in Legionella testing by clinicians.

Two outbreaks of carbapenem-resistant *Klebsiella pneumoniae* (CRKP) occurred in 2014, one in a long-term acute care facility. This outbreak accounted for 64 cases, 23 infected and 41 colonized over five months (the colonized cases were identified after point prevalence screening of non-CRKP positive patients and weekly patient surveillance cultures).

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2. Centers for Disease Control and Prevention, Antibiotic Resistance Threats in the United States, 2013. http://www.cdc.gov/drugresistance/biggest_threats.html. Accessed: June 24, 2015.

3. The California Antimicrobial Stewardship Program Initiative: http//www.cdph.ca.gov/programs/hai/Pages/AntimicrobialStewardshipProgramInitiative.aspx. Accessed: June 24, 2015.

4. Srinivasan, A and Fishman, Neil, Antimicrobial Stewardship 2012: Science Driving Practice. Infection Control and Hospital Epidemiology; April 2012, vol. 33, No. 4, pp. 319-321. http//www.jstor.org/stable/10.1086/664908. Accessed June 24, 2015.

5. Srivastava, S. and Shetty, N. Healthcare associated Infections in Neonatal Units: Lessons fro Contrasting Worlds, *J of Hospital Infection;* 2007, 65, 292-306.

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 (SNFs), 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, 2005 – 2014*

* The total number of licensed SNFs, 399, was utilized to calculate the 2012 to 2014 SNF outbreaks per 100 facility rate.

ABSTRACT

- Total confirmed sub-acute care associated outbreaks decreased by 13% from to 98 to 85 outbreaks in 2013 and 2014, respectively.
- The number of SNF outbreaks reported decreased by 15% from 96 to 82 outbreaks in 2013 and 2014, respectively (Table 1). The rate of SNF outbreaks was 21 per 100 facilities in 2014 compared with 24 per 100 in 2013. (Figure 1).
- Outbreaks occurred in intermediate care facilities and SNFs in 2014 (Table 1).

Table 1. Number of Reported Outbreaks in Sub-acute Healthcare Facilities LAC, 2010–2014

	YEAR				
Type of Facility	**2010**	**2011**	**2012**	**2013**	**2014**
Intermediate Care Facilities	-	4	2	1	3
Psychiatric Care Facilities	-	3	3	1	-
Dialysis Centers	-	1	-	-	-
Skilled Nursing Facilities	104	102	119	96	82
Total	104	110	124	98	85

Intermediate Care Facilities: Two unknown respiratory outbreaks and one unknown gastroenteritis (GI) outbreak were reported in an intermediate care facility in 2014. All 3 outbreaks were from the same facility.

Skilled Nursing Facilities: Eighty-two outbreaks were reported by SNFs. Gastroenteritis (GI) illness was the most frequently reported outbreak category, with 36 (44%) outbreaks, and the represented the greatest number of outbreak- associated illnesses, with 763 (62%) cases. In 2013, rash illness outbreaks were most frequently reported (41%), and GI illness represented the greatest number of outbreak associated illness cases (42%).

Table 2. All Sub-acute Healthcare Facilities Outbreaks by Disease/Condition LAC, 2014

Disease/Condition	No. of Outbreaks	No. of Cases
Gastroenteritis (GI)	37	779
• Unspecified (n=20) • Norovirus (n=16) • Clostridium difficile (n=1)		
Rash Illness	31	269
• Atypical Scabies (n=4) • Scabies (n=15) • Unknown Rash (n= 12)		
Respiratory Illness	12	179
• Unspecified (n=7) • Influenza (n=5)		
Other Illness		
• Head lice/Pediculosis (n=3)	3	13
• Chicken Pox (n=1)	1	4
• Hepatitis B, Acute (n=1)	1	9
Total	**85**	**1253**

COMMENTS

The total number of outbreaks within sub-acute care facilities decreased by 13% in 2014 compared to 2013 with 85 and 98 outbreaks reported in respective years. In 2014, GI illness was the most frequently reported outbreak category (44%), and contributed the greatest number of outbreak-associated illnesses (62%). In 2013, rash illness outbreaks was the most frequently reported outbreak type (41%), and GI illness was the greatest number of outbreak associated illness cases (42%). GI illness outbreaks in 2014 included 16 (43%) laboratory-confirmed norovirus, 20 (54%) unknown GI and 1 (3%) *Clostridium difficile* outbreak. Service Planning Area (SPA) 3 consistently reported the most GI outbreaks of any Los Angeles County (LAC) Department of Public Health (DPH) SPA since 2008 with 16 (46%) and 13 (39%) outbreaks in 2013 and 2014, respectively. The reason for this association is possibly due to continuous outreach activities to SNFs in SPA 3 on reporting requirements and prevention and control of GI outbreaks using "Norovirus Outbreak Prevention Toolkit" which was developed in 2012 with Acute Communicable Disease Control Program (ACDC) and SPA 3 public health nurses. Per the Centers for Disease Control and Prevention (CDC), health care facilities, including nursing homes and hospitals, are the most commonly reported settings for norovirus outbreaks in the United States and other industrialized countries. Over half of all norovirus outbreaks reported in the United States occur in long-term care facilities. The virus can be introduced into healthcare facilities by infected patients—who may or may not be showing symptoms—or by staff, visitors, or contaminated foods. Outbreaks in these settings can be quite long, sometimes lasting months. Illness can be more severe, occasionally even fatal, in hospitalized or nursing home patients compared with otherwise healthy people.[1]

The total number of reported rash illness outbreaks decreased by 12% from 40 to 31 outbreaks in 2013 and 2014. Thirty-one rash illness outbreaks were investigated with a total of 269 cases. Of 31 outbreaks, four (13%) outbreaks were atypical scabies, 15 (48%) outbreaks were scabies, and 12 (39%) outbreaks were unknown rash.

In 2014, the total number of reported respiratory outbreaks decreased by 61% from 31 to 12 outbreaks in 2013 and 2014. The reasons for the decrease in respiratory outbreaks are unclear. Twelve respiratory outbreaks were investigated causing 179 cases of outbreak-associated illness. Of the 12 outbreaks, five (42%) were caused by influenza virus and seven (58%) were due to unknown etiologies. Respiratory outbreaks were classified as influenza if there was at least one case of laboratory-confirmed influenza in the setting of a cluster of ILI within a 72-hour period..

Sub-acute facility outbreaks were investigated and documented from all LAC SPAs in 2014. The greatest proportion of outbreaks were investigated within SPA 3, 29 (34%) followed by SPA 2 with 16 (19%). This was consistent with outbreak reports in previous years.

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 treatment and prophylaxis for facility residents and staff and isolation are essential in the prevention of seasonal influenza.

In 2014, the LAC DPH ACDC created a new Skilled Nursing Facilities (SNF) Outreach Program (OP). The purpose of this program is to support our public health mission to prevent and control communicable diseases in the County. ACDC look forward to developing collaborations with SNFs, public health staff, and other key partners. ACDC will provide collaboration and assistance to prevent infections, strengthen outbreak detection and response, and address other acute communicable disease issues in the SNF setting. ACDC SNF OP sent a letter to remind SNFs to comply with the Health Officer Order (HOO), issued October 2, 2013, which mandates that healthcare personnel in acute care hospitals, long term care facilities, and intermediate care facilities in Los Angeles County be vaccinated against influenza, or wear a protective mask. A toolkit for influenza vaccination programs in SNFs was developed to assist with implementation of the HOO at SNFs. The toolkit is available on

[1] CDC. Norovirus U.S. Trends and Outbreaks http://www.cdc.gov/norovirus/trends-outbreaks.html

the LAC DPH Los Angeles County Department of Public Health ACDC Influenza website at http://publichealth.lacounty.gov/acd/SNFToolKit.htm..

In 2014, SPA 3 public health nurses continued outreach to SNFs in SPA 3 using the “Norovirus Outbreak Prevention Toolkit” which was developed in the spring of 2012, by ACDC in collaboration with Community Health Services (CHS), Health Facilities Inspection Division, Licensing and Certification Program, and Environmental Health in response to an increasing number of GI outbreaks reported by sub-acute facilities. The online toolkit is available on the ACDC web site at http://publichealth.lacounty.gov/acd/docs/Norovirus/NoroToolkit2012.pdf.

Acute Communicable Disease Control Program

Special Studies Report

2014

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 2014

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BOTULISM CASE REPORT SUMMARY
LOS ANGELES COUNTY, 2014

Moon Kim, MD, MPH

One case of botulism was reported in 2014 that met the case definition. This was a case of wound botulism due to injection drug use and the patient recovered from their symptoms. Although both the mouse bioassay on serum for toxin A performed by the Los Angeles County (LAC) Public Health Laboratory and the Centers for Disease Control and Prevention's Matrix-assisted laser desorption/ionization-Time of Flight (MALDI-TOF) test for toxin A in serum[1] were negative, the case was classified as a case of probable botulism because the clinical history, risk factors, symptoms, and electromyography (EMG) testing were all consistent with botulism. The LAC Acute Communicable Disease Control Program also received one report of suspected botulism that tested negative for toxin A and MALDI-TOF and did not meet criteria for a case; the patient was diagnosed with seizures and drug withdrawal.

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/.

ENTEROVIRUS D68 ENHANCED SURVEILLANCE SPECIAL STUDY, LOS ANGELES COUNTY

Wendy Manuel, MPH and Rachel Civen, MD, MPH

BACKGROUND

Enteroviruses are a group of viruses that usually cause mild illness, such as the common cold, especially during the summer and fall. Infection with enteroviruses can also be associated with a broad range of clinical illness including gastrointestinal illness, rashes, and neurologic illness including aseptic meningitis, less commonly encephalitis and rarely, acute myelitis and paralysis.

Enterovirus D68 (EV-D68) was first detected in California in 1962 and is one of more than 100 non-polio enteroviruses. During August 2014, EV-D68 was identified in clusters of children with severe respiratory illness in Missouri and Illinois bringing national attention to this specific enterovirus type. In response, the Centers for Disease Control and Prevention (CDC) began conducting enhanced surveillance nationwide to better understand the full spectrum of this disease. From mid-August 2014 to January 15, 2015, 1,153 cases of EV-D68 in 49 states and the District of Columbia were identified (1). To identify clustering or unique manifestations of EV-D68, the CDC and California Department Public Health (CDPH) called for an increase in testing of cases of severe respiratory illness in children, as well as clusters or outbreaks of respiratory illness in any age group. On September 11, 2014 the Los Angeles County Department of Public Health (LACDPH) sent out a Health Alert notifying healthcare providers about the EV-D68 outbreak and requesting providers to report suspected cases of EV-D68 for testing at CDPH. Surveillance was passive and voluntary and cases of EV-D68 are not reportable to federal, state, or local health jurisdictions.

In parallel with the Midwest respiratory outbreaks, in September 2014, a cluster of nine cases of acute neurologic illness/acute flaccid paralysis (AFP) characterized by extremity weakness, cranial nerve dysfunction, or both was identified in Colorado among pediatric patients. Four cases had EV-D68 identified from nasopharyngeal specimens suggesting a causal association to EV-D68 infection. However, EV-D68 was not identified from cerebrospinal fluid (CSF) making the association of EV-D68 and neurologic illness less clear. On September 26, 2014, the CDC and CDPH sent local health departments a Health Advisory alerting healthcare providers to be vigilant for and report cases of sudden onset neurologic illness associated with limb weakness that meet CDC's case definition (see methods) (2).

This report summarizes our findings of respiratory and neurological illness associated with EV-D68 from August to December 2014.

METHODS

Laboratory testing for EV-D68 was done based on CDC criteria which included: cases of severe respiratory infections, especially those in pediatric intensive care units who had already tested positive for entero/rhinoviruses or those involved in suspected respiratory outbreaks of unknown etiology. Emphasis was placed on children with underlying medical conditions such as asthma, since children with asthma were found to be at higher risk for severe complications from EV-D68. Healthcare providers were asked to fill out a standardized case history form developed by CDC. Specimens were packaged by LAC Public Health Laboratory (PHL) and sent to CDPH for testing. If enterovirus was identified by initial PCR screening, then an additional D68 PCR test was performed. Turnaround time for results from CDPH ranged from one to five months.

In addition to respiratory illness, we reviewed cases that met the CDC case definition of EV-D68 neurologic illness associated with limb weakness. Cases included patients ≤ 21 years old with acute onset of focal limb weakness and an MRI showing a spinal cord lesion restricted to gray matter. As with the respiratory illness, a standardized CDC case history form was completed and testing was performed at the CDPH laboratory.

RESULTS

Twenty-five isolated cases of EV-D68 associated with respiratory illness were identified in LAC residents, plus an additional two cases associated with AFP symptoms. During this surveillance period no clusters of EV-D68 were identified in LAC. All respiratory and AFP cases recovered and were released from the hospital.

Respiratory

Of the 25 cases of respiratory associated EV-D68 identified from August 2014 to February 2015, 15 were submitted by a hospital under the jurisdiction of Long Beach City Health Department and will be omitted from further description as LACDPH did not participate in investigations of those cases.

Fifteen LAC hospitals submitted 25 specimens for EV-D68 testing at the CDPH laboratory. Consistent with CDC's testing criteria, all suspect cases were hospitalized for respiratory symptoms; illness onset ranged from September 15 to November 5, 2014. As of May 19, 2015, 10 (40.0%) positive EV-D68 cases have been identified; 12 (48.0%) were negative; and three (12.0%) are still pending state lab results. The age range of positive cases included children 11 months to 12 years old (median age: 4.5 years). Demographic, clinical, and underlying disease data from the ten EV-D68 cases are shown in Table 1.

Table 1. Demographics of Respiratory EV-D68 Positive Cases LAC, N=10

Age	Range	11 months - 12 years
	Median	4.5 years
Female		5 (50.0%)
Asthma		7 (70.0%)
ICU Admit		4 (40.0%)
Treated with supplemental oxygen		8 (80.0%)
Treated with bronchodilators		9 (90.0%)

AFP

Two cases of AFP associated with EV-D68 were identified in LAC during this surveillance period. Both had recent upper respiratory infection symptoms preceding their hospitalizations for AFP symptoms and met the CDC case definition for EV-D68 associated neurologic illness. In both cases, EV-D68 was isolated from respiratory specimens only. The patients' ages were six and seven years old, and the two cases shared no geographic or social links.

DISCUSSION AND CONCLUSION

Enterovirus is not a reportable disease and routine surveillance is not usually done. Therefore, no baseline incidence or prevalence data are available at the national or local level for either enterovirus generally or EV-D68 specifically. Sentinel laboratories in LAC report weekly data on enterovirus/rhinovirus detection during respiratory virus season; however, cross-reactivity between these two viruses requires specific PCR testing to identify enterovirus. Furthermore, the PCR test for enterovirus does not distinguish between specific strain types and additional testing must be performed to identify D68.

Data gathered from enhanced surveillance of EV-D68 focused specifically on pediatric cases and clusters of respiratory illness and, therefore, does not provide information on the full burden or spectrum of disease. Illness in the adult population or the outpatient setting has not been studied and broad conclusions cannot be drawn from this surveillance.

