ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM

ANNUAL MORBIDITY REPORT

AND

SPECIAL STUDIES REPORT

2008

Los Angeles County
Department of Public Health

Public Health
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Los Angeles County Department of Public Health
Acute Communicable Disease Control Program
Annual Morbidity Report
2008

● EXECUTIVE SUMMARY ●

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

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

ACDC Mission

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

Los Angeles County: A Description of Our Community

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

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

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

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

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

- assisting hospitals with outbreak investigations, and consulting on infection control issues; conducts surveillance and investigation of the viral hepatitis, MRSA, invasive disease caused by pneumococcus, group A streptococcus, and other infectious agents
- influenza including pandemic influenza through a variety of case-based, aggregate and virologic parameters
- LAC DPH Community Health Services (CHS) for community outbreak investigations to provide guidance, support and consultation on infection prevention and control
- vaccine-preventable diseases for surveillance, outbreak investigation and control
- healthcare providers such as hospitals to enhance preparedness and response efforts through strengthened communications, collaboration, and consolidation of resources; ACDC engages infection preventionists, emergency departments, and laboratories in these efforts
- Automated Disease Surveillance System to enhance surveillance and epidemiology capacity, and strengthen laboratory capacity to identify and respond to unusual occurrences and possible terrorist incidents; activities include syndromic surveillance and electronic laboratory reporting
- the California Department of Public Health's Infant Botulism Treatment and Prevention Program to identify infant botulism cases in LAC
- the Varicella Surveillance Project, a special research project.

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

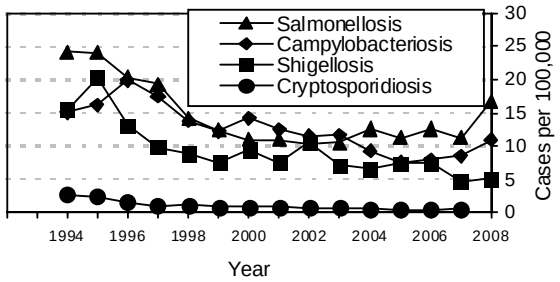
- provide epidemiologic consultation and support; assist with special projects, data maintenance, epidemiologic analysis, data presentation, and geographic information system (GIS)
- plan and evaluate cross-cutting ACDC activities with strategic planning and consequential epidemiology concept (application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

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

Foodborne Diseases

Diseases spread by food and food sources make up much of the investigations and activities conducted by ACDC and CHS. Overall, foodborne diseases declined since the mid-1990's and have stabilized at lower rates as in Figure 1 (see individual chapters campylobacteriosis, *E. coli* O157:H7, cryptosporidiosis, listeriosis, salmonellosis, shigellosis, typhoid fever, and vibriosis for more details). The declining trend in reported cases is most evident with the bacterial disease shigellosis. Salmonellosis and campylobacteriosis increased in the past year. These findings are similar to national trends depicting sustained decreases with occasional upsurges among many foodborne illnesses, particularly those of bacterial origin.[1] While the underlying causes for these local and national trends are not known, the implementation of control measures at several levels are believed to be important factors in the reduction of food and water-related illnesses. On a national level, these include the expansion of federal food safety and inspection services as well as increased attention to fresh produce safety. Locally, a highly publicized

Figure 1
Food and Waterborne Disease
Incidence Rates by Year
LAC and US, 1994–2008



[1] CDC, Preliminary FoodNet Data on the incidence of infection with pathogens transmitted commonly through food---Selected sites, United States, 2003. MMWR 2004; 53(16); 338-343. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5316a2.htm.

restaurant grading system implemented in LAC in 1998 may have also advanced food safety through education for food handlers and the public regarding best practices to reduce foodborne disease.

In 2008, the salmonellosis crude rate for LAC increased 50% to 16.8 per 100,000 (Figure 1) when compared to 2007 due to a very large outbreak of salmonellosis in the Fall (see 2008 Special Studies Report). When the outbreak cases are not included, the rate is similar to that for the past five years (10.4/100,000). The crude rate was the highest since 1997 and was above the national rate for the first time since 1998 after an overall decrease of more than 100% since 1994. Nationally, the incidence of salmonellosis cases has also been decreasing, but at a slower rate than it has for LAC in the previous 10 years.[2] Although many food items and both potable and recreational water sources have been implicated in the transmission of salmonella, salmonellosis is most commonly associated with eggs, poultry, and fresh produce. Occasionally, an infected food worker can be the source of salmonellosis outbreaks. Another prominent source is contact with reptiles, either directly or through surfaces or other people exposed to reptiles. In 2008, nearly 10% of LAC salmonellosis cases had contact with turtles, lizards or snakes—unchanged from past couple of years of community interventions.

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

ACDC investigated 18 foodborne disease outbreaks in 2008, in which 887 persons were affected. This included one large salmonellosis outbreak with 594 cases. While the overall incidence of most foodborne diseases has been decreasing, they continue to account for considerable morbidity and mortality—thousands of preventable infections continue to occur yearly. The majority of people affected by these illnesses improve without complications; however, some infections may cause invasive disease especially among children, the elderly and those with certain chronic medical conditions (e.g., the immunocompromised), leading to hospitalization and fatality. In LAC, foodborne diseases were a contributing factor for at least 12 deaths during 2008. Accordingly, further efforts to improve food quality and to educate food industry and the public about proper food storage, handling, and preparation are needed.

Waterborne Diseases

ACDC conducts surveillance of waterborne diseases such as amebiasis, cryptosporidiosis, and giardiasis, as well as other parasitic diseases. No waterborne disease outbreaks occurred in 2008; the last known outbreak occurred in 1988 which was a swimming pool-associated cryptosporidiosis outbreak. Waterborne parasitic disease reports have steadily declined over the past ten years, staying below or consistent with state incidence rates. From 2006 to 2008, surveillance data reflects a growing proportion of reported amebiasis and giardiasis cases among immigrants in LAC.

Invasive Bacterial Diseases

In February 2008 severe community acquired *Staphylococcus aureus* infection was made a reportable disease by State mandate. Twenty-five cases were reported in 2008, all of which resulted in ICU admission or death. From interviews with patients or their family members (in the case of death), it was found that diabetes was a significant risk factor for acquiring such infections. Counter to the popular reports in the press, those at highest risk for illness were aged 65 years and more. This surveillance system was able to identify risk factors that were previously unappreciated for severe *Staphylococcal* infections. However, only four hospitals reported 52% of the cases which may indicate substantial under-reporting.

While trends and risk factors for invasive group A streptococcal disease (IGAS) remained the same, the rate of invasive pneumococcal disease (IPD) increased slightly for the second year in a row. The lowest rate of IPD was recorded in 2006 and for the past two years there has been a slight increase in IPD cases, probably due

[2] Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food --- 10 States, 2008; MMWR 2009 ; 58(13);333-337. Available at:.http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5813a2.htm.

to serotype replacement — the resurgence of disease due to serotypes not present in the vaccine. An expanded IPD vaccine for children with six new serotypes (13-valent) is slated to be approved for use by 2010.

Hepatitis

The rate of hepatitis A continued to be extremely low, following the increased rates in 2005-2006 when an outbreak spread throughout LAC. For the first time in many years, there was an outbreak of hepatitis B including nine cases; this occurred in a skilled nursing facility, primarily among people in ages 50s and 60s. It was an unusual outbreak, co-investigated by ACDC and investigators from the CDC. The main cause of transmission was thought to be poor infection control by visiting doctors, though person-to-person transmission could not be ruled out. See the 2008 Special Studies Reports for an overview of this outbreak. Surveillance for acute hepatitis C remains difficult as there is no one laboratory test to identify cases. However, five acute cases were identified this past year, of which two may have been nosocomially acquired. ACDC's hepatitis team will continue to aggressively follow-up on all potential cases of nosocomial hepatitis B and C.

Vaccine Preventable Diseases

Although missed opportunities for vaccination are an unfortunate common occurrence, 2008 marked a year of multiple missed opportunities along with fatalities among reported vaccine preventable disease (VPD) cases. All this occurred while national and international VPD outbreaks increased in frequency.

Pertussis received some media attention in 2008 due to outbreaks in one state in the US and two additional countries. International mumps outbreaks also occurred, one associated with a non-vaccinated religious group. Worldwide, 20 million cases of measles still occur each year. A large-scale US measles outbreak was reported in 2008 and involved hundreds of cases across 15 states, including California and one case in LAC. The unvaccinated index cases from the national outbreak were linked to international exposures in 11 countries. Outbreaks were also reported in four other countries. The United Kingdom declared that measles was once again endemic in the country as a result of almost a decade of low MMR vaccination coverage. The LAC case reported in 2008 was a 23-month old unvaccinated child who was hospitalized for five days with pneumonia. In addition, a laboratory-confirmed rubella case was identified in 2008, the first since 2005. The case was a 61-year old who had numerous international visitors and an unknown immunization history. A congenital rubella case was also identified in 2008, the first since 2003. The mother was a healthcare worker educated and practicing in the US who believed in vaccinations but despite multiple opportunities was never adequately immunized. She was exposed to rubella while visiting India during her first trimester of pregnancy. She had received some immunizations prior to her travel but never received the MMR. The child currently has hearing problems, is legally blind in both eyes, and developmentally delayed.

Vaccine Preventable Diseases

- *2008 marked a year of multiple missed opportunities and fatalities among reported vaccine preventable disease (VPD) cases.*
- *International and national VPD outbreaks are increasing in frequency yearly.*

Three laboratory-confirmed VPD fatalities also occurred in 2008. A 38-year old individual who suffered a cut on his hand presented with classic tetanus symptoms; he had primary vaccination but had never received a tetanus booster dose. After a hospitalization of 20 days, the case died. A 10-month old died of bacteremia, pneumonia, and sepsis due to a non-typeable strain of *Haemophilus influenzae*. Finally, an infant less than one month of age died of hypoxia, acute respiratory distress, and pneumonia due to *Bordatella pertussis* infection. The child was too young to have received immunizations but household exposure to an unvaccinated adult with a cough was suspected.

These unfortunate deaths and cases could have all been prevented with appropriate immunizations for the case as well as the source(s) of exposure to the case (i.e., MMR for children/adults protecting against measles, mumps, and rubella as well as Tdap for tetanus, diphtheria, and pertussis protection among adolescents and adults).

These outbreaks, cases, and deaths illustrate continued gaps in immunization coverage: providers missing opportunities to vaccinate individuals; rising percentage of parents who for personal reasons elect their children not to receive vaccine (personal beliefs exemptions rates in LAC kindergarten schools have increased steadily over the last ten years and now comprise over 1% of the population); increased number of cases among unvaccinated adolescents and adults; and global travel or meeting international visitors from countries where several VPDs are still endemic without appropriate vaccinations.

A multi-level plan of intervention working with providers, schools, and other external partners is already in place in LAC to curb VPD morbidity and increase immunization coverage levels across the life span for all ten vaccine preventable diseases and have thus far helped LAC keep its VPD morbidity levels low compared to more impacted regions.

A new quadrivalent meningococcal conjugate (MCV4), Menactra®, was approved for use in the United States in persons aged 11 to 55 years in 2004, and in 2006 was recommended for all children between ages 11 to 12 years as part of the childhood vaccination schedule. Though the relationship between the vaccine and incidence of meningococcal disease remains to be seen, the incidence of disease in LAC has decreased and remained stable since 2003.

Infant Botulism

Ten cases of infant botulism were confirmed in LAC residents in 2008, including three from the Long Beach jurisdiction. The remaining seven cases resided within the jurisdiction of LAC DPH; five were female and five were Hispanic whites. Type B toxin was detected in four cases, while toxin type A was found in the other three. All cases survived.

Diagnosis and treatment of suspected infant botulism cases is managed exclusively by the California Department of Public Health's Infant Botulism Treatment and Prevention Program. Physicians consult with state experts directly and all clinical specimens are sent directly to the state botulism laboratory for analysis. Treatment with human botulism immune globulin (BabyBIG®) is authorized and provided by the state. See http://infantbotulism.org/ for program specifics.

Healthcare Associated Infections and Outbreaks

Healthcare associated infections (HAI) have generated a great deal of attention in the US within the past few years, especially regarding public reporting and transparency. In recent years, California has passed legislation that impose healthcare facility reporting requirements and establish a statewide HAI advisory committee to monitor implementation of the laws to reduce and prevent these infections. The HOU participates in the state advisory committee and works with the California Department of Public Health and other public health organizations to make recommendations related to the prevention and control of HAIs including compliance with HAI regulations and public reporting of HAI associated process and outcome measures. Other important topics in 2008 included continuing preparedness for pandemic influenza, the rise in multi-drug resistant organisms (notably acinetobacter and MRSA), and confirmation of the new strain of highly toxigenic *Clostridium difficile* (B1/NAP1) in LAC.

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

Sub-acute Healthcare Facilities

In 2008, total of 87 outbreaks in sub-acute healthcare facilities were documented; the most frequent agent was scabies. A Scabies Task Force was formed consisting of ACDC Sub-acute care unit, HOU and CHS in 2008 with a goal to create and disseminate information packets to skilled nursing facilities regarding the prevention and treatment of scabies in their facilities. Guidelines for the prevention of multi-drug resistant organisms were developed and distributed to over 400 sub-acute healthcare facilities. Recently enacted legislation in California regarding healthcare associated infections has created new requirements for skilled nursing facilities. These institutions are now required to create patient safety committees and implement facility wide hand hygiene programs that monitor for patient safety issues.

Partnerships were created with an LAC chain of skilled nursing facilities in 2008 to conduct seasonal influenza surveillance among their residents and direct patient care staff. Surveillance was conducted throughout the 2008-2009 flu season with 24 participating facilities. No outbreaks of influenza-like-illness were documented among staff and residents from November 1, 2008 through March 31, 2009. We anticipate enhancing influenza surveillance during the 2009-2010 influenza season in light of the introduction of novel H1N1 influenza.

Automated Disease Surveillance

The achievements of ACDC automated disease surveillance in 2008 were consolidating gains and building toward future accomplishments as well as the continued integration of early detection system activities into routine public health operations. Emergency department syndromic surveillance, which includes detecting major trends from baseline patterns of illness that may potentially identify bioterrorist-related activity or natural disease outbreaks, was continued with the addition of several local hospitals.

Automated Disease Surveillance

The year 2008 was time for consolidating gains and building toward future accomplishments. Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complemented traditional disease surveillance activities and is one of the tools used for ILI surveillance.

Syndromic surveillance proved capable of detecting patterns of illness and community outbreaks, complemented traditional disease surveillance activities and is one of the tools used for influenza surveillance. In 2008, the near real-time syndromic surveillance data was also used to monitor heat related illness during the summer months as well as monitoring respiratory effects of poor air quality due to wildfires. Current hospital participation represents approximately 60% of all emergency department visits in the County and recruitment of additional hospitals is ongoing. Volume data from the ReddiNet® system for emergency department visits during influenza season strongly correlated with virologic test results. Nurse call line, coroner data, veterinary, and over-the-counter medications data also complement our early event detection systems.

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

It is aligned with CDC-sponsored initiatives such as the Public Health Information Network (PHIN) and National Electronic Disease Surveillance System (NEDSS). The system was converted to a fully web-based application using Microsoft.NET technology. Much of the testing and training took place for an upgrade to version 8.3.3 that would be implemented in 2009. The following program areas have access to the vCMR application: Acute Communicable Disease Control (ACDC) Program; Environmental Health Food and Milk; Immunization Program; Community Health Services’ eight Service Planning Areas; Health Assessment and Epidemiology; Injury and Violence Prevention; and

STD (laboratory reports only). In 2008, the State of California adopted vCMR for its Cal-REDIE (California-Reportable Disease Information Exchange) system, to be deployed for statewide disease control activities.

ELR (Electronic Laboratory Reporting): Automated electronic reporting of communicable diseases from laboratories to public health has been shown to yield more complete and rapid reporting of disease. Results are sent to public health as soon as they are available rather than days later. LAC began receiving ELR in 2002, and since early 2006 has pursued efforts to recruit and implement many additional public and private laboratories. We currently have live feeds from 15 laboratories representing 16 hospitals and four independent laboratories. We have 11 laboratories currently in testing and many more poised to begin testing in 2009. Establishing electronic laboratory reporting is a very time consuming process and on average takes roughly 8 to 12 months to implement.

Bioterrorism, Emergency Preparedness and Response Activities

The ACDC Bioterrorism Preparedness and Response team continues active participation and collaboration with the Consortium of Technical Responders (CTR). The CTR is a multi-agency collaborative of agencies comprised of members from the LAPD, LAC Sheriff, DPH, Fire, Hazmat, US Customs and Border Patrol, California Highway Patrol, FBI, and US Postal Inspectors. The goal of CTR is to unify the technical response community in incidents involving the use of Chemical, Biological and Radiological Agents.

In February 2008, several members of ACDC participated as the public health representative at the Emergency Operation Center (EOC), along with others from DPH CHS, Environmental Health and Emergency Preparedness and Response Program the Operation Higher Ground Exercise (a 3-week simulated tsunami response event). In June 2008, key upper-level ACDC and CHS decision-makers participated in a tabletop exercise, Operation Viral Peril addressing pandemic flu response.

Ongoing traininig and preparedness of the LAC DPH Smallpox (SP) Response Team were accomplished in 2008 via a customized on-line course on Suspected Smallpox Case Investigation. In addition to the SP Response Team, an additional group of ten DPH physicians and nurses completed the online training and participated in the skills review practicum. Smallpox Aid Response Kits (SPARK) were assembled and pre-positioned at 15 public health clinics and program offices to facilitate quick access to necessary supplies, forms and reference material for rapid response and investigation to a report of a suspected case of smallpox in LAC.

Collaborative efforts continued in 2008 among numorous DPH Programs, Department of Health Services, Emergency Medical Services (EMS), and external response agencies and partners in the testing and exercising of plans for response to a positive Biohazard Detection System (BDS) signal at the United States Postal Service Processing and Distribution Centers in LAC. In 2008, LAC DPH participated in two BDS full-scale exercises which provided the opportunity to exercise test and evaluate the readiness and preparedness of elements such as, notification, deployment of public health staff to assume ICS roles and functions, delivery of medication from the cache, laboratory testing of sample cartridge, a functional point of dispensing (POD) at the USPS facility, deployment of the mobile DPH Command Center, and real-time
notification and response after regular work hours.

Acute Communicable Disease Control Program

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2008

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PURPOSE

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

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

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

LOS ANGELES COUNTY DEMOGRAPHIC DATA

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

National and California state counts of reportable diseases were obtained from the Centers for Disease Control and Prevention (CDC) Final 2008 Reports of Nationally Notifiable Infectious Diseases.[1] This report also includes United States (US) Census population estimates—these were used to calculate national and California rates of disease.

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

DATA SOURCES

Data on occurrence of communicable diseases in LAC were obtained through passive and sometimes active surveillance. Every healthcare provider or administrator of a health facility or clinic, and anyone in charge of a public or private school, kindergarten, boarding school, or preschool knowing of a **case or suspected case** of a communicable disease is required to report it to the local health department as specified by the California Code of Regulations (Section 2500). Immediate reporting by telephone is also required for any **outbreak** or **unusual incidence** of infectious disease and any **unusual disease** not listed in Section 2500. Laboratories have separate requirements for reporting certain communicable diseases (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] CDC. Notice to Readers: Final 2008 Reports of Nationally Notifiable Infectious Disease. MMWR 58(31);856-857;859-869. Available at: **http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5831a5.htm**

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 LIMITATIONS

This report should be interpreted in light of the following notable limitations:

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

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

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

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

3. Case Definitions
   To standardize surveillance, CDC case definition for infectious diseases under public surveillance[2] is used with some exceptions as noted in the text of the individual diseases. Since verification by a laboratory test is required for the diagnosis of some diseases, cases reported without such verification may not be true cases. Therefore, an association between a communicable disease and a death or an outbreak possibly may not be identified.

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

5. Population Estimates

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

6. Place of Acquisition of Infections
   Some cases of diseases reported in LAC may have been acquired outside of the county. This may be especially true for many of the diseases common in Hispanic and Asian populations. Therefore, some

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

disease rates more accurately reflect the place of diagnosis than the location where an infection was acquired.

7. Health Districts and Service Planning Areas

Since 1999, Los Angeles County is divided into eight "Service Planning Areas" (SPAs) for purposes of healthcare planning and provision of health services: SPA 1 Antelope Valley, SPA 2 San Fernando, SPA 3 San Gabriel, SPA 4 Metro, SPA 5 West, SPA 6 South, SPA 7 East, and SPA 8 South Bay. Each SPA is organized further into health districts (HDs) (see SPA map in this report).

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.
   - **American Indian** – person having origins in any of the original peoples of North America and who maintain cultural identification through tribal affiliation or community recognition.
   - **Black** – person having origins in any of the black racial groups of Africa.
   - **Hispanic/Latino** – person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
   - **White** – person having origins in any of the original peoples of Europe, North Africa, or the Middle East.

STANDARD REPORT FORMAT

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

2. Description

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

3. Trends and Highlights

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

4. Table

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

5. Figures

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

vaccination rates). When stratified data are presented in figures and/or tables these following facts are to be considered.

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

Los Angeles County Demographic Data
2008

Table A. Los Angeles County* population by year, 2003–2008

Year	Population	% change
2003	9,402,401	
2004	9,506,371	1.1%
2005	9,580,462	0.8%
2006	9,644,738	0.7%
2007	9,689,462	0.5%
2008	9,771,950	0.9%

* Does not include cities of Pasadena and Long Beach.

Table B. Los Angeles County* population by age group, 2008

Age (in years)	Population	%
<1	139,706	1.4%
1–4	566,061	5.8%
5–14	1,403,015	14.4%
15–34	2,869,685	29.4%
35–44	1,513,713	15.5%
45–54	1,345,824	13.8%
55–64	913,099	9.3%
65+	1,020,847	10.4%
Total	**9,771,950**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

Table C. Los Angeles County* population by sex, 2008

Sex	Population	%
Male	4,845,496	49.6%
Female	4,926,454	50.4%
Total	**9,771,950**	**100.0%**

* Does not include cities of Pasadena and Long Beach.

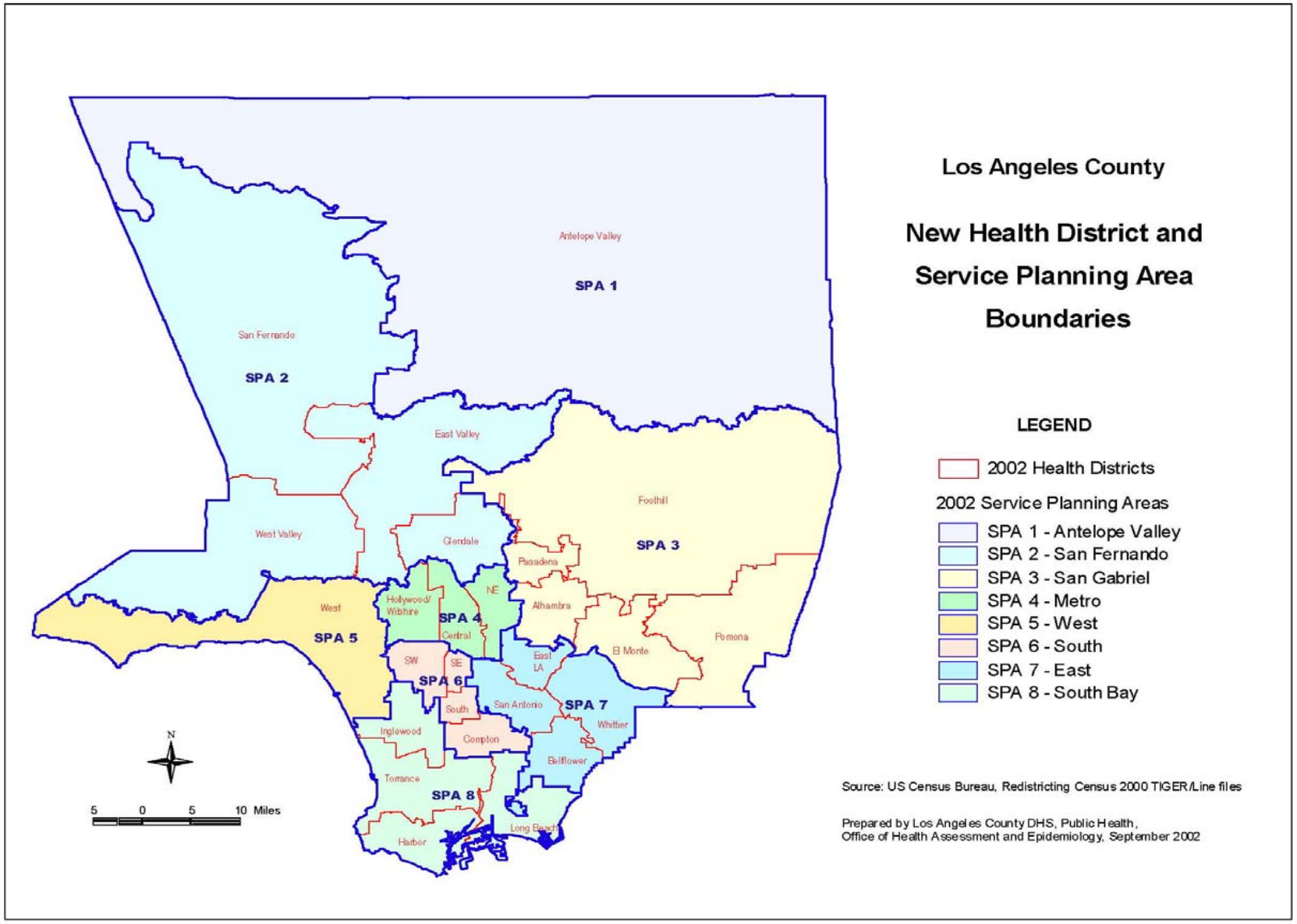
Table D. Los Angeles County* population by race, 2008

Race	Population	%
Asian	1,304,110	13.3%
Black	855,604	8.8%
Latino	4,679,287	47.9%
White	2,908,288	29.8%
Other**	24,661	0.2%
Total	**9,771,950**	**100.0%**

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

Table E. Los Angeles County* population by health district and SPA, 2008	
Health District	**Population**
SPA1	**366,568**
Antelope valley	366,568
SPA 2	**2,188,507**
East Valley	463,743
Glendale	355,785
San Fernando	473,499
West Valley	895,480
SPA 3	**1,734,871**
Alhambra	361,762
El Monte	482,761
Foothill	315,363
Pomona	574,985
SPA 4	**1,273,510**
Central	372,264
Hollywood Wilshire	544,756
Northeast	356,490
SPA 5	**646,036**
West	646,036
SPA 6	**1,054,469**
Compton	292,592
South	188,824
Southeast	182,130
Southwest	390,923
SPA 7	**1,384,324**
Bellflower	370,827
East Los Angeles	222,086
San Antonio	454,302
Whittier	337,109
SPA 8	**1,123,665**
Inglewood	437,982
Harbor	214,209
Torrance	471,474
Total	**9,771,950**

* 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
Pomona
El Monte
SW
SE
East LA
SPA 6
SPA 7
South
San Antonio
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
CDHS	California Department of Health Services	**LAC**	Los Angeles County
CMR	Confidential morbidity report	**MMR**	Mumps-Measles-Rubella vaccine
CSF	Cerebral spinal fluid	**MMWR**	Morbidity and Mortality Weekly Report
CSTE	Council of State and Territorial Epidemiologists	**MSM**	Men who have sex with men
DHS	Department of Health Services	**N/A**	Not available
DPH	Department of Public Health	**OR**	Odds ratio
DTaP	Diphtheria-tetanus-acellular pertussis	**PCP**	*Pneumocystis carinii pneumonia*
DTP	Diphtheria-tetanus-pertussis vaccine	**PCR**	Polymerase Chain Reaction
EHS	Environmental Health Services	**PFGE**	Pulsed Field Gel Electrophoresis
EIA	Enzyme Immunoassay	**PHBPP**	Perinatal Hepatitis B Prevention Program
GI	gastrointestinal	**RNA**	Ribonucleic Acid
GE	gastroenteritis	**RR**	Rate ratio or relative risk
HAART	Highly Active Antiretroviral Therapy	**SNF**	Skilled nursing facility
HAV	Hepatitis A virus	**sp. or spp.**	Species
HBIG	Hepatitis B Immunoglobulin	**SPA**	Service Planning Area
HBsAg	Hepatitis B surface antigen	**US**	United States
HBV	Hepatitis B virus	**VCMR**	Visual confidential morbidity report (software)

LOS ANGELES COUNTY HEALTH DISTRICTS

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

TABLES OF NOTIFIABLE DISEASES

Table G. Reported Cases of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2003-2008

Disease	Year of Onset						Previous 5-year Average	5-Yr 95% upper Limit[a]
	2003	2004	2005	2006	2007	2008		
Amebiasis	121	114	114	94	122	115	113	133
Botulism	0	3	8	2	1	5	3	8
Brucellosis	7	4	8	5	3	3	5	9
Campylobacteriosis	1100	884	725	775	825	1072	862	1117
Cholera	1	0	0	0	0	0	0	1
Coccidioidomycosis	73	133	214	196	145	228	152	250
Cryptosporidiosis	71	56	45	48	50	41	54	72
Cysticercosis	12	8	15	11	7	6	11	16
Dengue	0	5	10	2	3	0	4	11
E. *coli* O157:H7	27	18	13	12	12	16	16	28
Encephalitis	38	133	72	46	65	89	71	136
Foodborne Outbreaks	25	40	32	37	21	18	31	45
Giardiasis	401	320	313	376	441	355	370	465
Haemophilus Influenzae Type B	0	2	3	5	1	0	2	6
Hansen's Disease (Leprosy)	9	9	2	2	5	1	5	12
Hepatitis A	374	321	480	364	78	80	323	585
Hepatitis B	73	72	57	62	55	66	64	78
Hepatitis C	0	5	3	4	3	5	3	6
Hepatitis Unspecified	1	0	4	7	10	4	4	12
Kawasaki Syndrome	35	42	56	75	52	55	52	79
Legionellosis[b]	21	15	31	24	40	59	26	43
Listeriosis, Nonperinatal	17	21	25	25	21	20	22	28
Listeriosis, Perinatal	3	6	3	12	6	2	6	12
Lyme Disease	6	0	7	16	9	9	8	18
Malaria	60	51	45	33	26	30	43	67
Measles	0	1	0	1	0	1	0	1
Meningitis, Viral	899	807	527	373	395	597	600	1022
Meningococcal Infections	32	28	37	46	24	30	33	48
Mumps	10	5	10	10	5	7	8	13
Pertussis	130	156	439	150	69	80	189	441
Psittacosis	0	0	0	1	0	0	0	1
Q-fever	0	4	0	1	2	2	1	4
Relapsing Fever	0	0	0	2	0	0	0	2
Rheumatic Fever, Acute	0	1	0	0	0	1	0	1
Rubella	0	0	1	0	0	1	0	1
Salmonellosis[b]	995	1205	1085	1217	1081	1638	1117	1281
Shigellosis	669	625	710	524	463	498	598	778
Strongyloidiasis	0	0	0	0	0	0	0	0
Tetanus	1	2	0	4	0	2	1	4
Trichinosis	0	0	0	1	0	0	0	1
Tularemia	1	0	0	0	0	0	0	1
Typhoid Fever, Case	16	13	12	17	17	14	15	19
Typhoid Fever, Carrier	2	3	4	3	1	4	3	5
Typhus Fever[b]	12	8	9	10	17	18	11	17
Vibrio	13	26	14	18	13	18	17	27
West Nile Virus	0	309	43	16	43	170	82	307

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

[b]2008 data over 95% upper limit.