The CDC reported that from mid-August 2014 to January 15, 2015, a total of 1,153 confirmed cases of respiratory illness caused by EV-D68 were detected across 49 states. Almost all of the confirmed cases were among children with underlying medical conditions of asthma or a history of wheezing. Out of approximately 2,600 specimens CDC received for enterovirus testing, 36% tested positive for EV-D68 and 33% tested positive for an enterovirus or rhinovirus other than EV-D68. Fourteen fatal cases were associated with EV-D68.

AFP can have numerous etiologies and can prove diagnostically challenging. Worldwide, AFP surveillance is done as part of polio virus eradication programs as this virus once was the most common cause of AFP. However, with widespread implementation of the polio vaccination, AFP is rarely seen. Over a two-year surveillance period, CDPH identified 23 cases of AFP in patients between the ages of one to 73 years (median age: ten years); no common viral or bacterial etiology could be determined. In two of 23 AFP cases, EV-D68 was identified in respiratory specimens only (3). In 2014, Colorado identified a cluster of AFP cases associated with EV-D68 respiratory illness; no additional AFP clusters related to EV-D68 have been documented in the United States (4). The association between AFP and EV-D68 remains unclear. A complete analysis of the 2014 national EV-D68 surveillance data may lead to a better understanding of the role of EV-D68 in neurological illness. However, in the meantime physicians treating patients with AFP of unknown etiology should work with their local health departments to rule out poliomyelitis for cases that are unimmunized and have travelled to countries with endemic polio or countries that use OPV for routine immunization and also consider enterovirus and West Nile virus as possible etiologies(3).

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RESOURCES

Non-Polio Enteroviruses | About EV-68 | EV-D68 for Health Care Professionals

INCREASE OF INVASIVE MENINGOCOCCAL DISEASE AMONG MEN WHO HAVE SEX WITH MEN IN LOS ANGELES COUNTY, 2012-2014

Van Ngo, MPH and Rachel Civen, MD, MPH

BACKGROUND

Invasive meningococcal disease (IMD) is a life-threatening infection caused by the bacteria *Neisseria meningitidis*. IMD occurs most often as meningitis, an infection of the cerebrospinal fluid (CSF), or meningococcemia, an infection of the bloodstream. It is transmitted via direct or droplet contact with nose or throat secretion of persons colonized with the bacteria. There are 13 serogroups; however, serogroups A, B, C, Y, and W-135 are the most common and are preventable by vaccination in the United States (U.S.). [1,2,3,4,5] Serogroup C IMD account for the greatest proportion of outbreaks in the U.S. [6]

The incidence of IMD has declined from 0.59 cases per 100,000 in 1995 to 0.38 cases per 100,000 in 2011 within Los Angeles County (LAC). [7,8] Despite an overall decrease in cases of IMD over the past several decades in LAC, the number of cases among gay men/men who have sex with men (MSM) has increased since 2012.

In fall 2012, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) became aware of reports from the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) documenting an outbreak of serogroup C invasive meningococcal disease cases among MSM from 2010 to 2012. [9] In December 2012, ACDC documented two male serogroup C IMD cases who identified themselves as MSM. In response, ACDC initiated enhanced surveillance of IMD to document IMD among MSM and to detect epidemiologic linkage among MSM cases. This report summarizes IMD surveillance among MSM from October 1, 2012 to September 30, 2014.

METHODS

This report includes IMD cases who are LAC residents that meet the case definition of confirmed, probable, and suspect IMD as defined by the Council of State and Territorial Epidemiologists (CSTE), with onset of disease between October 1, 2012 and September 30, 2014. [10] Only one case was <18 years old and was excluded in this report. For each suspected case of IMD, medical records are reviewed, and LAC DPH Community Health Service (CHS) public health nursing staff interviews the case, or their proxies when the case is unavailable, with a standardized reporting form that includes demographics, laboratory evidence of infection, and exposure to schools and confined spaces (e.g., college dormitories or military barracks). Serotyping is performed by the LAC Public Health Laboratory (PHL) on *N. meningitidis* isolates from culture positive cases by bacterial slide agglutination, or by polymerase chain reaction (PCR) analysis at the California Department of Public Health Microbial Diseases Laboratory for culture-negative cases.

Beginning December 2012, enhanced surveillance for MSM status and additional risk factors was conducted. ACDC requested Public Health Nurses (PHNs) to interview all cases using a supplemental form querying risk factor information during the three months prior to symptom onset including MSM status, recent travel and attendance at bars and parties. MSM status was either self-designated or designated by a sexual partner. All adult male IMD cases with symptom onset starting from October 1 to December 1, 2012 were re-interviewed to collect this additional information. All serogroup C culture-positive isolates had pulsed field gel electrophoresis (PFGE) analysis completed at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. PFGE analysis was performed using the NheI restriction enzyme.

Descriptive analyses were conducted to compare characteristics of adult IMD cases who were MSM with males who were not MSM during this time period. U.S. Census estimates from 2012 were used to calculate LAC population incidence rates. An estimate of 8.2% MSM among the California adult male population was

used to estimate incidence rates among MSM in LAC. [11]

RESULTS

Thirty-four IMD cases ≥18 years old had onset during the study time period between October 1, 2012 and September 30, 2014, of whom 13 (38%) were identified as MSM (Table 1). The MSM cases had onset dates ranging from December 15, 2012 through July 28, 2014. Twelve cases were non-MSM males and nine were adult females. Using estimates of the MSM population within LAC, the incidence rate of IMD among LAC MSM was 2.39 cases per 100,000 per year. IMD incidence among non-MSM males is estimated as 0.26 per 100,000 per year and among females as 0.13 per 100,000 per year.

Table 1. Demographics of IMD Cases ≥18 Years, Los Angeles County (LAC), October 1, 2012-September 30, 2014, N=34

		MSM (N=13) n (%)	Non-MSM Males (N=12) n (%)	Females (N=9) n (%)	All Cases (N=34) n (%)
Annual Incidence (per 100,000)		2.39	0.26	0.13	0.25
Age (yrs)	Mean	32.4	45.8	58	43.9
	Median	28	47	54	40.5
	Range	21-50	22-72	24-94	21-94
Sex (M:F)		--	--	--	25:9
Race n (%)	White	3 (23)	3 (25)	3 (33)	9 (26)
	Latino	6 (46)	6 (50)	4 (44)	16 (47)
	Black	3 (23)	2 (17)	1 (11)	6 (21)
	Asian/Other	1 (8)	1 (8)	1 (11)	3 (9)
Health District*	Hollywood-Wilshire	4 (31)	1 (8)	3 (33)	8 (24)
	East Valley	0 (0)	4 (33)	1 (11)	5 (15)
	Central	1 (7)	0 (0)	2 (33)	3 (9)

* Most common health districts (HD) reported among all cases out of 24 HD in LAC.

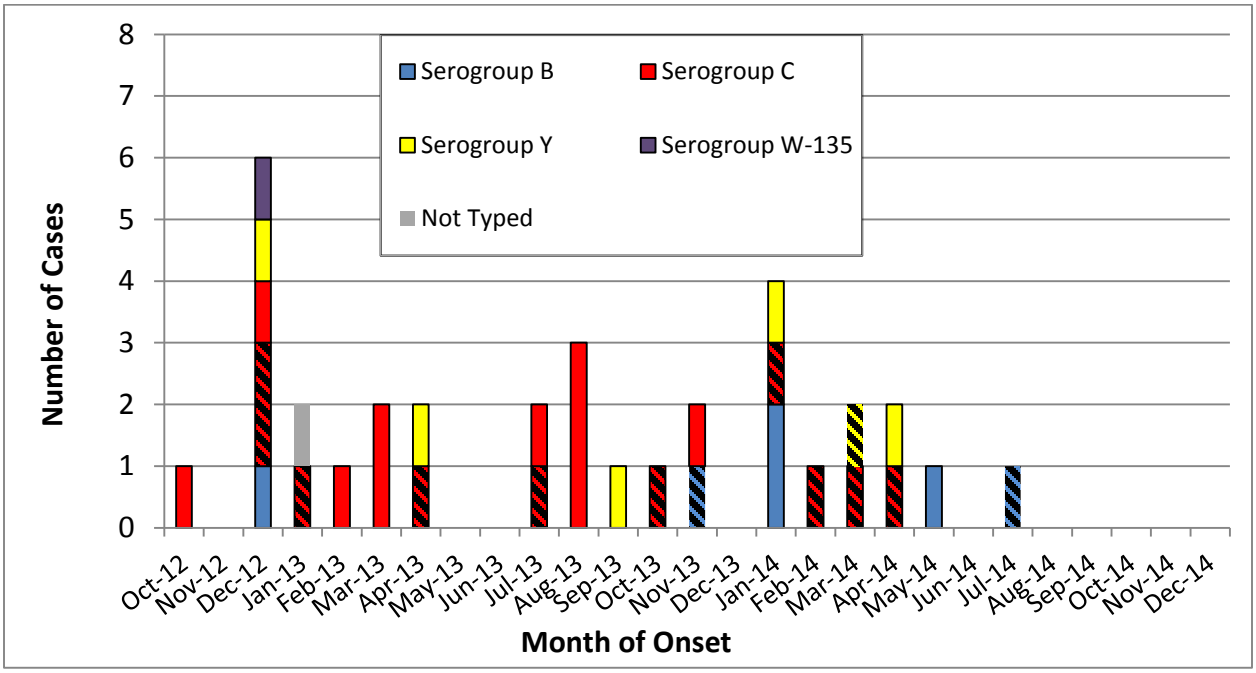
The median age of MSM cases (28 years) was younger than the median age of non-MSM male cases (47 years). Race/ethnicity distribution was similar in both groups of cases, with Latinos accounting for 46% and 50% of MSM cases and non-MSM males, respectively. The largest proportion of MSM cases resided in the Hollywood-Wilshire Health District (HD) (n=4, 31%), an area that includes a large MSM community. The remainder of MSM cases was distributed across eight different Health Districts across Los Angeles County. Among non-MSM males, only one resided in Hollywood-Wilshire HD. The largest number resided in East Valley HD (n=4, 33%).

Serotyping was completed on all but one of the 34 IMD cases during the investigation period, with four identified by PCR. Serogroup C was predominant (59%). The remaining serogroups identified were B (18%), Y (18%), and W-135 (3%). Among 13 MSM IMD cases, ten (77%) were serogroup C, two were serogroup B, and one was serogroup Y. A large proportion of non-MSM males also had serogroup C IMD (67%). Nine cases were fatal (26%). The fatality rate among MSM cases (39%) was similar to that of non-MSM males (33%). Four cases were HIV-positive with onset dates from November 15, 2013 through March 24, 2014, all of whom were MSM (31% of all MSM). Two of the HIV-positive cases were fatal. No cases reported travel to New York City within the prior three months. No cases identified any social gatherings that they attended in common.

The epidemic curve in Figure 1 shows the occurrence of serogroups B, C, and Y from October 2012 through December 2014, with MSM cases identified by the cross-hatching. A temporal cluster of four MSM serogroup C cases occurred beginning December 14, 2012 lasting through April 5, 2013, and a second cluster occurred in early 2014 from January 27 through April 6. Of the 20 cases that were serogroup C, 12

were analyzed by PFGE. Among the ten cases of serogroup C among MSM, two cases with onsets on December 14, 2012 and January 5, 2013 had PFGE patterns that matched each other as well as one of the patterns identified in the NYC outbreak. Thus, in neither of the temporal clusters, was there spread of a common strain.

Figure 1. Invasive Meningococcal Disease Cases ≥18 Years, Los Angeles County, October 2012-December 2014



DISCUSSION

Although incidence rates of IMD have been decreasing both in LAC and nationwide, an unusually high proportion of cases among MSM, over one-third of all cases, was reported to LAC DPH between October 1, 2012 and September 30, 2014. PFGE analysis identified two MSM cases with a pattern matching to each other and to several MSM cases associated with the NYC outbreak. However, other than MSM status, no other epidemiological links were identified, including travel to NYC. Though PFGE has been useful in augmenting and supporting identified common source exposures for foodborne and healthcare-related outbreaks, it has not been frequently used and can be difficult to interpret in IMD investigations. PFGE results should always be interpreted in conjunction with the epidemiological case investigation. The PFGE analysis results may indicate that the strain found both in NYC and LAC is a common *N. meningitidis* strain colonizing persons in both cities.

When LAC documented its first case of IMD in MSM in December 2012, NYC already was issuing recommendations to vaccinate HIV positive MSM due to 56% of the NYC outbreak cases having HIV-positive status [9,12]. LAC did not document its first HIV-positive MSM IMD case until November 2013 and then documented three additional HIV-positive cases in a period of less than five months, contributing 31% of MSM cases. Though HIV-positive patients have not been targeted for routine vaccination as a group, recent epidemiologic studies support HIV infection as an independent risk factor for meningococcal disease. [13, 14] The Advisory Committee on Immunization Practices (ACIP) is currently considering if HIV infection should be added to the list of underlying conditions for which meningococcal vaccine should be recommended.

From October 2012 to September 2014, the incidence of IMD among MSM was estimated to be 2.39 cases per 100,000 population per year. [11] This is nine times the rate in non-MSM males in LAC (0.26 cases per 100,000 per year) and 18 times the rate among females (0.13 cases per 100,000 per year). The rate among

LAC MSM is higher than found in young adults 15 to 24 years old (0.78 per 100,000 population) in a national study between 1998 and 2007. [15] Further, the LAC MSM rate is comparable to college freshmen and college dormitory residents, and about half the rate of college freshmen who live in dormitories. College freshman living in dormitories experienced IMD at a rate of 5.1 per 100,000 [1]. The ACIP has recommended routine vaccination of all persons aged 11-18 years in order to address the increased rates of IMD in these groups. [16]

In April 2014, in the midst of the second cluster of MSM cases, LAC DPH recommended meningococcal vaccination for MSM due to the increase in IMD cases in this population and high levels of concern expressed by the MSM community and their medical providers. The recommendation was for vaccination of:

- all HIV-positive MSM,
- all MSM, regardless of HIV status, who regularly have close or intimate contact with multiple partners or who seek partners through the use of digital applications ("apps"), particularly those who share cigarettes/marijuana or use illegal drugs.

Following the recommendation, LAC DPH distributed 3,500 doses of vaccine to clinics that serve MSM and HIV-positive populations and made vaccination available at district public health clinics. Since the LAC DPH recommendation was initiated in April 2014, four IMD cases have occurred in LAC, two of which were among MSM (Figure 2). The last MSM case in 2014 occurred on July 28th.

In response to the outbreak of IMD among MSM in NYC, the NYC DOHMH also recommended vaccination of MSM at high risk for IMD. [17] In NYC, outbreak-associated cases were clonal with many meningococcal isolates matching by PFGE analysis, though several additional strains have emerged. Furthermore, outbreak-associated cases reported strong social and geographic epidemiologic links. By contrast, nearly all LAC MSM cases were affected by different strains and none were epidemiologically linked. NYC will continue vaccinating through the 2015 IMD season.