Table H. Annual Incidence Rates of Selected Notifiable Diseases by Year of Onset
Los Angeles County, 2003-2008

Disease	Annual Incidence Rate (Cases per 100,000)[b]					
	2003	2004	2005	2006	2007	2008
Amebiasis	1.29	1.20	1.19	0.97	1.26	1.18
Botulism	-	0.03	0.08	0.02	0.01	0.05
Brucellosis	0.07	0.04	0.08	0.05	0.03	0.03
Campylobacteriosis	11.70	9.30	7.57	8.04	8.51	10.97
Cholera	0.01	-	-	-	-	-
Coccidioidomycosis	0.78	1.40	2.23	2.03	1.50	2.33
Cryptosporidiosis	0.76	0.59	0.47	0.50	0.52	0.42
Cysticercosis	0.13	0.08	0.16	0.11	0.07	0.06
Dengue	-	0.05	0.10	0.02	0.03	-
E. *coli* O157:H7	0.29	0.19	0.14	0.12	0.12	0.16
Encephalitis	0.40	1.40	0.75	0.48	0.67	0.91
Giardiasis	4.26	3.37	3.27	3.90	4.55	3.63
Haemophilus Influenzae Type B	-	0.02	0.03	0.05	0.01	-
Hansen's Disease (Leprosy)	0.10	0.09	0.02	0.02	0.05	0.01
Hepatitis A	3.98	3.38	5.01	3.77	0.80	0.82
Hepatitis B	0.78	0.76	0.59	0.64	0.57	0.68
Hepatitis C	-	0.05	0.03	0.04	0.02	0.05
Hepatitis Unspecified	0.01	-	0.04	0.07	0.10	0.04
Kawasaki Syndrome	0.37	0.44	0.58	0.78	0.54	0.56
Legionellosis	0.22	0.16	0.32	0.25	0.41	0.60
Listeriosis, Nonperinatal	0.18	0.22	0.26	0.26	0.22	0.21
Listeriosis, Perinatal[a]	2.12	4.25	2.14	8.47	4.23	1.45
Lyme Disease	0.06	-	0.07	0.17	0.09	0.09
Malaria	0.64	0.54	0.47	0.34	0.27	0.31
Measles	-	0.01	-	0.01	-	0.01
Meningitis, Viral	9.56	8.49	5.50	3.87	4.08	6.11
Meningococcal Infections	0.34	0.29	0.39	0.48	0.25	0.31
Mumps	0.11	0.05	0.10	0.10	0.05	0.07
Pertussis	1.38	1.64	4.58	1.56	0.71	0.82
Psittacosis	-	-	-	0.01	-	-
Q-fever	-	0.04	-	0.01	0.02	0.02
Relapsing Fever	-	-	-	0.02	-	-
Rheumatic Fever, Acute	-	0.01	-	-	-	0.01
Rubella	-	-	0.01	-	-	0.01
Salmonellosis	10.58	12.68	11.34	12.62	11.16	16.76
Shigellosis	7.12	6.57	7.41	5.43	4.78	5.10
Strongyloidiasis	-	-	-	-	-	-
Tetanus	0.01	0.02	-	0.04	-	0.02
Trichinosis	-	-	-	0.01	-	-
Tularemia	0.01	-	-	-	-	-
Typhoid Fever, Case	0.17	0.14	0.13	0.18	0.18	0.14
Typhoid Fever, Carrier	0.02	0.03	0.04	0.03	0.01	0.04
Typhus Fever	0.13	0.08	0.09	0.10	0.18	0.18
Vibrio	0.14	0.27	0.15	0.19	0.13	0.18
West Nile Virus	-	3.25	0.45	0.17	0.44	1.74

[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, 2004-2008

Disease	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Amebiasis	7.2	7.0	6.8	7.4	7.0	8.0	8.6	10.8	7.6	6.8	8.2	9.6	111.6
Botulism	0.0	0.4	0.4	0.2	0.0	0.4	0.2	0.4	0.4	0.0	1.4	0.0	3.8
Brucellosis	0.2	0.4	0.0	1.0	0.2	0.6	0.6	0.6	0.2	0.2	0.4	0.2	4.6
Campylobacteriosis	68.4	50.4	55.2	68.8	76.8	95.0	107.2	84.0	71.2	63.8	63.8	44.8	856.2
Cholera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coccidioidomycosis	14.8	13.8	14.8	12.2	13.2	13.0	13.8	16.8	20.0	15.2	18.4	14.2	184.0
Cryptosporidiosis	3.8	2.8	2.8	4.6	3.0	3.0	5.0	7.2	5.8	3.2	3.2	2.6	48.0
Cysticercosis	0.8	0.6	1.4	0.6	1.4	1.0	1.4	0.2	0.6	0.6	0.0	0.2	9.4
Dengue	0.0	0.0	0.0	0.0	0.0	0.4	0.6	1.4	0.6	0.6	0.0	0.0	3.6
E. *coli* O157:H7	1.0	0.4	0.2	0.4	1.6	1.0	1.6	3.0	2.8	1.6	0.2	0.4	14.2
Encephalitis	3.8	2.2	6.0	4.2	4.6	4.4	10.2	16.2	14.6	5.2	4.2	2.8	80.8
Giardiasis	23.6	21.6	26.6	29.4	24.2	24.4	34.2	35.8	35.2	30.2	24.2	24.6	360.2
Haemophilus Influenzae Type B	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	2.2
Hansen's Disease (Leprosy)[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	29.4	25.4	18.4	16.0	17.4	12.4	11.8	15.8	26.4	30.2	33.2	24.0	264.6
Hepatitis B	6.4	6.4	5.6	4.8	6.2	6.0	3.2	4.0	4.6	5.2	5.8	4.0	62.4
Hepatitis C	0.2	0.2	0.4	0.2	0.4	0.2	0.2	0.6	0.2	0.6	0.4	0.2	3.8
Hepatitis Unspecified	0.2	0.0	0.0	0.2	0.0	0.0	0.2	0.2	0.0	0.2	0.0	0.4	5.0
Kawasaki Syndrome	4.4	5.4	6.0	6.2	4.2	4.2	2.8	3.0	3.2	3.6	4.6	5.0	52.6
Legionellosis	2.4	2.0	3.0	2.0	2.4	2.8	2.0	3.4	1.6	3.8	3.8	3.8	33.8
Listeriosis, Nonperinatal	0.8	1.8	0.4	1.8	1.0	2.4	2.8	3.2	3.2	1.8	0.0	1.4	22.4
Listeriosis, Perinatal	0.2	0.0	0.2	0.6	0.6	0.2	0.8	1.2	1.0	0.8	0.2	0.0	5.8
Lyme Disease	0.2	0.4	0.0	0.2	0.2	2.2	3.4	0.8	0.4	0.4	0.0	0.0	8.2
Malaria[a]	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	0.2	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Meningitis, Viral	26.0	22.0	19.4	28.8	32.2	42.4	73.6	94.8	73.4	47.0	29.8	26.2	540.0
Meningococcal Infections	6.6	5.2	3.0	3.2	2.0	3.0	1.6	1.6	1.6	1.2	2.2	1.8	33.0
Mumps	0.6	1.2	0.2	0.8	0.4	0.2	1.0	1.4	0.6	0.2	0.2	0.6	7.4
Pertussis	11.8	11.4	11.6	12.2	16.8	13.2	20.6	21.4	16.8	15.8	11.6	15.6	178.8
Psittacosis	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Q-fever	0.2	0.2	0.0	0.0	0.4	0.4	0.2	0.2	0.2	0.0	0.0	0.0	1.8
Relapsing Fever	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4
Rheumatic Fever, Acute	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4
Rubella	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Salmonellosis	65.6	54.2	64.8	72.2	92.6	100.2	144.8	128.4	112.4	211.6	91.6	74.2	1245.0
Shigellosis	32.4	16.4	22.6	22.6	35.4	38.8	73.4	91.4	89.0	67.4	38.4	30.2	564.0
Strongyloidiasis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tetanus	0.4	0.2	0.0	0.2	0.0	0.2	0.2	0.0	0.2	0.2	0.0	0.0	1.6
Trichinosis	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Tularemia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Typhoid Fever, Case	1.2	1.8	0.2	1.2	0.8	2.4	1.4	1.6	1.8	1.0	0.8	0.4	14.6
Typhoid Fever, Carrier	0.2	0.2	0.6	0.0	0.4	0.4	0.4	0.0	0.0	0.2	0.2	0.4	3.0
Typhus Fever	1.0	0.2	0.4	0.2	1.0	1.2	2.2	2.0	1.0	1.2	1.4	0.4	12.2
Vibrio	0.2	0.8	1.2	0.4	0.8	2.0	4.4	2.8	1.2	2.0	1.2	0.2	17.8
West Nile Virus	0.2	0.0	0.0	0.0	0.0	3.0	23.4	49.8	32.8	6.0	0.6	0.4	116.2

[a] Not applicable.

[b] Month of culture.

Table J. Number of Cases of Selected Notifiable Diseases by Age Group
Los Angeles County, 2008

Disease	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+	Total[a]
Amebiasis	0	1	8	37	26	22	12	9	115
Botulism	0	0	0	1	0	3	1	0	5
Brucellosis	0	0	0	0	0	1	1	1	3
Campylobacteriosis	42	137	152	285	129	127	90	110	1073
Cholera	0	0	0	0	0	0	0	0	0
Coccidioidomycosis	0	0	6	41	33	58	38	52	228
Cryptosporidiosis	0	2	7	10	15	4	1	2	41
Cysticercosis	0	0	0	2	2	0	1	1	6
Dengue	0	0	0	0	0	0	0	0	0
E. *coli* O157:H7	1	4	3	4	1	1	0	2	16
Encephalitis	4	8	14	4	1	11	14	33	89
Giardiasis	4	45	41	96	63	62	27	17	335
Haemophilus Influenzae Type B	0	0	0	0	0	0	0	0	0
Hansen's Disease (Leprosy)	0	0	0	0	1	0	0	0	1
Hepatitis A	0	0	7	34	14	9	7	9	80
Hepatitis B	0	0	0	18	14	13	14	7	66
Hepatitis C	0	0	0	1	1	2	0	1	5
Hepatitis Unspecified	0	0	0	0	1	1	1	1	4
Kawasaki Syndrome	10	32	13	0	0	0	0	0	55
Legionellosis	1	0	0	1	5	7	12	33	59
Listeriosis, Nonperinatal	0	0	1	1	2	1	4	11	20
Listeriosis, Perinatal[b]	0	0	0	2	0	0	0	0	2
Lyme Disease	0	2	1	1	1	3	0	1	9
Malaria	0	0	1	12	6	7	4	0	30
Measles	0	1	0	0	0	0	0	0	1
Meningitis, Viral	80	24	148	164	52	44	29	51	597
Meningococcal Infections	3	1	6	6	5	3	4	2	30
Mumps	0	0	1	2	1	3	0	0	7
Pertussis	42	7	13	12	1	2	2	1	80
Psittacosis	0	0	0	0	0	0	0	0	0
Q-fever	0	0	0	0	1	0	1	0	2
Relapsing Fever	0	0	0	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	1	0	0	0	0	1
Rubella	0	0	0	0	0	0	1	0	1
Salmonellosis	89	613	170	278	151	116	91	127	1638
Shigellosis	8	118	137	122	42	26	23	22	498
Strongyloidiasis	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	1	1	0	0	0	2
Trichinosis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid Fever, Case	0	1	5	5	1	0	1	1	14
Typhoid Fever, Carrier	0	0	0	1	2	0	0	1	4
Typhus Fever	0	0	3	3	4	4	3	1	18
Vibrio	0	0	1	4	3	3	5	2	18
West Nile Virus	0	1	0	19	15	34	36	65	170

[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, 2008

Disease	Age-group Rates (Cases per 100,000)[b]							
	<1	1-4	5-14	15-34	35-44	45-54	55-64	65+
Amebiasis	-	0.2	0.6	1.3	1.7	1.6	1.3	0.9
Botulism	-	-	-	-	-	0.2	0.1	-
Brucellosis	-	-	-	-	-	0.1	0.1	0.1
Campylobacteriosis	30.1	24.2	10.8	9.9	8.5	9.4	9.9	10.8
Cholera	-	-	-	-	-	-	-	-
Coccidioidomycosis	-	-	0.4	1.4	2.2	4.3	4.2	5.1
Cryptosporidiosis	-	0.4	0.5	0.3	1.0	0.3	0.1	0.2
Cysticercosis	-	-	-	0.1	0.1	-	0.1	0.1
Dengue	-	-	-	-	-	-	-	-
E. *coli* O157:H7	0.7	0.7	0.2	0.1	0.1	0.1	-	0.2
Encephalitis	2.9	1.4	1.0	0.1	0.1	0.8	1.5	3.2
Giardiasis	2.9	7.9	2.9	3.3	4.2	4.6	3.0	1.7
Haemophilus Influenzae Type B	-	-	-	-	-	-	-	-
Hansen's Disease (Leprosy)	-	-	-	-	0.1	-	-	-
Hepatitis A	-	-	0.5	1.2	0.9	0.7	0.8	0.9
Hepatitis B	-	-	-	0.6	0.9	1.0	1.5	0.7
Hepatitis C	-	-	-	-	0.1	0.1	-	0.1
Hepatitis Unspecified	-	-	-	-	0.1	0.1	0.1	0.1
Kawasaki Syndrome	7.2	5.7	0.9	-	-	-	-	-
Legionellosis	0.7	-	-	-	0.3	0.5	1.3	3.2
Listeriosis, Nonperinatal	0.0	0.0	0.1	0.0	0.1	0.1	0.4	1.1
Listeriosis, Perinatal[a]	-	-	-	1.8	-	-	-	-
Lyme Disease	-	0.4	0.1	-	0.1	0.2	-	0.1
Malaria	-	-	0.1	0.4	0.4	0.5	0.4	-
Measles	-	0.2	-	-	-	-	-	-
Meningitis, Viral	57.3	4.2	10.5	5.7	3.4	3.3	3.2	5.0
Meningococcal Infections	2.1	0.2	0.4	0.2	0.3	0.2	0.4	0.2
Mumps	-	-	0.1	0.1	0.1	0.2	-	-
Pertussis	30.1	1.2	0.9	0.4	0.1	0.1	0.2	0.1
Psittacosis	-	-	-	-	-	-	-	-
Q-fever	-	-	-	-	0.1	-	0.1	-
Relapsing Fever	-	-	-	-	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-	-	-	-	-
Rubella	-	-	-	-	-	-	0.1	-
Salmonellosis	63.7	108.3	12.1	9.7	10.0	8.6	10.0	12.4
Shigellosis	5.7	20.8	9.8	4.3	2.8	1.9	2.5	2.2
Strongyloidiasis	-	-	-	-	-	-	-	-
Tetanus	-	-	-	-	0.1	-	-	-
Trichinosis	-	-	-	-	-	-	-	-
Tularemia	-	-	-	-	-	-	-	-
Typhoid Fever, Case	-	0.2	0.4	0.2	0.1	-	0.1	0.1
Typhoid Fever, Carrier	-	-	-	-	0.1	-	-	0.1
Typhus Fever	-	-	0.2	0.1	0.3	0.3	0.3	0.1
Vibrio	-	-	0.1	0.1	0.2	0.2	0.5	0.2
West Nile Virus	-	0.2	-	0.7	1.0	2.5	3.9	6.4

[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, 2008

Disease	Asian	Black	Hispanic	White	Other[a]	Unknown
Amebiasis	7	3	36	56	4	5
Botulism	0	0	3	1	0	0
Brucellosis	0	0	2	0	0	0
Campylobacteriosis	100	31	542	373	0	16
Cholera	0	0	0	0	0	0
Coccidioidomycosis	27	37	86	62	1	3
Cryptosporidiosis	1	5	10	12	2	0
Cysticercosis	0	0	6	0	0	0
Dengue		0	0	0	0	0
E. *coli* O157:H7	0	5	5	6	0	0
Encephalitis	3	5	40	38	1	1
Giardiasis	21	16	106	167	5	27
Haemophilus Influenzae Type B	0	0	0	0	0	0
Hansen's Disease (Leprosy)	1	0	0	0	0	0
Hepatitis A	14	6	36	23	1	0
Hepatitis B	7	15	16	22	1	5
Hepatitis C	1	0	1	3	0	0
Hepatitis Unspecified	1	0	0	0	0	0
Kawasaki Syndrome	17	3	28	4	3	0
Legionellosis	5	11	13	30	0	0
Listeriosis, Nonperinatal	4	1	11	4	0	0
Listeriosis, Perinatal[b]	0	0	2	0	0	0
Lyme Disease	0	0	0	9	0	0
Malaria	4	15	1	4	0	0
Measles	0	0	1	0	0	0
Meningitis, Viral	37	43	275	121	20	13
Meningococcal Infections	1	4	20	4	0	0
Mumps	1	0	3	3	0	0
Pertussis	4	4	51	19	0	2
Psittacosis	0	0	0	0	0	0
Q-fever	0	0	1	1	0	0
Relapsing Fever	0	0	0	0	0	0
Rheumatic Fever, Acute	0	0	0	0	0	0
Rubella	0	0	0	1	0	0
Salmonellosis	114	77	1071	326	5	20
Shigellosis	10	25	376	71	3	3
Strongyloidiasis	0	0	0	0	0	0
Tetanus	0	0	2	0	0	0
Trichinosis	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0
Typhoid Fever, Case	8	0	5	1	0	0
Typhoid Fever, Carrier	1	0	3	0	0	0
Typhus Fever	1	0	5	12	0	0
Vibrio	2	0	4	9	0	0
West Nile Virus	6	5	68	75	3	0

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

Table M. Incidence Rates of Selected Notifiable Diseases by Race/Ethnicity
Los Angeles County, 2008

Disease	Race/Ethnicity Rates (Cases per 100,000)[b]			
	Asian	Black	Hispanic	White
Amebiasis	0.5	0.4	0.8	1.9
Botulism	-	-	0.1	-
Brucellosis	-	-	-	-
Campylobacteriosis	7.7	3.6	11.6	12.8
Cholera	-	-	-	-
Coccidioidomycosis	2.1	4.3	1.8	2.1
Cryptosporidiosis	0.1	0.6	0.2	0.4
Cysticercosis	-	-	0.1	-
Dengue	-	-	-	-
E. *coli* O157:H7	-	0.6	0.1	0.2
Encephalitis	0.2	0.6	0.9	1.3
Giardiasis	1.6	1.9	2.3	5.7
Haemophilus Influenzae Type B	-	-	-	-
Hansen's Disease (Leprosy)	0.1	-	-	-
Hepatitis A	1.1	0.7	0.8	0.8
Hepatitis B	0.5	1.8	0.3	0.8
Hepatitis C	0.1	-	-	0.1
Hepatitis Unspecified	0.1	-	-	-
Kawasaki Syndrome	1.3	0.4	0.6	0.1
Legionellosis	0.4	1.3	0.3	1.0
Listeriosis, Nonperinatal	0.3	0.1	0.2	0.1
Listeriosis, Perinatal[a]	-	-	2.3	-
Lyme Disease	-	-	-	0.3
Malaria	0.3	1.8	-	0.1
Measles	-	-	-	-
Meningitis, Viral	2.8	5.0	5.9	4.2
Meningococcal Infections	0.1	0.5	0.4	0.1
Mumps	0.1	-	0.1	0.1
Pertussis	0.3	0.5	1.1	0.7
Psittacosis	-	-	-	-
Q-fever	-	-	-	-
Relapsing Fever	-	-	-	-
Rheumatic Fever, Acute	-	-	-	-
Rubella	-	-	-	-
Salmonellosis	8.7	9.0	22.9	11.2
Shigellosis	0.8	2.9	8.0	2.4
Strongyloidiasis	-	-	-	-
Tetanus	-	-	-	-
Trichinosis	-	-	-	-
Tularemia	-	-	-	-
Typhoid Fever, Case	0.6	-	0.1	-
Typhoid Fever, Carrier	0.1	-	0.1	-
Typhus Fever	0.1	-	0.1	0.4
Vibrio	0.2	-	0.1	0.3
West Nile Virus	0.5	0.6	1.5	2.6

[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, 2008

Disease	Male		Female	
	Cases	Rate (Cases per 100,000)[b]	Cases	Rate (Cases per 100,000)[b]
Amebiasis	60	1.2	55	1.1
Botulism	4	0.1	1	0.0
Brucellosis	3	0.1	0	-
Campylobacteriosis	545	11.2	525	10.7
Cholera	0	-	0	-
Coccidioidomycosis	134	2.8	92	1.9
Cryptosporidiosis	28	0.6	11	0.2
Cysticercosis	4	0.1	2	0.0
Dengue	0	-	0	-
E. *coli* O157:H7	5	0.1	11	0.2
Encephalitis	54	1.1	33	0.7
Giardiasis	252	5.2	102	2.1
Haemophilus Influenzae Type B	0	-	0	-
Hansen's Disease (Leprosy)	1	0.0	0	-
Hepatitis A	34	0.7	45	0.9
Hepatitis B	52	1.1	14	0.3
Hepatitis C	2	0.0	3	0.1
Hepatitis Unspecified	2	0.0	2	0.0
Kawasaki Syndrome	29	0.6	26	0.5
Legionellosis	38	0.8	21	0.4
Listeriosis, Nonperinatal	3	0.2	11	0.2
Listeriosis, Perinatal[a]	0	-	2	3.0
Lyme Disease	5	0.1	4	0.1
Malaria	14	0.3	16	0.3
Measles	0	-	1	0.0
Meningitis, Viral	314	6.5	270	5.5
Meningococcal Infections	14	0.3	16	0.3
Mumps	1	0.0	6	0.1
Pertussis	37	0.8	43	0.9
Psittacosis	0	-	0	-
Q-fever	2	0.0	0	-
Relapsing Fever	0	-	0	-
Rheumatic Fever, Acute	0	-	0	-
Rubella	0	-	1	0.0
Salmonellosis	737	15.2	901	18.3
Shigellosis	246	5.1	252	5.1
Strongyloidiasis	0	-	0	-
Tetanus	2	0.0	0	-
Trichinosis	0	-	0	-
Tularemia	0	-	0	-
Typhoid Fever, Case	8	0.2	6	0.1
Typhoid Fever, Carrier	1	0.0	3	0.1
Typhus Fever	8	0.2	10	0.2
Vibrio	13	0.3	4	0.1
West Nile Virus	118	2.4	52	1.1

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

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

Table O-1. Selected Notifiable Diseases SPA 1. Antelope Valley Area Los Angeles County, 2008

Disease	Frequency	Rate (Cases per 100,000)[b]
	Antelope	Antelope
Amebiasis	1	0.3
Botulism	1	0.3
Brucellosis	0	-
Campylobacteriosis	27	7.4
Cholera	0	-
Coccidioidomycosis	52	14.2
Cryptosporidiosis	2	0.5
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	0	-
Encephalitis	3	0.8
Giardiasis	8	2.2
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	3	0.8
Hepatitis B	2	0.5
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Kawasaki Syndrome	1	0.3
Legionellosis	1	0.3
Listeriosis, Nonperinatal	0	-
Listeriosis, Perinatal[a]	0	-
Lyme Disease	0	-
Malaria	0	-
Measles	0	-
Meningitis, Viral	69	18.8
Meningococcal Infections	1	0.3
Mumps	1	0.3
Pertussis	2	0.5
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	35	9.5
Shigellosis	11	3.0
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	0	-
Vibrio	0	-
West Nile Virus	5	1.4

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

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

Table O-2. Selected Notifiable Diseases SPA 2. San Fernando Area Los Angeles County, 2008

Disease	Frequency					Rate (Cases per 100,000)[b]				
	EV	GL	SF	WV	TOTAL	EV	GL	SF	WV	TOTAL
Amebiasis	11	33	7	1	52	2.4	9.3	1.5	0.1	2.4
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	0	0	-	-	-	-	-
Campylobacteriosis	65	43	84	79	271	14.0	12.1	17.7	8.8	12.4
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	15	10	25	12	62	3.2	2.8	5.3	1.3	2.8
Cryptosporidiosis	4	1	7	2	14	0.9	0.3	1.5	0.2	0.6
Cysticercosis	0	0	1	0	1	-	-	0.2	-	0.0
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	1	2	1	1	5	0.2	0.6	0.2	0.1	0.2
Encephalitis	1	2	1	5	9	0.2	0.6	0.2	0.6	0.4
Giardiasis	25	82	21	33	161	5.4	23.0	4.4	3.7	7.4
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	1	1	-	-	-	0.1	0.0
Hepatitis A	2	8	2	5	17	0.4	2.2	0.4	0.6	0.8
Hepatitis B	1	4	0	4	9	0.2	1.1	-	0.4	0.4
Hepatitis C	2	0	0	1	3	0.4	-	-	0.1	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	3	0	2	6	11	0.6	-	0.4	0.7	0.5
Legionellosis	4	7	1	6	18	0.9	2.0	0.2	0.7	0.8
Listeriosis, Nonperinatal	0	2	0	1	3	-	0.6	-	0.1	0.1
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	1	1	2	-	-	0.2	0.1	0.1
Malaria	2	2	1	1	6	0.4	0.6	0.2	0.1	0.3
Measles	0	0	0	1	1	-	-	-	0.1	0.0
Meningitis, Viral	13	12	25	30	80	2.8	3.4	5.3	3.4	3.7
Meningococcal Infections	1	1	1	0	3	0.2	0.3	0.2	-	0.1
Mumps	1	0	0	1	2	0.2	-	-	0.1	0.1
Pertussis	1	1	3	7	12	0.2	0.3	0.6	0.8	0.5
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	1	0	1	-	-	0.2	-	0.0
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	407	25	138	87	657	87.8	7.0	29.1	9.7	30.0
Shigellosis	22	9	32	26	89	4.7	2.5	6.8	2.9	4.1
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	1	0	1	-	-	0.2	-	0.0
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	0	5	5	-	-	-	0.6	0.2
Typhoid Fever, Carrier	0	0	0	1	1	-	-	-	0.1	0.0
Typhus Fever	0	2	0	0	2	-	0.6	-	-	0.1
Vibrio	0	0	1	2	3	-	-	0.2	0.2	0.1
West Nile Virus	5	5	2	25	37	1.1	1.4	0.4	2.8	1.7

[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, 2008

Disease	Frequency					Rate (Cases per 100,000)[b]				
	AH	EM	FH	PO	TOTAL	AH	EM	FH	PO	TOTAL
Amebiasis	6	1	5	2	14	1.7	0.2	1.6	0.3	0.8
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	0	0	-	-	-	-	-
Campylobacteriosis	29	24	41	60	154	8.0	5.0	13.0	10.4	8.9
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	2	2	10	7	21	0.6	0.4	3.2	1.2	1.2
Cryptosporidiosis	0	0	0	0	0	-	-	-	-	-
Cysticercosis	1	0	0	2	3	0.3	-	-	0.3	0.2
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	1	0	0	1	-	0.2	-	-	0.1
Encephalitis	4	6	6	9	25	1.1	1.2	1.9	1.6	1.4
Giardiasis	10	3	12	9	34	2.8	0.6	3.8	1.6	2.0
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	4	4	4	5	17	1.1	0.8	1.3	0.9	1.0
Hepatitis B	1	1	2	2	6	0.3	0.2	0.6	0.3	0.3
Hepatitis C	0	0	1	0	1	-	-	0.3	-	0.1
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	4	1	0	3	8	1.1	0.2	-	0.5	0.5
Legionellosis	2	2	2	3	9	0.6	0.4	0.6	0.5	0.5
Listeriosis, Nonperinatal	1	2	1	2	6	0.3	0.4	0.3	0.3	0.3
Listeriosis, Perinatal[a]	0	0	0	1	1	-	-	-	0.8	0.3
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	1	2	3	-	-	0.3	0.3	0.2
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	13	12	36	25	86	3.6	2.5	11.4	4.3	5.0
Meningococcal Infections	0	2	1	1	4	-	0.4	0.3	0.2	0.2
Mumps	0	0	0	1	1	-	-	-	0.2	0.1
Pertussis	0	1	2	1	4	-	0.2	0.6	0.2	0.2
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	48	27	69	60	204	13.3	5.6	21.9	10.4	11.8
Shigellosis	4	6	39	17	66	1.1	1.2	12.4	3.0	3.8
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	1	1	3	0.3	-	0.3	0.2	0.2
Typhoid Fever, Carrier	0	0	1	0	1	-	-	0.3	-	0.1
Typhus Fever	3	0	6	0	9	0.8	-	1.9	-	0.5
Vibrio	3	0	0	0	3	0.8	-	-	-	0.2
West Nile Virus	8	10	23	20	61	2.2	2.1	7.3	3.5	3.5

[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-4. Selected Notifiable Diseases SPA 4. Metro Area
Los Angeles County, 2008

Disease	Frequency				Rate (Cases per 100,000)[b]			
	CE	HW	NE	TOTAL	CE	HW	NE	TOTAL
Amebiasis	4	10	3	17	1.1	1.8	0.8	1.3
Botulism	0	1	0	1	-	0.2	-	0.1
Brucellosis	0	0	0	0	-	-	-	-
Campylobacteriosis	24	44	31	99	6.4	8.1	8.7	7.8
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	6	3	11	20	1.6	0.6	3.1	1.6
Cryptosporidiosis	1	11	0	12	0.3	2.0	-	0.9
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	1	2	0	3	0.3	0.4	-	0.2
Encephalitis	2	3	5	10	0.5	0.6	1.4	0.8
Giardiasis	11	22	3	36	3.0	4.0	0.8	2.8
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	3	4	0	7	0.8	0.7	-	0.5
Hepatitis B	1	5	1	7	0.3	0.9	0.3	0.5
Hepatitis C	0	0	0	0	-	-	-	-
Hepatitis Unspecified	0	0	0	0	-	-	-	-
Kawasaki Syndrome	5	1	3	9	1.3	0.2	0.8	0.7
Legionellosis	2	3	2	7	0.5	0.6	0.6	0.5
Listeriosis, Nonperinatal	0	1	2	3	-	0.2	0.6	0.2
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	0	1	0	1	-	0.2	-	0.1
Malaria	0	2	0	2	-	0.4	-	0.2
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	5	6	13	24	1.3	1.1	3.6	1.9
Meningococcal Infections	1	5	0	6	0.3	0.9	-	0.5
Mumps	1	0	0	1	0.3	-	-	0.1
Pertussis	1	6	10	17	0.3	1.1	2.8	1.3
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	1	0	1	-	0.2	-	0.1
Salmonellosis	36	56	43	135	9.7	10.3	12.1	10.6
Shigellosis	23	29	19	71	6.2	5.3	5.3	5.6
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	1	2	0	3	0.3	0.4	-	0.2
Typhoid Fever, Carrier	0	1	1	2	-	0.2	0.3	0.2
Typhus Fever	1	0	0	1	0.3	-	-	0.1
Vibrio	0	0	0	0	-	-	-	-
West Nile Virus	3	6	3	12	0.8	1.1	0.8	0.9

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

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

Table O-5. Selected Notifiable Diseases SPA 5. West Area
Los Angeles County, 2008

Disease	Frequency	Rate (Cases per 100,000)[b]
	West	West
Amebiasis	6	0.9
Botulism	0	-
Brucellosis	0	-
Campylobacteriosis	155	24.0
Cholera	0	-
Coccidioidomycosis	9	1.4
Cryptosporidiosis	5	0.8
Cysticercosis	0	-
Dengue	0	-
E. *coli* O157:H7	6	0.9
Encephalitis	0	-
Giardiasis	37	5.7
Haemophilus Influenzae Type B	0	-
Hansen's Disease (Leprosy)	0	-
Hepatitis A	10	1.5
Hepatitis B	9	1.4
Hepatitis C	0	-
Hepatitis Unspecified	0	-
Kawasaki Syndrome	3	0.5
Legionellosis	8	1.2
Listeriosis, Nonperinatal	1	0.2
Listeriosis, Perinatal[a]	0	-
Lyme Disease	4	0.6
Malaria	3	0.5
Measles	0	-
Meningitis, Viral	29	4.5
Meningococcal Infections	5	0.8
Mumps	2	0.3
Pertussis	10	1.5
Psittacosis	0	-
Q-fever	0	-
Relapsing Fever	0	-
Rheumatic Fever, Acute	0	-
Rubella	0	-
Salmonellosis	46	7.1
Shigellosis	23	3.6
Strongyloidiasis	0	-
Tetanus	0	-
Trichinosis	0	-
Tularemia	0	-
Typhoid Fever, Case	0	-
Typhoid Fever, Carrier	0	-
Typhus Fever	3	0.5
Vibrio	3	0.5
West Nile Virus	1	0.2

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

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

Table O-6. Selected Notifiable Diseases SPA 6. South Area
Los Angeles County, 2008

Disease	Frequency					Rate (Cases per 100,000)[b]				
	CN	SO	SE	SW	TOTAL	CN	SO	SE	SW	TOTAL
Amebiasis	7	1	0	3	11	2.4	0.5	-	0.8	1.0
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	1	1	-	-	-	0.3	0.1
Campylobacteriosis	31	26	21	44	122	10.6	13.8	11.5	11.3	11.6
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	6	7	3	8	24	2.1	3.7	1.6	2.0	2.3
Cryptosporidiosis	1	0	0	0	1	0.3	-	-	-	0.1
Cysticercosis	0	1	1	0	2	-	0.5	0.5	-	0.2
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
Encephalitis	0	2	1	0	3	-	1.1	0.5	-	0.3
Giardiasis	8	3	7	9	27	2.7	1.6	3.8	2.3	2.6
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	0	0	0	2	2	-	-	-	0.5	0.2
Hepatitis B	8	5	1	8	22	2.7	2.6	0.5	2.0	2.1
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	0	0	0	0	0	-	-	-	-	-
Kawasaki Syndrome	1	1	0	2	4	0.3	0.5	-	0.5	0.4
Legionellosis	1	1	0	2	4	0.3	0.5	-	0.5	0.4
Listeriosis, Nonperinatal	0	1	0	1	2	-	0.5	-	0.3	0.2
Listeriosis, Perinatal[a]	0	0	0	0	0	-	-	-	-	-
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	1	0	1	2	4	0.3	-	0.5	0.5	0.4
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	37	20	10	12	79	12.6	10.6	5.5	3.1	7.5
Meningococcal Infections	0	1	4	2	7	-	0.5	2.2	0.5	0.7
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	1	1	1	6	9	0.3	0.5	0.5	1.5	0.9
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	32	30	30	31	123	10.9	15.9	16.5	7.9	11.7
Shigellosis	49	21	11	28	109	16.7	11.1	6.0	7.2	10.3
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	0	0	0	0	0	-	-	-	-	-
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	0	0	0	1	1	-	-	-	0.3	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	0	0	0	1	1	-	-	-	0.3	0.1
Vibrio	1	0	0	0	1	0.3	-	-	-	0.1
West Nile Virus	2	3	1	0	6	0.7	1.6	0.5	-	0.6