LIMITATIONS

MSM classification can be challenging as cases are not always forthcoming about their intimate behaviors. A few cases were identified through interview of close contacts, such as in situations where the case was deceased. Further, MSM status has not been considered a risk factor for IMD and so has not been collected during routine patient interviews. LAC DPH began actively collecting MSM status information in December 2012. Prior to that only two male cases occurred in 2012, one of whom was deceased and we were able to re-interview the single close contact and determine he was likely not a MSM. We are confident that the second male case in 2012 was also likely not a MSM.
Incidence rates for MSM in LAC were calculated using an estimate published by a Lieb *et al* study estimating that 8.2% of the adult male population in the state of California is identified as MSM [11]. The estimate was derived by mathematical modeling based on assumptions that have not been validated. Further, we infer that the same prevalence applies in LAC as it does across the state.

CONCLUSION

Between October 1, 2012 and September 30, 2014, IMD incidence among MSM was nine time higher than among non-MSM males in LAC. Enhanced surveillance including comprehensive interviews for risk factors and additional molecular analysis failed to detect an outbreak caused by a common meningococcal strain among LAC MSM. The number of IMD cases among MSM has declined since the beginning of 2014, at which time LAC DPH instituted a vaccine recommendation for this group. Although we do not know a definitive number of vaccine doses administered after the recommendation, the total is estimated at approximately 7,000 doses (unpublished data) and is unlikely to have had significant effect on IMD case incidence. It is possible that public messaging strongly discouraging sharing of oral secretions could have been effective at decreasing spread of *N. meningitidis* among colonized MSM. Nevertheless, this population continues to account for a high proportion of IMD cases. LAC DPH continues to endorse the 2014

meningococcal vaccine recommendation for all HIV-positive MSM and the MSM groups who may be at higher risk for infection, regardless of HIV status. The February 2015 Health Update on meningococcal vaccination in MSM can be viewed on the Los Angeles Health Alert Network webpage: http://publichealth.lacounty.gov/lahan/. CDPH also supports the vaccine recommendation for HIV-positive MSM and MSM in risk groups for IMD. [18,19] LAC DPH will continue to query MSM status and pertinent risk factors in order to monitor further increases of IMD among MSM. LAC DPH will also continue to communicate to the public and health care providers through the DPH website and press releases as new information become available.

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INFLUENZA SURVEILLANCE OVERVIEW
2013-2014 SEASON SUMMARY

Wendy Manuel, MPH and Christine Wigen, MD, MPH

BACKGROUND

Influenza (flu) causes significant morbidity and mortality each season. The Los Angeles County of Public Health (LACDPH) Acute Communicable Disease Control Program (ACDC) conducts year-round influenza surveillance assessing levels of disease for our population of over 10 million. The Centers for Disease Control and Prevention (CDC) estimates that each season, 5-20% of the population will get the flu, which translates to 500,000 to 2 million people in Los Angeles County (LAC). Previous studies have shown a difference in mortality burden by age group depending on the dominant circulating strain (1). In addition, strain type correlates with the severity of the season. Since each season is different, surveillance indicators track influenza activity using a variety of methods. This report summarizes influenza surveillance for the 2013-2014 season covering the time period from September 1, 2013-July 26, 2014.

METHODS

Due to the high proportion of the population that will get influenza each season, individual cases are not reportable (with the exception of new/novel strains of influenza which are reportable to ACDC immediately). Alternatively, influenza activity in the community is measured using weekly influenza test data reported from eight sentinel laboratories in LAC; a subset of these also report data for other respiratory viruses such as respiratory syncytial virus (RSV), rhinovirus/enterovirus, parainfluenza, human metapneumovirus, and coronavirus. Using these data, percent positive rates for influenza (and types A and B) and other respiratory viruses can be calculated. Strain type information is not included in these reports; however, a high volume regional reference laboratory reports individual cases with subtype information allowing LACDPH to determine the dominant subtype(s) in circulation.

In addition to aggregate rates of influenza in LAC, all influenza-associated deaths (IADs) are reportable within seven days of identification. Reports are submitted year round from the following sources: hospitals and healthcare providers, the LAC Coroner Office, and LACDPH Office of Health Assessment and Epidemiology death certificate analysis. A confirmed influenza death is defined by a positive laboratory test, compatible symptoms, and clear progression from illness to death. Acceptable laboratory confirmation tests include rapid antigen testing, polymerase chain reaction (PCR), direct-fluorescent antibody staining, or viral culture. Reporting of intensive care unit (ICU) cases of influenza is not required in LAC; however, hospitals may report these cases on a voluntary basis. The case definition of an ICU influenza case is hospitalization in the ICU for at least 24 hours and a positive laboratory test.

All respiratory outbreaks of influenza-like-illness (ILI) defined as fever of ≥ 100° F and cough and/or sore throat are reportable to ACDC and are investigated by LACDPH Community Health Services within one business day. The definition of an outbreak differs by setting type.

(1) Health care institutions (e.g., skilled nursing facilities): Two or more cases of ILI within a 72 hour period;

(2) Non-healthcare institutions (e.g., prisons or university dormitories): Two or more cases of ILI within a 48-72 hour period; and

(3) Congregate settings (e.g., schools): At least 10% of average daily attendance absent with ILI sustained over a three-day period, or five or more cases of ILI in an epidemiologically linked group (one classroom or sports team) sustained over 72 hours.

ACDC's Automated Disease Surveillance Section monitors initial self-reported symptoms from patients presenting to participating emergency departments (EDs) throughout LAC. These symptoms are

categorized into different clinical syndromes according to specific code words. The syndrome of ILI includes symptoms such as: fever, congestion, sneezing, sore throat, runny nose, and cough. The proportion of ILI ED visits for all ages and by age group is analyzed weekly, year-round. The ILI visits to EDs are also analyzed by zip code of residence and statistical algorithms are used to identify areas of the county that have significantly increased levels of ILI.

RESULTS

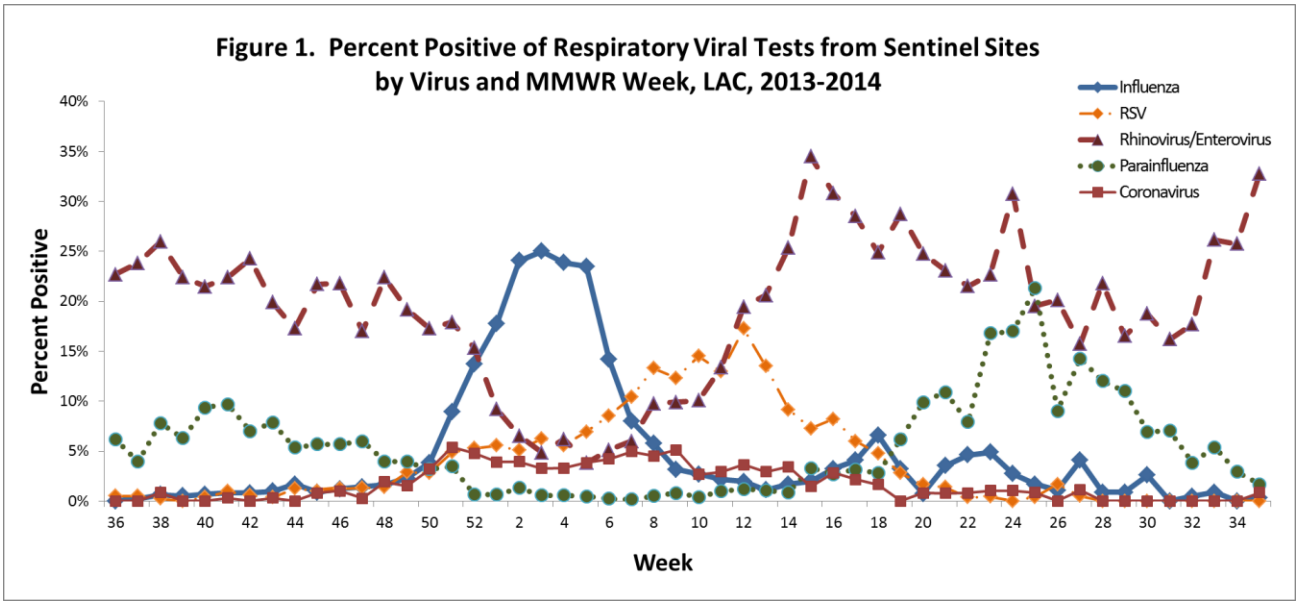
Sentinel Laboratory Data

Type A pandemic 2009 H1N1 (pH1N1) dominated the 2013-2014 influenza season, resulting in moderately severe activity. Sentinel site data shows influenza activity peaked in January and remained high through the beginning of February (Figure1 and Table 1). While other respiratory virus activity was low during the influenza season, respiratory syncytial virus (RSV) and rhinovirus/enterovirus quickly rose as influenza started decreasing.

Table 1. LAC 2013-2014 Influenza Season Summary

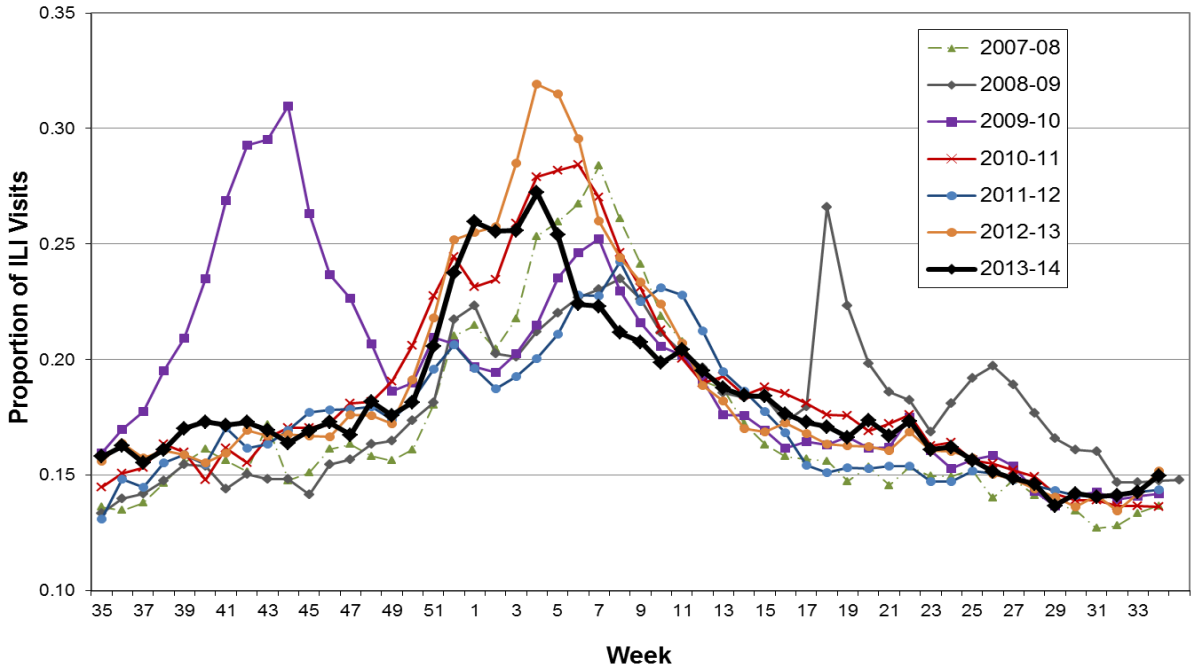
	Peak Week 4 1/19/14-1/25/14	2013-14 Season 9/1/13-7/26/14
Positive Flu Tests/Total Tests† (Percent Positive Flu Tests)	681/2,853 (23.9%)	3,953/41,032 (9.6%)
Percent Flu A/B	97/3	92/8
Community Respiratory Outbreaks Influenza confirmed outbreaks††	2 0	17 2
Pediatric Flu Deaths Adult Flu Deaths, confirmed **Total Flu Deaths**	0 22 22	4 101 **105**

†Sentinel laboratories (9 participating)
††Associated with at least one positive influenza laboratory test



Syndromic ILI Data

Figure 2. Proportion of Respiratory Illness Emergency Department Visits in LAC, by MMWR Week, 2007-2014



Overall influenza activity reached peak levels during the last week of January where the highest proportion of visits to emergency departments for influenza-like-illness (ILI) was reported, the greatest number of flu tests from sentinel sites were performed, and the greatest number of influenza-associated deaths occurred (Table 1 and Figure 2).

Table 2. Demographic Characteristics of Influenza Fatalities, LAC, 2013-2014

		N	% of Cases	% of LAC*
Age (years)	0-5	1	0.9	6.4
	6-17	3	2.8	23.2
	18-40	13	12.4	33.4
	41-64	59	56.2	31.5
	65+	30	28.5	11..9
Gender	Male	67	63.8	49.3
	Female	38	36.2	50.7
Race	Hispanic	48	45.7	48.3
	White Non-Hispanic	41	39.0	27.2
	Black	9	8.6	9.2
	Asian/Pacific Islander	7	6.7	14.6

*2013 US Census Data

ICU Cases and Fatalities

Thirty ICU hospitalized influenza cases were reported in LAC, and 22 of those were in persons younger than 65 years old. During the 2013-2014 influenza season, the highest numbers of IADs were reported since the 2009 pandemic. A total of 105 IADs were confirmed in LAC with the 18-64 years age group accounting for the majority (68.5%) of those (Table 2). The age of IADs ranged from 0-89 years with a median of 56 years. Both age groups 41-64 and 65+ years old were overrepresented among IADs compared to the population distribution of LAC. The top three underlying medical conditions associated with adult IADs were hypertension, being overweight or obese and heart disease. During this season, one influenza-associated death of a pregnant woman was reported.

Vaccination Status

Influenza vaccination status was unknown for the majority of IADs with the exception of the pediatric age group (Table 3). Only 7% of 18-64 years old IADs reported receiving a flu vaccination and 31% definitely did not get a vaccine for that season. Adult IADs 65 years and older reported a higher vaccination rate of 30% with only 13% reporting no vaccine. Of the two pediatric IADs who did not receive a flu vaccine, one was too young (<6 months) and the other was immunocompromised.

Figure 3. Geographic Distribution of Community Respiratory Outbreaks By SPA, LAC, 2013-2014

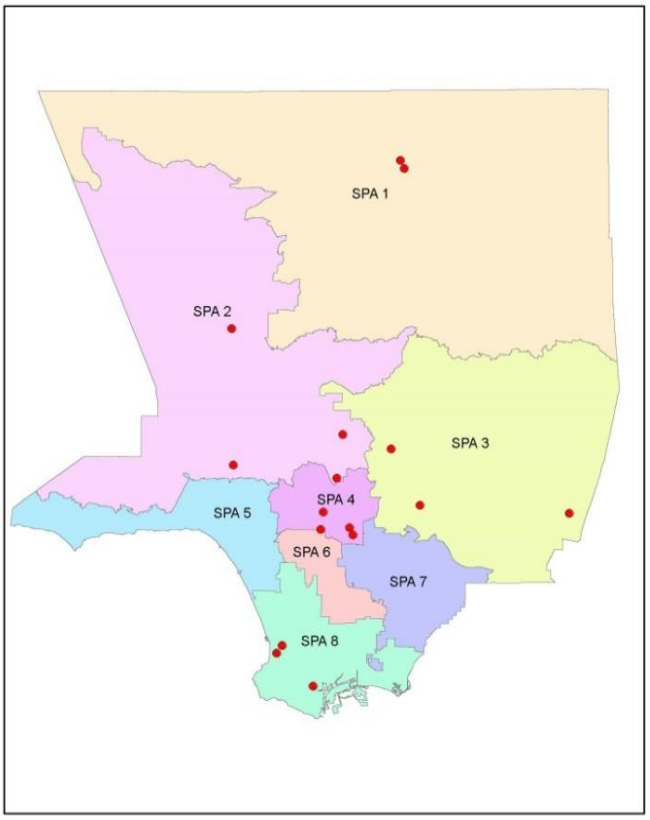


Table 3. Influenza Vaccination Status in Fatal Cases, LAC, 2013-2014

Age group (years)	Yes N(%)	No N(%)	Unk N(%)	Total
0-17	2 (50)	2 (50)	0	**4**
18-64	5 (7)	22 (31)	44 (62)	**71**
65+	9 (30)	4 (13)	17 (57)	**30**
Total	**16 (15)**	**28 (27)**	**61 (58)**	**105**

Outbreaks

Seventeen community respiratory disease outbreaks were confirmed with only two of those attributed to influenza confirmed by laboratory testing. The remaining fifteen respiratory disease outbreaks had no known etiology due to lack of specimen testing and subsequent laboratory confirmation of a specific pathogen. Consistent with previous seasons, the majority of outbreaks occurred in schools or assisted living residences and were evenly distributed throughout the county (Figure 3).

DISCUSSION/CONCLUSION

During the 2013-14 influenza season, pH1N1 caused the most morbidity and mortality since its initial emergence, despite circulating as a seasonal strain and being included in the vaccine each season since the pandemic. The disproportionate effect on younger adults is similar to what was seen during the 2009

pandemic when pH1N1 first appeared (2). During this past H1N1 dominant season, the 18-64 year old age group, which accounts for over 60% of the population in LAC, experienced a greater than expected proportion of IAD. In addition, the majority of reported ICU hospitalized influenza cases in LAC were in those younger than 65 years old. The majority of respiratory disease outbreaks were of unknown etiology due to the lack of laboratory data. Specimen collection during outbreak situations is challenging because the outbreak is sometimes over before DPH nurses can collect specimens and individuals or parents of children involved in outbreaks may decline specimen collection. All outbreaks occurred during flu season, therefore it is likely that a greater proportion were actually caused by influenza virus but lacked proper testing.

National data from the CDC report similar outcomes; pH1N1 predominated in the US overall along with an increase in influenza B activity later in the season. Overall activity peaked in late December, whereas activity in LAC peaked in the last week of January/first week of February, highlighting the benefit of local surveillance as national data do not always reflect community level conditions.

Vaccination data for the pediatric influenza associated deaths reinforces the importance of vaccinations for all close contacts of children who cannot be protected by vaccination because of young age or immunosuppression. Effective implementation of this “cocoon” strategy may have prevented transmission and the subsequent deaths.

LIMITATIONS

Since individual cases of influenza are not monitored, the surveillance systems in place are only representative of flu activity in LAC and are not inclusive. Despite requirements mandating reporting of influenza deaths and outbreaks, underreporting occurs, resulting in an underestimate of the mortality and morbidity associated with documented influenza. Moreover, influenza is rarely identified specifically through laboratory testing preceding death so the total of IADs significantly underestimates the total burden of influenza mortality. Studies estimating influenza-associated deaths based on seasonal differences in cardiac and respiratory deaths suggest that an average of about 30,000 excess deaths annually. In addition, a testing bias may exist for those <65 years old if younger individuals are more likely to be tested for influenza in hospitalized and fatal cases, whereas illness in older adults may be attributed to community acquired pneumonia and vigorous testing is less likely to be performed. Further studies are needed to explore this possible bias. Although there are limitations of assessing the true disease burden, the surveillance data are useful in comparing seasons as well as aiding in identifying new risk factors for severe influenza outcomes.

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RESOURCES

Seasonal Influenza: Flu Basics | Seasonal Influenza (Flu) | CDC

MONITORING WEST AFRICAN TRAVELERS FOR EBOLA VIRUS DISEASE IN LOS ANGELES COUNTY: A THREE-MONTH REVIEW

Alison Itano, MS, Curtis Croker, MPH, Michael Tormey, MPH, Moon Kim, MD, MPH

In September 2014, the diagnosis of a West African traveler with Ebola Virus Disease (EVD) in Dallas, Texas, and subsequent transmission to two of the traveler's healthcare workers, lead to the implementation of a nationwide surveillance system to monitor all recent travelers from EVD-affected West African countries while in the United States (U.S.). The Ebola outbreak in West Africa had been going on for six months prior, but the U.S. case in a traveler and subsequent nosocomial transmission heightened concern leading to a recommendation for surveillance. In mid-October 2014, the Centers for Disease Control and Prevention (CDC) announced new restrictions on where travelers from Ebola affected countries (Guinea, Liberia, and Sierra Leone) could enter the U.S. and on the need for prospective monitoring. On October 21, the Los Angeles County Department of Public Health (LACDPH) was notified of their first traveler under this new system. A successful local collaboration between LACDPH Programs resulted in a symptom monitoring system for travelers from EVD affected countries. Additionally, the system allowed for real-time updates to be distributed to key staff. This document is a summary of the first three months of traveler monitoring in LAC.

METHODS

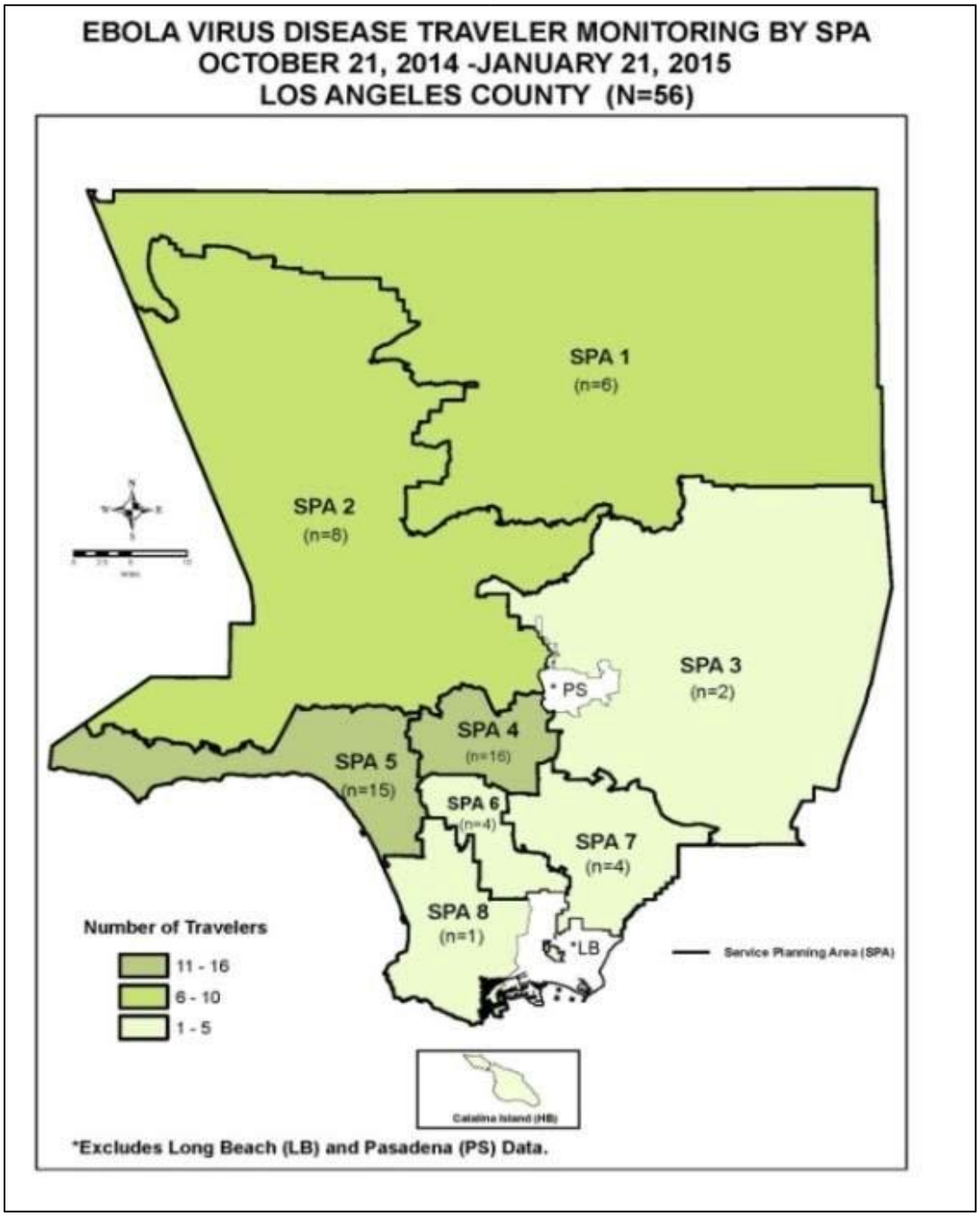
To assess traveler risk and to implement daily symptom monitoring, LACDPH developed an EVD Exposure Risk Assessment Form and the EVD Daily Symptom Monitoring Log based on guidance material from the CDC. Using CDC definitions, the risk of a traveler's EVD exposure was divided into four categories: No identifiable risk, Low, Some, and High risk (1). Information on new travelers came to LACDPH via the California Department of Public Health (CDPH) after screening by U.S. Customs and Border Protection and CDC. Upon notification, LACDPH personnel visited the traveler and completed an assessment form, evaluating their activities while in the affected country. Department personnel then started daily monitoring for fever (≥ 99.5° F) and other symptoms for 21 days (EVD incubation period) after the last exposure with an EVD patient or in an affected country. While fever is a hallmark symptom, the other symptoms associated with EVD are: severe headache, abdominal pain, diarrhea, vomiting, muscle pain, weakness or fatigue and unexplained hemorrhage (bleeding or bruising). During the monitoring period, a Public Health Nurse (PHN) contacted "Low" risk travelers by phone each day while "Some" risk travelers had a daily face-to-face interaction – either in-person or by video link. See the "Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure" for more information (2). Any travelers reporting the above symptoms were assessed by subject matter experts in LACDPH and, if warranted, the traveler was transported for medical evaluation at a LAC-designated Ebola treatment facility to rule out an Ebola diagnosis. The initial paper-based protocol was merged into an electronic surveillance system which centralized the data and allowed for data queries. Data variables from this system were analyzed utilizing Microsoft Access and SAS®. For this report, only travelers monitored from October 21, 2014 to January 21, 2015 are included in the analysis.

RESULTS

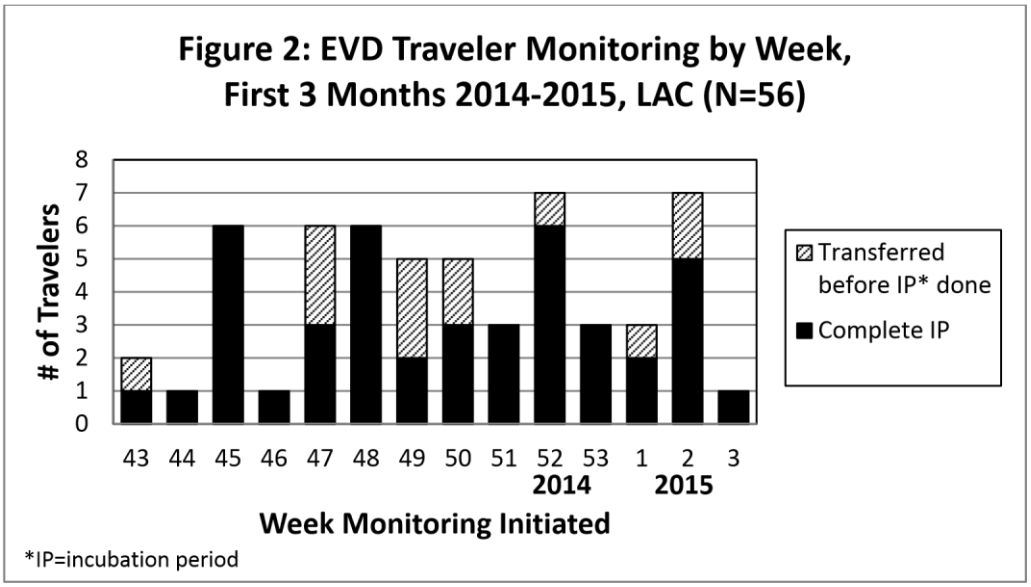
Sixty-three (63) travelers were reported to LACDPH which ultimately led to 56 individuals being monitored during the 3-month period. Seven individuals did not meet criteria for monitoring: three were in an affected area greater than 21 days prior and four had no evidence of arriving in Los Angeles. The monitored travelers were mostly male (63%) and had an average age of 39 years with a range from 2 to 65 years. Three of the travelers were less than five years old and one woman was pregnant. For these two groups, LACDPH pre-arranged availability of specialized care with a LAC-designated Ebola treatment facility pediatric intensive care, pediatric, or obstetric unit so staff would be available if they needed care.

Persons traveling to LAC from Ebola affected countries resided throughout the County, however, Service Planning Areas (SPA) 4 and 5 monitored the most travelers, 29% and 27%, respectively (Figure 1).