[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, 2008

Disease	Frequency					Rate (Cases per 100,000)[b]				
	BF	EL	SA	WH	TOTAL	BF	EL	SA	WH	TOTAL
Amebiasis	2	0	4	1	7	0.5	-	0.9	0.3	0.5
Botulism	0	0	0	0	0	-	-	-	-	-
Brucellosis	0	0	0	1	1	-	-	-	0.3	0.1
Campylobacteriosis	24	37	35	31	127	6.5	16.7	7.7	9.2	9.2
Cholera	0	0	0	0	0	-	-	-	-	-
Coccidioidomycosis	10	1	7	3	21	2.7	0.5	1.5	0.9	1.5
Cryptosporidiosis	2	0	1	0	3	0.5	-	0.2	-	0.2
Cysticercosis	0	0	0	0	0	-	-	-	-	-
Dengue	0	0	0	0	0	-	-	-	-	-
E. *coli* O157:H7	0	0	0	0	0	-	-	-	-	-
Encephalitis	2	0	6	8	16	0.5	-	1.3	2.4	1.2
Giardiasis	11	5	6	3	25	3.0	2.3	1.3	0.9	1.8
Haemophilus Influenzae Type B	0	0	0	0	0	-	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	0	-	-	-	-	-
Hepatitis A	6	3	4	2	15	1.6	1.4	0.9	0.6	1.1
Hepatitis B	1	1	0	4	6	0.3	0.5	-	1.2	0.4
Hepatitis C	0	0	0	0	0	-	-	-	-	-
Hepatitis Unspecified	1	0	0	0	1	0.3	-	-	-	0.1
Kawasaki Syndrome	7	2	3	1	13	1.9	0.9	0.7	0.3	0.9
Legionellosis	1	0	1	2	4	0.3	-	0.2	0.6	0.3
Listeriosis, Nonperinatal	1	2	0	0	3	0.3	0.9	-	-	0.2
Listeriosis, Perinatal[a]	1	0	0	0	1	1.2	-	-	-	0.3
Lyme Disease	0	0	0	0	0	-	-	-	-	-
Malaria	0	0	1	0	1	-	-	0.2	-	0.1
Measles	0	0	0	0	0	-	-	-	-	-
Meningitis, Viral	37	6	55	33	131	10.0	2.7	12.1	9.8	9.5
Meningococcal Infections	0	1	1	0	2	-	0.5	0.2	-	0.1
Mumps	0	0	0	0	0	-	-	-	-	-
Pertussis	2	3	6	2	13	0.5	1.4	1.3	0.6	0.9
Psittacosis	0	0	0	0	0	-	-	-	-	-
Q-fever	0	0	0	0	0	-	-	-	-	-
Relapsing Fever	0	0	0	0	0	-	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	0	-	-	-	-	-
Rubella	0	0	0	0	0	-	-	-	-	-
Salmonellosis	36	197	41	35	309	9.7	88.7	9.0	10.4	22.3
Shigellosis	28	20	30	15	93	7.6	9.0	6.6	4.4	6.7
Strongyloidiasis	0	0	0	0	0	-	-	-	-	-
Tetanus	1	0	0	0	1	0.3	-	-	-	0.1
Trichinosis	0	0	0	0	0	-	-	-	-	-
Tularemia	0	0	0	0	0	-	-	-	-	-
Typhoid Fever, Case	1	0	1	0	2	0.3	-	0.2	-	0.1
Typhoid Fever, Carrier	0	0	0	0	0	-	-	-	-	-
Typhus Fever	1	0	1	0	2	0.3	-	0.2	-	0.1
Vibrio	0	0	0	0	0	-	-	-	-	-
West Nile Virus	9	3	15	17	44	2.4	1.4	3.3	5.0	3.2

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

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

Table O-8. Selected Notifiable Diseases SPA 8. South Bay Area
Los Angeles County, 2008

Disease	Frequency				Rate (Cases per 100,000)[b]			
	HB	IW	TO	TOTAL	HB	IW	TO	TOTAL
Amebiasis	1	5	1	7	0.5	1.1	0.2	0.6
Botulism	1	0	2	3	0.5	-	0.4	0.3
Brucellosis	0	1	0	1	-	0.2	-	0.1
Campylobacteriosis	30	55	32	117	14.0	12.6	6.8	10.4
Cholera	0	0	0	0	-	-	-	-
Coccidioidomycosis	3	6	4	13	1.4	1.4	0.8	1.2
Cryptosporidiosis	0	2	2	4	-	0.5	0.4	0.4
Cysticercosis	0	0	0	0	-	-	-	-
Dengue	0	0	0	0	-	-	-	-
E. *coli* O157:H7	0	1	0	1	-	0.2	-	0.1
Encephalitis	2	5	2	9	0.9	1.1	0.4	0.8
Giardiasis	4	17	5	26	1.9	3.9	1.1	2.3
Haemophilus Influenzae Type B	0	0	0	0	-	-	-	-
Hansen's Disease (Leprosy)	0	0	0	0	-	-	-	-
Hepatitis A	1	4	2	7	0.5	0.9	0.4	0.6
Hepatitis B	1	2	1	4	0.5	0.5	0.2	0.4
Hepatitis C	0	1	0	1	-	0.2	-	0.1
Hepatitis Unspecified	0	0	1	1	-	-	0.2	0.1
Kawasaki Syndrome	1	2	3	6	0.5	0.5	0.6	0.5
Legionellosis	0	4	4	8	-	0.9	0.8	0.7
Listeriosis, Nonperinatal	0	1	1	2	-	0.2	0.2	0.2
Listeriosis, Perinatal[a]	0	0	0	0	-	-	-	-
Lyme Disease	0	0	2	2	-	-	0.4	0.2
Malaria	1	4	1	6	0.5	0.9	0.2	0.5
Measles	0	0	0	0	-	-	-	-
Meningitis, Viral	18	40	32	90	8.4	9.1	6.8	8.0
Meningococcal Infections	0	0	1	1	-	-	0.2	0.1
Mumps	0	0	0	0	-	-	-	-
Pertussis	2	10	1	13	0.9	2.3	0.2	1.2
Psittacosis	0	0	0	0	-	-	-	-
Q-fever	0	0	0	0	-	-	-	-
Relapsing Fever	0	0	0	0	-	-	-	-
Rheumatic Fever, Acute	0	0	0	0	-	-	-	-
Rubella	0	0	0	0	-	-	-	-
Salmonellosis	36	73	20	129	16.8	16.7	4.2	11.5
Shigellosis	6	21	7	34	2.8	4.8	1.5	3.0
Strongyloidiasis	0	0	0	0	-	-	-	-
Tetanus	0	0	0	0	-	-	-	-
Trichinosis	0	0	0	0	-	-	-	-
Tularemia	0	0	0	0	-	-	-	-
Typhoid Fever, Case	0	0	0	0	-	-	-	-
Typhoid Fever, Carrier	0	0	0	0	-	-	-	-
Typhus Fever	0	0	0	0	-	-	-	-
Vibrio	0	1	3	4	-	0.2	0.6	0.4
West Nile Virus	1	1	2	4	0.5	0.2	0.4	0.4

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

[b]Rates of disease based on less than 19 cases or events are considered "unreliable." A zero rate made from no events is 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
2008

AMEBIASIS

CRUDE DATA	
Number of Cases	115
Annual Incidence[a]	
LA County	1.2
California[b]	1.0
United States	N/A
Age at Diagnosis	
Mean	39
Median	37
Range	4-84

[a]Cases per 100,000 population.
[b]Calculated from Monthly Summary Report Selected Reportable Diseases. California Department of Public Health, December 2008.

DESCRIPTION

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

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

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

2008 TRENDS AND HIGHLIGHTS

- The incidence rate of amebiasis decreased in 2008 to 1.18 per 100,000 residents from 1.26 in 2007.
- The age group with the largest proportion of cases was the 35 to 44 year age group; 2008 showed a slightly more even age distribution than previous years (Figure 2).
- White cases accounted for nearly half of cases this year (56, 49%), with a wider gap between the proportion of white and Hispanic cases (Figure 3).
- Service Planning Area (SPA) 2 continued to have the highest incidence rate of all the SPAs in 2008 as previous reporting periods, with 2.4 per 100,000 residents (Figure 4).
- In 2008, the month with the highest number of cases reported was January, differing from the previous five-year average in which cases peaked in August (Figure 5).
- 2008 cases were equally distributed among males (60, 52%) and females (55, 48%).
- Risk factor information was available for all cases reported in 2008. The most frequently reported risk factor was immigration to the US (77, 67%); immigrants from Iran were the most frequently reported (25, 33%). Other frequently reported risk factors were travel (23, 20%) and contact with pets at home (22, 19%).

Reported Amebiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=114)			2005 (N=114)			2006 (N=94)			2007 (N=122)			2008 (N=115)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	0.9	0.7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	3	2.6	0.5	2	1.8	0.3	0	0.0	0.0	6	4.9	1.0	1	0.9	0.2
5-14	19	16.7	1.3	14	12.3	0.9	5	5.3	0.3	11	9.0	0.8	8	7.0	0.6
15-34	35	30.7	1.2	31	27.2	1.1	28	29.8	1.0	30	24.6	1.1	37	32.2	1.3
35-44	22	19.3	1.5	31	27.2	2.1	26	27.7	1.7	30	24.6	2.0	26	22.6	1.7
45-54	17	14.9	1.4	26	22.8	2.0	18	19.1	1.4	22	18.0	1.7	22	19.1	1.6
55-64	6	5.3	0.8	5	4.4	0.6	9	9.6	1.0	13	10.7	1.5	12	10.4	1.3
65+	10	8.8	1.1	5	4.4	0.5	8	8.5	0.8	9	7.4	0.9	9	7.8	0.9
Unknown	1	0.9		0	0.0		0	0.0		1	0.8		0	0.0	
Race / Ethnicity															
Asian	3	2.6	0.2	5	4.4	0.4	10	10.6	0.8	8	6.6	0.6	7	6.1	0.5
Black	13	11.4	1.5	7	6.1	0.8	2	2.1	0.2	10	8.2	1.2	3	2.6	0.4
Hispanic	53	46.5	1.2	46	40.4	1.0	32	34.0	0.7	44	36.1	1.0	36	31.3	0.8
White	37	32.5	1.3	47	41.2	1.6	39	41.5	1.4	50	41.0	1.7	56	48.7	1.9
Other	5	4.4	18.0	2	1.8	7.1	2	2.1	7.0	8	6.6	38.4	4	3.5	16.2
Unknown	3	2.6		7	6.1		9	9.6		2	1.6		9	7.8	
SPA															
1	4	3.5	1.2	0	0.0	0.0	2	2.1	0.6	6	4.9	1.7	1	0.9	0.3
2	30	26.3	1.4	30	26.3	1.4	39	41.5	1.8	51	41.8	2.4	52	45.2	2.4
3	13	11.4	0.8	6	5.3	0.4	6	6.4	0.3	14	11.5	0.8	14	12.2	0.8
4	20	17.5	1.6	37	32.5	3.0	17	18.1	1.3	16	13.1	1.3	17	14.8	1.3
5	19	16.7	3.0	17	14.9	2.7	12	12.8	1.9	9	7.4	1.4	6	5.2	0.9
6	12	10.5	1.2	9	7.9	0.9	4	4.3	0.4	8	6.6	0.8	11	9.6	1.0
7	10	8.8	0.7	9	7.9	0.7	7	7.4	0.5	11	9.0	0.8	7	6.1	0.5
8	6	5.3	0.5	6	5.3	0.5	7	7.4	0.6	6	4.9	0.5	7	6.1	0.6
Unknown	0	0.0		0	0.0		0	0.0		1	0.8		0	0.0	

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

Figure 1. Incidence Rates of Amebiasis CA and LAC, 1999-2008

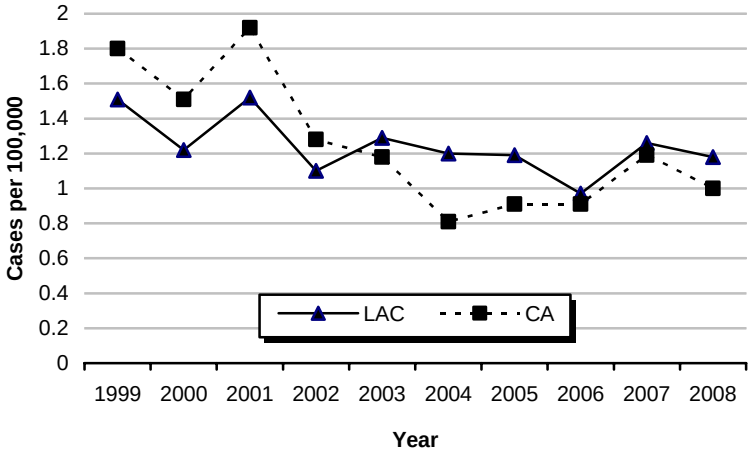


Figure 2. Incidence Rates of Amebiasis by Age Group LAC, 2008

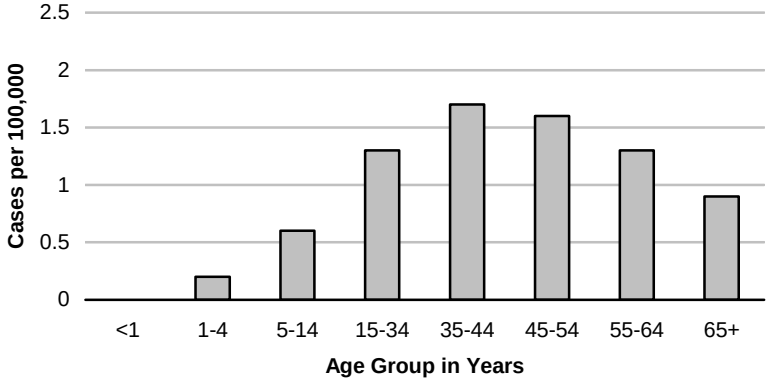


Figure 3. Percent Cases of Amebiasis by Race/Ethnicity LAC, 2008

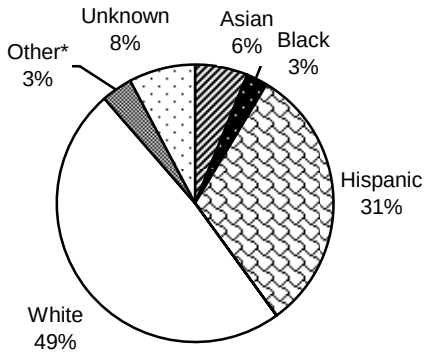
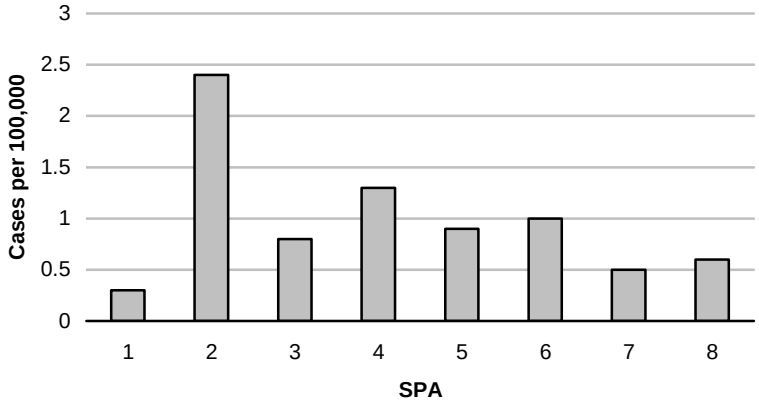


Figure 4. Incidence Rates of Amebiasis by SPA LAC, 2008



* 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, 2008

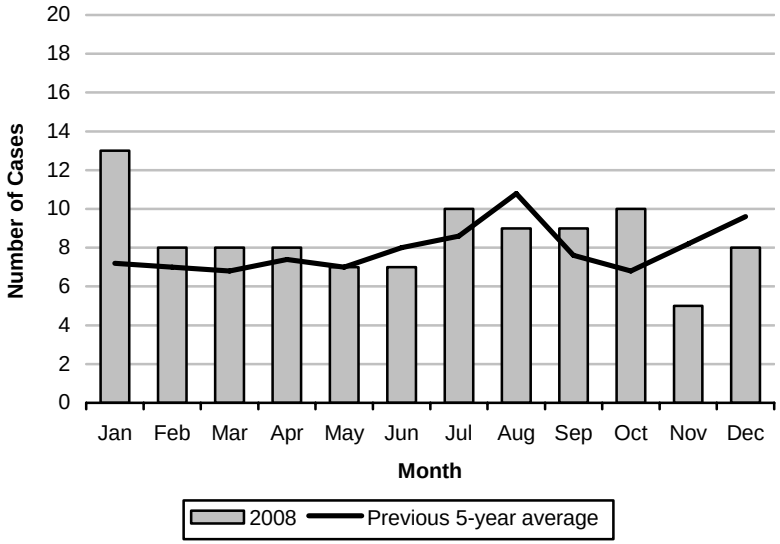
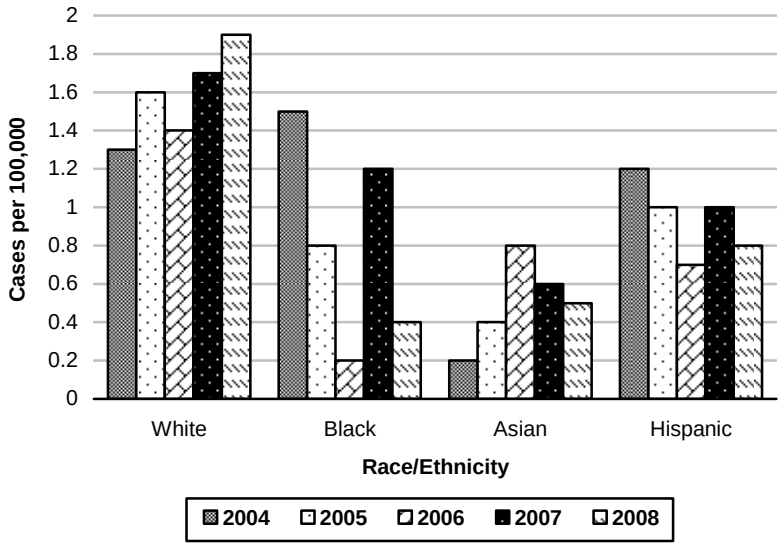
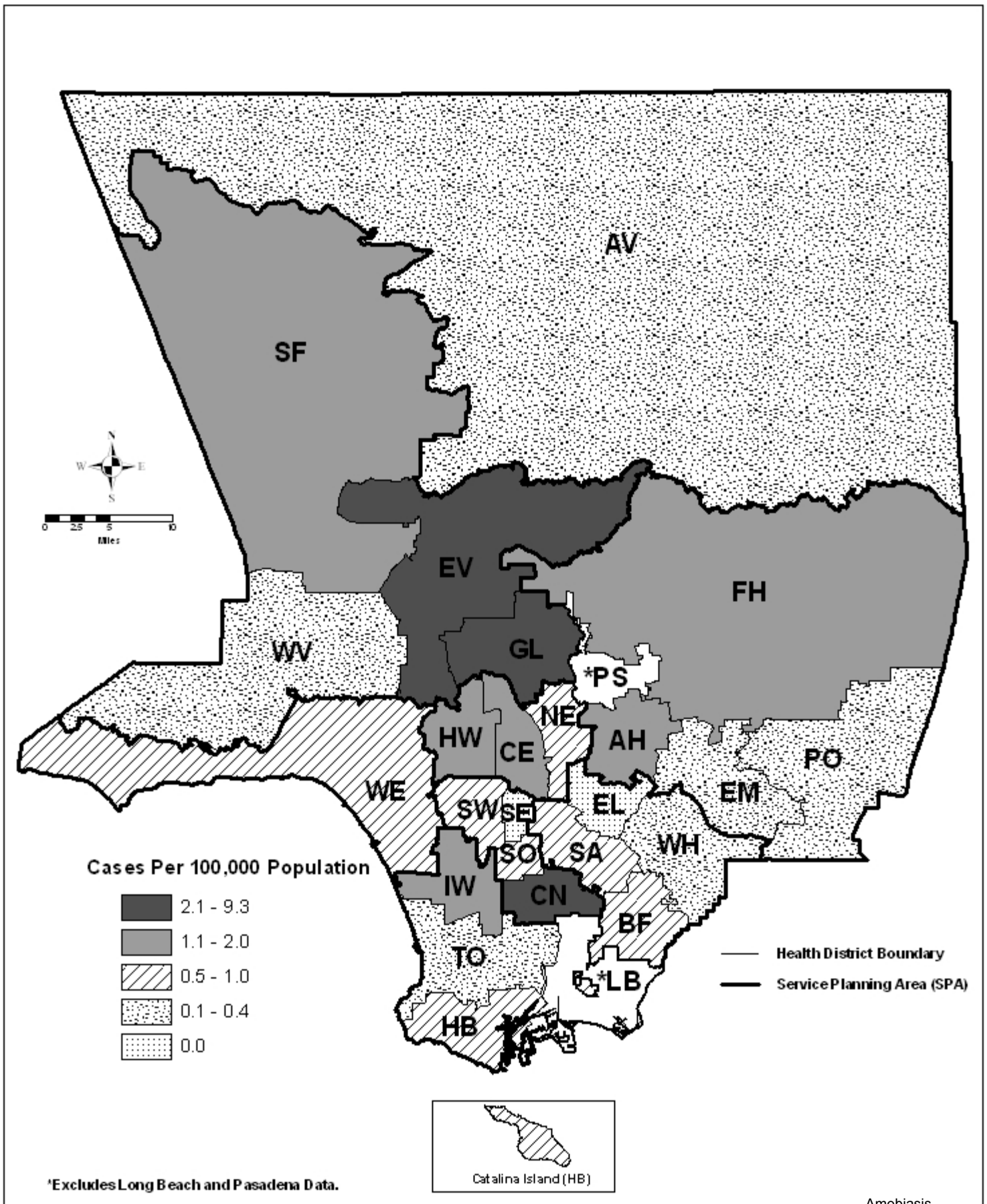


Figure 6. Amebiasis Incidence by Race/Ethnicity
LAC, 2004-2008



Map 1. Amebiasis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

CAMPYLOBACTERIOSIS

CRUDE DATA	
Number of Cases	1072
Annual Incidence[a]	
LA County	11.0
California	N/A
United States	N/A
Age at Diagnosis	
Mean	31.6
Median	29
Range	0-92

[a]Cases per 100,000 population.

DESCRIPTION

Campylobacteriosis is a bacterial disease caused by Gram-negative bacilli transmitted through ingestion of organisms in undercooked poultry or other meat, contaminated food, water or raw milk, or contact with infected animals. The incubation period is 2 to 5 days. Common symptoms include watery or bloody diarrhea, fever, abdominal cramps, myalgia, and nausea. Species include *C. jejuni, C. upsaliensis, C. coli* and *C. fetus*. Sequelae include Guillain-Barré syndrome and Reiter syndrome, which occur in a limited number of cases.

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

2008 TRENDS AND HIGHLIGHTS

- There was a 30.0% increase in the incidence of campylobacteriosis in 2008 (Figure 1).
- The highest rates continued to be among infants aged <1 year (30.1 per 100,000) and children aged 1 to 4 years (24.2 per 100,000) (Figure 2).
- Cases are predominantly observed in the Hispanic population; however, whites had the highest rate. (Figure 3 and 6).
- Service Planning Area (SPA) 5 had the highest rate (24.0 per 100,000) which is consistent with previous years (Figure 4).
- The incidence from March to August was higher than the previous five-year average. Increase in the spring and summer is typical which may be associated with the increase in travel seen at this time (Figure 5).
- The percentage of Hispanic cases has increased by at least 7.0 percentage points when compared to previous years (Figure 6).
- No outbreaks of campylobacteriosis were reported in 2008.
- Twelve percent (n=126) of campylobacteriosis cases were hospitalized for at least two days. There was one reported death in a person with a history of cancer.

Reported Campylobacteriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=884)			2005 (N=725)			2006 (N=775)			2007 (N=827)			2008 (N=1072)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	35	4.0	24.6	31	4.3	22.0	21	2.7	14.5	25	3.0	16.9	42	3.9	30.1
1-4	102	11.5	17.7	81	11.2	14.0	91	11.7	15.7	108	13.1	18.7	137	12.8	24.2
5-14	121	13.7	8.1	87	12.0	5.9	97	12.5	6.6	109	13.2	7.6	152	14.2	10.8
15-34	227	25.7	8.1	203	28.0	7.2	207	26.7	7.4	237	28.7	8.4	285	26.6	9.9
35-44	116	13.1	7.7	111	15.3	7.4	105	13.5	7.0	78	9.4	5.2	129	12.0	8.5
45-54	82	9.3	6.6	82	11.3	6.4	81	10.5	6.2	100	12.1	7.6	127	11.8	9.4
55-64	84	9.5	10.5	56	7.7	6.7	68	8.8	7.8	69	8.3	7.8	90	8.4	9.9
65+	117	13.2	12.4	74	10.2	7.7	105	13.5	10.7	101	12.2	10.0	110	10.3	10.8
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	98	11.1	7.9	65	9.0	5.2	92	11.9	7.2	86	10.4	6.7	100	9.3	7.7
Black	30	3.4	3.5	24	3.3	2.8	34	4.4	4.0	39	4.7	4.6	31	2.9	3.6
Hispanic	370	41.9	8.3	318	43.9	7.0	336	43.4	7.3	364	44.0	7.9	542	50.6	11.6
White	374	42.3	12.8	302	41.7	10.4	302	39.0	10.5	314	38.0	10.8	373	34.8	12.8
Other	3	0.3	10.8	4	0.6	14.2	4	0.5	14.0	3	0.4	14.4	0	0.0	0.0
Unknown	9	1.0		12	1.7		7	0.9		21	2.5		26	2.4	
SPA															
1	16	1.8	4.8	19	2.6	5.6	25	3.2	7.2	22	2.7	6.1	27	2.5	7.4
2	205	23.2	9.7	201	27.7	9.4	217	28.0	10.1	209	25.3	9.7	271	25.3	12.4
3	124	14.0	7.3	105	14.5	6.1	92	11.9	5.3	122	14.8	7.1	154	14.4	8.9
4	110	12.4	8.9	77	10.6	6.2	98	12.6	7.8	68	8.2	5.4	99	9.2	7.8
5	123	13.9	19.4	107	14.8	16.8	119	15.4	18.7	115	13.9	17.9	155	14.5	24.0
6	62	7.0	6.1	54	7.4	5.2	63	8.1	6.0	68	8.2	6.5	122	11.4	11.6
7	127	14.4	9.3	81	11.2	5.9	94	12.1	6.8	108	13.1	7.8	127	11.8	9.2
8	117	13.2	10.6	81	11.2	7.3	65	8.4	5.8	95	11.5	8.5	117	10.9	10.4
Unknown	0	0.0		0	0.0		2	0.3		20	2.4		0	0.0	

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

Figure 1. Reported Campylobacteriosis Rates by Year LAC, 1999-2008

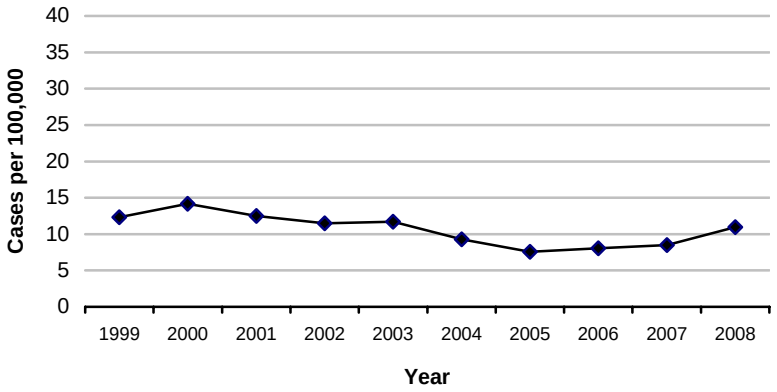


Figure 2. Reported Campylobacteriosis Rates by Age Group LAC, 2008

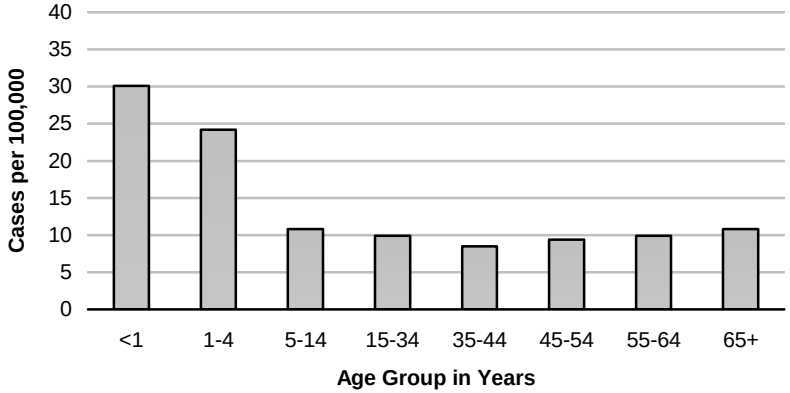


Figure 3. Reported Cases of Campylobacteriosis by Race/Ethnicity LAC, 2008

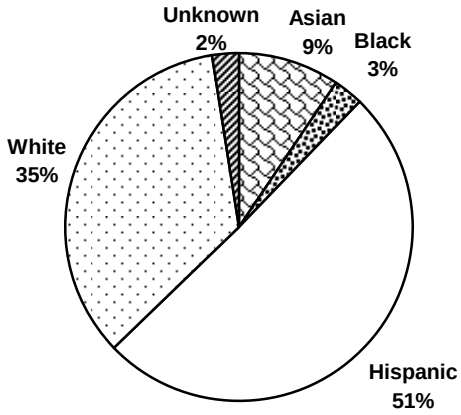


Figure 4. Reported Campylobacteriosis Rates by SPA LAC, 2008

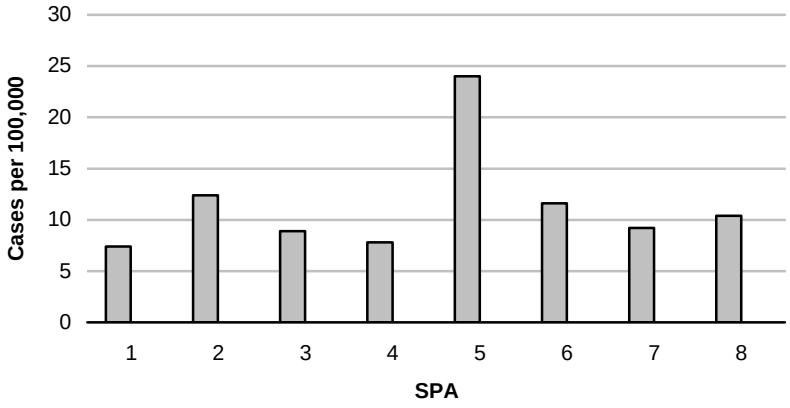


Figure 5. Reported Campylobacteriosis Cases by Month of Onset, LAC, 2008

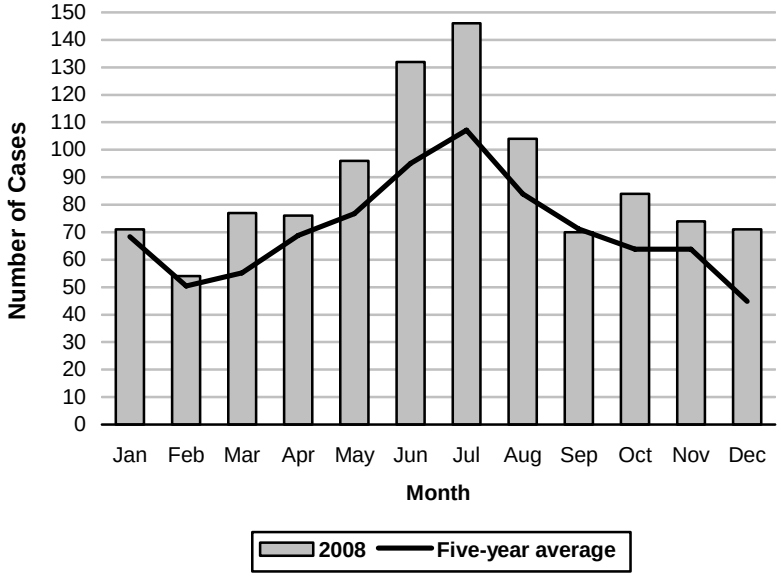
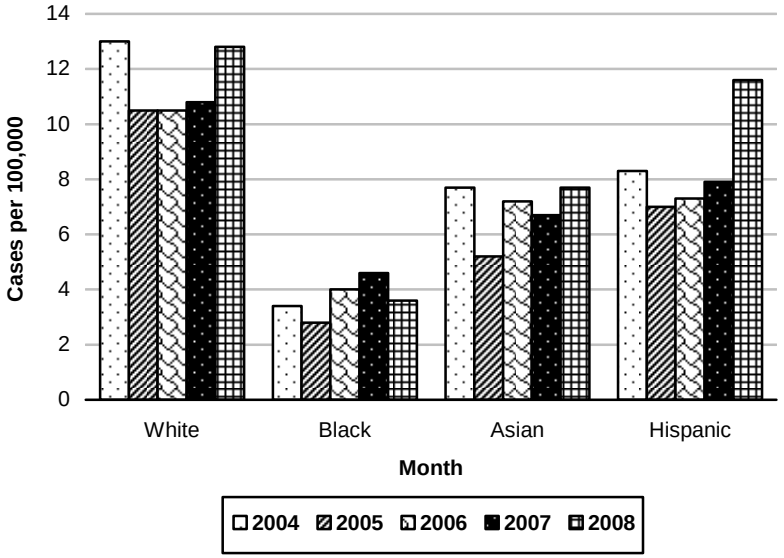
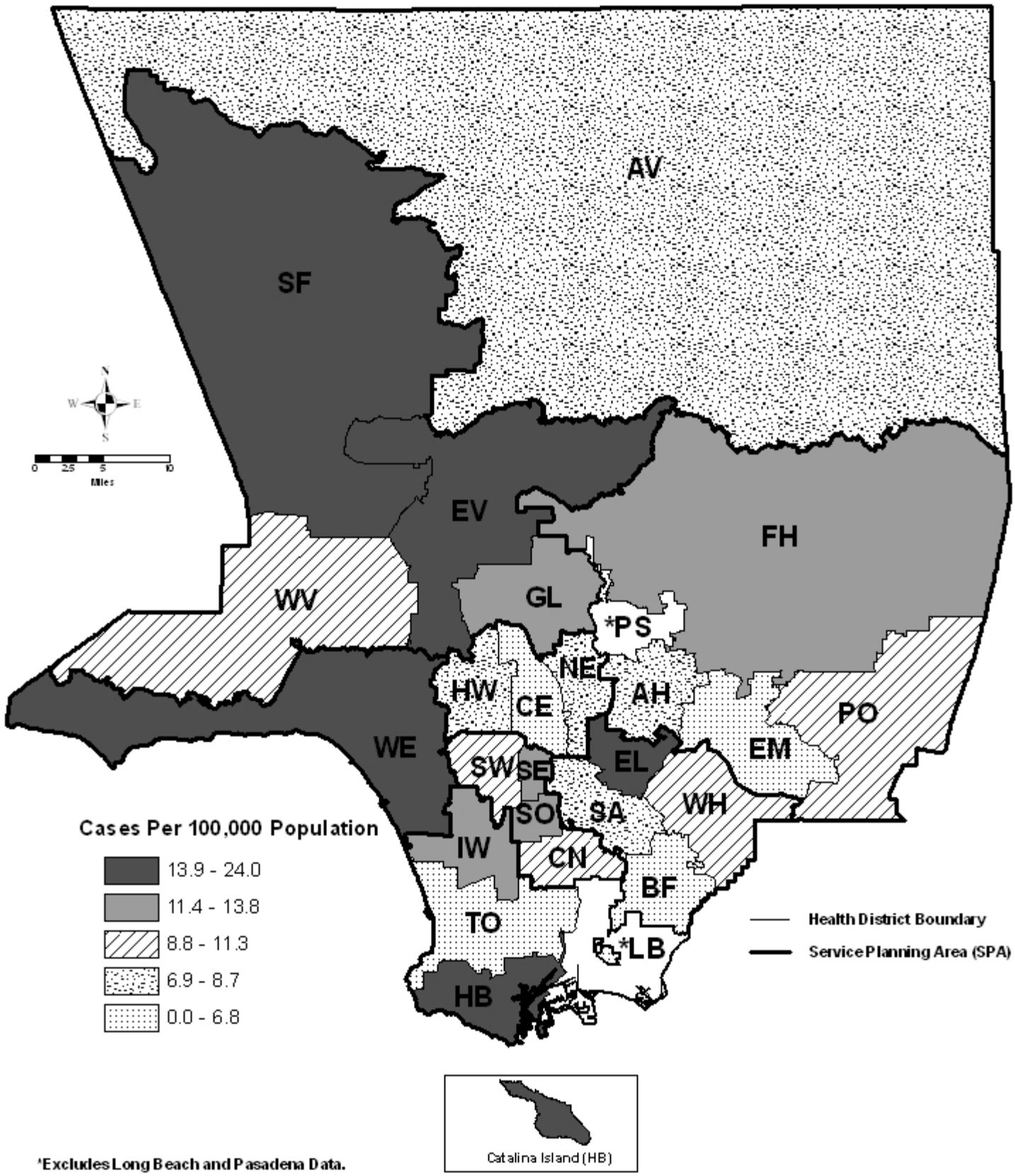


Figure 6. Campylobacteriosis Incidence by Race/Ethnicity LAC, 2004-2008



Map 2. Campylobacteriosis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

COCCIDIOIDOMYCOSIS

CRUDE DATA	
Number of Cases	228
Annual Incidence[a]	
LA County	2.3
California[b]	7.1
United States[b]	2.5
Age at Diagnosis	
Mean	50
Median	50
Range	10-90

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

DESCRIPTION

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

University of Arizona will launch a human clinical drug trial. “Nikkomycin Z, discovered in the 1970s, will be tested in Tucson on the people diagnosed with fresh cases of the valley fever to show the drug's safety and offer insights on its effectiveness,” said Dr. John Galgiani, Director of the Valley Fever Center for Excellence.

2008 TRENDS AND HIGHLIGHTS

- Overall, the Los Angeles County incidence rate for coccidioidomycosis has increased in the last ten years (Figure 1).
- Cases occurred primarily in adults with the greatest number of reported cases in ages 45 to 54 and 65+ years. The greatest incidence rate was in the 65+ age group (5 cases per 100,000) which is different than in previous years where the predominant age group was younger (Figure 2).
- Hispanics had the highest percentage of cases with 37.7% (n=86) in 2008 as compared to other racial groups. However, the incidence rate for blacks 4.3 cases per 100,000 (n=37) was highest as compared to other racial groups, which is consistent with previous years (Figure 3).
- Service Planning Area (SPA) 1 (Antelope Valley Health District) reported the highest incidence rate of coccidiodomycosis in LAC, 14.2 per 100,000 (n=52), which is consistent with previous years (Figure 4).
- Cases most commonly occurred in the fall, winter, and spring months, which is consistent with previous reports (Figure 5).
- On January 1, 2008, in concordance with the Council for State and Territorial Epidemiologists (CSTE) definitions, LAC began confirming cases with a single positive IgG serology and clinical symptoms.

Reported Coccidioidomycosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=133)			2005 (N=214)			2006 (N=196)			2007 (N=145)			2008 (N=228)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	1	0.5	0.7	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	1	0.5	0.2	1	0.7	0.2	0	0.0	0.0
5-14	1	0.8	0.1	3	1.4	0.2	3	1.5	0.2	4	2.8	0.3	6	2.6	0.4
15-34	35	26.3	1.2	52	24.3	1.9	51	26.0	1.8	27	18.6	1.0	41	18.0	1.4
35-44	33	24.8	2.2	50	23.4	3.3	30	15.3	2.0	30	20.7	2.0	33	14.5	2.2
45-54	33	24.8	2.7	49	22.9	3.9	42	21.4	3.2	37	25.5	2.8	58	25.4	4.3
55-64	20	15.0	2.5	27	12.6	3.2	32	16.3	3.7	26	17.9	2.9	38	16.7	4.2
65+	10	7.5	1.1	33	15.4	3.4	36	18.4	3.7	20	13.8	2.0	52	22.8	5.1
Unknown	1	0.8		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	11	8.3	0.9	15	7.0	1.2	15	7.7	1.2	10	6.9	0.8	27	11.8	2.1
Black	24	18.0	2.8	28	13.1	3.3	27	13.8	3.2	22	15.2	2.6	37	16.2	4.3
Hispanic	50	37.6	1.1	70	32.7	1.5	68	34.7	1.5	52	35.9	1.1	86	37.7	1.8
White	41	30.8	1.4	96	44.9	3.3	75	38.3	2.6	56	38.6	1.9	62	27.2	2.1
Other	1	0.8	3.6	0	0.0	0.0	3	1.5	10.5	1	0.7	4.8	1	0.4	4.1
Unknown	6	4.5		5	2.3		8	4.1		4	2.8		15	6.6	
SPA															
1	50	37.6	15.1	79	36.9	23.2	67	34.2	19.3	51	35.2	14.2	52	22.8	14.2
2	34	25.6	1.6	76	35.5	3.6	57	29.1	2.7	47	32.4	2.2	62	27.2	2.8
3	4	3.0	0.2	13	6.1	0.8	11	5.6	0.6	9	6.2	0.5	21	9.2	1.2
4	10	7.5	0.8	10	4.7	0.8	14	7.1	1.1	8	5.5	0.6	20	8.8	1.6
5	4	3.0	0.6	4	1.9	0.6	9	4.6	1.4	1	0.7	0.2	9	3.9	1.4
6	10	7.5	1.0	10	4.7	1.0	16	8.2	1.5	0	0.0	0.0	24	10.5	2.3
7	11	8.3	0.8	16	7.5	1.2	9	4.6	0.7	12	8.3	0.9	21	9.2	1.5
8	10	7.5	0.9	5	2.3	0.5	12	6.1	1.1	8	5.5	0.7	13	5.7	1.2
Unknown	0	0.0		1	0.5		1	0.5		9	6.2		6	2.6	

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

**Figure 1. Incidence Rates of Coccidioidomycosis
US, CA and LAC, 1999-2008**

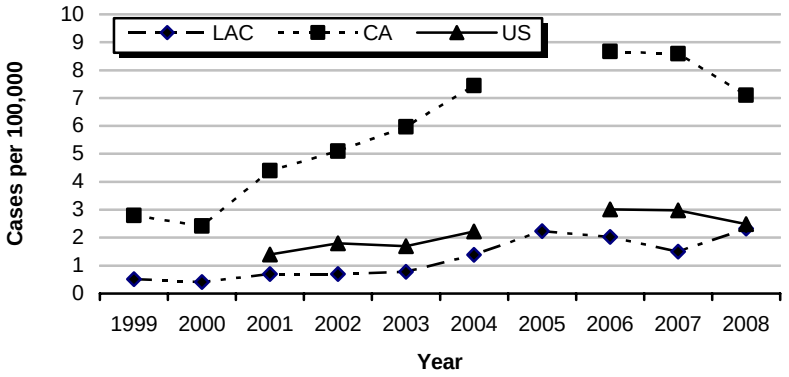


**Figure 2. Incidence Rates of Coccidioidomycosis by Age Group
LAC, 2008**

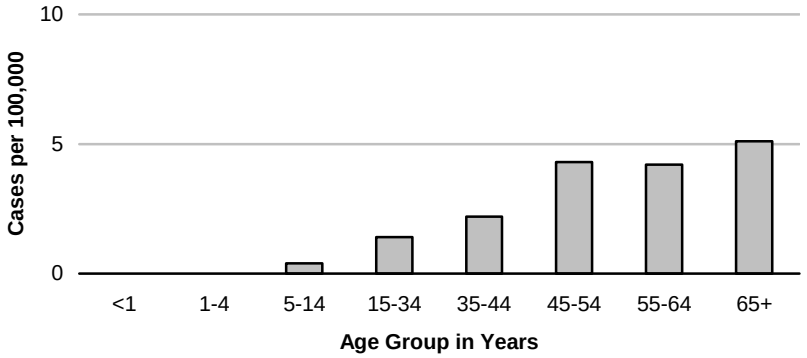


**Figure 3. Percent Cases of Coccidioidomycosis
by Race/Ethnicity, LAC, 2008**

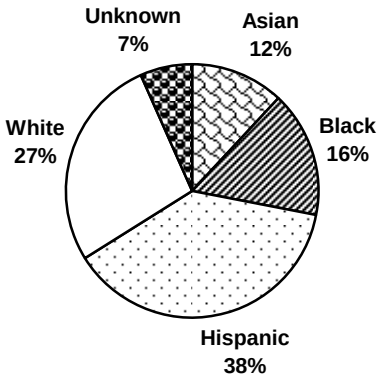


**Figure 4. Incidence Rates of Coccidioidomycosis by SPA
LAC, 2008**

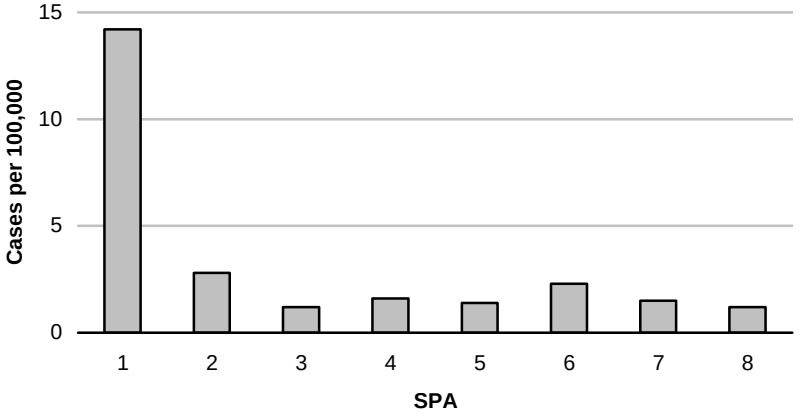


Figure 5. Reported Coccidioidomycosis Cases by Month of Onset, LAC, 2008

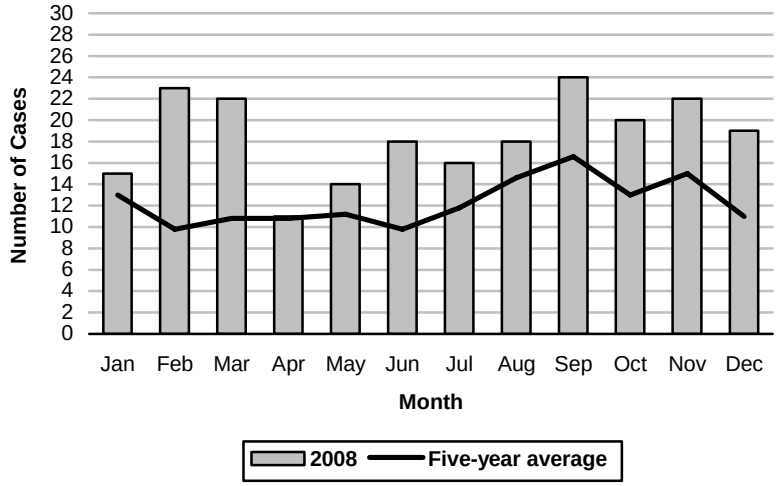
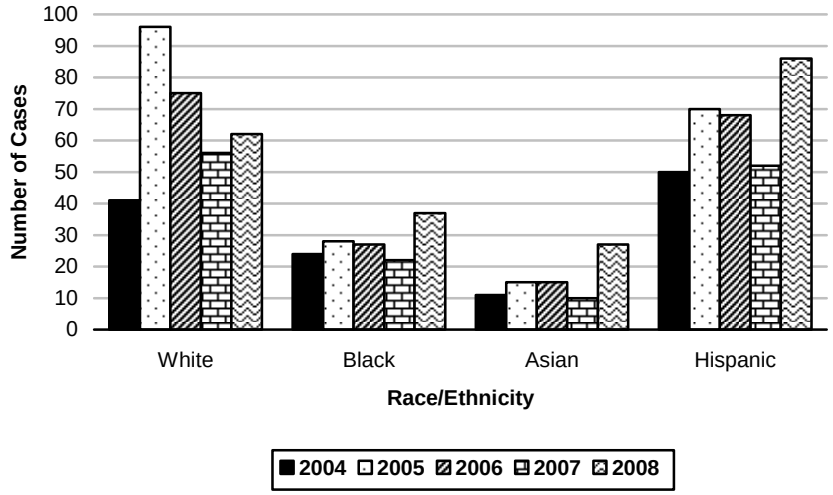
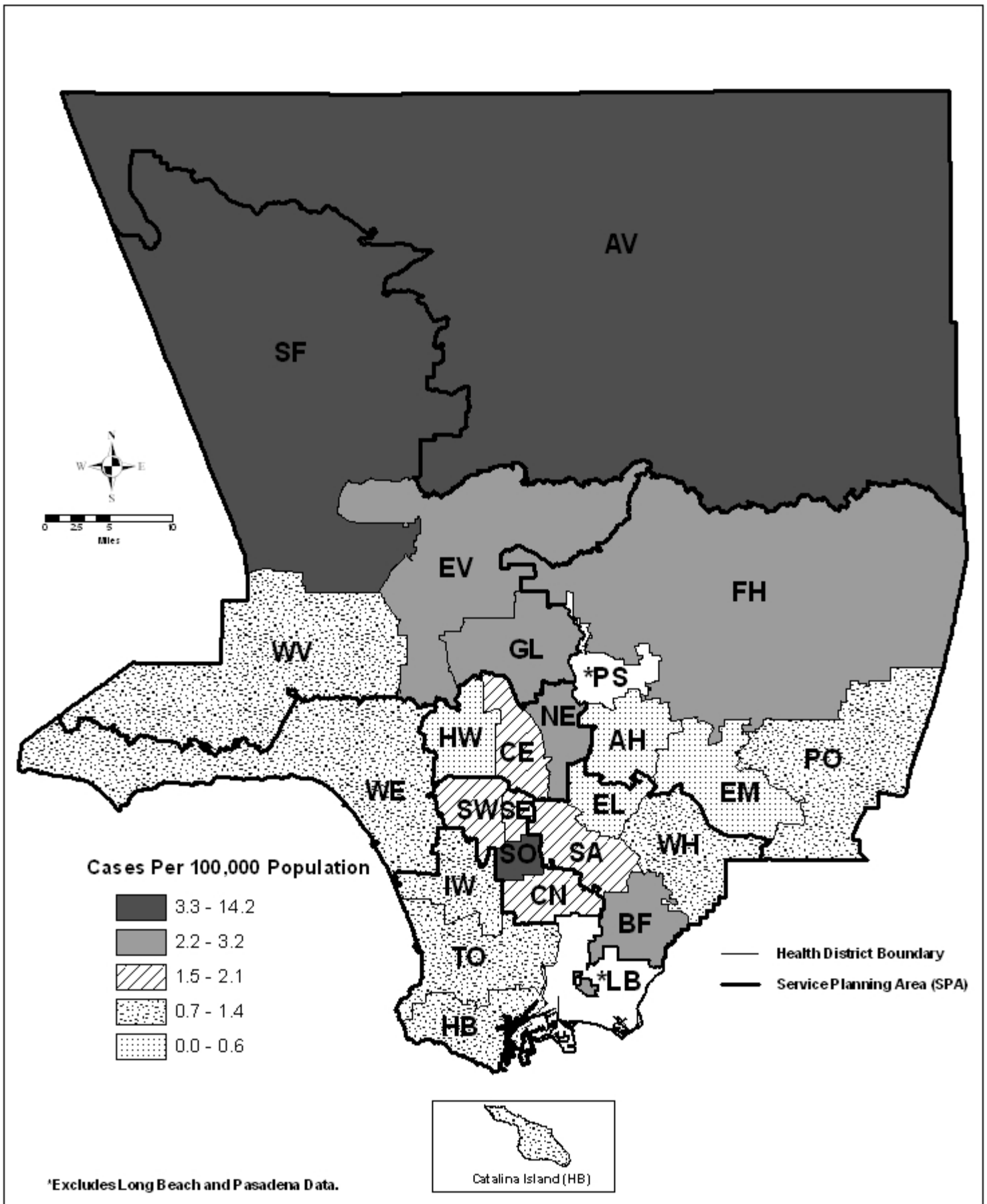


Figure 6. Coccidioidomycosis Cases by Race/Ethnicity LAC, 2004-2008



Map 3. Coccidiodomycosis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

CRYPTOSPORIDIOSIS

CRUDE DATA	
Number of Cases[a]	41
Annual Incidence	
LA County	0.42
California[b]	0.75
United States[b]	3.02
Age at Diagnosis	
Mean	32
Median	36
Range	3-78 years

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

DESCRIPTION

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

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

2008 TRENDS AND HIGHLIGHTS

- The incidence of cryptosporidiosis cases in Los Angeles County (LAC) decreased slightly in 2008 to 0.4 from 0.5 in 2007 (Figure 1).
- The age group with the highest incidence of cryptosporidiosis in LAC was the 35 to 44 year old age group, which had an incidence rate of 1 case per 100,000 (Figure 2). This age group has consistently had the highest incidence rate in previous reporting periods. The group with the second highest incidence rate was the 5 to 14 year age group, differing from previous years where the second highest incidence is reported in the 45 to 54 age group.
- Whites (12, 29%) accounted for a larger proportion of cases in 2008 than Hispanic cases (10, 24%). A great percentage (26%) of cases had unknown race/ethnicity data (Figure 3). The incidence rate for all race/ethnicity groups decreased in 2008 compared to 2007.
- Service Planning Area (SPA) 4 had the highest incidence rate, with 0.9 cases per 100,000; SPA 5 had the second highest incidence rate with 0.8 cases per 100,000. This differs from 2007 in which SPA 5 and SPA 2 had the highest incidence rates (Figure 4).
- In 2008, July was the month with the highest number of cases reported, although the previous five year average peak was in August (Figure 5).
- The male (28) to female (11) ratio for 2008 was 2.5:1; this is smaller than the 3.2:1 ratio in 2007.
- Complete risk factor data were available for 38 cases. The most frequently reported risk factor was contact with animals (13, 34%) the majority of which was contact with dogs at home. Other reported risk factors were HIV positive status (12, 32%), and travel (11, 29%).

Reported Cryptosporidiosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=56)			2005 (N=45)			2006 (N=48)			2007 (N=50)			2008 (N=41)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	4	7.1	0.7	1	2.2	0.2	1	2.1	0.2	2	4.0	0.3	2	4.9	0.4
5-14	6	10.7	0.4	1	2.2	0.1	4	8.3	0.3	4	8.0	0.3	7	17.1	0.5
15-34	12	21.4	0.4	10	22.2	0.4	7	14.6	0.3	15	30.0	0.5	10	24.4	0.3
35-44	18	32.1	1.2	20	44.4	1.3	22	45.8	1.5	13	26.0	0.9	15	36.6	1.0
45-54	10	17.9	0.8	7	15.6	0.6	5	10.4	0.4	10	20.0	0.8	4	9.8	0.3
55-64	6	10.7	0.8	4	8.9	0.5	6	12.5	0.7	1	2.0	0.1	1	2.4	0.1
65+	0	0.0	0.0	2	4.4	0.2	3	6.3	0.3	5	10.0	0.5	2	4.9	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	2	3.6	0.2	0	0.0	0.0	0	0.0	0.0	1	2.0	0.1	1	2.4	0.1
Black	13	23.2	1.5	10	22.2	1.2	8	16.7	0.9	7	14.0	0.8	5	12.2	0.6
Hispanic	20	35.7	0.4	16	35.6	0.4	20	41.7	0.4	8	16.0	0.2	10	24.4	0.2
White	17	30.4	0.6	15	33.3	0.5	16	33.3	0.6	29	58.0	1.0	12	29.3	0.4
Other	0	0.0	0.0	0	0.0	0.0	2	4.2	7.0	2	4.0	9.6	2	4.9	8.1
Unknown	4	7.1		4	8.9		2	4.2		3	6.0		11	26.8	
SPA															
1	5	8.9	1.5	0	0.0	0.0	4	8.3	1.2	3	6.0	0.8	2	4.9	0.5
2	9	16.1	0.4	10	22.2	0.5	13	27.1	0.6	19	38.0	0.9	14	34.1	0.6
3	5	8.9	0.3	4	8.9	0.2	3	6.3	0.2	3	6.0	0.2	0	0.0	0.0
4	20	35.7	1.6	18	40.0	1.4	13	27.1	1.0	7	14.0	0.6	12	29.3	0.9
5	4	7.1	0.6	3	6.7	0.5	2	4.2	0.3	7	14.0	1.1	5	12.2	0.8
6	5	8.9	0.5	4	8.9	0.4	3	6.3	0.3	1	2.0	0.1	1	2.4	0.1
7	4	7.1	0.3	4	8.9	0.3	8	16.7	0.6	3	6.0	0.2	3	7.3	0.2
8	4	7.1	0.4	2	4.4	0.2	1	2.1	0.1	7	14.0	0.6	4	9.8	0.4
Unknown	0	0.0		0	0.0		1	2.1		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Cryptosporidiosis US, CA and LAC, 1999-2008

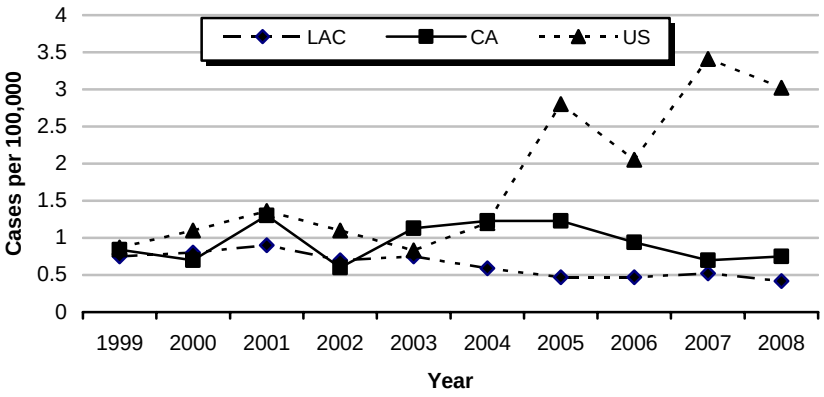


Figure 2. Incidence Rates of Cryptosporidiosis by Age Group, LAC, 2008

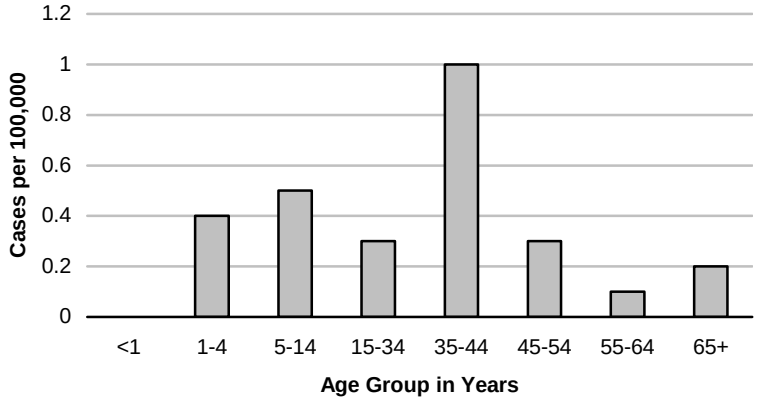
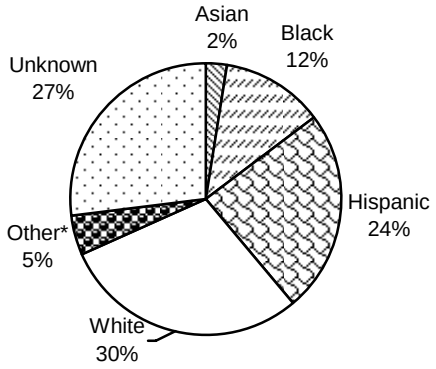


Figure 3. Percent Cases of Cryptosporidiosis by Race/Ethnicity LAC, 2008



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

Figure 4. Incidence Rates of Cryptosporidiosis by SPA LAC, 2008

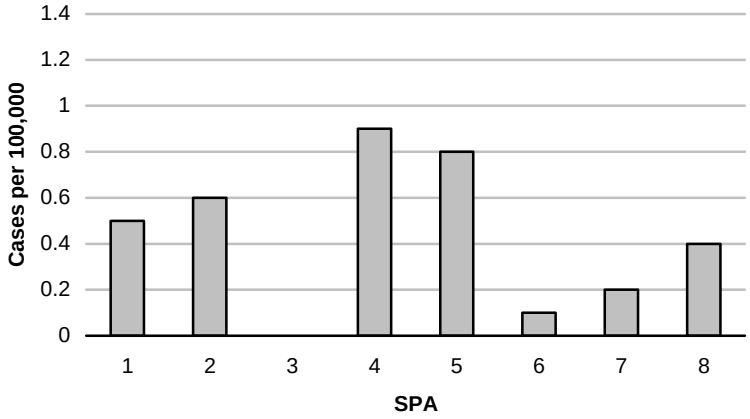


Figure 5. Reported Cryptosporidiosis Cases by Month of Onset LAC, 2008

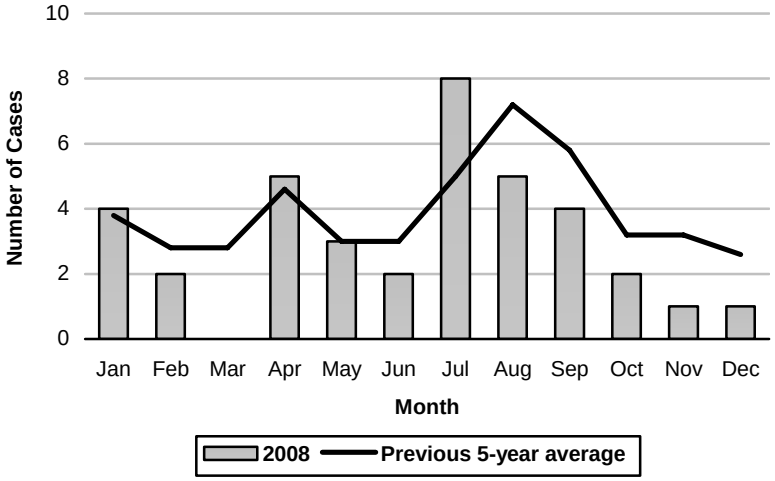
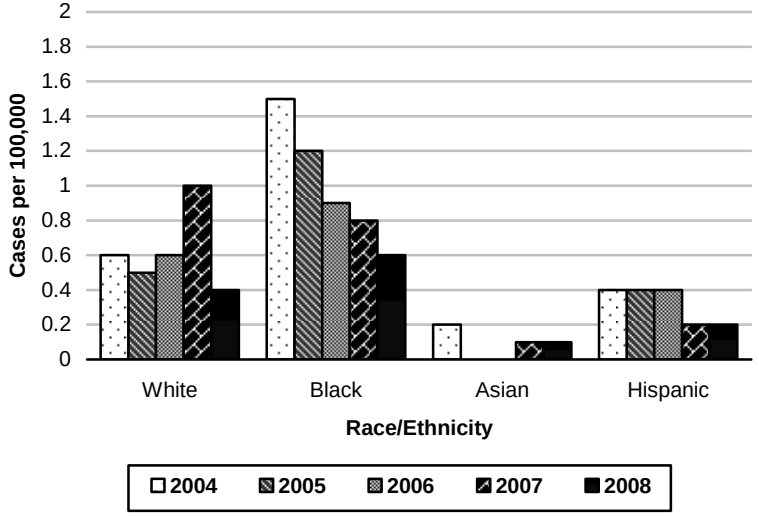


Figure 6. Cryptosporidiosis Incidence by Race/Ethnicity LAC, 2004-2008



ENCEPHALITIS

CRUDE DATA	
Number of Cases	89
Annual Incidence[a]	
LA County	0.91
California	N/A
United States	N/A
Age at Diagnosis	
Mean	46 years
Median	58 years
Range	6 months-85 years

[a]Cases per 100,000 population.