Figure 1

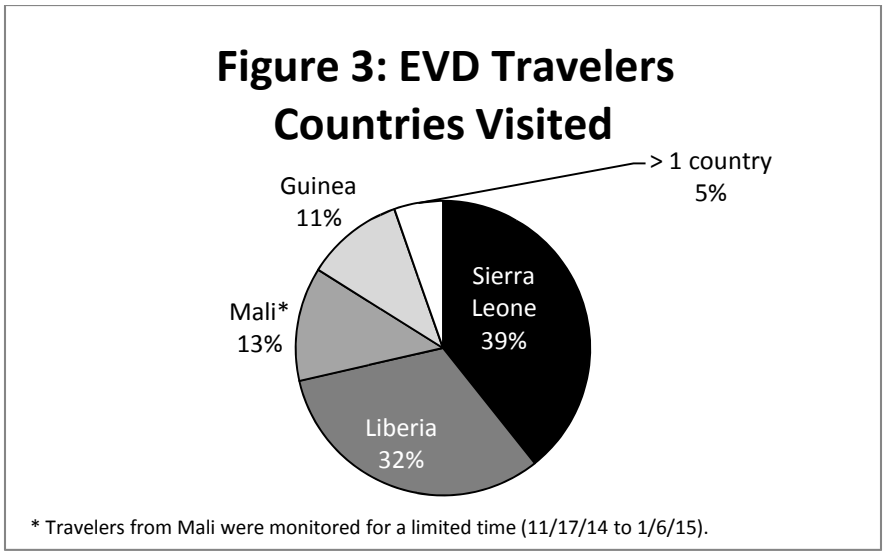


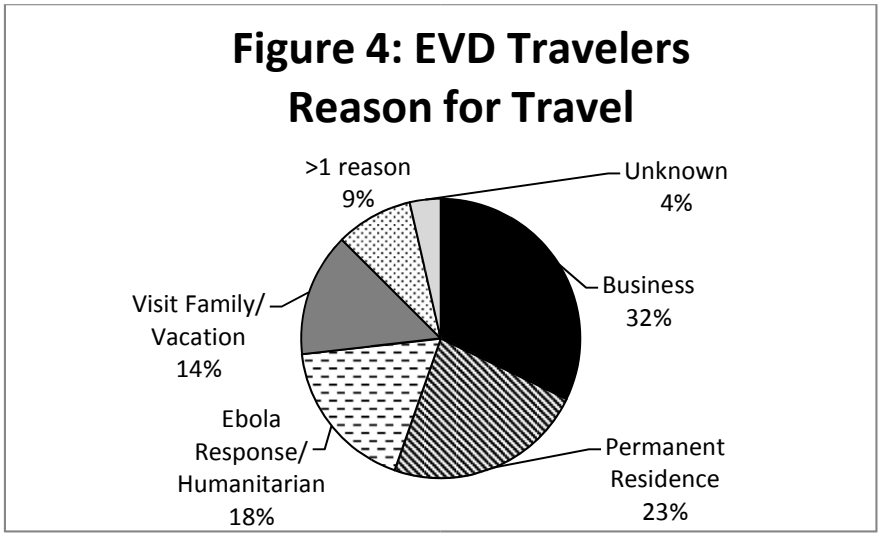
LACDPH initiated monitoring for the first traveler on October 21, 2014. Travelers were added consistently through the study period (Figure 2). On average, four travelers arrived in LAC each week (range 1 to 7). Forty-three travelers (77%) completed their monitoring in LAC while the remaining 13 transferred out of the County before 21 days elapsed: either leaving the U.S. (7%) or transferring to another jurisdiction within the U.S. (16%). Overall, the average number of monitoring days per traveler was 16 (range 1 to 21 days).



Ninety-five percent of the travelers were classified as having a “Low” risk exposure to EVD. Three healthcare workers with EVD patient exposure (direct contact with appropriate personal protective equipment) were classified as “Some” risk. Of the “Some” risk individuals, two were only monitored one day each before being transferred to another state and the third was monitored until the end of their incubation period.

Travelers predominately came from Sierra Leone (39%) and Liberia (32%) (Figure 3). Travelers also came from Mali, Guinea, or had been in multiple affected countries. Note that Mali was added to the affected country list for only a portion (51 days) of the three-month study period. The majority of the travelers were U.S. residents (64%); others were permanent residents of Sierra Leone (14%), Liberia (9%), or dual residents of the U.S. and Guinea (2%). As shown in Figure 4, 32% of the travelers indicated business as their reason for travel, 23% had permanent residence in the affected area, 18% cited Ebola response/humanitarian, 14% visiting family or vacation, 9% provided more than one reason, and for 4% the reason was not listed. During the three-month period, two travelers were monitored twice and counted twice; their occupation required repeated travel between the U.S. and the affected areas in West Africa.





Through three months of monitoring, none of the travelers developed EVD. Nine travelers (16%) reported having EVD-like symptoms and were closely followed by LACDPH. Of the 24 occurrences where ***any*** daily symptoms were noted, 57% reported severe headache, 22% weakness/fatigue, 13% vomiting, 9% diarrhea, 8% fever (≥99.5° F), 4% muscle pain, 4% abdominal pain, and 4% unexplained bleeding. The majority of daily symptom occurrences (67%) were reported by two individuals. Only one traveler reported fever (99.9 and 101.6° F) for two days. Most of the symptomatic travelers (77%) resolved their illness within two days. The median number of symptom-days per traveler was one with a range from 1 to 10 days.

There was one traveler requiring medical evaluation by a LAC-designated Ebola treatment facility. An adult male sporadically complained of fever, headache, and weakness/fatigue in 10 out of the 21 days of monitoring. He tested negative for Ebola but positive for malaria.

CONCLUSION

Building on existing surveillance systems, LACDPH Programs were able to quickly and efficiently implement an enhanced surveillance system with specific variables associated with our Ebola surveillance. As demonstrated, LADPH was able to detect symptomatic travelers and respond to those

who needed medical evaluation. EVD case management protocols and data systems were created to manage the travelers, control the flow of information, and rapidly communicate findings to key LACDPH staff in real-time. Consistent communication between LACDPH, our State and CDC partners was essential in adapting to a dynamic and potentially volatile situation with far-reaching public health implications. This experience provided valuable lessons which better prepares the Department to address potential emerging disease threats in the future.

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ASEPTIC MENINGITIS OUTBREAK ASSOCIATED WITH ECHOVIRUS 30 AMONG HIGH SCHOOL FOOTBALL PLAYERS LOS ANGELES COUNTY, CALIFORNIA 2014

Curtis Croker, MPH; Kathleen Keough, BS; Van Ngo, MPH;
Amy Marutani, MPH; and Rachel Civen, MD, MPH

BACKGROUND

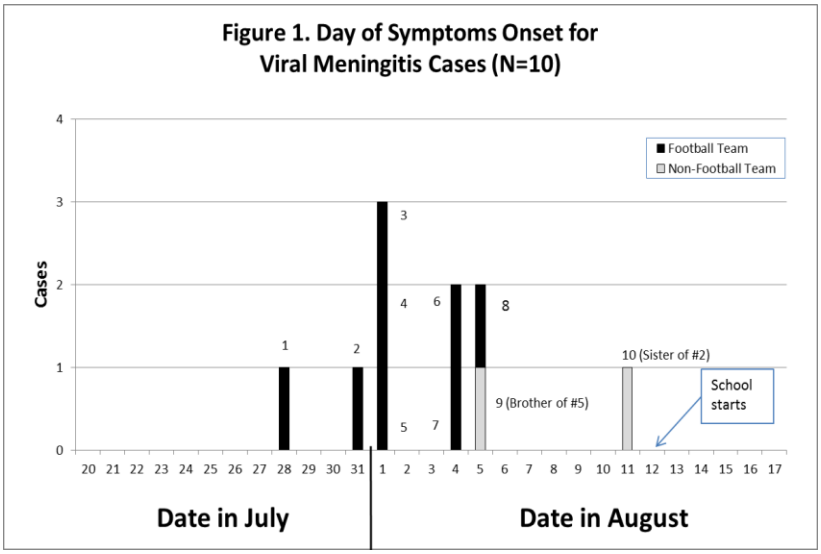
On August 4, 2014 the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County (LAC) Department of Public Health (DPH) received a report of three aseptic meningitis cases among football players from a high school. ACDC staff conducted an investigation to determine the extent of the outbreak, identify potential exposures, and ensure that control measures were implemented to prevent any additional cases.

METHODS

We defined an outbreak-associated aseptic meningitis case as an illness of any team or family member with onset between July 28 and August 11 with: 1) cerebrospinal fluid pleocytosis and negative bacterial culture or 2) an emergency department visit with headache, fever, and stiff neck. To identify additional cases on the team or among family members, letters were mailed by the school to team member's parents to request any ill family members with similar illness be reported. In addition, ACDC interviewed coaches, reviewed team absenteeism records as well as made calls to local hospitals to identify any additional cases.

To determine whether outbreak-associated cases occurred beyond the team and their family members, ACDC initiated active case finding by: 1) coordinating with the Los Angeles Unified School District's (LAUSD) school district's head nurse to survey other local schools, 2) contacting football coaches from schools that had interacted with the football team reporting the outbreak, and 3) reviewing recent cases of viral meningitis already reported to LAC DPH with symptom onsets occurring within one month of the last known outbreak-associated case. ACDC requested medical records for each suspect case. All cerebrospinal fluid (CSF) specimens were sent to the California Department of Public Health (CDPH) Viral and Rickettsial Disease Laboratory for enteroviral typing by PCR methodology.

ACDC conducted a site investigation to identify potential exposures and ensure that proper control measures were in place. ACDC toured the athletic facility and completed interviews with high school administrators, coaches, the LAUSC public health nurse, and janitorial staff. A roster of football players was obtained, detailing each player's position. ACDC continued to monitor for additional cases to ensure that the recommended control measures were effective.



RESULTS

Ten viral meningitis cases due to enterovirus infection occurred during the outbreak; three that were originally reported by the school district nurse and seven that were identified through active case finding (Figure 1). The first case had symptom onset on Monday, July 28, 2014 (#1), followed by a second wave of case

onsets at the end of the first week (#2-5). A third group of case onsets occurred at the beginning of the second week (#6-9), and last case occurred at the end of this week (#10, Friday). The incubation period for enteroviruses typically ranges from three to *ten days***.**

Eight cases were football players and two were siblings of football players. Nine cases were male and one female, with ages ranging from 13 to 17 years. All ten patients visited an emergency department and five were hospitalized resulting in 12 total hospital days. No cases were identified in other teams played or other nearby schools. Eight cases tested polymerase chain reaction (PCR)-positive for enterovirus; echovirus 30 was identified in seven cases. One specimen could not be typed due to insufficient quantity.

Seven of eight cases were among junior varsity players (attack rate: 12.3%, 7/57), and one case was in a varsity player. The relative risk of aseptic meningitis was higher among linemen than non-linemen (relative risk = 5.4, p=0.03).

Site Visit Observations:

The field restroom was well stocked with soap and paper towels and appeared well maintained at time of inspection. However, one coach commented during the interview that the field restroom was often out of soap during the summer practice when the outbreak began. The restroom that was located in the locker room appeared clean, but the soap dispensers were empty. One coach stated that these locker rooms were closed in the summer months and the football players only used the field restroom. When the janitorial staff was asked about the report of lack of soap in the field restroom, they responded that students often steal the paper towels and soap and break the dispensers, making this restroom sometimes difficult to maintain. Cleaning logs for the field restroom were requested, but were very difficult to interpret; it was not clear how often the field restroom had been inspected or cleaned over the summer months at the beginning of the outbreak.

ACDC staff questioned athletic staff about water distribution to the team players during summer practice. One coach stated that players had consumed water from unlabeled plastic water bottles at the start of the outbreak. The coach was also aware that sharing water bottles during the time of the outbreak was common practice. If bottles were shared by groups playing a particular position, this may explain why linemen were more likely to become a case then non-linemen. These bottles were filled prior to the practice by other students, brought back to the athletics room after practice, and rinsed and refilled in a large sink for the next practice. No soap or disinfectant was used to clean water bottles. The coach stated they had stopped using these water bottles after the initial cases of meningitis occurred and are currently using other means of distributing water to the players.

The coach demonstrated two devices that they were currently using to distribute water to players. One was a metal tube that attaches to a garden hose and shoots water out of several holes so that multiple players can drink at once without mouth contact with the device. The other device consisted of a portable water tank and pump on a dolly that shoots out water for players to drink from a single spout. ACDC advised that both devices appeared sufficient to prevent potential transmission of illnesses as long as the players do not place their mouth on the tubing of the device while drinking. School administrators also reported notifying parents by e-mail of the recent cases of viral meningitis, advising parent that ill players should not come to practice and discouraging water bottles from being shared or passed among football players.

ACDC maintained active surveillance for one month after the last case to ensure that no further transmission occurred. All cases recovered without complications.

DISCUSSION

The environments in which athletes practice provide varied opportunities for the transmission of infectious organisms. A review of recently published outbreaks among competitive sports teams [1] identified Methicillin-resistant *Staphylococcus aureus* and herpes simplex virus skin infections as the most common reported outbreaks, with direct, person-to-person contact reported as the most common form of transmission. Appropriate documentation of such outbreaks is important so that sports medicine staff can recognize outbreaks quickly and take necessary control measures to contain further transmission. This

outbreak of viral meningitis appears to have been limited to only these high school football players and the player's siblings. Fortunately, this outbreak was contained and ended before the start of the school year. This investigation identified various factors that likely contributed to the spread of enterovirus among the football players. These factors include the sharing of improperly cleaned water bottles among players and possible lapses in field restroom maintenance during the outbreak period. How often water bottles are shared among high school sports team players is unknown and should be further explored. Sports team coaches should be educated to strongly discourage this practice among athletes.

The pathogen identified in this outbreak, echovirus-30, comprised 4.5% of all non-polio enterovirus serotypes reported from 2006 through 2008 in the United States [2]. Echovirus-30 has been associated with several community-wide outbreaks of viral meningitis in Europe [3-5]. Other echovirus types such as 5, 9, 16, 24 have also been associated with aseptic meningitis outbreaks in football teams [6]. This appears to be the first documented echovirus-30 aseptic meningitis outbreak in the United States occurring among members of a sports team. A summary of these investigational findings were published in the January 30th, 2015 issue of the Morbidity and Mortality Weekly Report Notes from the Field [7].

CONCLUSION

ACDC determined the most likely route of transmission for the virus involved in this outbreak was improperly cleaned water bottles shared among team players during practice. Lapses in field restroom maintenance leading to poor hand hygiene among players may have also contributed to the fecal-oral transmission of the virus on the team. School staff were proactive at implementing effective control measures prior to ACDC intervention. ACDC provided education to the school staff to ensure the proper control measures were in place and completed surveillance to determine the extent of the outbreak. ACDC advised the school administration to discourage shared water bottles among students and ensure that team players have access to clean and well stocked restrooms to avoid future outbreaks.

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HEPATITIS B OUTBREAK AT A SUBACUTE CARE AND SKILLED NURSING FACILITY

Christine Selzer, MPH; Susan Hathaway, PHN, MPH; and Christine Wigen, MD, MPH

BACKGROUND

On March 3, 2014, Acute Communicable Disease Control Program (ACDC) of the Los Angeles County (LAC) Department of Public Health (DPH) was notified of a single resident in the Sub-Acute Unit (SAU) of a skilled nursing facility (SNF, Facility A), who was hospitalized and tested positive for hepatitis B surface antigen (HBsAg) and IgM antibody to hepatitis B core antigen (IgM anti-HBc), consistent with acute hepatitis B infection. On March 7, 2014, the SAU of Facility A reported an additional hospitalized resident with acute hepatitis B. An investigation was begun to determine the source of the outbreak, identify other cases and control potential spread of the disease.

CONTEXT

Facility A has a total of 181 beds, of which 53 are in the SAU, 42 are in the mental health locked unit and 86 are in the open SNF. The SAU has long-term care residents with tracheostomies, gastrostomy tubes, and some on ventilators. There is one full-time physician and one pulmonologist. The total nursing staff of the SAU was reported as 73, including ten registered nurses (RNs), 39 licensed vocational nurses (LVNs), and 24 certified nursing assistants. There are also 29 respiratory therapists employed at the facility. The RNs administer intravenous (IV) infusions and IV medications and the LVNs administer oral medication and injections, fingersticks, blood glucose testing and insulin injections. It was reported that an outside podiatrist came to the facility every six weeks and a dentist visited monthly. Two outside wound care consultants also visited the facility on a weekly basis.