DESCRIPTION

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

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

2008 TRENDS AND HIGHLIGHTS

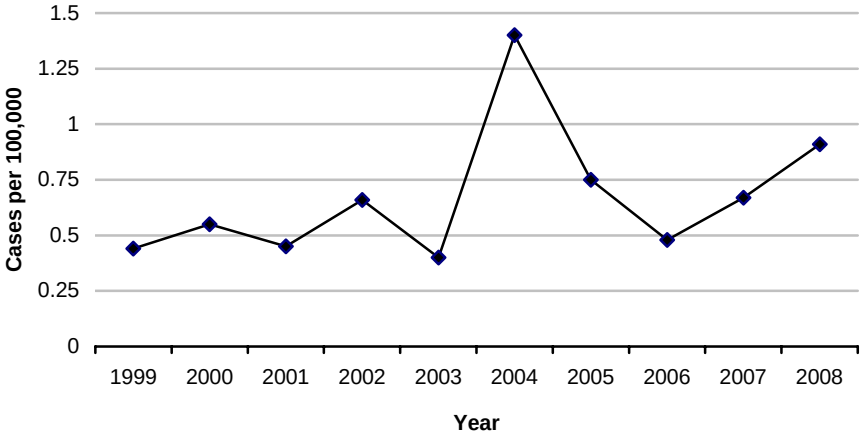
- Encephalitis cases were reported from the California Encephalitis Project (http://ceip.us/encephalitis.htm) and the local confidential morbidity reporting system, and include WNV- associated encephalitis.
- Eighty- nine cases of encephalitis of probable viral etiology were reported in 2008. This is a 27% increase in 2008 encephalitis cases compared to 2007 when 65 cases were reported. The increase in overall related encephalitis cases is most likely related to the increase in WNV-associated infections in 2008 compared to previous seasons from 2005 to 2007.
- The most frequent underlying etiology for encephalitis cases was WNV accounting for 48 (54%) cases followed by herpes simplex virus (HSV) 1 with 6 (7%) of cases.
- Twenty-one (24%) encephalitis cases were reported to Los Angeles County from the California Encephalitis Project. Despite a thorough work-up, 18 (86%) cases had no definitive infectious disease etiology. Only three cases had presumed underlying etiologies (one case with HSV 6 infection and two cases with mycoplama infection).
- The majority of encephalitis cases were reported from July to October, 66 (77%) cases, most likely due to circulating WNV infection.
- The greatest incidence of encephalitis was in the <1 year old group (2.9 cases per 100,000) followed by those 65 years and older (3.2 cases per 100,000 population).

Reported Encephalitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=133)			2005 (N=70)			2006 (N=46)			2007 (N=65)			2008 (N=89)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	4	3.0	2.8	3	4.3	2.1	2	4.3	1.4	3	4.6	2.0	4	4.5	2.9
1-4	6	4.5	1.0	6	8.6	1.0	8	17.4	1.4	6	9.2	1.0	8	9.0	1.4
5-14	18	13.5	1.2	19	27.1	1.3	8	17.4	0.5	13	20.0	0.9	14	15.7	1.0
15-34	17	12.8	0.6	11	15.7	0.4	15	32.6	0.5	15	23.1	0.5	4	4.5	0.1
35-44	12	9.0	0.8	7	10.0	0.5	3	6.5	0.2	2	3.1	0.1	1	1.1	0.1
45-54	9	6.8	0.7	7	10.0	0.6	4	8.7	0.3	6	9.2	0.5	11	12.4	0.8
55-64	16	12.0	2.0	1	1.4	0.1	1	2.2	0.1	7	10.8	0.8	14	15.7	1.5
65+	47	35.3	5.0	15	21.4	1.6	5	10.9	0.5	10	15.4	1.0	33	37.1	3.2
Unknown	4	3.0		1	1.4		0	0.0		3	4.6		0	0.0	
Race / Ethnicity															
Asian	9	6.8	0.7	11	15.7	0.9	4	8.7	0.3	7	10.8	0.5	3	3.4	0.2
Black	8	6.0	0.9	5	7.1	0.6	8	17.4	0.9	5	7.7	0.6	5	5.6	0.6
Hispanic	45	33.8	1.0	32	45.7	0.7	20	43.5	0.4	31	47.7	0.7	40	44.9	0.9
White	63	47.4	2.2	22	31.4	0.8	12	26.1	0.4	19	29.2	0.7	38	42.7	1.3
Other	2	1.5	7.2	0	0.0	0.0	1	2.2	3.5	0	0.0	0.0	1	1.1	4.1
Unknown	6	4.5		0	0.0		1	2.2		3	4.6		2	2.2	
SPA															
1	5	3.8	1.5	3	4.3	0.9	5	10.9	1.4	3	4.6	0.8	3	3.4	0.8
2	33	24.8	1.6	21	30.0	1.0	8	17.4	0.4	20	30.8	0.9	9	10.1	0.4
3	35	26.3	2.1	6	8.6	0.4	12	26.1	0.7	7	10.8	0.4	25	28.1	1.4
4	7	5.3	0.6	6	8.6	0.5	3	6.5	0.2	5	7.7	0.4	10	11.2	0.8
5	2	1.5	0.3	2	2.9	0.3	1	2.2	0.2	1	1.5	0.2	0	0.0	0.0
6	10	7.5	1.0	3	4.3	0.3	1	2.2	0.1	6	9.2	0.6	3	3.4	0.3
7	18	13.5	1.3	12	17.1	0.9	8	17.4	0.6	6	9.2	0.4	16	18.0	1.2
8	11	8.3	1.0	13	18.6	1.2	8	17.4	0.7	13	20.0	1.2	9	10.1	0.8
Unknown	12	9.0		4	5.7		0	0.0		4	6.2		14	15.7	

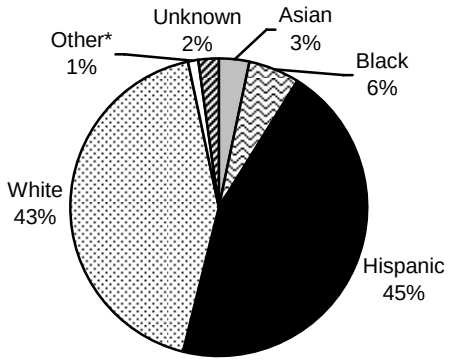
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates* of Encephalitis
LAC, 1999-2008



*See text for limitations.

Figure 2. Percent Cases of Encephalitis by Race/Ethnicity
LAC, 2008



* 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, 2008

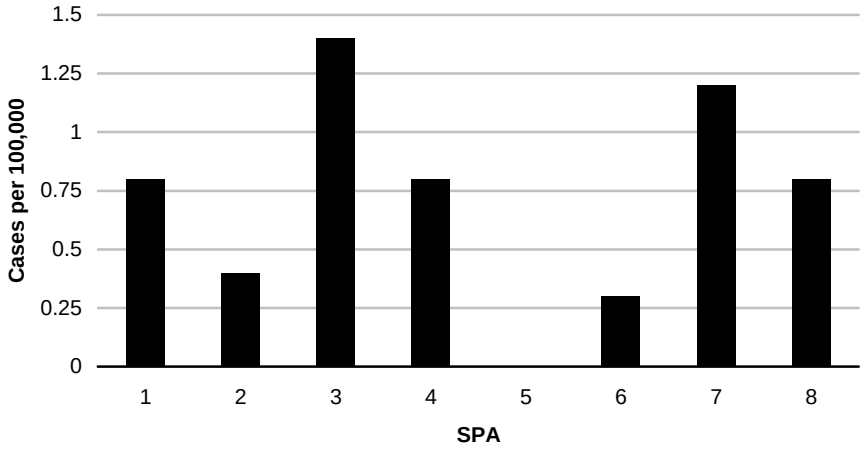


Figure 4. Reported Encephalitis Cases by Month of Onset
LAC, 2008

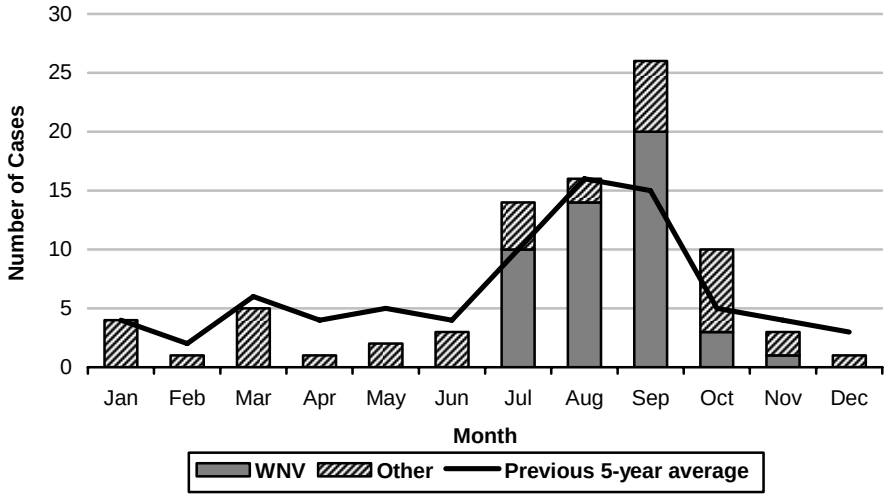
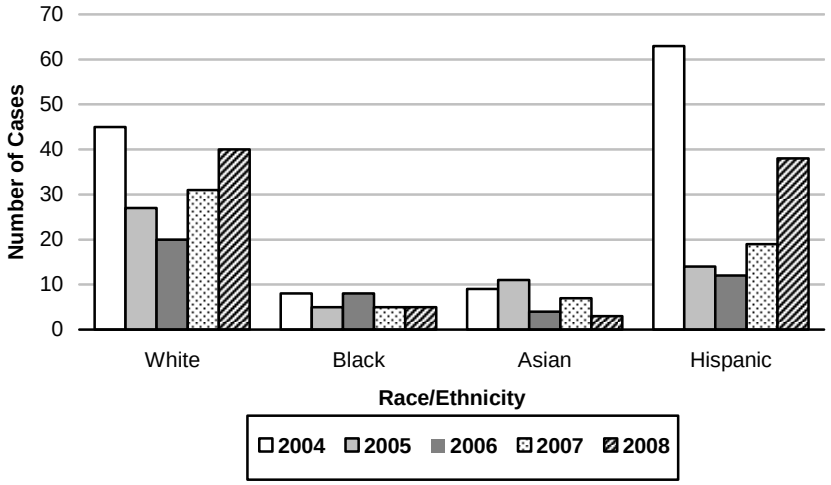
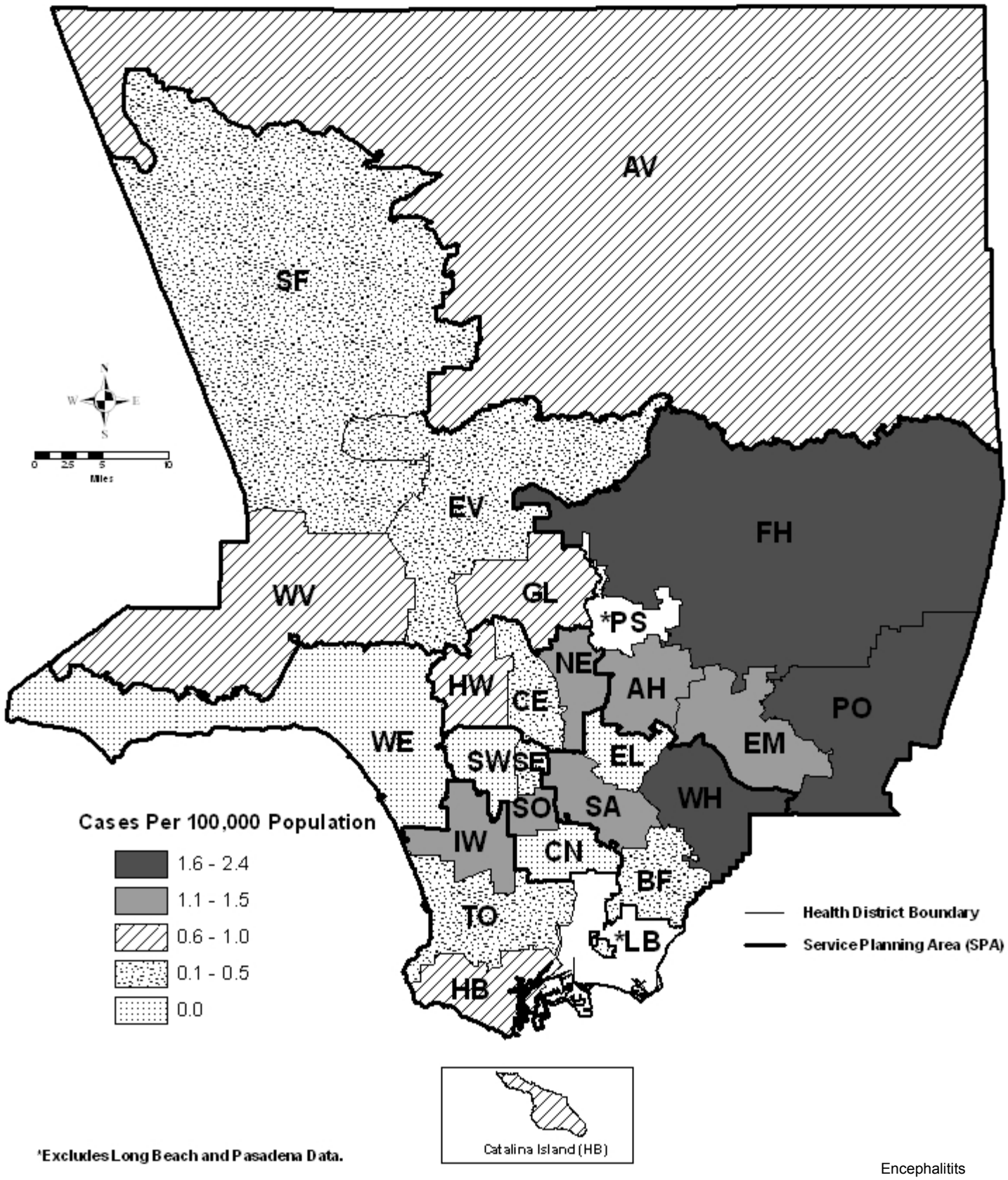


Figure 5. Reported Encephalitis Cases by Race/Ethnicity LAC, 2004-2008



Map 4. Encephalitis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

ESCHERICHIA COLI O157:H7 / HEMOLYTIC UREMIC SYNDROME

CRUDE DATA	
Number of Cases	16
Annual Incidence[a]	
LA County	0.16[b]
California	0.77[c]
United States	1.76 [c]
Age at Diagnosis	
Mean	21.68
Median	10
Range	0-80

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

DESCRIPTION

Escherichia coli O157:H7, a Gram-negative bacillus, is a specific serotype of the shiga toxin producing class of *E. coli* (STEC) and the most common such serotype in the US. Shiga toxins cause abdominal cramps and watery diarrhea, often developing into bloody diarrhea; fever is uncommon. Incubation period is 2 to 8 days. Likely modes of transmission include foodborne (e.g., undercooked ground beef, fresh produce, unpasteurized juice, and raw milk) and person-to-person (e.g., daycare settings). There also have been outbreaks associated with exposure to animals and their environments and recreational water exposure. All *E.coli* O157:H7 isolates are confirmed by the Los Angeles County Public Health Laboratory.

Hemolytic uremic syndrome (HUS) is a disease diagnosed clinical that may or may not be associated with *E. coli* O157:H7 infection. Children younger than five years of age are at highest risk for HUS, consisting of hemolytic anemia, thrombocytopenia, and kidney failure. Adults may develop a related condition called thrombotic thrombocytopenic purpura (TTP) after infection 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. The strengthening of national food processing regulations to decrease contamination is also important to reduce infection.

2008 TRENDS AND HIGHLIGHTS

- There was a 33% (n=16) increase in the frequency of confirmed *E. coli* O157:H7 case in 2008 (Figure1).
- There were 13 cases of other STEC (non-O157:H7) reported with different serotypes.
- Two HUS cases were reported; one case was laboratory confirmed with *E. coli* O157:H7.
- No reported outbreaks related *E. coli* O157:H7 nor non-*E.coli* O157:H7.
- The number of cases increased in ages 15 to 34 (Figure 2).
- There was an increase in black cases due to a family cluster; however, the highest number of cases continues to be observed among the whites. (Figure 3 and 6).
- SPA 5 had an increase in cases due to a family cluster (Figure 4).
- The monthly incidence in October peaked above the previous five-year average due to a family cluster (Figure 5).

Reported *Escherichia coli* O157:H7 Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=18)			2005 (N=13)			2006 (N=12)			2007 (N=12)			2008 (N=16)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	6.3	0.7
1-4	1	5.6	0.2	2	15.4	0.3	5	41.7	0.9	6	50.0	1.0	4	25.0	0.7
5-14	4	22.2	0.3	4	30.8	0.3	3	25.0	0.2	3	25.0	0.2	3	18.8	0.2
15-34	8	44.4	0.3	5	38.5	0.2	4	33.3	0.1	0	0.0	0.0	4	25.0	0.1
35-44	1	5.6	0.1	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1
45-54	0	0.0	0.0	1	7.7	0.1	0	0.0	0.0	1	8.3	0.1	1	6.3	0.1
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	1	5.6	0.1	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	2	12.5	0.2
Unknown	3	16.7		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	6	33.3	0.5	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	25.0	0.4	5	31.3	0.6
Hispanic	2	11.1	0.0	1	7.7	0.0	3	25.0	0.1	5	41.7	0.1	5	31.3	0.1
White	10	55.6	0.3	12	92.3	0.4	7	58.3	0.2	4	33.3	0.1	6	37.5	0.2
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	8.3		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	1	7.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	7	38.9	0.3	1	7.7	0.0	6	50.0	0.3	3	25.0	0.1	5	31.3	0.2
3	5	27.8	0.3	1	7.7	0.1	3	25.0	0.2	2	16.7	0.1	1	6.3	0.1
4	1	5.6	0.1	1	7.7	0.1	1	8.3	0.1	0	0.0	0.0	3	18.8	0.2
5	1	5.6	0.2	2	15.4	0.3	0	0.0	0.0	2	16.7	0.3	6	37.5	0.9
6	0	0.0	0.0	1	7.7	0.1	0	0.0	0.0	2	16.7	0.2	0	0.0	0.0
7	1	5.6	0.1	2	15.4	0.1	1	8.3	0.1	1	8.3	0.1	0	0.0	0.0
8	3	16.7	0.3	4	30.8	0.4	1	8.3	0.1	2	16.7	0.2	1	6.3	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Number Cases of *E. coli* O157:H7
LAC, 1999-2008

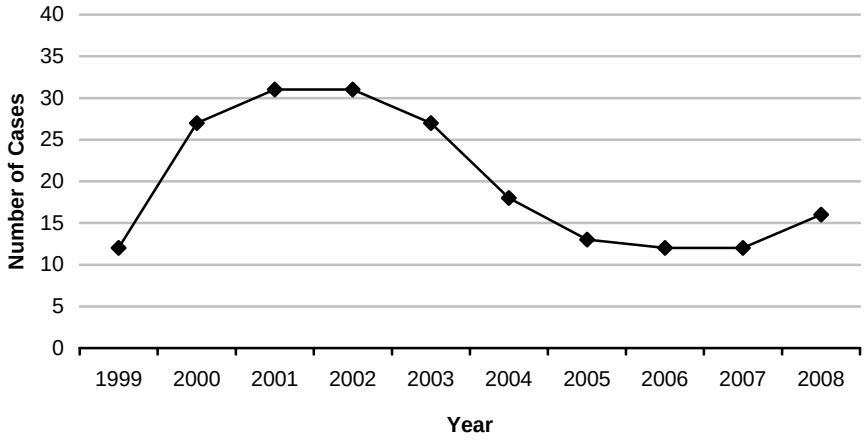


Figure 2. Reported Cases of *E. coli* O157:H7 by Age Group
LAC, 2008

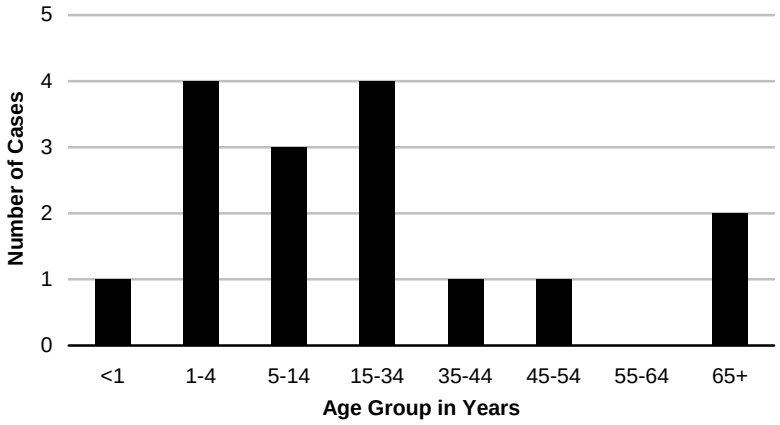


Figure 3. Percent Cases of *E. coli* O157:H7
by Race/Ethnicity, LAC, 2008

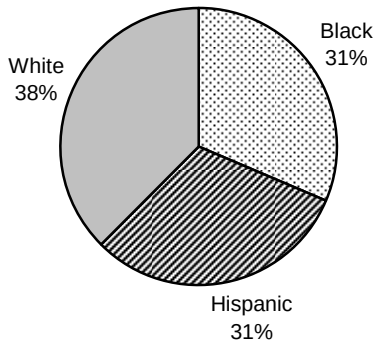


Figure 4. Reported Cases of *E. coli* O157:H7 by SPA
LAC, 2008

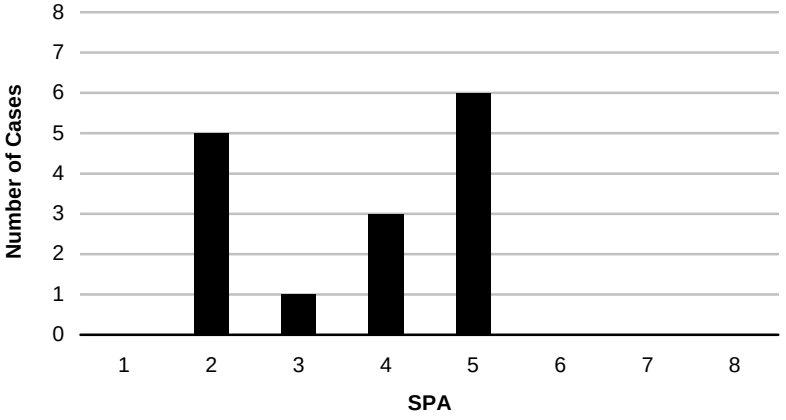


Figure 5. Reported *E. coli* O157:H7 Cases by Month of Onset, LAC, 2008

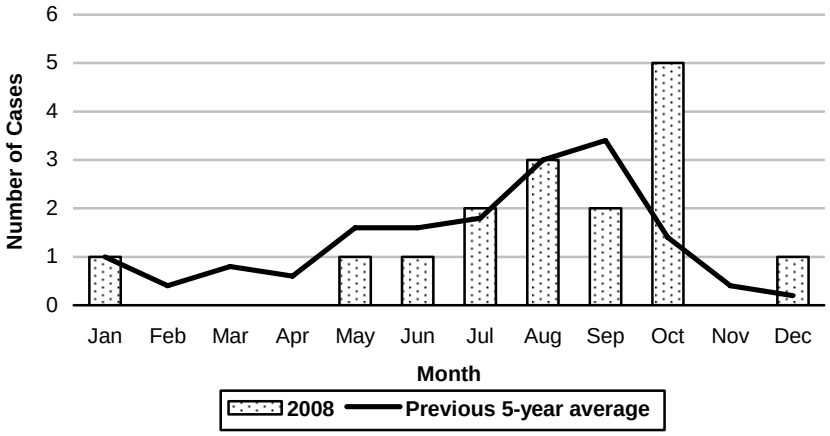
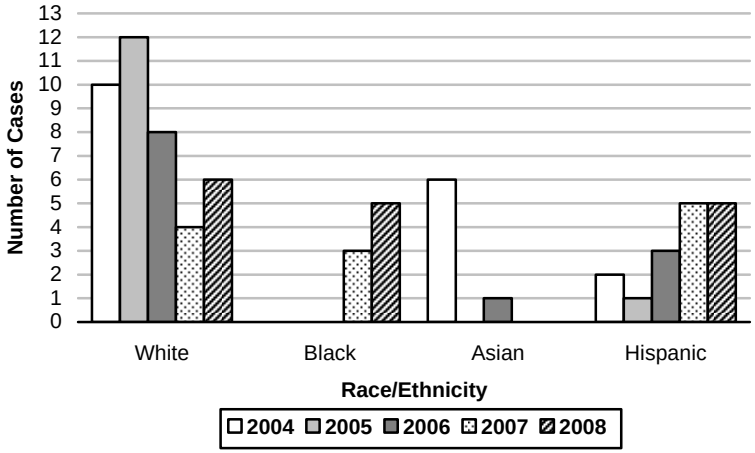


Figure 6. *E. coli* O157:H7 Incidence by Race/Ethnicity LAC, 2004-2008



GIARDIASIS

CRUDE DATA	
Number of Cases	355
Annual Incidence[a]	
LA County	3.63
California[b]	5.52
United States[b]	6.27
Age at Diagnosis	
Mean	32
Median	33
Range	<1-94

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

DESCRIPTION

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

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

2008 TRENDS AND HIGHLIGHTS

- Giardiasis incidence decreased in 2008 to 3.6 cases per 100,000 residents compared to 4.6 cases per 100,000 residents in 2007 (Figure 1).
- The highest age-specific incidence rate occurred among children aged 1 to 4 years; the highest total number of cases was reported in the 15 to 34 year age group (Figure 2).
- Whites continue to have higher race/ethnicity specific incidence rates and percent cases compared to other races (Figure 3).
- Within Los Angeles County (LAC), Service Planning Area (SPA) 2 reported the highest incidence rate of giardiasis with 7.4 cases per 100,000; the second highest incidence rate was reported from SPA 5 (5.7 per 100,000) (Figure 4). This is a change from the previous reporting period in which SPA 5 had the highest incidence rate and SPA 2 the second highest.
- The number of cases reported in 2008 peaked in April, differing from the previous five-year average where cases tended to peak in the summer months (Figure 5).
- The male to female ratio was 2.5:1; males have consistently accounted for a larger proportion of cases in previous reporting periods.
- The most frequently reported risk factor in 2008 was immigration to the US (130, 37%); half of immigrant cases were from Iran. Contact with animals was also reported among a large proportion of cases (120, 34%), as well as outdoor recreational activities (76, 21%). These risk factors are consistent with risk factor information for other waterborne parasitic diseases reported in LAC.

Reported Giardiasis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=320)			2005 (N=313)			2006 (N=376)			2007 (N=441)			2008 (N=355)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	6	1.9	4.2	3	1.0	2.1	0	0.0	0.0	3	0.7	2.0	4	1.1	2.9
1-4	57	17.8	9.9	37	11.8	6.4	47	12.5	8.1	61	13.8	10.6	45	12.7	7.9
5-14	61	19.1	4.1	56	17.9	3.8	66	17.6	4.5	66	15.0	4.6	41	11.5	2.9
15-34	59	18.4	2.1	62	19.8	2.2	105	27.9	3.8	126	28.6	4.5	96	27.0	3.3
35-44	64	20.0	4.3	58	18.5	3.8	66	17.6	4.4	76	17.2	5.1	63	17.7	4.2
45-54	31	9.7	2.5	42	13.4	3.3	47	12.5	3.6	62	14.1	4.7	62	17.5	4.6
55-64	20	6.3	2.5	31	9.9	3.7	29	7.7	3.3	30	6.8	3.4	27	7.6	3.0
65+	22	6.9	2.3	23	7.3	2.4	15	4.0	1.5	17	3.9	1.7	17	4.8	1.7
Unknown		0.0		1	0.3		1	0.3			0.0			0.0	
Race / Ethnicity															
Asian	34	10.6	2.7	20	6.4	1.6	36	9.6	2.8	33	7.5	2.6	21	5.9	1.6
Black	15	4.7	1.8	17	5.4	2.0	26	6.9	3.1	24	5.4	2.8	16	4.5	1.9
Hispanic	118	36.9	2.6	101	32.3	2.2	137	36.4	3.0	133	30.2	2.9	106	29.9	2.3
White	129	40.3	4.4	149	47.6	5.1	149	39.6	5.2	195	44.2	6.7	167	47.0	5.7
Other	13	4.1	46.7	4	1.3	14.2	7	1.9	24.5	13	2.9	62.4	5	1.4	20.3
Unknown	11	3.4		22	7.0		21	5.6		43	9.8		40	11.3	
SPA															
1	13	4.1	3.9	9	2.9	2.6	11	2.9	3.2	4	0.9	1.1	8	2.3	2.2
2	87	27.2	4.1	94	30.0	4.4	124	33.0	5.8	170	38.5	7.9	161	45.4	7.4
3	51	15.9	3.0	43	13.7	2.5	46	12.2	2.7	45	10.2	2.6	34	9.6	2.0
4	61	19.1	4.9	48	15.3	3.8	57	15.2	4.5	63	14.3	5.0	36	10.1	2.8
5	44	13.8	6.9	34	10.9	5.3	44	11.7	6.9	57	12.9	8.9	37	10.4	5.7
6	17	5.3	1.7	23	7.3	2.2	34	9.0	3.3	26	5.9	2.5	27	7.6	2.6
7	22	6.9	1.6	30	9.6	2.2	30	8.0	2.2	42	9.5	3.0	25	7.0	1.8
8	24	7.5	2.2	32	10.2	2.9	27	7.2	2.4	32	7.3	2.9	26	7.3	2.3
Unknown	1	0.3		0	0.0		3	0.8		2	0.5		1	0.3	

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

Figure 1. Incidence Rates of Giardiasis
US, CA and LAC, 1999-2008

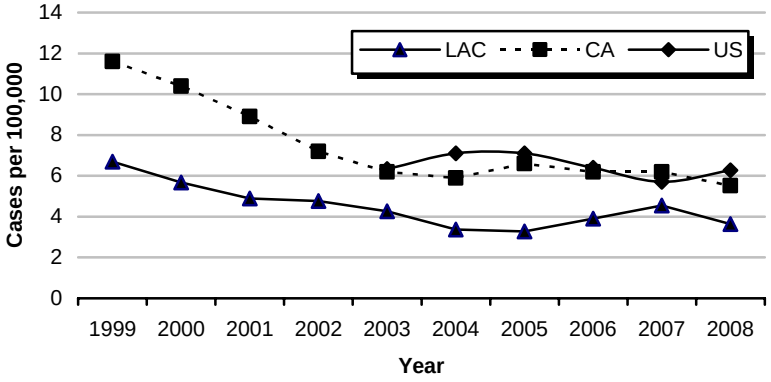


Figure 2. Incidence Rates of Giardiasis by Age Group
LAC, 2008

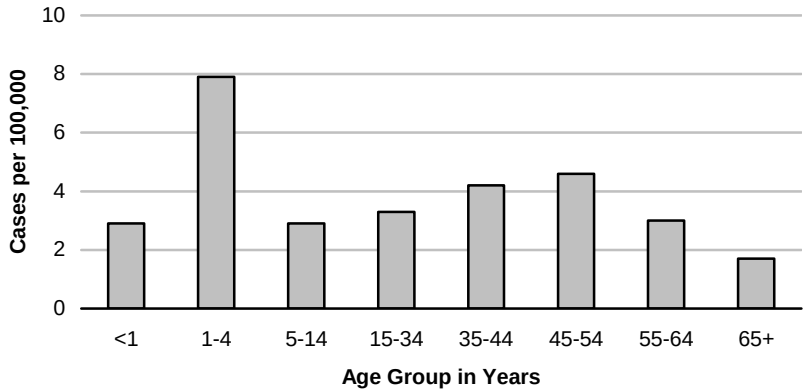


Figure 3. Percent Cases of Giardiasis by Race/Ethnicity
LAC, 2008

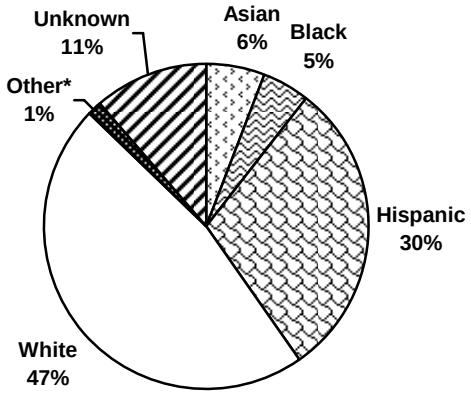
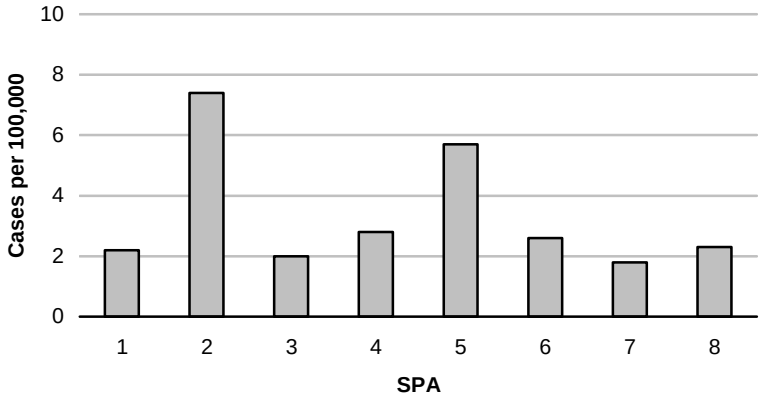