INVESTIGATION

Case Definitions

A case of incident Hepatitis B virus (HBV) infection was defined as any Facility A (SAU or SNF) resident, with or without symptoms of infection, who fell into one of two categories between June 1, 2013 and March 31, 2014[1]:

1. Acute infection (positive for both HBsAg and IgM anti-HBc)
2. Resolving acute infection (positive for total hepatitis B core antibody (anti-HBc) and IgM anti-HBc and negative for HBsAg).

A case of chronic HBV infection was defined as any facility resident who tested positive for HBsAg and total anti-HBc and negative for IgM anti-HBc and anti-HBs. Individuals were considered immune if there was serologic evidence of past resolved infection (positive for anti-HBs and total-anti-HBc and negative for IgM anti-HBc and HBsAg) or vaccination [positive for hepatitis B surface antibody (anti-HBs) only]. Susceptible individuals were defined as those residents who tested negative for all markers of HBV infection.

Hepatitis B Case Finding

A total of 9 cases were identified: two chronic cases, four acute cases, and three resolving infections at the time of testing. In addition to the first two cases reported to ACDC that initiated this investigation, a third case was hospitalized on March 12, 2014 and found to have acute HBV.

To find possible sources of the infection and additional reported HBV cases within or outside of LAC, the names of residents who were housed at Facility A between June 1, 2013 and March 31, 2014 were entered in the LAC DPH hepatitis registry and also sent to California Department of Public Health (CDPH). Two previously reported residents were identified: the first was reported to CDPH in 1999; blood tests done in

[1] Time period used to capture any exposed case within the incubation period for acute hepatitis B which is 6 weeks to 6 months. http://www.cdc.gov/hepatitis/HBV/

January 2014 indicated the resident was HBsAg positive. A second resident was reported to CDPH in 2012; blood tests done in March 2014 indicated that the resident was HBsAg positive. Both chronic cases still resided at the facility and may have been potential sources of the outbreak.

All SAU and SNF Unit patients underwent hepatitis serology testing and were offered HIV testing in order to detect any additional cases and to determine if the exposure had extended beyond the SAU. 157 residents underwent testing during March and April of 2014. The remaining four cases were found through this process. One acute case (A4) and three resolving cases (R1-3) were identified, including one that was a resident of the SNF (R3). One chronic case had passed away before the time of testing, however, he is included in the total numbers. The serologic status of SNF and SAU residents is displayed in Table 3.

Table 3. HBV Serologic status of SNF and SAU residents

HBV infection status	SAU (n=56) (%)	SNF (n=102) (%)	Total, (N=158) (%)
Susceptible	35 (63)	87 (85)	122 (77)
Immune	13 (23)	14 (14)	27 (17)
Chronic	2 (4)*	0	2 (1)
Acute	4 (7)	0	4 (3)
Resolving	2 (4)	1(1)	3 (2)

*Includes chronic case identified through registry search and not through testing

Case Characterization

ACDC reviewed medical records and room location histories of the nine acute, resolving and chronic cases. Data abstracted included demographic information, past medical history including prior hospitalizations, medical procedures, dates of blood draws, dental and podiatry visits, medications and serology and other laboratory data.

There were two chronic cases, one male and one female, 57 and 62 years old, respectively. There were four acute cases that were aged 50-77 years; three were male and one was female. Lastly, there were three cases who had resolving infections at the time of testing, two males and one female aged 35-73 years. All cases resided in the SAU. One of the resolving cases resided in the SAU until the end of August of 2013, and then was transferred to the open SNF unit (R3). Five of the cases (C1 and C2, A2 and A3, R2) were hospitalized for various reasons during the period of June 2013 through March 2014. Three of the cases were hospitalized for acute hepatitis (A1-3), one of whom died (A2). In February 2014, one chronic case (C1) died of causes unrelated to hepatitis (Table 1).

Table 1. Characteristics of residents identified with chronic, acute and resolving HBV infection

Resident	Age, years	Sex	Month of admission	Serologic status	Detection of infection	Month detected
C1	57	M	6/2013	Chronic	Hepatitis Registry	8/1999
C2	62	F	8/2012	Chronic	Hepatitis Registry, Screening	12/2012
A1	50	M	5/2013	Acute	Elevated LFTs	2/2014
A2	73	M	3/2013	Acute	Elevated LFTs	2/2014
A3	59	F	6/2013	Acute	Jaundice, elevated LFTs	3/2014
A4	77	M	4/2013	Acute	Screening	3/2014
R1	47	F	7/2012	Resolving	Screening	3/2014
R2	35	M	8/2013	Resolving	Screening	3/2014
R3	73	M	12/2012	Resolving	Screening	3/2014

Common procedures between the chronic cases (possible source cases) and the probable outbreak-associated cases were reviewed during the exposure period from June 1, 2013 through March 31, 2014. Both chronic cases, three acute and two resolving cases (n=7) received daily subcutaneous medications (SQ). One chronic, two acute and one resolving case (n=4) had regular fingersticks (either weekly or daily). The same distribution (n=4) had blood drawn during the incubation period and of the six cases that had dental work, two were chronic, one was acute and three were resolving. All nine cases had IV medications administered and all had podiatry visits during their stays. The podiatry procedures were done bedside, at the facility, and seven of the nine cases had appointments on the same day on two separate occasions. On a third occasion, eight of the nine cases had an appointment on the same day. See Table 2 for further clarification of exposures.

Table 2. Exposure by Serologic Status

Resident	Subcutaneous Medication	Fingersticks	Blood Draws	Dental Work	IV medications	Podiatry
C1	X			X	X	X
C2	X	X	X	X	X	X
A1					X	X
A2	X				X	X
A3	X	X	X		X	X
A4	X	X	X	X	X	X
R1	X		X	X	X	X
R2	X			X	X	X
R3		X		X	X	X

During medical record abstractions, room locations were recorded to cross match with already existing information. The room locations for each case were then recorded on the facility map to indicate their location during a specific period of time. Residents moved frequently, and cases were in the same room or in nearby rooms on several occasions. Residents were visited by dental, podiatry and wound care consultants but were seen based on the resident's convenience and availability rather than in order by resident location or rooms. Linking room information to procedure was difficult because documentation of the visits by any consultant was limited.

Facility A Site Visits

Site investigations were conducted throughout the outbreak to gather additional information regarding potential exposures and infection control practices within Facility A.

On March 10, 2014 ACDC staff conducted a first site visit to Facility A and on March 27, 2014, a second site visit was conducted jointly with Health Facilities Inspection Division (HFID). The site visits were conducted to perform chart abstraction of the nine cases, to interview facility administrators and nurses and to observe procedures and cleanliness within the facility.

Overall, the appearance of the facility was neat and clean. Soap dispensers and sharps containers were located in each resident room. Personal protective equipment are available for staff use. A medication room was used for storage and refrigeration of unopened medications. Individual medications, glucometers and single use lancets were stored in locked medication carts located in hallways. Narcotics were double locked. IV medications were prepared individually at an outside pharmacy. PDI® Sani-Cloth® Plus Wipes were used to wipe down the cart before medication preparation. ACDC staff observed the SAU staff perform fingersticks for glucose monitoring and insulin injection. It was noted each individual has their own glucometer. ACDC/HFID observed gastronomy tube (GT) feeding procedures, respiratory therapy procedures, IV medication procedures and housekeeping procedures within the SAU. ACDC also conducted chart reviews. Copies of facility maps, policies, and logs for staff trainings were obtained. The staff received monthly infection control training including blood glucose monitoring using videos. They

received injection safety training every six months and the facility contracts with an infection control consultant.

During the site visits, the following infection control discrepancies were observed by ACDC and HFID investigators.

1. Sharps containers mounted above eye level not allowing for safe visualization.
2. Not allowing five minutes of contact time after using Sani-Cloth® wipes for cart disinfection before medication preparation.
3. Discrepancies in mixing cleaning solutions for housekeeping and mixing of clean and dirty laundry.[2]

Podiatry and Dental Consultant Observations

On March 28, 2014, ACDC Program staff observed podiatry procedures performed by Podiatrist X and his two assistants at Facility A. A free-standing, mobile cart was used to transport Clorox® wipes, a stainless steel box containing disinfection solution (Metricide™ OPA Plus), toe nippers (three in the box soaking in the solution) and 1-2 other nail nippers in sealed plastic packaging on the cart surface. Nail nippers are supplied by the podiatrist specifically for these procedures and are sanitized and re-used. The nail nippers had a colored mark on the handle which helped to determine how the nippers were cycled through for use when seeing patients. The assistant was responsible for ensuring a clean area and cleaning and returning the nippers to the disinfection solution after each procedure. Each patient visit consisted of nail clipping which took on average about three to five minutes. The mobile cart was taken inside the room to the bedside for every patient.

During observation of Podiatrist X and his assistants, the following infection control breaches were observed by ACDC.

1. Disinfection of podiatric instruments: There was no open date on the Metricide™ OPA Plus solution. There was no date on disinfection boxes indicating when solution had been placed in box. Solution is only viable for 14 days after being placed in disinfection tray. A log was not provided indicating daily testing of disinfection solution. For nails nippers used on patients, a thorough cleaning, rinsing with water and drying was not done prior to soaking in disinfection solution (simply cleaned with a Clorox® wipe). Instruments were not disinfected in the solution for the duration recommended by the manufacturer. Upon removal from the disinfection solution, each nipper was not rinsed and dried before reusing on patients.
2. Environmental cleaning: Clorox® household disinfection wipes were used to wipe down surfaces. Clorox® wipes are not effective against hepatitis B or hepatitis C.[3]

On April 10, 2014 ACDC Program staff observed dental procedures performed by Dentist X and his assistant at Facility A. Dental procedures were performed by the dentist and a dental assistant at the bedside using a portable cart. All procedures by the dentist and cleaning of the dental system and surrounding areas by the assistant were observed. Environmental surfaces and dental system were cleaned with CaviCide® and allowed the proper duration for disinfection. Waste was disposed of properly and reusable dental instruments were placed in a designated container in the bottom drawer of the portable cart for transport to the office for disinfection. No infection control breaches were observed.

Residents were not seen in any particular order by either the podiatry or dental consultant. Visits were conducted when convenient for the residents.

Interviews of Wound Care Consultants

Telephone interviews were conducted with two wound care consultants who delivered care to residents at Facility A during the exposure period. ACDC staff were unable to observe these consultants providing care

[2] This discrepancy was identified by HFID was addressed in recommendations separately provided to Facility A and were not provided by ACDC.
[3] Chlorox Disinfecting wipes at http://www.Cloroxprofessional.com/products/Clorox-disinfecting-wipes/efficacy-claims/

at Facility A. As of April 2, 2014 these consultants were no longer contracted to provide services at the facility.

Wound Doctor A was interviewed on April 14, 2014 and Wound Doctor B was interviewed on April 24, 2014. Both reported they visited the facility once a week and utilized single-use disposable curettes and/or scalpels in the treatment of residents requiring wound care. No instruments requiring sterilization were utilized.

Anonymous Staff Survey

An anonymous survey was distributed to all the SAU staff at Facility A to better characterize their infection control practices and perceptions. Staff were asked about receiving hepatitis B vaccine and various questions relating to infection control safety. Unfortunately, the response rate was low; a total of 20 out of 102 (20%) SAU staff members returned the survey.

Ninety percent of respondents reported receiving hepatitis B vaccine, 44% of which reported receiving three or more doses of the vaccine. Only one person reported observing another staff member perform fingersticks without changing gloves between residents. Otherwise no other breaches were mentioned. All respondents reported feeling that they had received adequate infection control and injection safety training. All respondents were able to identify at least one major aspect of standard precautions.

Review of Infection Control Policies/Procedures and Logs

Policies/procedures, training and maintenance logs were reviewed by ACDC for the podiatrist, dentist and Facility A. While there was current information on autoclave operations, disinfection, and autoclave maintenance logs at the podiatry consultant's office, logs for each run of the autoclave and daily testing of disinfection solution were not available. All infection control policies, procedures and training logs for the dentist and Facility A were current and appropriate.

Genotyping

Blood samples of eight residents (four acute cases, one chronic case and three resolving infections) were obtained by LAC DPH and sent to the Centers for Disease Prevention and Control (CDC) in Atlanta, GA for genotype testing to determine if the infections were related. A sample from C1 was not collected due to his death prior to collection. The tests revealed that five newly diagnosed hepatitis B cases had identical genotypes, suggesting transmission of the same virus among the cases through a common medical procedure. Hepatitis B genotyping could not be performed for three of the residents because there was no virus remaining in the sample. The hepatitis B genotype test results are listed in Table 4.

Table 4. Hepatitis B Genotype Test Results

Resident	Age, years	Sex	Serologic status	HBV genotype
C1	57	M	Chronic	Unknown
C2	62	F	Chronic	C2
A1	50	M	Acute	C2
A2	73	M	Acute	C2
A3	59	F	Acute	C2
A4	77	M	Acute	C2
R1	47	F	Resolving	Unknown
R2	35	M	Resolving	Unknown
R3	73	M	Resolving	Unknown

Hepatitis B vaccinations were recommended for the 35 susceptible individuals within the SAU, and all were vaccinated. Because there was no evidence of hepatitis B transmission occurring within the SNF, hepatitis B vaccination of those residents was left to the discretion of the facility. Surveillance involving a second round of blood testing after vaccination to check for continued transmission was recommended. Vaccination and testing were done on residents that gave consent. Of the 35 individuals, 18 got a vaccination and subsequent screen, 7 had already been discharged, 4 refused, and 4 expired (not HBV related). No new infections have been detected to date.

LIMITATIONS

Medical records at Facility A were incomplete with missing notes for consultation visits, months of progress notes and medication distribution notes. Multiple exposures were possible for each case and many were overlapping. Consultant visits often occurred by convenience and records of the order in which patients were seen were not kept. This restricted ACDC's ability to determine if a chronic case had a procedure before an outbreak associated case. After consultation with CDC, it was determined that a case-control study would not have been likely to provide further clarity regarding risk factors for infection. ACDC was unable to observe the wound care consultants because they were not available or no longer seeing patients at the facility. Lastly, blood sample genotyping was not complete because one chronic case (C1) died before a sample could be taken. The living chronic case (C2) had the same genotype as the acute cases, but because a blood sample could not be taken from C1, it could not be determined if that was the original case, if it came from C2, or another source. Lastly, the usefulness of the staff survey is limited because of the low response rate, and the responses should be interpreted with caution.

CONCLUSIONS AND RECOMMENDATIONS

Transmission of HBV occurs due to practices involving percutaneous or mucosal contact with blood or other body fluids.[4] Also, the virus is stable enough to live on certain environmental surfaces for up to seven days unless properly disinfected. During this investigation, four acute, three resolving, and two chronic cases of hepatitis B were identified. Testing at the CDC revealed that five infections (four acute and resolving; one chronic) were linked, implicating transmission of hepatitis B from either one or both of the chronic cases to the acute/resolving cases; spread may have been due to a common medical procedure. Due to the number of overlapping exposures and missing data, it was not possible to implicate a specific proecedure associated with the transmission of hepatitis B at Facility A.

Given the extensive literature documenting transmission of hepatitis B in long term care facilities, recommendations to Facility A were made as follows.