Figure 4. Incidence Rates of Giardiasis by SPA
LAC, 2008



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

Figure 5. Reported Giardiasis Cases by Month of Onset
LAC, 2008

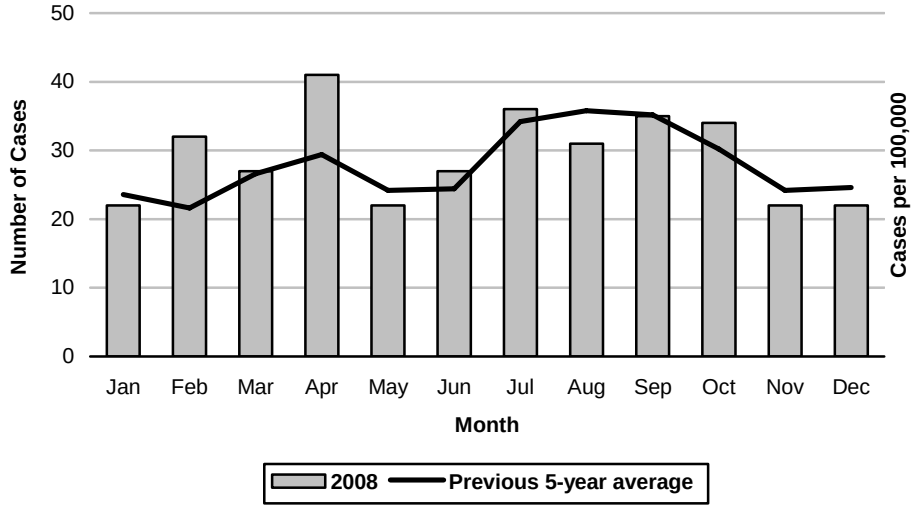
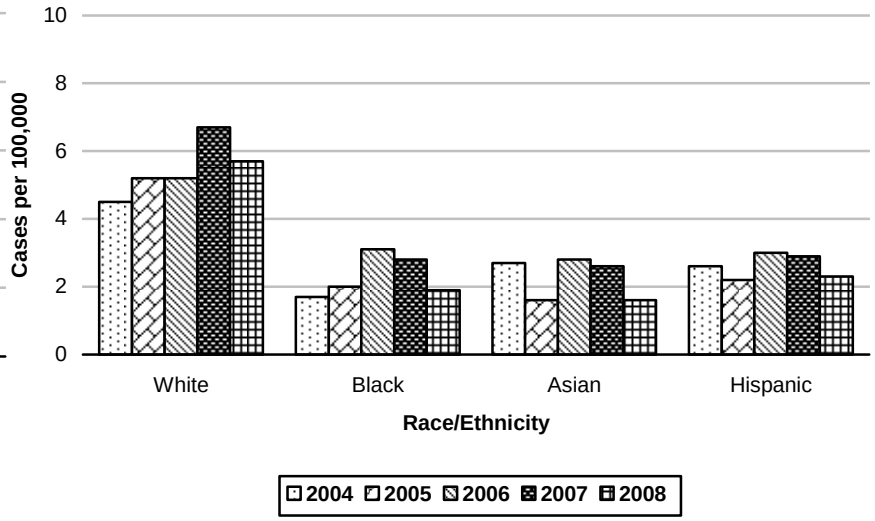
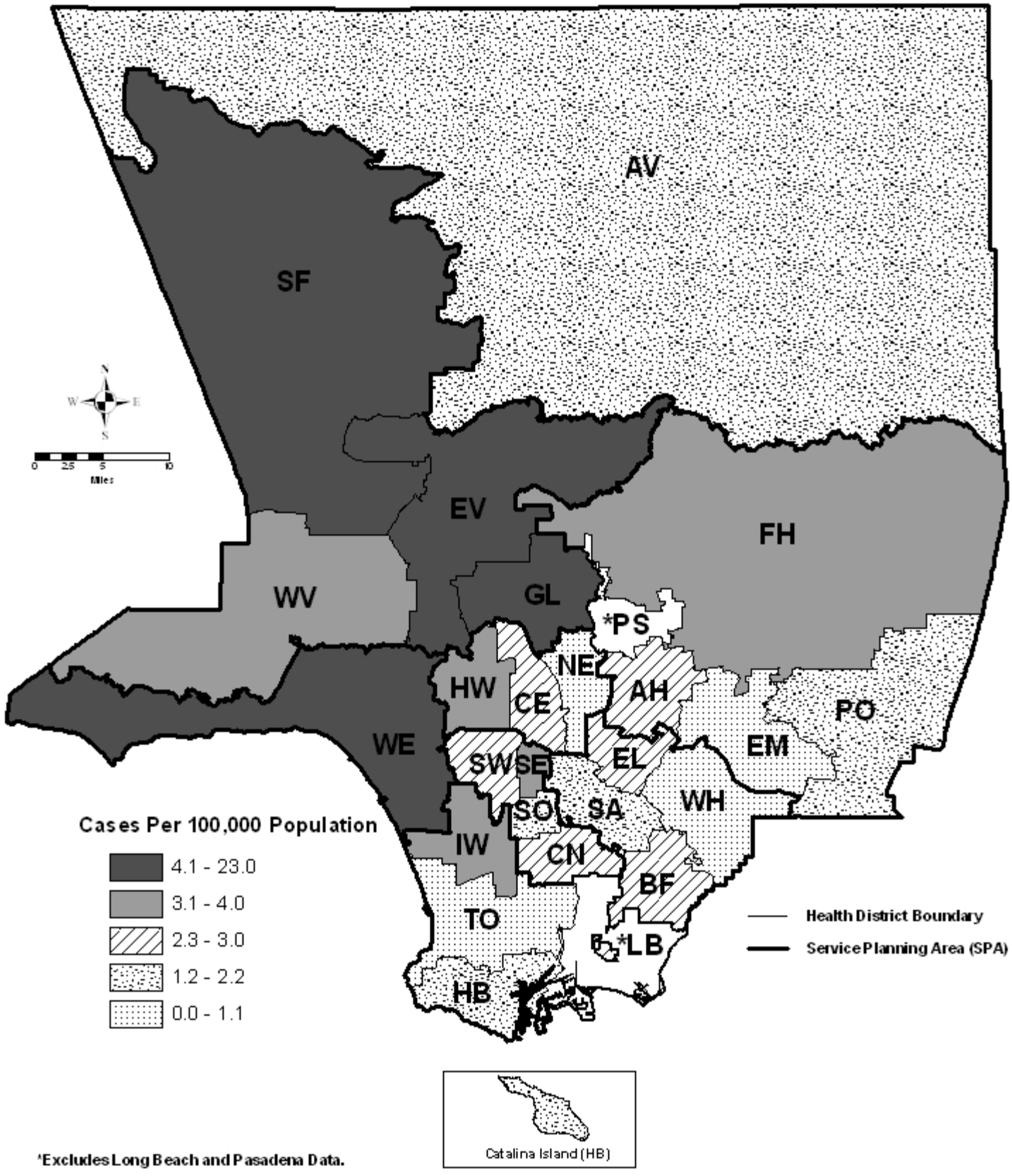


Figure 6. Giardiasis Incidence by Race/Ethnicity
LAC, 2004-2008



Map 5. Giardiasis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

HAEMOPHILUS INFLUENZAE INVASIVE DISEASE

CRUDE DATA	
Number of Cases	64
Annual Incidence[a]	
LA County	0.65
California[b]	0.13
United States[c]	0.96
Age at Diagnosis	
Mean	54.1 years
Median	57.0 years
Range	<1 – 99 years

[a]Cases per 100,000 population.
[b]Cases per 100,000 persons, aged less than 15 years.
[c]Calculated from Final 2008 Reports of Nationally Notifiable Infectious Disease, MMWR 58(31);856-857;859-869.

DESCRIPTION

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

Immunization Recommendations:

- Prior to the introduction of the Hib conjugate vaccine in 1990, most cases of invasive disease in children were caused by serotype B.
- All infants, including those born prematurely, can receive a primary series of conjugate Hib vaccine beginning at 2 months of age. The number of doses (2 or 3) depends on the brand of vaccine used.
- A booster dose is recommended at 12-15 months regardless of which brand of vaccine is used for the primary series. However, due to the vaccine shortage in 2008, the CDC issued interim guidelines that called for the temporary deferral of the booster dose except to children in special high-risk groups, such as those with asplenia, sickle cell disease, human immunodeficiency virus infection and certain other immunodeficiency syndromes, and malignant neoplasms.
- 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.

2008 TRENDS AND HIGHLIGHTS

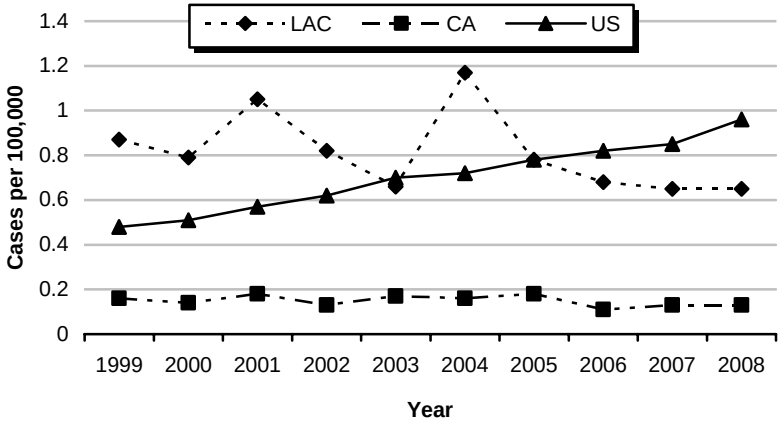
- The vaccine shortage and booster dose deferral in 2008 may theoretically increase the circulation of Hib bacteria. However, it did not result in increased levels of *H. influenzae* serotype B disease in LAC. Since no serotype B cases were identified, none of the cases were vaccine-preventable.
- None of the cases were linked. As in previous years, the highest incidence rates occurred in the <1 and 65+ age groups (Figure 2) and during the first six months of the year (Figure 5).
- Service Planning Area (SPA) 6 and SPA 8 reported the highest incidence rates (Figure 4).
- Similar to previous years, the majority of reported cases were among non-B (n=40) and unknown serotypes (n=24) (Figures 6, 7, 8). Of the 64 cases, 82.8% (n=53) were ≥15 years of age and were not investigated further. Thus, data on race/ethnicity and location is missing for many of the cases.
- With the vaccine shortage extending into 2009, it remains important for all lab specimens to be serotyped in order to monitor epidemiologic trends between serotype B and other serotypes for which control measures aren't required. All children should be completely vaccinated for the primary series.

Reported H. Influenzae Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=111)			2005 (N=75)			2006 (N=66)			2007 (N=63)			2008 (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	8	7.2	5.6	8	10.7	5.7	4	6.1	2.8	8	12.7	5.4	6	9.4	4.3
1-4	8	7.2	1.4	2	2.7	0.3	1	1.5	0.2	1	1.6	0.2	2	3.1	0.4
5-14	1	0.9	0.1	3	4.0	0.2	2	3.0	0.1	3	4.8	0.2	3	4.7	0.2
15-34	9	8.1	0.3	3	4.0	0.1	7	10.6	0.3	7	11.1	0.2	4	6.3	0.1
35-44	3	2.7	0.2	6	8.0	0.4	5	7.6	0.3	4	6.3	0.3	5	7.8	0.3
45-54	11	9.9	0.9	7	9.3	0.6	6	9.1	0.5	7	11.1	0.5	11	17.2	0.8
55-64	16	14.4	2.0	6	8.0	0.7	6	9.1	0.7	5	7.9	0.6	2	3.1	0.2
65+	55	49.5	5.8	40	53.3	4.2	35	53.0	3.6	28	44.4	2.8	31	48.4	3.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	4	3.6	0.3	4	5.3	0.3	3	4.5	0.2	1	1.6	0.1	3	4.7	0.2
Black	10	9.0	1.2	7	9.3	0.8	10	15.2	1.2	8	12.7	0.9	2	3.1	0.2
Hispanic	12	10.8	0.3	16	21.3	0.4	17	25.8	0.4	10	15.9	0.2	13	20.3	0.3
White	43	38.7	1.5	28	37.3	1.0	9	13.6	0.3	13	20.6	0.4	9	14.1	0.3
Other	2	1.8	7.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	40	36.0		20	26.7		27	40.9		31	49.2		37	57.8	
SPA															
1	2	1.8	0.6	0	0.0	0.0	2	3.0	0.6	2	3.2	0.6	0	0.0	0.0
2	15	13.5	0.7	18	24.0	0.8	11	16.7	0.5	13	20.6	0.6	7	10.9	0.3
3	15	13.5	0.9	10	13.3	0.6	7	10.6	0.4	3	4.8	0.2	10	15.6	0.6
4	12	10.8	1.0	12	16.0	1.0	6	9.1	0.5	8	12.7	0.6	8	12.5	0.6
5	3	2.7	0.5	4	5.3	0.6	11	16.7	1.7	8	12.7	1.2	4	6.3	0.6
6	10	9.0	1.0	10	13.3	1.0	10	15.2	1.0	12	19.0	1.1	10	15.6	0.9
7	11	9.9	0.8	8	10.7	0.6	10	15.2	0.7	8	12.7	0.6	10	15.6	0.7
8	10	9.0	0.9	6	8.0	0.5	6	9.1	0.5	6	9.5	0.5	9	14.1	0.8
Unknown	33	29.7		7	9.3		3	4.5		3	4.8		6	9.4	

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

Figure 1. Incidence Rates of *H. influenzae* Invasive Disease US, CA and LAC, 1999-2008*



*The incidence rates for CA only includes cases aged <30 years (1999-2006) and cases aged <15 years (2007-2008).

Figure 2. Incidence Rates of *H. influenzae* Invasive Disease by Age Group LAC, 2008

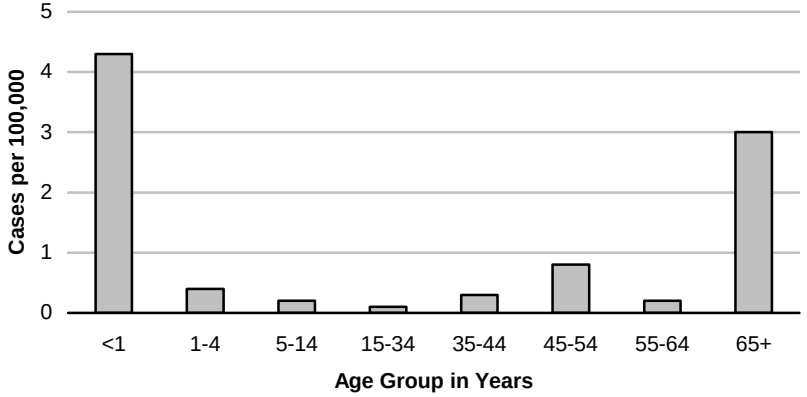
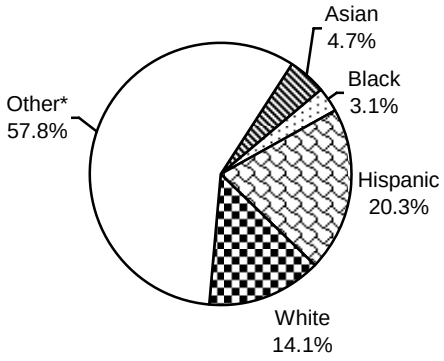


Figure 3. Percent Cases of *H. influenzae* Invasive Disease by Race/Ethnicity, LAC, 2008



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

Figure 4. Incidence Rates of *H. influenzae* Invasive Disease by SPA, LAC, 2008

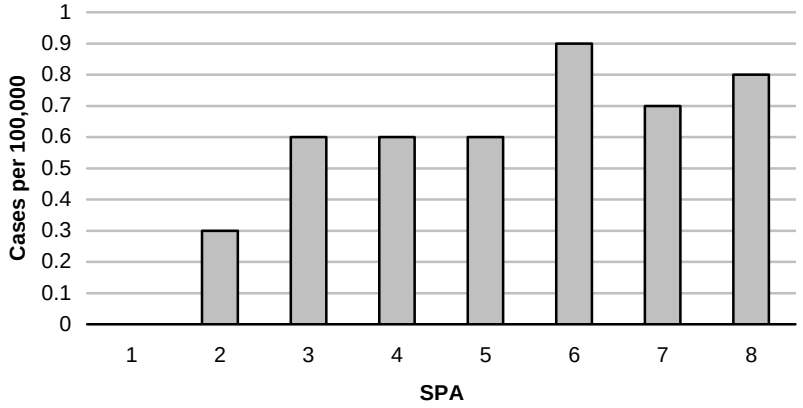


Figure 5. Reported *H. influenzae* Invasive Disease Cases by Month of Onset, LAC, 2008

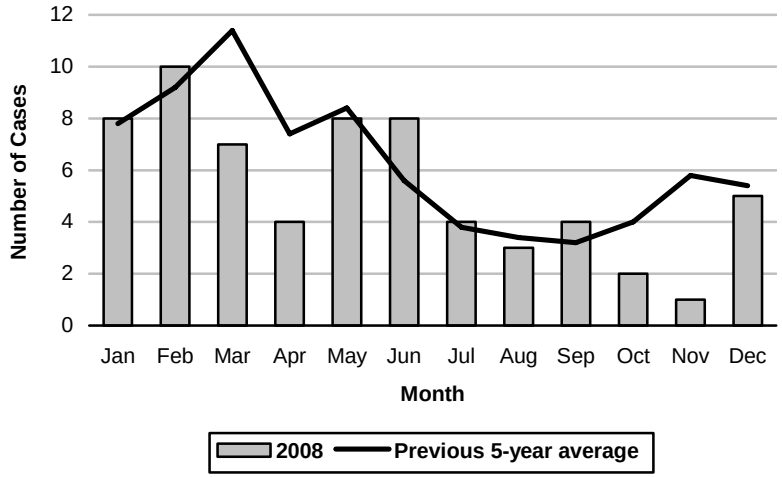


Figure 6. Reported *H. influenzae* Invasive Disease Cases by Serotype, LAC, 1999-2008

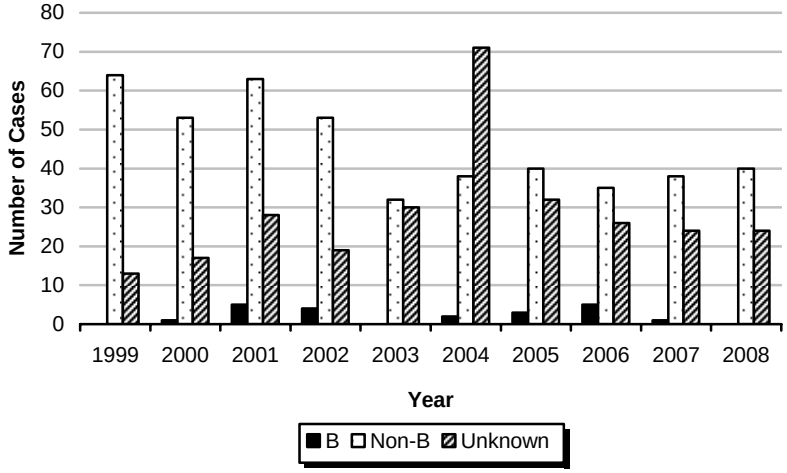


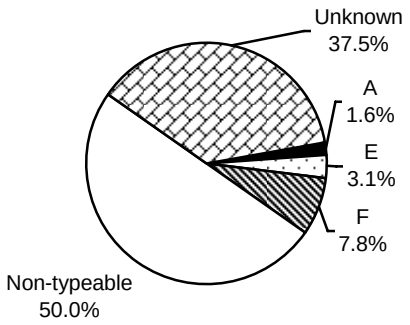
Figure 7. Reported *H. influenzae* Invasive Disease Cases by Serotype, 2008 vs. Previous 5-Year Average

	B		Non-B		Unknown	
	2008	Previous 5-Year Average	2008	Previous 5-Year Average	2008	Previous 5-Year Average
Total Cases	0	2.2	40	36.6	24	36.6
Age at Onset (years)						
Mean	--	35.0	48.6	44.0	63.5	67.1
Median	--	31.1	53.0	46.0	71.0	69.7
Range	--	<1 - 73	<1 – 99	<1 – 95	16 – 92	<1 - 100
Case Fatality	--	9.1%	2.5%[1]	5.5%	8.3%[2]	9.6%

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

[2] Two deaths were reported. Both were cases ≥15 years of age so no further investigation was conducted.

Figure 8. Percent Cases of *H. influenzae* Invasive Disease by Serotype LAC, 2008



HEPATITIS A

CRUDE DATA	
Number of Cases	80
Annual Incidence[a]	
LA County	0.82
California[b]	1.22
United States[b]	0.86
Age at Diagnosis	
Mean	38
Median	34
Range	5-92 years

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

DESCRIPTION

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

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

2008 TRENDS AND HIGHLIGHTS

- The 2008 incidence rate of acute hepatitis A in Los Angeles County (LAC) has remained relatively the same as the previous year (0.82 per 100,000 vs 0.80 per 100,000) (Figure 1).
- The 2008 incidence rate of acute hepatitis A in LAC is highest in those between the ages of 15-34 (1.2 per 100,000), followed by the 35-44 age group (0.9 per 100,000) and the 65+ age group (0.9 per 100,000) (Figure 2).
- The 2008 incident rate of acute hepatitis A in LAC is highest in Asians (1.1 per 100,000) followed by Hispanics (0.8 per 100,000), whites (0.8 per 100,000) and blacks (0.7 per 100,000) (Figure 3).
- Of the eight Service Planning Areas (SPAs) across LAC, three SPAs had rates greater than the overall county mean rate for this disease: SPA 3 (1.0 per 100,000), SPA 5 (1.5 per 100,000) and SPA 7 (1.1 per 100,000) (Figure 4).
- Historically, there is an increase of hepatitis A cases in summer to early autumn, and in 2008 there was an increase in the fall. There was also an increase in April (Figure 5).
- Risk factors were identified in 53% (n=41) of the 78 confirmed cases interviewed by a public health nurse (including some cases with multiple risk factors). Of those with identified risk factors, recent travel outside of the US (n=31, 76%) was the most common risk factor reported, followed by eating raw shellfish (n=13, 32%) and having a household contact who traveled outside of the US in 3 months prior to onset of illness (n=13, 32%) (Figure 6).
- Thirty-three percent (n=26) of hepatitis A cases were hospitalized. The median age was 34 years.

Reported Hepatitis A Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=321)			2005 (N=480)			2006 (N=364)			2007 (N=78)			2008 (N=80)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	2	0.6	0.3	7	1.5	1.2	5	1.4	0.9	1	1.3	0.2	0	0.0	0.0
5-14	26	8.1	1.7	24	5.0	1.6	20	5.5	1.4	6	7.7	0.4	7	8.8	0.5
15-34	86	26.8	3.1	198	41.3	7.1	114	31.3	4.1	32	41.0	1.1	34	42.5	1.2
35-44	44	13.7	2.9	88	18.3	5.8	83	22.8	5.5	16	20.5	1.1	14	17.5	0.9
45-54	39	12.1	3.1	88	18.3	6.9	73	20.1	5.6	13	16.7	1.0	9	11.3	0.7
55-64	33	10.3	4.1	44	9.2	5.3	33	9.1	3.8	5	6.4	0.6	7	8.8	0.8
65+	91	28.3	9.6	30	6.3	3.1	36	9.9	3.7	5	6.4	0.5	9	11.3	0.9
Unknown	0	0.0		1	0.2		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	58	18.1	4.7	42	8.8	3.3	25	6.9	2.0	15	19.2	1.2	14	17.5	1.1
Black	15	4.7	1.8	49	10.2	5.8	64	17.6	7.6	5	6.4	0.6	6	7.5	0.7
Hispanic	95	29.6	2.1	135	28.1	3.0	124	34.1	2.7	33	42.3	0.7	36	45.0	0.8
White	107	33.3	3.7	203	42.3	7.0	125	34.3	4.3	24	30.8	0.8	23	28.8	0.8
Other	3	0.9	10.8	13	2.7	46.0	1	0.3	3.5	0	0.0	0.0	1	1.3	4.1
Unknown	43	13.4		38	7.9		25	6.9		1	1.3		0	0.0	
SPA															
1	8	2.5	2.4	11	2.3	3.2	3	0.8	0.9	5	6.4	1.4	3	3.8	0.8
2	73	22.7	3.5	78	16.3	3.7	58	15.9	2.7	16	20.5	0.7	17	21.3	0.8
3	50	15.6	2.9	56	11.7	3.3	57	15.7	3.3	17	21.8	1.0	17	21.3	1.0
4	58	18.1	4.7	130	27.1	10.4	79	21.7	6.3	9	11.5	0.7	7	8.8	0.5
5	16	5.0	2.5	45	9.4	7.1	24	6.6	3.8	5	6.4	0.8	10	12.5	1.5
6	39	12.1	3.8	30	6.3	2.9	37	10.2	3.6	8	10.3	0.8	2	2.5	0.2
7	55	17.1	4.0	50	10.4	3.6	33	9.1	2.4	12	15.4	0.9	15	18.8	1.1
8	22	6.9	2.0	58	12.1	5.2	45	12.4	4.0	5	6.4	0.4	7	8.8	0.6
Unknown	0	0.0		22	4.6		28	7.7		1	1.3		2	2.5	

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

Figure 1. Incidence Rates of Hepatitis A
LAC, CA and US, 1999-2008

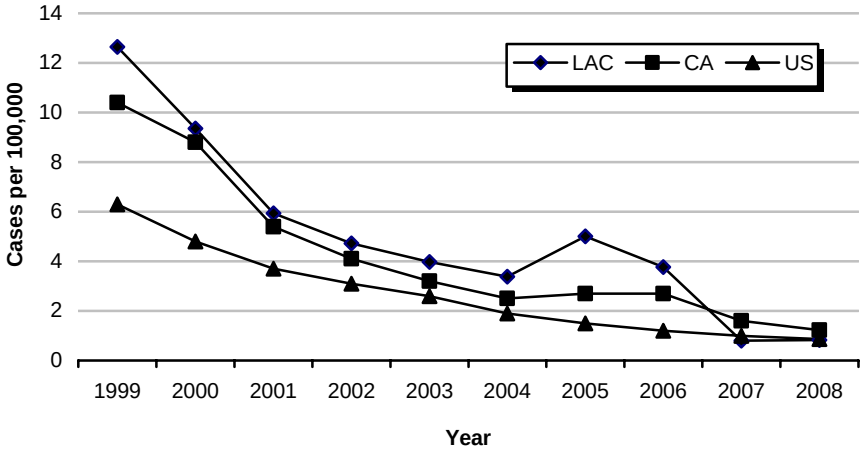


Figure 2. Incidence Rates of Hepatitis A by Age Group
LAC, 2008

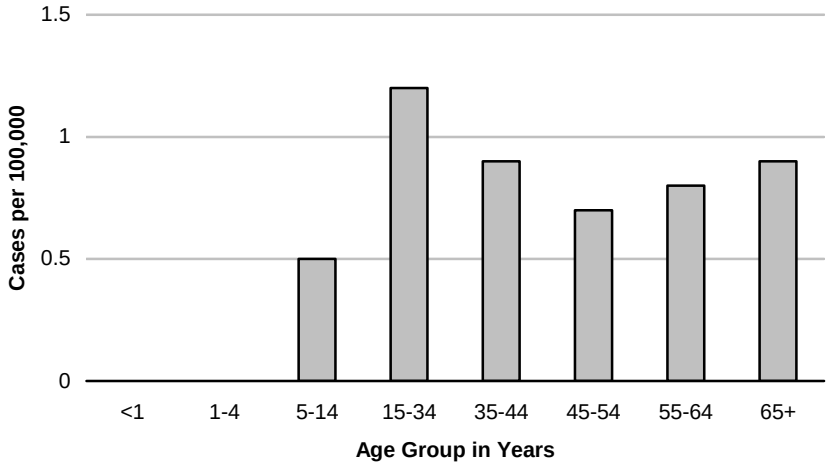


Figure 3. Hepatitis A Incidence by Race/Ethnicity
LAC, 2004-2008

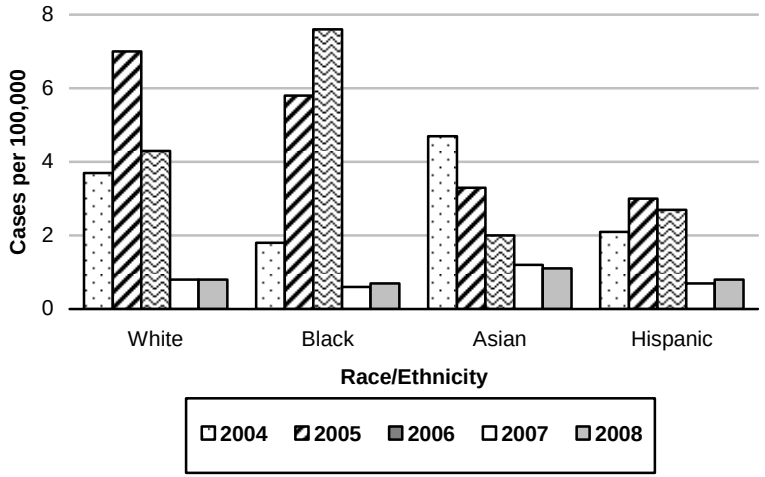
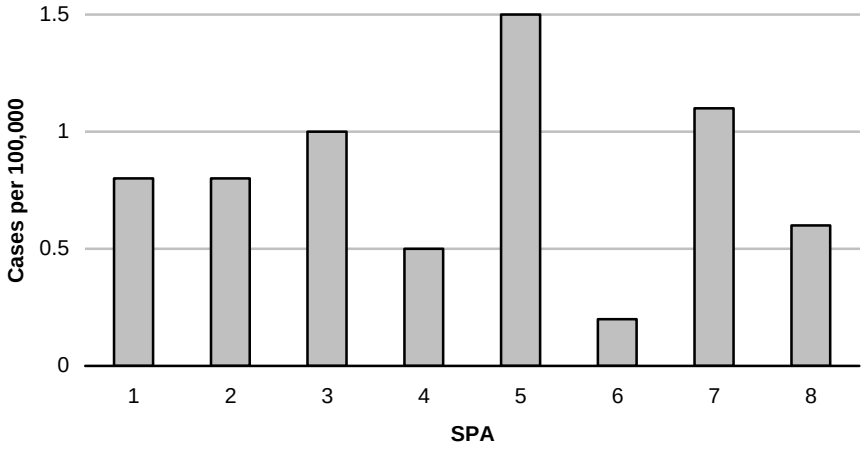
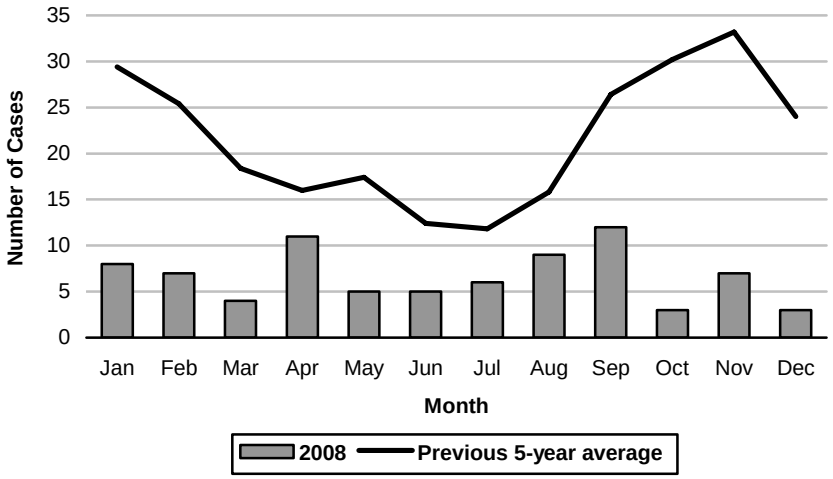


Figure 4. Incidence Rates* of Hepatitis A by SPA
LAC, 2008

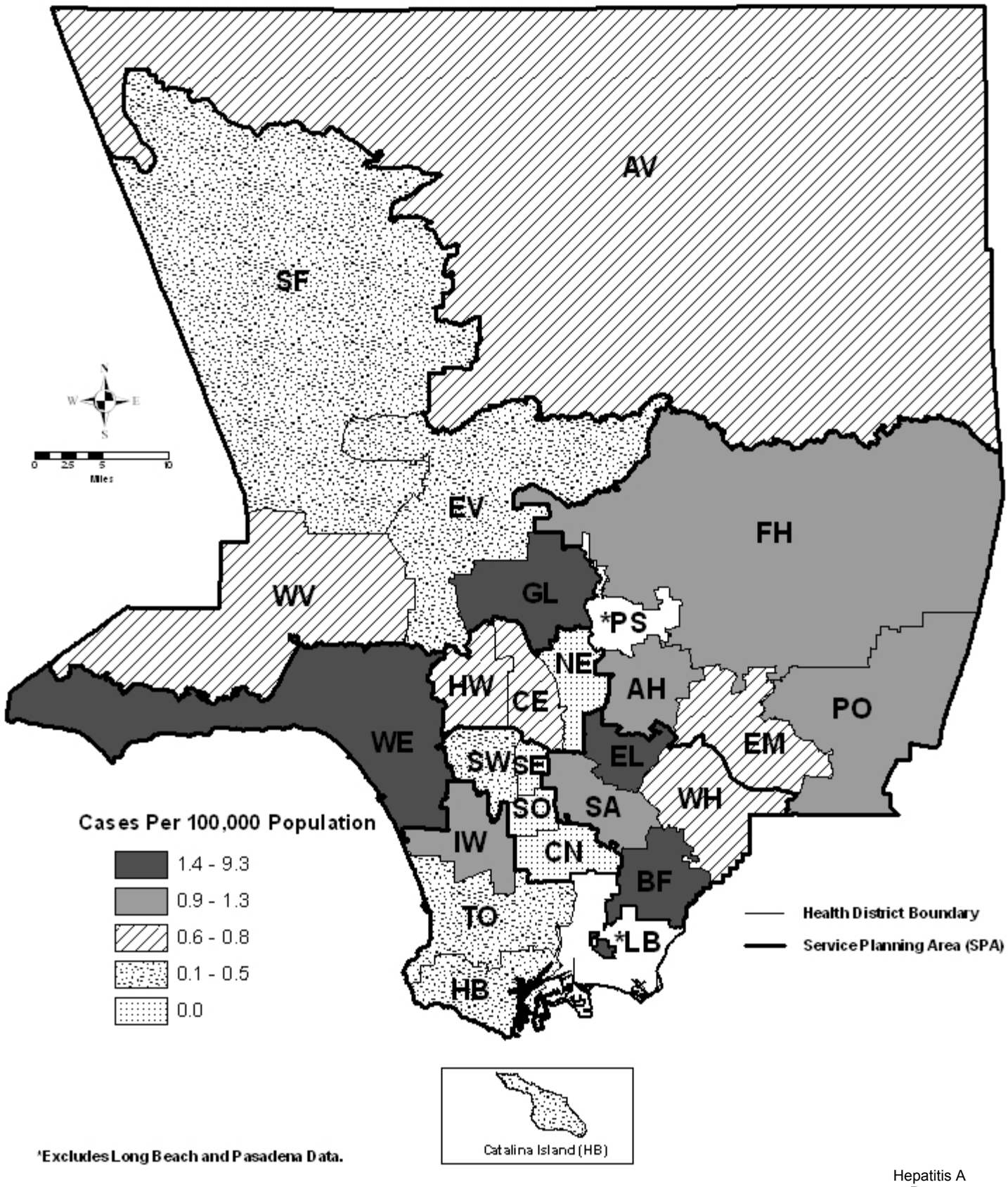


* Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Hepatitis A Cases by Month of Onset
LAC, 2008



Map 6. Hepatitis A
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, ACUTE (NONPERINATAL)

CRUDE DATA	
Number of Cases	66
Annual Incidence[a]	
LA County	0.68
California[b]	0.83
United States[b]	1.34
Age at Diagnosis	
Mean	46
Median	45
Range	23-83 years

[a] Cases per 100,000 population

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

DESCRIPTION

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

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

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

New strategies are needed to reduce high-risk behaviors and provide resources for low-cost hepatitis B immunization, particularly for adults with the highest rates of transmission. Development and implementation of such strategies is possible through collaboration between public health, community-based organizations, and other agencies that serve target populations. Additionally, promoting hepatitis health education aims at eliminating, reducing, or mitigating high-risk behaviors in sexually active adults and increasing awareness and knowledge in the community.