- Ensure mounted sharps boxes are lowered to a safe height.
- Ensure that all consulting agencies that provide contract services with Facility A have written infection control policies and procedures that include:
    - prevention of patient exposure to bloodborne pathogens,
    - injection safety to prevent transmission of disease to patients, and
    - disinfection and sterilization of reusable equipment.
- Consider implementation of a hepatitis B vaccination policy to protect at-risk residents who are new to the facility.
- Report to ACDC any resident that has symptoms of hepatitis (i.e., yellowing of the eyes, nausea, vomiting, abdominal pain) in the next six months which may represent a newly acquired hepatitis infection.
- Improve record-keeping of procedures so that exposures can be identified from medical record reviews.

The investigation team recommended to Facility A to consider including in their infection control policies information from the following references:

- Evidence-based infection prevention guidelines for healthcare settings including those for disinfection sterilization, environmental cleaning, and hand hygiene available at:

[4] "Hepatitis B FAQs for Health Professionals." http://www.cdc.gov/hepatitis/HBV/HBVfaq.htm#b1

http://www.cdc.gov/hicpac/pubs.html.

- Injection safety resources available at:
  http://www.cdc.gov/injectionsafety/providers.html
  http://www.oneandonlycampaign.org/

Additional recommendations were made to the podiatrist consultant as follows:

- Appropriately disinfect and reprocess used equipment. Nail nippers that are used for wound debridement and any nippers that are contaminated with blood or other bodily fluids should receive cleaning and high level disinfection with a Food and Drug Administration-cleared chemical disinfectant according to both the instrument reprocessing instructions and the disinfectant label instructions before use on subsequent patients. Instruments should not be put in the disinfectant tray and reused without completing each step according to the CDC guidelines.
- Follow instructions for Metricide™ OPA Plus Solution, including using test strips and logging data, along with direction for labeling the open bottle and storage time parameters.
- Any reusable podiatric instruments that are both heat-stable and have the potential to break intact skin during ordinary use (e.g., nippers, forceps, splitters, curettes) should ideally be sterilized using steam, rather than using chemical disinfectants for the terminal reprocessing step. Autoclave maintenance logs and sterilization records should be maintained for proper infection control management.
- Disinfect environmental surfaces with Environmental Protection Agency-registered disinfectants that have been specifically designated for use in healthcare and as indicated on the label. Unused supplies and medications should be maintained in clean areas separate from used supplies and equipment.

MIDDLE EAST RESPIRATORY SYNDROME (MERS) RESPONSE, LOS ANGELES COUNTY DEPARTMENT OF PUBLIC HEALTH

Christine Wigen, MD, MPH and Wendy Manuel, MPH

BACKGROUND

Middle East Respiratory Syndrome (MERS) is a viral respiratory illness caused by a novel coronavirus called the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) that first emerged in the Middle East in September 2012. While the full spectrum of illness is still unknown, cases in the Middle East resulted in severe lower respiratory symptoms along with a high case fatality rate. On March 8, 2013, the Centers for Disease Control and Prevention (CDC) issued a health advisory providing information and guidance to health care professionals detailing that persons returning from the Arabian Peninsula and neighboring countries who developed severe acute lower respiratory illness within ten days of travel should be evaluated for MERS-CoV infection.

In May 2014, two cases of travel-associated imported MERS were discovered in the United States (U.S.). The cases were identified in Indiana and Florida and were unrelated. Both cases were male healthcare providers who lived and worked in Saudi Arabia. Both were hospitalized in the U.S. and recovered with no secondary infections reported. Local transmission of the disease in the U.S. has not been documented and person-to-person transmission is thought to be low (1).

As of January 20, 2015, the World Health Organization reported 955 worldwide laboratory-confirmed cases of MERS, including 351 related deaths (2). All infections have originated in or near the Arabian Peninsula (3). Infection has been found in healthcare workers in the Middle East who have treated MERS patients and lapses in infection control procedures have been documented (4). The source of the virus is still unknown, however, several studies have implicated camels as a likely animal reservoir (5, 6).

METHODS

Beginning in the summer of 2013, the Los Angeles County Department of Public Health (LACDPH) began receiving calls from local emergency departments (ED) that suspected MERS in patients with an international travel history presenting with respiratory symptoms. In response, LACDPH distributed announcements to hospitals, infectious disease and ED physicians, requesting them to monitor and report patients with acute respiratory disease syndrome or pneumonia and recent travel to the Arabian Peninsula. Additional investigation forms and materials were developed based on CDC guidelines to screen for suspected cases of MERS.

At the start of the outbreak in the Middle East, much was unknown about the virus and clinical course of the disease, therefore the case definition for patients under investigation (PUI) continued to change as more epidemiology surrounding cases was discovered. The initial PUI case definition was a person with an acute respiratory infection with pulmonary parenchymal disease and a history of travel from the Arabian Peninsula or neighboring countries within 14 days of onset. Over time the case definition expanded to include those who had been in a healthcare facility in one of the Middle Eastern countries where healthcare-associated cases of MERS had previously been identified. Healthcare providers who encountered patients with suspected MERS-CoV infection called into the Acute Communicable Disease Control Program (ACDC) to discuss clinical symptoms and an ACDC physician would assess whether the patient met the criteria for a PUI. If criteria were met, the healthcare provider was asked to complete a PUI form, collect the recommended specimens for MERS-CoV testing, and was given guidance on infection control recommendations.

In addition to routine MERS calls, the discovery of the two imported U.S. cases from Indiana and Florida required public health agencies across the country to mobilize immediately to limit or prevent local MERS-CoV transmission. The CDC conducted investigations to identify contacts of the two cases which resulted

in a list of travel conveyance contacts, 16 of whom were LAC residents who were passengers on shared flights with the second confirmed case from Florida. LACDPH responded by calling all conveyance contacts to conduct an interview to assess their exposure to the case and if they were experiencing any respiratory symptoms. In addition, passengers were asked for a voluntary serum sample for serologic testing for MERS-CoV infection at the CDC. At least three attempts were made to contact these individuals before classifying them as lost-to-follow-up.

RESULTS

From June 2013 to January 2015, LACDPH has investigated ten suspected cases of MERS (Table 1). All ten suspect cases tested negative for MERS at CDPH or PHL.

Table 1. Demographic Information, Travel History, and Test Results of MERS-CoV Rule-out Cases, LAC, June 2013-January 2015

Suspected Case#	Age	Gender	Travel History	MERS-CoV rRT-PCR Results
1	65	F	Abu Dhabi (UAE)	Negative
2	19	M	Dubai (UAE), Sudan, Istanbul	Negative
3	59	F	Israel	Negative
4	71	F	Israel	Negative
5	66	F	Saudi Arabia	Negative
6	70	F	Saudi Arabia	Negative
7	84	M	Israel	Negative
8	25	M	Dubai (UAE)	Negative
9	22	F	Iran	Negative
10	20	M	Saudi Arabia	Negative

As part of the contact investigation related to the second imported U.S. case, interviews were obtained for 12 out of the 16 LAC conveyance contacts identified (Table 2). Of those 12, ten consented to serology testing and two declined. All ten tested negative for MERS-CoV antibodies. The remaining four contacts were lost-to-follow-up). None of the contacts interviewed reported any respiratory symptoms.

Table 2. Interview and Serology Testing Outcomes from the Conveyance Contact Investigation for the Second Imported Case of MERS, LAC, 2014

By Outcome	N
Obtained interview and serology	10
Interview but declined serology	2
Lost to follow up	4
Total	16

In response to the emerging situation in the Middle East, LACDPH proactively developed educational and informative messages to share with healthcare providers to keep them up-to-date on the local situation and

who they should contact if they encountered a patient with suspected MERS-CoV infection. Plans and case report and investigation forms were generated to prepare if a case was identified in LAC. In addition, educational materials for the public and healthcare providers were developed and posted on the LACDPH website (http://publichealth.lacounty.gov/acd/MERS.htm).

- LACDPH MERS website
- MERS FAQ sheet
- Guidelines for Healthcare providers and travel alert flyer

DISCUSSION AND CONCLUSION

The Los Angeles International airport is the sixth busiest airport worldwide and third in the U.S. and served 66.7 million passengers in 2013. Thus, LAC needs to be prepared to detect and respond to emerging infectious diseases. While person-to-person transmission of MERS-CoV is thought to be low, LACDPH prepared for a case in a person traveling to or through LAC and to the possibility of local spread. The conveyance contact investigation that resulted from the two imported cases of MERS identified in Indiana and Florida highlighted the ability of an emerging infectious disease to potentially spread quickly across the U.S. During the SARS outbreak, disease rapidly spread across the globe and LACDPH investigated 22 potential cases, ultimately identifying zero cases. Unlike transmission of SARS, MERS-CoV does not spread easily from person-to-person which helped prevent transmission in the U.S.

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RESOURCES

CDC-MERS-About MERS

LAX - General Description

NOROVIRUS OUTBREAK WITH AN ASSOCIATED DEATH

Marifi Pulido, PhD, MPH and Roshan Reporter, MD, MPH

BACKGROUND

Infection with norovirus often leads to acute gastroenteritis with the primary symptoms being diarrhea and vomiting. Norovirus has a human reservoir and can be found in the stool or vomitus of infected individuals.[1] Transmission occurs from ingestion of the virus, either by direct person-to-person contact, or via food or fomite contamination. Cooking kills the virus and foodborne outbreaks of norovirus are usually linked to a cold food item or ice. Norovirus outbreaks follow seasonal trends, being more frequent in winter months than in summer.

On Thursday, July 10, 2014, the Los Angeles County Department of Public Health (LAC-DPH) Environmental Health Services (EHS), Wholesale Food and Safety (WFS) received a telephone call from an LAC business (Company A) to report employees experiencing symptoms of diarrhea, vomiting, headaches, and body aches after eating at an office luncheon on Monday, July 7, 2014. The event was catered by an LAC restaurant (Restaurant A). The Acute Communicable Disease Control Program (ACDC) initiated an outbreak investigation to determine the extent of the outbreak, risk factors for the disease, and steps needed to prevent further spread.

METHODS

During the intake interview WFS requested a menu and contact information for all attendees. WFS conducted an inspection of Restaurant A on Friday, July 11, 2014, and a re-inspection on July 14, 2014. ACDC created a standardized illness and food history questionnaire which was used to interview persons eating food from the office luncheon. ACDC requested stool specimens from ill Company A employees and LAC-DPH Community Health Services (CHS) requested stool specimens from Restaurant A employees who had contact with the food delivered to Company A on Monday, July 7. These specimens were tested for norovirus, *Salmonella*, and *Shigella* at the LAC-DPH Public Health Laboratory. In order to find additional cases, ACDC requested the invoices for Restaurant A catering orders delivered Sunday, July 6th through Tuesday, July 8th. The contact persons on the invoices were telephoned to determine if anyone became ill after eating the catered food.

An outbreak-associated case was defined as: 1) a person who ate food from the July 7th luncheon and had a positive laboratory test result for norovirus, or 2) a person who ate food from the July 7th luncheon and became ill with diarrhea and vomiting, or 3) a person who ate food from the July 7th luncheon and became ill with diarrhea or vomiting with at least two of the following symptoms: dizziness, nausea, stomach cramps, fatigue, headache, body aches, chills, or fever. An outbreak-associated control was defined as a person who ate food from the July 7th luncheon but did not become ill.

ACDC entered case and control data in Microsoft® Access®. ACDC calculated frequency and distribution of symptoms among cases. A case-control analysis of food items consumed was also performed. All analyses were conducted using SAS® 9.2 analysis software and Microsoft® Excel®.

RESULTS

Setting

On Monday, July 7th, Company A provided food for 20 employees attending a lunchtime meeting. The lunch was catered by Restaurant A. Food items included soup, fish, chicken, vegetables, three types of salad, cut fruit, various desserts, and iced tea. The leftover food was put in a common area and made available to other Company A employees. Company A provided a list of employees who attended the July 7th meeting, persons who ate leftovers from the meeting, and persons who claimed they were ill but did not attend the

meeting or eat the food. Company A arranged for ACDC staff to interview the employees at the work site on Monday, July 14, 2014. ACDC interviewed 31 Company A employees. Twenty-six ill persons were identified; 17 met the case definition (including one who was not interviewed but had a positive norovirus laboratory test). Ten ill persons did not meet the case definition and were excluded from the analysis. Five controls were identified.

Cases

No Company A employees reported illness with gastroenteritis symptoms prior to July 7th. The average age of cases was 40 years, with ages ranging from 27 to 60 years (Table 1). Cases were both male (59%) and female (41%). Symptoms of cases included fatigue (100%), nausea (94%), body aches (94%), vomiting (75%), headache (75%), and diarrhea (69%) (Table 2). Illness onsets occurred on July 8th and July 9th (Figure 1). The median incubation period was 39 hours (range: 24-51 hours). The median duration of symptoms was 48 hours (range: 9 to 96 hours). Three of the four stool samples submitted by cases tested positive for norovirus. Two of the cases with positive laboratory results experienced milder symptoms (i.e., no diarrhea or vomiting). One employee died after leaving work early July 9th. His specific symptoms and the food items he consumed could not be ascertained. At the request of ACDC, the coroner tested the decedent's stool; it was positive for norovirus. However, the death certificate only listed a heart condition as the cause of death. No other cases sought medical care.

Table 1. Case Demographics (N=17)

	n	Percent
Male	10	59%
Female	7	41%
Age Group		
1-4	0	0%
5-19	0	0%
20-49	14	82%
50+	3	18%
Median age (years)	40	range: 27 to 60

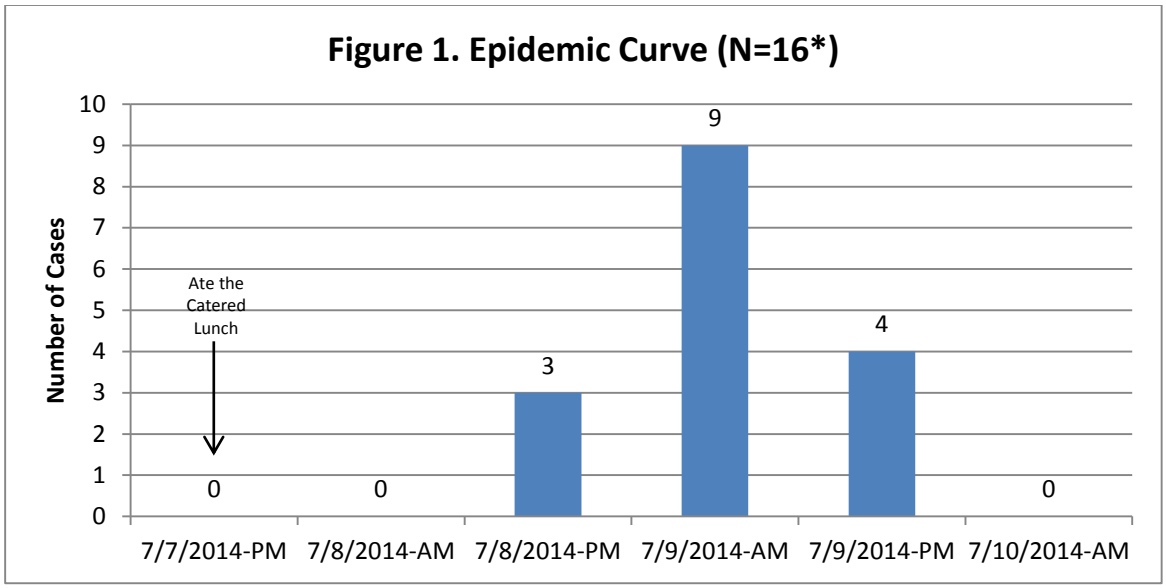
Table 2. Reported Symptoms (N=16*)

Symptom	n	Percent
Diarrhea	11	69%
Bloody Diarrhea	0	0%
Abdominal cramps	11	69%
Nausea	15	94%
Fatigue	16	100%
Chills	11	69%
Body Aches	15	94%
Headache	12	75%
Fever	3	19%
Fever > 102˚F	0	0%
Dizziness	9	56%
Vomiting	12	75%
Median Duration= 48 hours (range: 9 to 96) Median Incubation= 39 hours (range: 24 to 51 hours)		

*Symptom information on the deceased case was not available

Food Analysis

The results of the analysis of food items eaten by Company A employees are shown in Table 3. Thirteen of the 16 cases (81%) recalled eating the Garlic Lime Chicken, which was significantly associated with becoming ill (odds ratio=17.33, confidence interval: 1.39-216.60, p=0.025). This dish is marinated in several spices, grilled, and sliced. The chicken is presented on a bed of lettuce. No other food item was significantly associated with becoming ill.



*Onset date and time on the deceased case was not available

Restaurant A

Inspection

Restaurant A is a family-owned, gourmet restaurant, open daily from 8 AM to 7 or 8 PM. All food was prepared at the restaurant. Restaurant A employees were also responsible for the set-up at Company A. The inspection by WFS revealed mostly minor violations. The only major violation observed was the improper cooling of a potentially hazardous food item. During the re-inspection on July 14, 2014 all violations had been corrected.

Employees

Restaurant A had 53 employees. Fifteen of these employees had contact with the Company A food and were interviewed by ACDC staff via telephone. The remaining 38 employees were asked to complete the questionnaires on their own. Completed forms were emailed to ACDC by the Restaurant A owner. There was an 82% response rate. All 46 employees completing questionnaires denied symptoms of gastrointestinal illness in themselves and in family members during the previous month. All 15 Restaurant A employees who prepared the Company A catered food submitted stool samples for testing; two tested positive for norovirus. These two employees were also responsible for preparing the Garlic Lime Chicken (implicated food item).

Additional food orders

To determine whether other illnesses had occurred in LAC in relation to Restaurant A, persons who ordered food to be delivered from July 6th to July 8th were contacted by ACDC. There were 16 orders; ACDC was able to speak with seven parties. Two indicated that people became ill after consuming food from Restaurant A. One party reported three ill out of ten or 12 and the other party reported two ill out of 50. Neither party ordered the Garlic Lime Chicken or any other hot dish; only dessert, cheese, and vegetable platters were purchased from Restaurant A. Attempts to contact the ill individuals were unsuccessful. Therefore, it cannot be determined whether these illnesses were due to norovirus and/or associated with eating food from Restaurant A or were illnesses occurring in the community and not related to the restaurant.

Table 3. Food Items Eaten								
	Cases (N=16*)			Controls (N=5)				
Food Item	**Percent**	**n**	**N**	**Percent**	**n**	**N**	**Attack Rate**	**p-value**
chicken noodle soup	13%	2	16	0%	0	5	100%	1.000
poached salmon	56%	9	16	60%	3	5	75%	1.000
grilled garlic lime chicken**	**81%**	**13**	**16**	**20%**	**1**	**5**	**93%**	**0.025**
sauteed broccolini with lemon zest	56%	9	16	60%	3	5	75%	1.000
farro salad	50%	8	16	60%	3	5	73%	1.000
quinoa salad	63%	10	16	40%	2	5	83%	0.611
baby spinach and arugula salad	44%	7	16	20%	1	5	88%	0.607
cheese	13%	2	16	40%	2	5	50%	0.228
fruit platter***	**19%**	**3**	**16**	**80%**	**4**	**5**	**43%**	**0.025**
lemon bar	6%	1	16	40%	2	5	33%	0.128
brownies	6%	1	16	0%	0	5	100%	1.000
magic bar	6%	1	16	0%	0	5	100%	1.000
mini chocolate chip cookie	6%	1	16	20%	1	5	50%	0.429
mini oatmeal cookie	13%	2	16	0%	0	5	100%	1.000
mini chocolate dreams	0%	0	16	20%	1	5	0%	0.238
sugared pecan balls	0%	0	16	0%	0	5	0%	N/A
gluten-free cookies	0%	0	16	0%	0	5	0%	N/A
iced tea	13%	2	16	20%	1	5	67%	1.000

*Food history on the deceased case was not available
**Odds Ratio=17.33; Confidence Interval: 1.39-216.60
***Odds Ratio=0.06; Confidence Interval: 0.005-0.72

DISCUSSION

The symptoms and duration of illness reported by cases were consistent with norovirus infection. This outbreak was confirmed by positive norovirus laboratory results in both Restaurant A and Company A employees. The incubation times of cases were consistent with a point source exposure, with exposure occurring around the time cases reported eating food from the Company A meeting. The Centers for Disease Control & Prevention (CDC) reports that the incubation period for norovirus-associated gastroenteritis in humans is usually between 24 and 48 hours (median in outbreaks, 33 to 36 hours).[1] The median incubation period for this outbreak was 39 hours.

Norovirus outbreaks are usually associated with uncooked or ready-to-eat foods such as salads and cold salsa. In this outbreak, the illness appears to have been spread by Restaurant A employees.[2] Company A employees who ate the Garlic Lime Chicken had an increased odds (OR= 17.33) of becoming ill compared to Company A employees who did not eat the Garlic Lime Chicken. Although the Garlic Lime Chicken was cooked, there are a couple of steps in the preparation-to-plate process where contamination could have occurred. First, contamination could have occurred when the chicken was sliced if the Restaurant A employee used his hand to hold the chicken in place while slicing. Second, the lettuce for the lettuce bed could have been contaminated when placed on the platter. Because the lettuce is never heated or cooked, any virus on it could survive and subsequently be ingested by Company A employees. Although inspection of Restaurant A found a major violation of improper cooling of a potentially hazardous food item, this would not have caused a norovirus outbreak.

The coroner concluded that the Company A employee who expired on July 9, 2014 died due to a heart condition. It is possible that infection with norovirus exacerbated the heart problem, leading to an untimely death.

LIMITATIONS

The case-control analysis may have been limited by recall bias of what foods were consumed by persons involved. However, if the mistaken recall was the same in both cases and controls (i.e., non-differential) the association observed in this investigation may be an underestimation of the true association. Although the small number of controls in the analysis might be viewed as a limitation, the primary concern with small sample sizes is a lack of precision in estimating the magnitude of an association. A lack of precision can also result in a loss of Power, which is the odds of observing a true association. This does not appear to be a problem in this investigation.

PREVENTION

WFS distributed information about the control of norovirus to the Restaurant A head chef, including brochures and fact sheets with specific recommendations for all Restaurant A employees. Information included was about frequent, vigorous hand-washing, proper sanitation in all customer areas, and exclusion of infected persons from handling food until they are symptom-free for 48 hours.[3] WFS also provided guidance to Company A on how to perform a deep cleaning of the potentially contaminated areas (e.g., conference/meeting room, restrooms, etc.). Information on norovirus was also distributed to Company A employees.

CONCLUSIONS

This was a point-source norovirus outbreak that occurred among Company A employees eating food from a lunch meeting catered by Restaurant A. In addition to the symptoms and durations reported by cases being consistent with norovirus infection, the etiology for this outbreak was laboratory confirmed. The outbreak most likely originated with two ill food preparers and was spread by contaminated food. Effective prevention methods controlled the outbreak; there were no further complaints of illness received for this restaurant and the outbreak was only able to be documented in Company A employees.

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SUMMARY OF EBOLA VIRUS DISEASE HOSPITAL PREPAREDNESS OUTREACH, AUGUST – DECEMBER 2014

Patricia Marquez, MPH

BACKGROUND

The current Ebola Virus Disease (EVD) outbreak was first reported in Guinea in March of 2014, and later spread to surrounding West African countries (1). By early September, heightened awareness of the outbreak spread in the United States (U.S.), as the Centers for Disease Control and Prevention (CDC) reported high numbers of cases and deaths in Guinea, Sierra Leone, and Liberia (2). The first U.S. case of EVD was reported in Dallas, Texas, in a traveler from Liberia (3). This case, who subsequently died, infected two healthcare workers at the hospital where he was being treated. Both healthcare workers recovered from their illness; however, their infection highlighted the need for coordinated infection control efforts to ensure suspect cases were immediately identified, appropriately isolated, and healthcare workers were protected.

Beginning in August 2014, the Los Angeles County Department of Public Health's (LAC DPH) Health Officer requested the Acute Communicable Disease Control Program (ACDC) to begin outreach to hospitals in anticipation of the worsening of the outbreak, as well as an increase in the number of healthcare workers traveling to EVD affected countries on medical missions and returning to the U.S. The objectives of outreach were to assess current levels of preparedness for EVD in LAC hospitals, and provide guidance in areas that were identified as lacking. The following report describes the outreach efforts by ACDC to LAC acute care hospitals.

METHODS

LAC DPH shares important public health information with health care professionals in Los Angeles County through its Health Alert Network (LAHAN). In this manner, updates on screening and testing of suspect EVD patients, as well as reporting requirements were disseminated to key hospital personnel including hospital infection preventionists (IPs), Emergency Department (ED) directors and infection control committee chairs.

On August 28, 2014, a survey was sent via email to hospital IPs to assess which hospitals would voluntarily accept a suspect EVD patient identified in LAC. Multiple conference calls between ACDC, public health laboratory, and hospital IPs were held to answer questions and address concerns regarding preparedness of hospitals. In addition to activities above, letters from the Health Officer were sent to hospital IPs and Chief Executive Officers (CEOs) to encourage preparedness efforts and collaboration with LAC DPH.

Individual hospital outreach began in September 2014. Two groups of hospitals were prioritized: 1) larger facilities with proximity to airports and 2) larger, tertiary-care hospitals with EDs. Outreach consisted of emails, phone calls, and visits to IPs by ACDC Healthcare Outreach Unit (HOU) liaison public health nurses, ACDC epidemiologists and Community Health Services (CHS) staff. The goal was to review EVD preparedness policies and plans, conduct a walk-through of the ED, and participate in a preparedness drill, all with the goal to provide feedback and ensure optimal preparedness among these hospitals. ACDC created a preparedness evaluation checklist and observation tool to ensure that all visits were assessed consistently among staff. Due to the expected large volume of calls from hospitals and other healthcare settings requesting guidance from LAC DPH, an Ebola call log was created to track the main reasons for calls as well as resolutions of those calls.

RESULTS

Letters from the Health Officer to hospital CEOs urging them to make EVD preparedness a priority and encouraging them to collaborate with ACDC in preparedness efforts were sent on October 6th and

November 4th. A total of 82 calls were received at ACDC regarding EVD infection control guidance from healthcare facilities; 68 (83%) calls from hospitals, 14 from outpatient care settings. From these calls ACDC put together EVD guidance for outpatient settings, which was then adapted by CDPH and other jurisdictions.

Between August 28 and September 19, 2015, a total of 45 hospitals responded to the email survey sent in August; 14 hospitals (31%) indicated they would voluntarily accept the first EVD patient in LAC. From September through December, all 71 hospitals with EDs were contacted at least once via email and phone. Of 71 hospitals with EDs, LAC DPH conducted outreach (through site visits, drill participation, and policy review) to 51 (70%) of these hospitals. A breakdown of each category is below (Table 1). A total of 43 hospitals have completed drills. ACDC and CHS staff participated in 31 drills; 12 were completed without LAC DPH participation. During peak EVD outreach six hospitals were assessed per week, with an average of 2-3 staff on each visit. Eight (15%) hospitals were visited twice; all others were visited once.

Table 1. LAC DPH Hospital ED Outreach Activities for Ebola Preparedness, 2014

Hospital Activity	Number of hospitals completing activity
ED visit/walk-through	46
EVD policy review	37
EVD drill participation	31

The levels of preparedness among hospitals that have been visited vary. The two hospitals in LAC that are CDC designated EVD treatment facilities as well as some of the larger hospitals are the most prepared to identify and isolate a patient, and protect their staff. This includes appropriate personal protective equipment (PPE) training of staff, staff comfort level with PPE, and support by administrators in their facility. These facilities have the resources to provide PPE training not only to ED staff but volunteer inpatient staff as well. In addition, the layout of these hospitals is ideal for the designation of an isolation room that is set apart from the activity of the rest of the ED. One of the challenges was hospitals' inability to meet California-Occupational Safety and Health Administration (Cal-OSHA) standards for powered air purifying respirators (PAPRs); some facilities only had a brand of PAPR where the hoods were not compliant with Cal-OSHA standards.

Mid-size and smaller community hospitals face larger obstacles to preparedness, mainly, a lack of resources to properly and efficiently train their staff in PPE donning and doffing. Some facilities could only train staff one or two at a time during their ED shift, and only when they are not at full capacity. This affected their ability to conduct preparedness exercises since not all staff were trained. Also, many of the facilities are older and the physical layout of their EDs may make it difficult to select an appropriate room to effectively isolate a suspect EVD patient. Some isolation rooms do not have easy access to proper areas for donning and doffing PPE, or are in a location that is in direct pathway of traffic as patients are admitted from ED to inpatient areas.

DISCUSSION

One of the biggest challenges hospitals faced in their preparedness efforts was the changing PPE recommendations, both from CDC as well as Cal-OSHA. These changes made it difficult for hospitals to meet preparedness standards, since equipment would be purchased, staff would be trained, and when changes were made they needed to start over again. Changing PPE requirements and recommendations were cited as a common reason for refusing public health's assistance or attendance at trainings and drills. Some stated they did not want to conduct drills until staff were fully trained and comfortable so as not to lower their confidence with negative feedback. Several facilities cited their administration's reluctance to have public health observe and participate in drill activities. Many smaller hospitals stated they did not want LAC DPH to attend any drills or trainings until they were "ready." ACDC staff reminded these hospitals that we were there as a resource for preparedness and not punitive; however their refusal remained.

A positive finding is that all hospitals contacted, regardless of preparedness level, knew to isolate a suspect EVD patient and immediately contact ACDC. Existing relationships between liaison PHNs and hospital IPs were a key part of the successful outreach to 70% of hospitals with EDs in a relatively short amount of time. During follow-up meetings and roundtable discussions, hospitals expressed gratitude to the program for being a consistent resource at a time when recommendations and information were evolving rapidly. They stated the letters to CEOs urging them to support infection control efforts were helpful to expand their preparedness efforts.

CONCLUSION

EVD preparedness efforts in LAC were a reminder to all hospitals that they should be able to quickly identify and isolate a patient suspected who has a highly communicable disease. While no EVD cases occurred in LAC, exercises with hospitals served to strengthened relationships with public health and enhance future preparedness efforts.

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