2008 TRENDS AND HIGHLIGHTS

- The 2008 incidence rate of acute hepatitis B in Los Angeles County (LAC) has increased slightly from the previous year (0.68 per 100,000 versus 0.57 per 100,000) (Figure 1).
- ACDC investigated one outbreak in a Long-Term Care Facility (LTCF) (See 2008 Special Studies Report for more information).
- The 2008 incidence rate of acute hepatitis B in LAC was highest in those between the ages of 55 to 64 years (1.5 per 100,000), followed by the 45 to 54 year age group (1.0 per 100,000) and the 35 to 44 year age group (0.9 per 100,000) (Figure 2).
- The male-to-female ratio was 4:1.
- The 2008 incident rate of acute hepatitis B in LAC was highest in blacks (1.8 per 100,000) followed by whites (0.8 per 100,000), Asians (0.5 per 100,000) and Hispanics (0.3 per 100,000) (Figure 3).
- Of the eight Service Planning Areas (SPAs) across LAC, SPA 6 had the highest incidence rate (2.1 per 100,000); however, SPA 6 had 8 cases of acute hepatitis B associated with the outbreak investigation in a LTCF (Figure 4).
- Risk factors were identified in 66% (n=31) of the 47 confirmed cases interviewed by a public health nurse which were not associated with the outbreak in the LTCF (including some cases with multiple risk factors). Of those with identified risk factors, recent dental work (n=13, 42%) was the most common risk factor reported followed by having multiple sexual partners (n=10, 32%), contact with a person with a confirmed or suspected acute or chronic Hepatitis B infection (n=7, 23%), receiving fingersticks (n=5, 16%), and receiving a tattoo (n=5, 16%) (Figure 5).

Reported Hepatitis B, Acute, (Nonperinatal) Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=72)			2005 (N=57)			2006 (N=62)			2007 (N=55)			2008 (N=66)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	29	40.3	1.0	18	31.6	0.6	20	32.3	0.7	9	16.4	0.3	18	27.3	0.6
35-44	18	25.0	1.2	21	36.8	1.4	21	33.9	1.4	21	38.2	1.4	14	21.2	0.9
45-54	9	12.5	0.7	10	17.5	0.8	15	24.2	1.2	12	21.8	0.9	13	19.7	1.0
55-64	10	13.9	1.3	2	3.5	0.2	3	4.8	0.3	3	5.5	0.3	14	21.2	1.5
65+	6	8.3	0.6	6	10.5	0.6	3	4.8	0.3	9	16.4	0.9	7	10.6	0.7
Unknown	0	0.0		0	0.0		0	0.0		1	1.8		0	0.0	
Race/Ethnicity															
Asian	12	16.7	1.0	8	14.0	0.6	10	16.1	0.8	7	12.7	0.5	7	10.6	0.5
Black	12	16.7	1.4	12	21.1	1.4	4	6.5	0.5	11	20.0	1.3	15	22.7	1.8
Hispanic	23	31.9	0.5	19	33.3	0.4	26	41.9	0.6	16	29.1	0.3	16	24.2	0.3
White	24	33.3	0.8	16	28.1	0.6	21	33.9	0.7	19	34.5	0.7	22	33.3	0.8
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	3.6	9.6	1	1.5	4.1
Unknown	1	1.4		2	3.5		1	1.6		0	0.0		5	7.6	
SPA															
1	0	0.0	0.0	1	1.8	0.3	2	3.2	0.6	1	1.8	0.3	2	3.0	0.5
2	19	26.4	0.9	10	17.5	0.5	15	24.2	0.7	13	23.6	0.6	9	13.6	0.4
3	11	15.3	0.6	4	7.0	0.2	6	9.7	0.3	4	7.3	0.2	6	9.1	0.3
4	14	19.4	1.1	14	24.6	1.1	16	25.8	1.3	14	25.5	1.1	7	10.6	0.5
5	7	9.7	1.1	5	8.8	0.8	3	4.8	0.5	5	9.1	0.8	9	13.6	1.4
6	6	8.3	0.6	7	12.3	0.7	6	9.7	0.6	9	16.4	0.9	22	33.3	2.1
7	7	9.7	0.5	8	14.0	0.6	6	9.7	0.4	4	7.3	0.3	6	9.1	0.4
8	8	11.1	0.7	8	14.0	0.7	6	9.7	0.5	5	9.1	0.4	4	6.1	0.4
Unknown	0	0.0		0	0.0		2	3.2		0	0.0		1	1.5	

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

**Figure 1. Incidence Rates of Acute Hepatitis B
LAC, CA and US, 1999-2008**

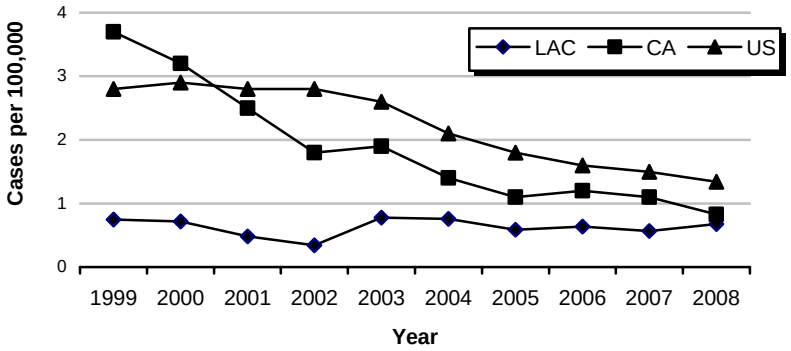
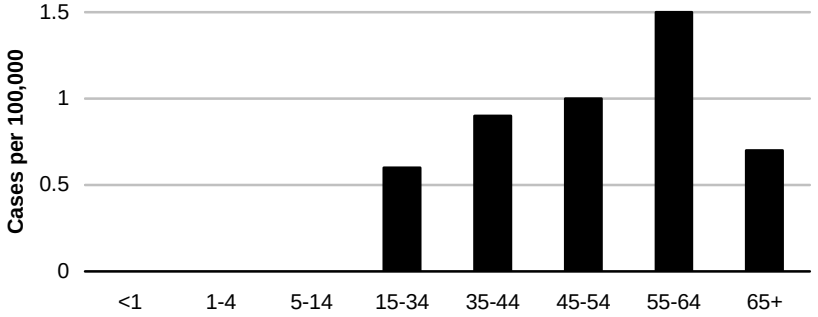


**Figure 2. Incidence Rates of Acute Hepatitis B by Age Group
LAC, 2008**



* Rates bases on fewer than 20 cases are unreliable

**Figure 3. Acute Hepatitis B Incidence by Race/Ethnicity
LAC, 2004-2008**

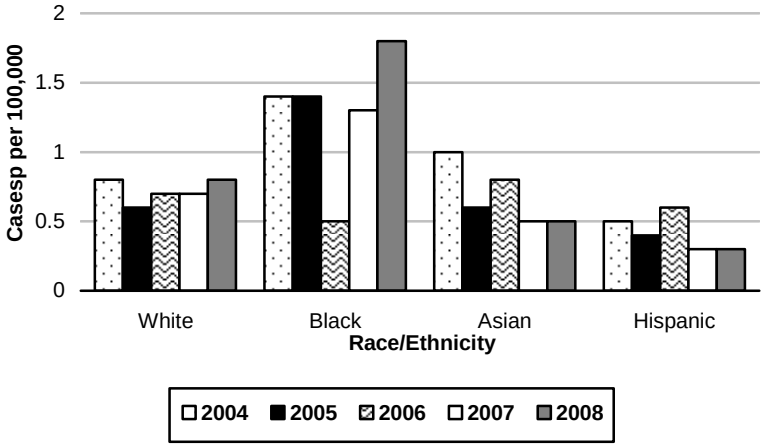


**Figure 4. Incidence Rates of Acute Hepatitis B by SPA
LAC, 2008**

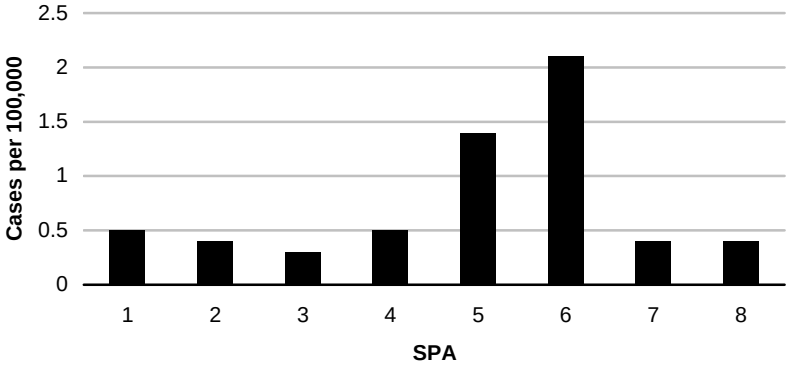
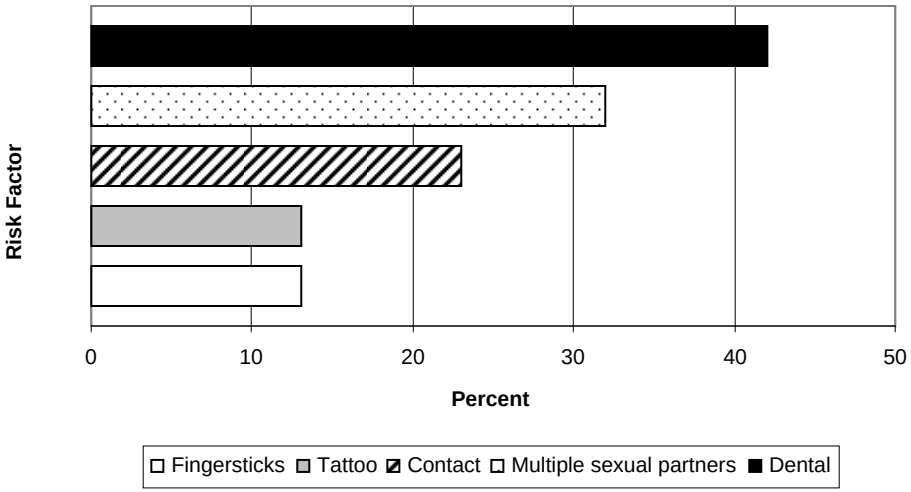
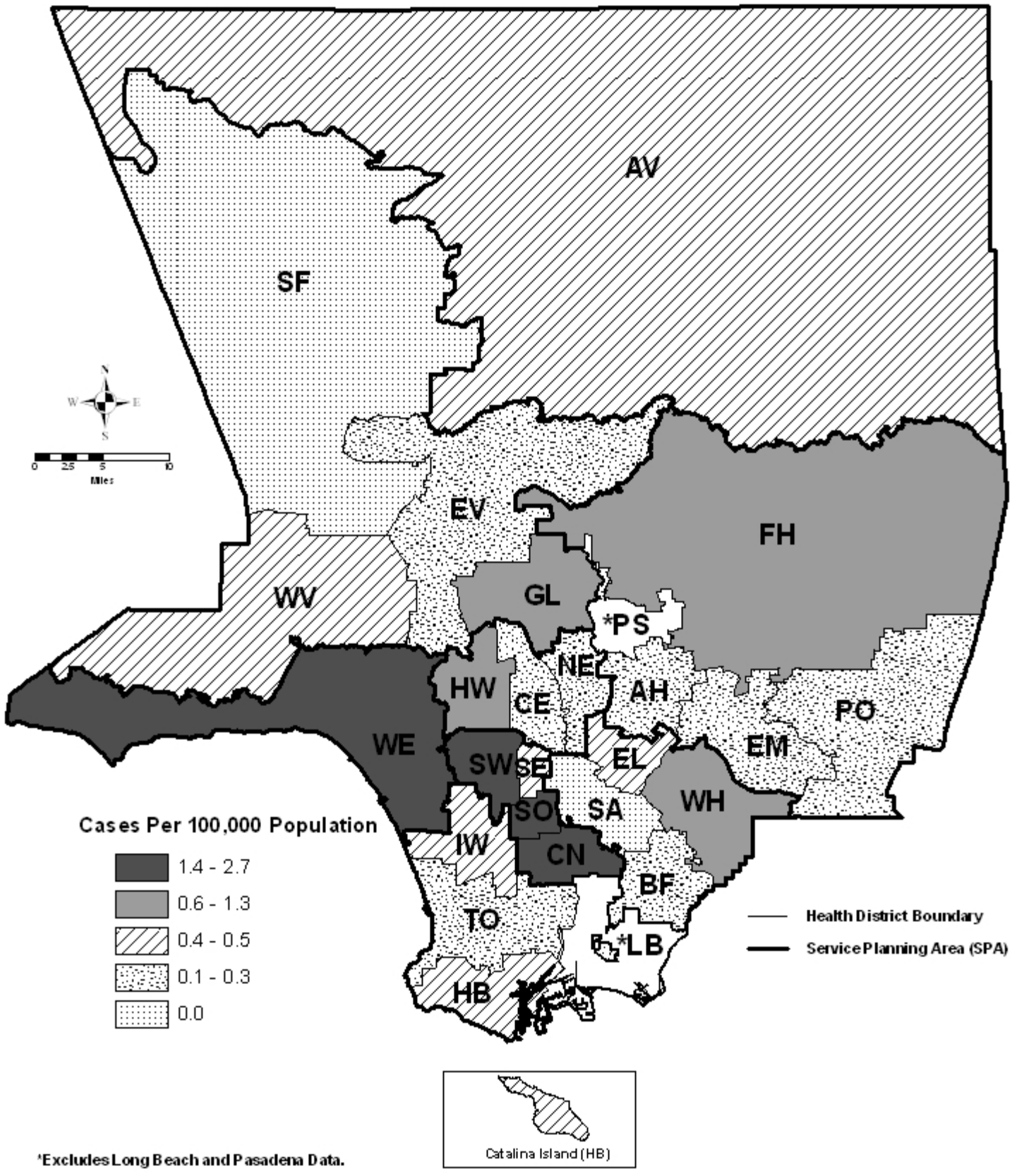


**Figure 5. Hepatitis B Reported Risk Factors*
LAC, 2008 (n=31)**



*Includes cases identifying multiple risk factors

Map 7. Hepatitis B
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

HEPATITIS B, PERINATAL

CRUDE DATA	
Number of Infants Born to HBsAg Positive Mothers	792
Incidence of Exposure[a]	
LA County	5.2
Maternal Age at Diagnosis	
Mean	32 years
Median	31 years
Range	17-46 years
Infant Age at Diagnosis	
Mean	9.75 months
Median	10 months
Range	8-11 months

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

DESCRIPTION

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

2008 TRENDS AND HIGHLIGHTS

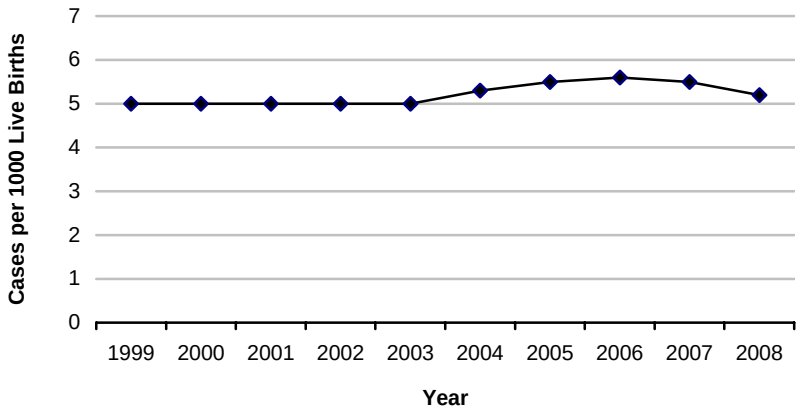
- In 2008, 792 infants (including 14 twins) were born to 778 HBsAg+ women.
- In 2008, the incidence of exposure decreased by 5% from 5.5 to 5.2 per 1000 infants born in 2007 (Figure 1).
- Over 70% (n=550) of women screened for HBsAg were between 15 and 34 years of age.
- As consistent with previous years, in 2008, the majority of HBsAg+ women were Asian/Pacific Islanders (API) (n=611, 79%), followed by Hispanic (n=71, 9%), black (n=32, 4%), and white (n=30, 4%), and (Figures 2 and 3).
- The majority of HBsAg+ women reside in Service Planning Area (SPA) 3 (n=394, 51%), which has a large Asian constituency (Figure 4).
- The majority of infants received the first dose of Hepatitis B vaccine and HBIG within 12 hours of birth (Figure 5).
- Fourteen percent (n=111) of infants born in 2008 have been screened for PVS. PVS results for 4 infants were HBsAg positive in 2008. PVS testing of infants born in 2008 is still in progress (Figure 6).
- The majority of HHCs were among the age groups 0-10 years (n=434, 38%) and 31-40 years (n=375, 33%) (Figure 7).
- Thirty-five percent of HHCs screened had a negative HBsAg, a negative antibody to HBsAg (anti-HBs) and a negative antibody to hepatitis B core antigen (anti-HBc), which suggests susceptibility to the hepatitis B virus. The Hepatitis B vaccine series was recommended (Figure 8).

Reported Hepatitis B, Perinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=733)			2005 (N=762)			2006 (N=803)			2007 (N=774)			2008 (N=778)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	0.1	0	0.0	0.0
15-34	558	76.1	19.8	572	75.1	20.4	613	76.3	22.0	567	73.3	20.1	550	70.7	19.2
35-44	172	23.5	11.5	187	24.5	12.4	190	23.7	12.6	206	26.6	13.7	225	28.9	14.9
45-54	3	0.4	0.2	3	0.4	0.2	0	0.0	0.0	0	0.0	0.0	3	0.4	0.2
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	585	79.8	47.1	619	81.2	49.2	627	78.1	49.3	636	82.2	49.5	611	78.5	46.9
Black	43	5.9	5.0	35	4.6	4.1	30	3.7	3.6	28	3.6	3.3	32	4.1	3.7
Hispanic	53	7.2	1.2	70	9.2	1.5	90	11.2	1.9	70	9.0	1.5	71	9.1	1.5
White	46	6.3	1.6	35	4.6	1.2	51	6.4	1.8	29	3.7	1.0	30	3.9	1.0
Other	6	0.8	21.6	3	0.4	10.6	4	0.5	14.0	11	1.4	52.8	34	4.4	137.
Unknown	0	0.0		0	0.0		1	0.1		0	0.0		0	0.0	
SPA															
1	12	1.6	3.6	8	1.0	2.3	6	0.7	1.7	8	1.0	2.2	4	0.5	1.1
2	94	12.8	4.4	100	13.1	4.7	99	12.3	4.6	100	12.9	4.6	96	12.3	4.4
3	335	45.8	19.7	361	47.4	21.1	396	49.3	23.0	392	50.6	22.7	394	50.6	22.7
4	101	13.8	8.2	81	10.6	6.5	97	12.1	7.7	88	11.4	7.0	96	12.3	7.5
5	31	4.2	4.9	36	4.7	5.7	37	4.6	5.8	33	4.3	5.2	37	4.8	5.7
6	36	4.9	3.5	38	5.0	3.7	41	5.1	3.9	33	4.3	3.2	43	5.5	4.1
7	49	6.7	3.6	62	8.1	4.5	58	7.2	4.2	54	7.0	3.9	55	7.1	4.0
8	74	10.1	6.7	76	10.0	6.9	56	7.0	5.0	66	8.5	5.9	50	6.4	4.4
Unknown	0	0.0		0	0.0		13	1.6		0	0.0		3	0.4	

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

**Figure 1. Perinatal Hepatitis B Incidence of Exposure
LAC, 1999-2008**



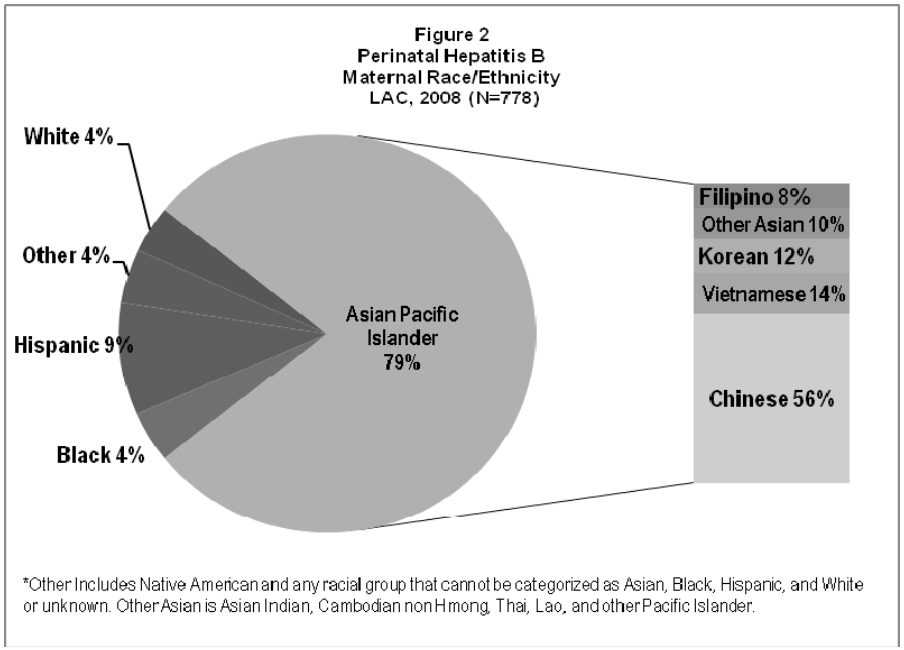


**Figure 3. Perinatal Hepatitis B Maternal Race/Ethnicity
LAC, 2004-2008 (N=3850)**

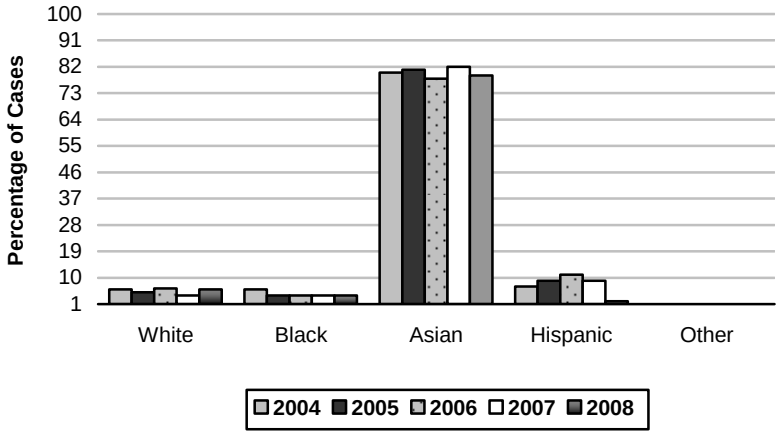


**Figure 4. Perinatal Hepatitis B Maternal by SPA
LAC, 2008 (N=778)**

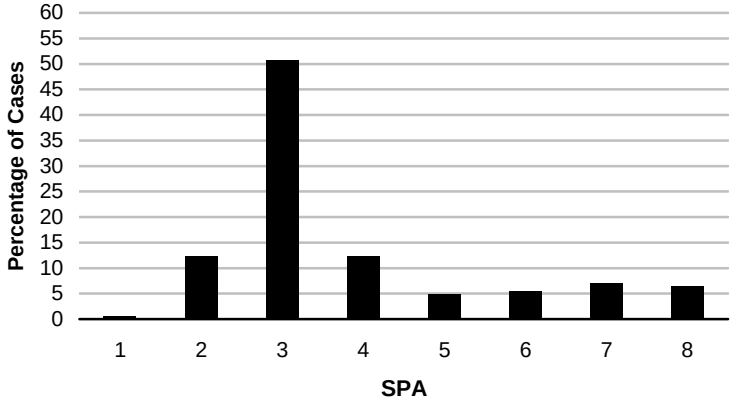


Figure 5. Perinatal Hepatitis B Summary of Infant Hepatitis B Immunoprophylaxis, LAC, 2008 (N=778)

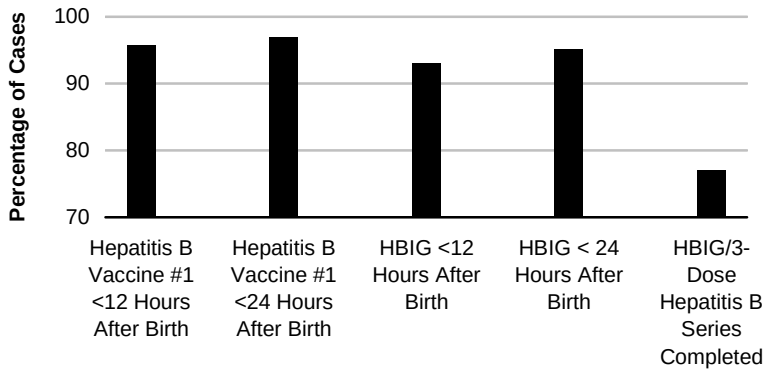
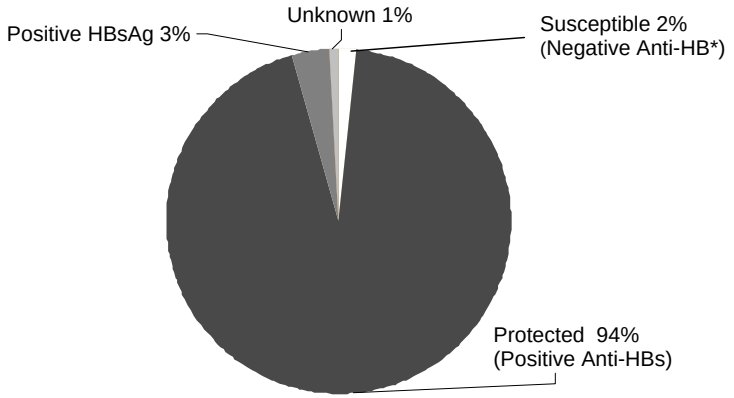


Figure 6. Perinatal Hepatitis B Infant Post Vaccination Serology Results, LAC, 2008 (N=111)



*Antibody to Hepatitis B Surface Antigen

Figure 7. Perinatal Hepatitis B Household and Sexual Contacts Age Range, LAC, 2008 (N=1143)

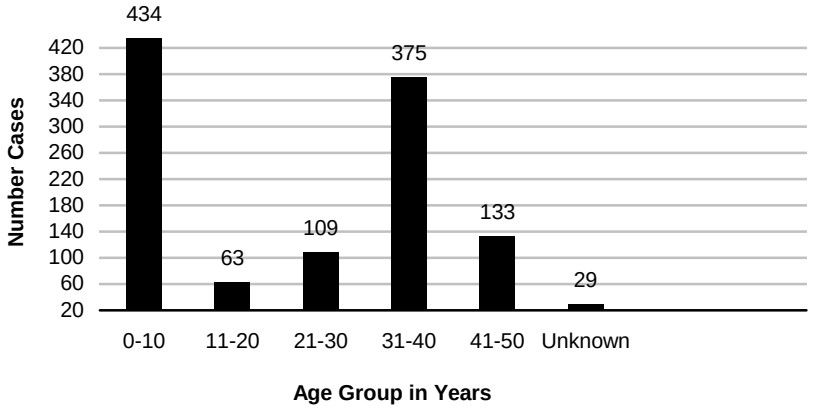
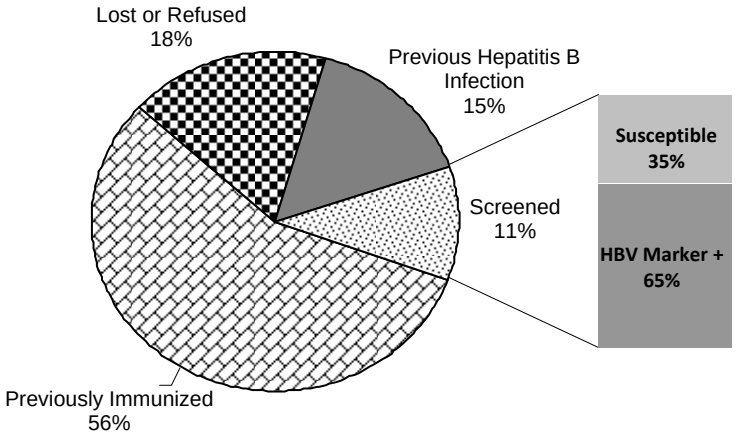


Figure 8. Perinatal Hepatitis B Hepatitis B Virus Marker Status of Household Contacts LAC, 2008 (N=1142)



HEPATITIS C, ACUTE

CRUDE DATA	
Number of Cases	5
Annual Incidence	
LA County	0.05[a]
California[b]	0.08
United States[b]	0.29
Age at Diagnosis	
Mean	48
Median	42
Range	32-72 years

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

DESCRIPTION

The Hepatitis C virus (HCV) is the most common chronic bloodborne infection in the US. This RNA virus is predominantly transmitted through contact with contaminated blood and blood products via injection drug use. Sexual and perinatal transmission of HCV appears to occur much less frequently. People at risk include: anyone who has had a blood transfusion prior to 1989, IV drug users, hemodialysis patients, infants born to infected mothers, those with multiple sexual partners, health care workers who suffer needle-stick accidents, and people with tattoos or body-piercing. However, an estimated 30% have no identifiable history of exposure to the virus. Household or familial contact is not considered a risk factor for the transmission of hepatitis C. There is no vaccine available for HCV and vaccines for hepatitis A and B do not provide immunity against hepatitis C.

Symptoms of acute infections can include jaundice, fatigue, anorexia, nausea, or vomiting; however, up to 85% of acute infections have mild or no symptoms. After acute infection, 15%-25% of persons appear to resolve their infection without sequelae as demonstrated by sustained absence of HCV RNA in serum and normalization of alanine aminotransferase (ALT) levels. Chronic HCV infection develops in (75%-85%) of persons with persistent or fluctuating ALT elevations developing in 60%-70% of

chronically infected persons. In the remaining 30%-40% of chronically infected persons, ALT levels are normal. Most studies have reported that medical complications occur decades after initial infection including cirrhosis, liver failure, and hepatic cancer.

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

Universal blood product screening in 1990 and heat-inactivation of other blood concentrates initiated in 1987 have dramatically reduced recipient-associated cases of hepatitis C. This leaves the reduction of high-risk behaviors as the primary recommendation for preventing transmission; especially, since there is no effective vaccine or post-exposure prophylaxis. Educational efforts aimed at reducing high-risk behaviors (e.g., sharing injection drug equipment, engaging in unprotected sex) may help to reduce new hepatitis C cases. Additional education provided to those who already have hepatitis C is important because alcohol consumption and co-infection with HIV can accelerate the progression of cirrhosis and hepatocellular carcinoma. Furthermore, patients with chronic hepatitis C should be encouraged to receive hepatitis A and B vaccine and evaluated for severity of their liver diseases and for possible treatment.

2008 TRENDS AND HIGHLIGHTS

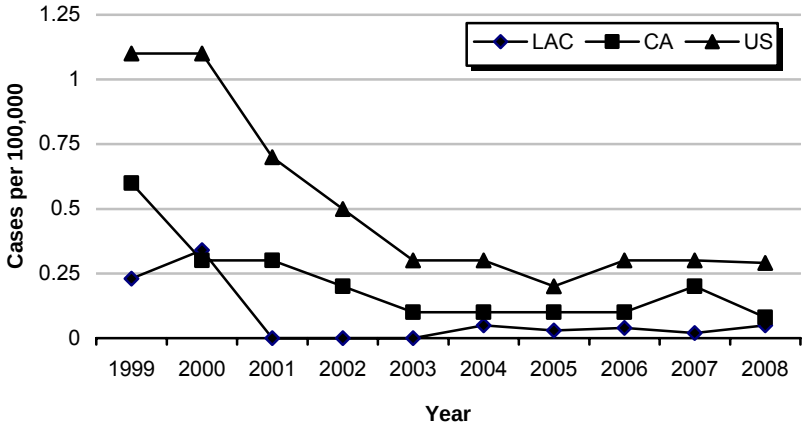
- There were five cases of confirmed acute hepatitis C in 2008 compared to two acute cases in 2007.
- The five cases ranged in age from 32 to 72 years; the median age was 51years; the mean age was 48 years (Figure 2).
- The majority of cases were white (60%, n=3), followed by Asian (20%, n=1) and Hispanic (20%, n=1) (Figure 3).
- Risk factors were identified in 60% (n=3) of the confirmed cases, including some with multiple risk factors. The most common risk factors identified were contact with known/suspect hepatitis C infected person (n=2, 67%), resident of long-term care facility (n=2, 67%), and receiving fingersticks (n=2, 67%).

Reported Hepatitis C, Acute Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004			2005			2006			2007			2008		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	1	20.0	0.0	1	33.3	0.0	0	0.0	0.0	2	66.7	0.1	1	20.0	0.0
35-44	0	0.0	0.0	1	33.3	0.1	2	50.0	0.1	0	0.0	0.0	1	20.0	0.1
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	40.0	0.1
55-64	1	20.0	0.1	1	33.3	0.1	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0
65+	3	60.0	0.3	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	1	20.0	0.1
Unknown	0	0.0		0	0.0		0	0.0		1	33.3		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1
Black	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0
Hispanic	1	20.0	0.0	0	0.0	0.0	2	50.0	0.0	1	33.3	0.0	1	20.0	0.0
White	4	80.0	0.1	3	100.	0.1	1	25.0	0.0	1	33.3	0.0	3	60.0	0.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		1	33.3		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	3	60.0	0.1	1	33.3	0.0	0	0.0	0.0	0	0.0	0.0	3	60.0	0.1
3	1	20.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1
4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0
5	0	0.0	0.0	2	66.7	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0
8	1	20.0	0.1	0	0.0	0.0	2	50.0	0.2	0	0.0	0.0	1	20.0	0.1
Unknown	0	0.0		0	0.0		1	25.0		1	33.3		0	0.0	

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

**Figure 1. Incidence Rates* of Acute Hepatitis C
LAC, CA and US, 1999-2008**



*Rates based on fewer than 19 cases are unreliable

**Figure 2. Cases of Acute Hepatitis C by Age Group
LAC, 2008 (N=5)**

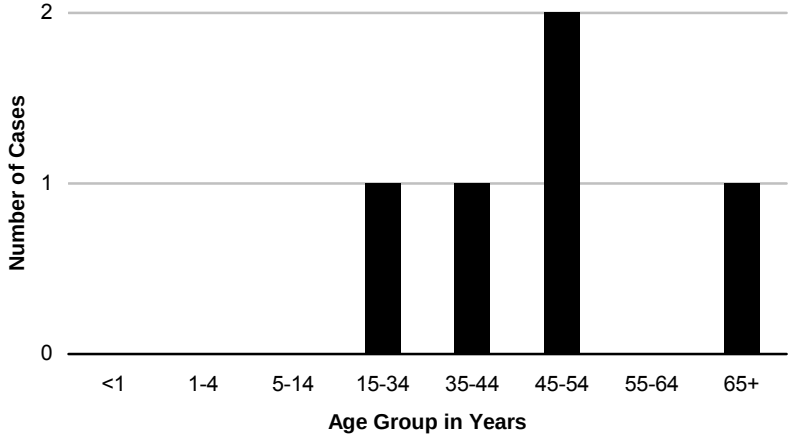
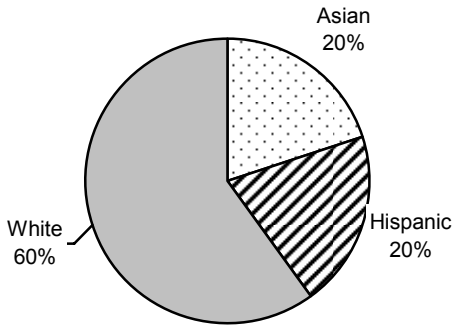


**Figure 3. Percent Cases of Acute Hepatitis C by Race/Ethnicity
LAC, 2008 (N=5)**



KAWASAKI SYNDROME

CRUDE DATA	
Number of Cases	55
Annual Incidence[a]	
LA County	0.56
California	N/A
Age at Diagnosis	
Mean	2.95
Median	2
Range	3 months – 12 years

[a]Cases per 100,000 population.

DESCRIPTION

Kawasaki Syndrome (KS), also called mucocutaneous lymph node syndrome (MLNS), was first described by Dr. Tomisaku Kawasaki in Japan in 1967 and emerged in the US in the 1970s. Several regional outbreaks have been reported since 1976. This is an illness that affects children usually under 5 years of age. It occurs more often in boys than girls (ratio of about 1.5:1). Clinical manifestations include an acute febrile illness and acute self-limited systemic vasculitis leading to vessel wall injury with potentially fatal complications affecting the heart and large arteries. In the US, it is a major cause of heart disease in children. The etiology is unknown and is considered a non-communicable infection. In the US, the mortality rate is approximately 1%.

CDC Case Definition

Fever lasting 5 or more days without any other reasonable explanation and must satisfy at least four of the following criteria:

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

2008 TRENDS AND HIGHLIGHTS

- A total of 55 confirmed cases including three cases of atypical KS met the CDC surveillance case definition in 2008, representing a 7% increase from 2007 (N=52).
- 76% (n=42) of confirmed cases were reported in children under 5 years old. Mean age was 2.95 years old, and the age range was from 3 months to 12 years old. The highest incidence rate occurred in children <1 year (7.2 per 100,000) followed by children ages 1 to 4 (5.7 per 100,000) (Figure 2).
- Hispanics had the highest number of cases (n=28, 50.9%) in 2008. However, the highest incidence rate occurred among Asians (1.3 per 100,000), which is consistent with previous years (Figure 3, 6).
- Service Planning Area (SPA) 7 and SPA 4 had the highest incidence rates—0.9 per 100,000 and 0.7 per 100,000, respectively (Figure 4). This data correlates with race/ethnicity demographics as both SPAs are majorly populated with Hispanics and Asians—SPA 7 (79.3%) and SPA 4 (73.0%).
- KS occurs year-round, but more cases are reported in winter and spring. In 2008, 21.8% (n=12) of confirmed cases were reported in April (Figure 5).
- There were no fatal or recurrent cases in 2008. Family history was reported in 2% of confirmed cases.

Reported Kawasaki Syndrome Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=41)			2005 (N=56)			2006 (N=75)			2007 (N=52)			2008 (N=55)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	7	17.1	4.9	9	16.1	6.4	18	24.0	12.4	9	17.3	6.1	10	18.2	7.2
1-4	29	70.7	5.0	38	67.9	6.6	50	66.7	8.6	35	67.3	6.1	32	58.2	5.7
5-14	5	12.2	0.3	9	16.1	0.6	7	9.3	0.5	8	15.4	0.6	13	23.6	0.9
15-34	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
35-44	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	12	29.3	1.0	19	33.9	1.5	25	33.3	2.0	13	25.0	1.0	17	30.9	1.3
Black	5	12.2	0.6	3	5.4	0.4	8	10.7	0.9	5	9.6	0.6	3	5.5	0.4
Hispanic	19	46.3	0.4	23	41.1	0.5	28	37.3	0.6	26	50.0	0.6	28	50.9	0.6
White	4	9.8	0.1	7	12.5	0.2	11	14.7	0.4	3	5.8	0.1	4	7.3	0.1
Other	1	2.4	3.6	4	7.1	14.2	3	4.0	10.5	3	5.8	14.4	3	5.5	12.2
Unknown	0	0.0		0	0.0		0	0.0		2	3.8		0	0.0	
SPA															
1	0	0.0	0.0	2	3.6	0.6	1	1.3	0.3	1	1.9	0.3	1	1.8	0.3
2	3	7.3	0.1	13	23.2	0.6	14	18.7	0.7	8	15.4	0.4	11	20.0	0.5
3	5	12.2	0.3	12	21.4	0.7	13	17.3	0.8	10	19.2	0.6	8	14.5	0.5
4	7	17.1	0.6	12	21.4	1.0	10	13.3	0.8	6	11.5	0.5	9	16.4	0.7
5	3	7.3	0.5	2	3.6	0.3	3	4.0	0.5	3	5.8	0.5	3	5.5	0.5
6	5	12.2	0.5	3	5.4	0.3	8	10.7	0.8	6	11.5	0.6	4	7.3	0.4
7	7	17.1	0.5	5	8.9	0.4	9	12.0	0.7	10	19.2	0.7	13	23.6	0.9
8	11	26.8	1.0	7	12.5	0.6	17	22.7	1.5	8	15.4	0.7	6	10.9	0.5
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Kawasaki Syndrome LAC, 1999-2008

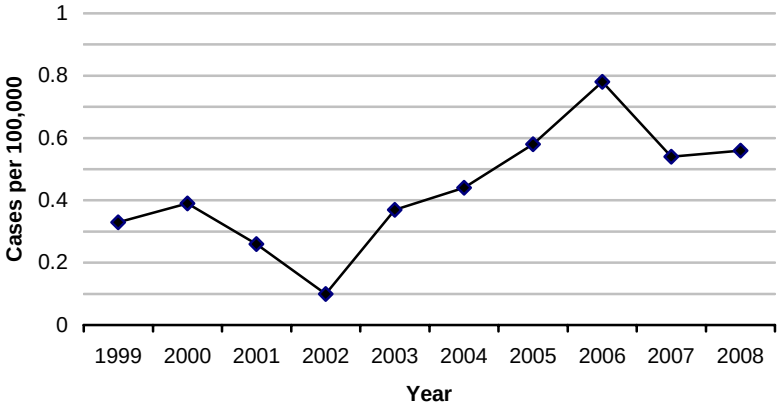


Figure 2. Incidence Rates of Kawasaki Syndrome by Age Group LAC, 2008

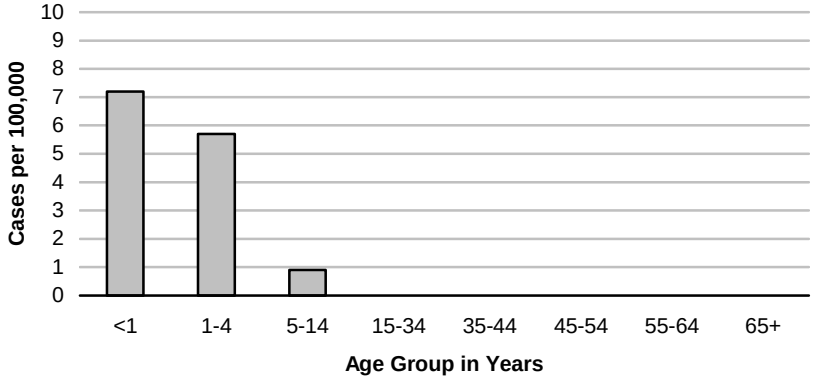
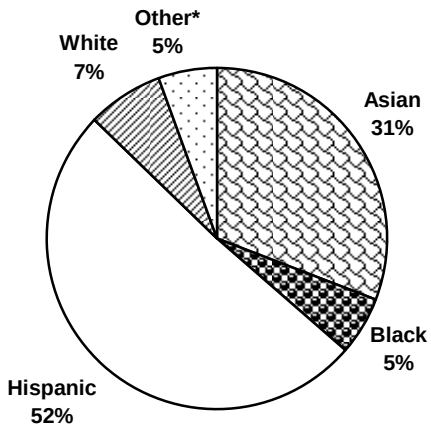


Figure 3. Percent Cases of Kawasaki Syndrome by Race/Ethnicity, LAC, 2008



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

Figure 4. Incidence Rates of Kawasaki Syndrome by SPA LAC, 2008

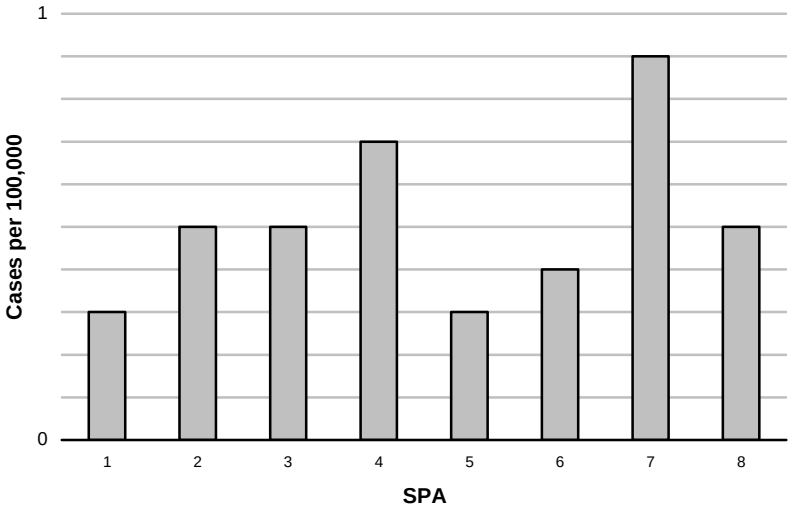


Figure 5. Reported Kawasaki Syndrome Cases by Month of Onset LAC, 2008

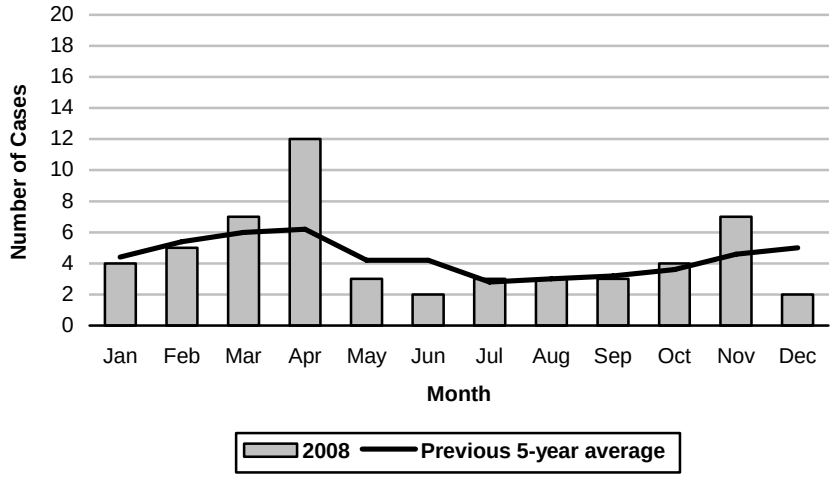
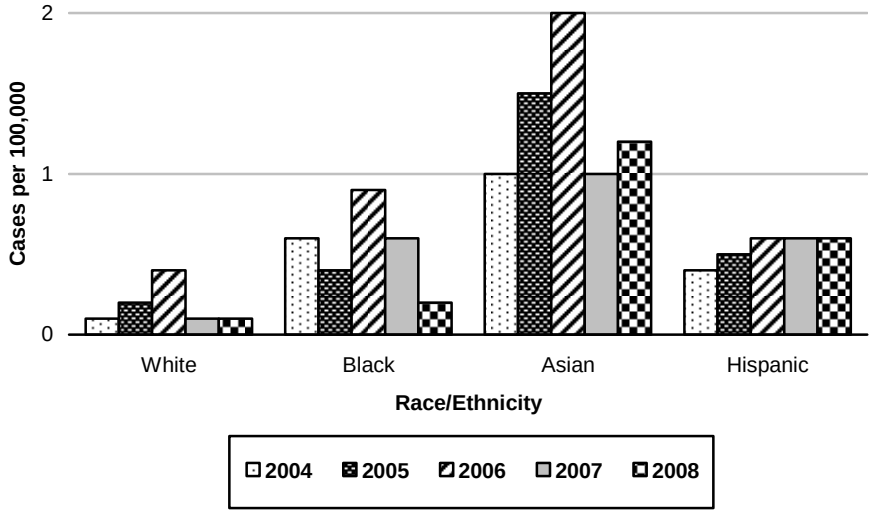
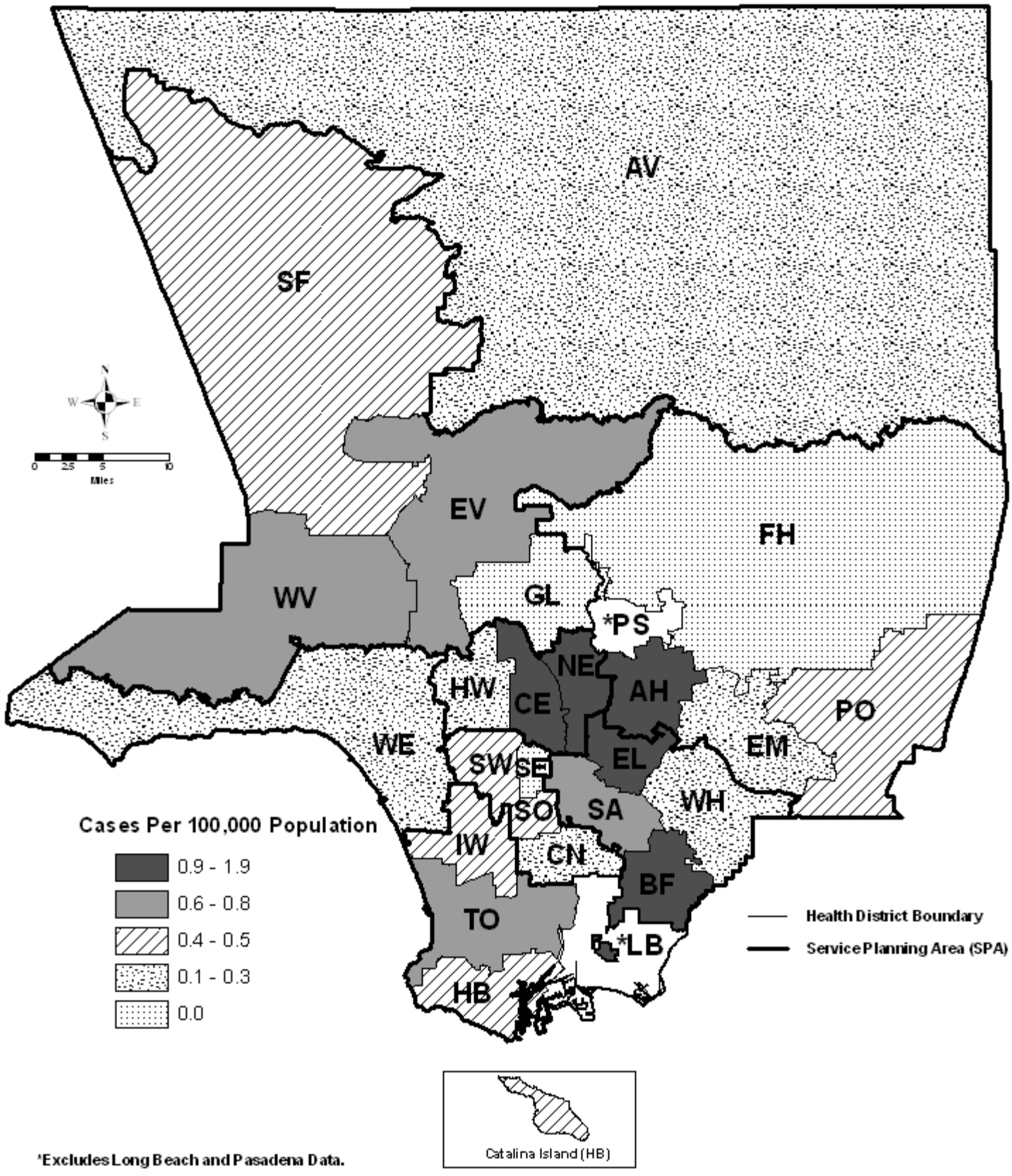


Figure 6. Kawasaki Syndrome Incidence by Race/Ethnicity LAC, 2004-2008



Map 8. Kawasaki Syndrome
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

LEGIONELLOSIS

CRUDE DATA	
Number of Cases	59
Number of Deaths	6
Annual Incidence[a]	
LA County	0.6
California[b]	0.5
United States[b]	1.1
Age at Diagnosis	
Mean	64
Median	66
Range	0-89

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

DESCRIPTION

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

At the community level, there is very little that can be done to prevent sporadic cases of LD. While prevention of LD is impractical at the community level, much has been written about preventive measures in hospitals. Instituting a routine, periodic culturing of the water system, cleaning contaminated water sources such as cooling towers, water pipes. Application of biocides to limit the growth of organism, maintaining hot water system temperatures at 50 degrees centigrade or higher may reduce the risk of transmission. Using tap water in respiratory devices and procedures should be avoided as well. Surveillance of LD is vital in order to monitor disease incidence and to recognize outbreaks. Prevention of additional cases during outbreaks by early recognition and investigation is of high priority; in order for the control measures may be applied in a timely fashion.

2008 TRENDS AND HIGHLIGHTS

- There was an increase of cases during the last two years; however, LAC rates are lower than the national average (Figure 1). CA rates during the last ten years are not available. No nosocomial cases were reported this year. The case fatality rate has decreased from 12.5% in 2007 to 10.2% in 2008. A history of recent travel was reported in 11.8% of cases.
- Historically, cases in younger groups are relatively uncommon. One case of a <1 year old was reported this year. According to the CDC, from 1994 to 1997, the average number of cases reported in this age group nationally is 1% of the total population. Rates in LAC are similar to US rates with the highest rates occurring in persons greater than 65 years old (Figure 2).
- The highest incidence rates occurred in Service Planning Area (SPA) 5 (1.2 per 100,000) followed by SPA 2 (0.8 per 100,000) (Figure 3). There was no clustering of cases identified in these SPAs.
- In 2008, the number of reported cases in LAC was significantly higher than the five-year average. Cases were distributed throughout the year, with a peak reported during summer, which is consistent with CDC national surveillance data (Figure 4). The increase can be explained due to improved reporting mechanisms such as electronic laboratory reporting and web-based confidential morbidity reporting.
- The majority of cases occurred among whites (30, 50.8%), which was more than twice the number of cases reported Hispanics (13, 22.0%). This data is consistent with the last couple of years (Figure 5).

Reported Legionellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=15)			2005 (N=31)			2006 (N=24)			2007 (N=40)			2008 (N=59)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	1.7	0.7
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	0	0.0	0.0	0	0.0	0.0	1	4.2	0.0	2	5.0	0.1	1	1.7	0.0
35-44	2	13.3	0.1	3	9.7	0.2	2	8.3	0.1	4	10.0	0.3	5	8.5	0.3
45-54	2	13.3	0.2	5	16.1	0.4	2	8.3	0.2	10	25.0	0.8	7	11.9	0.5
55-64	4	26.7	0.5	10	32.3	1.2	5	20.8	0.6	5	12.5	0.6	12	20.3	1.3
65+	5	33.3	0.5	13	41.9	1.3	14	58.3	1.4	19	47.5	1.9	33	55.9	3.2
Unknown	2	13.3		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	6.7	0.1	7	22.6	0.6	6	25.0	0.5	0	0.0	0.0	5	8.5	0.4
Black	1	6.7	0.1	2	6.5	0.2	3	12.5	0.4	6	15.0	0.7	11	18.6	1.3
Hispanic	5	33.3	0.1	10	32.3	0.2	5	20.8	0.1	12	30.0	0.3	13	22.0	0.3
White	3	20.0	0.1	12	38.7	0.4	10	41.7	0.3	22	55.0	0.8	30	50.8	1.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	5	33.3		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	1.7	0.3
2	4	26.7	0.2	4	12.9	0.2	3	12.5	0.1	8	20.0	0.4	18	30.5	0.8
3	4	26.7	0.2	6	19.4	0.4	4	16.7	0.2	6	15.0	0.3	9	15.3	0.5
4	1	6.7	0.1	1	3.2	0.1	7	29.2	0.6	7	17.5	0.6	7	11.9	0.5
5	2	13.3	0.3	1	3.2	0.2	1	4.2	0.2	7	17.5	1.1	8	13.6	1.2
6	1	6.7	0.1	2	6.5	0.2	0	0.0	0.0	7	17.5	0.7	4	6.8	0.4
7	2	13.3	0.1	6	19.4	0.4	7	29.2	0.5	4	10.0	0.3	4	6.8	0.3
8	1	6.7	0.1	1	3.2	0.1	1	4.2	0.1	1	2.5	0.1	8	13.6	0.7
Unknown	0	0.0		10	32.3		1	4.2		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Legionellosis
LAC, CA and US, 1999-2008

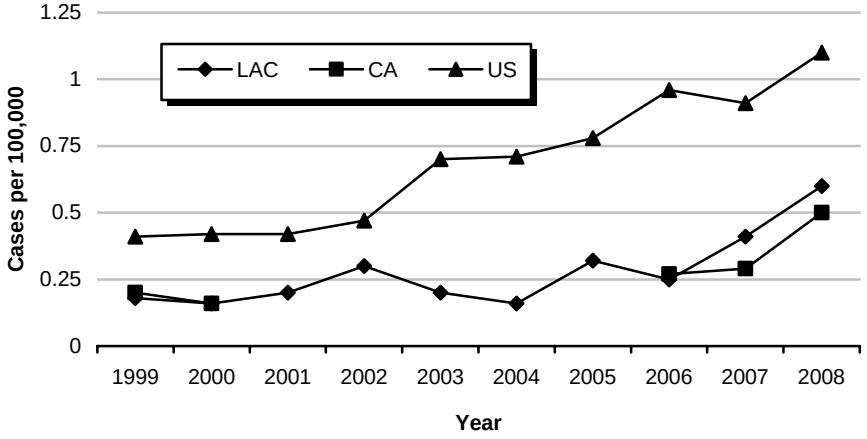


Figure 2. Incidence Rates of Legionellosis by Age Group
LAC, 2008

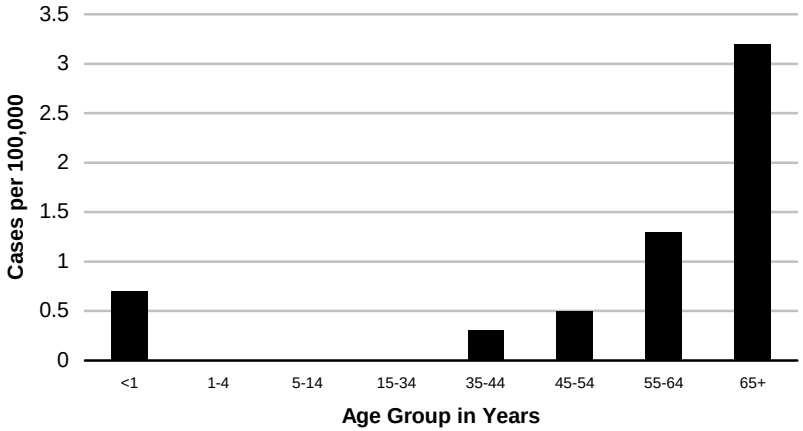


Figure 3. Incidence Rates of Legionellosis by SPA
LAC, 2008

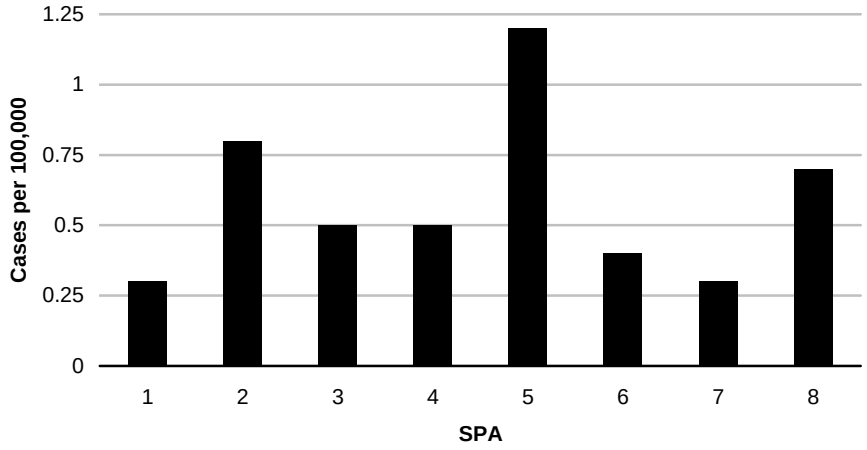


Figure 4. Reported Legionellosis Cases by Month of Onset
LAC, 2008

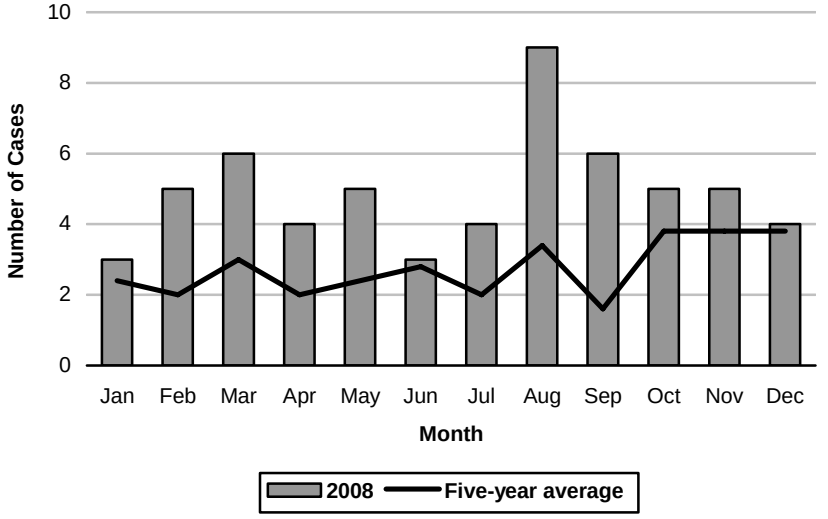
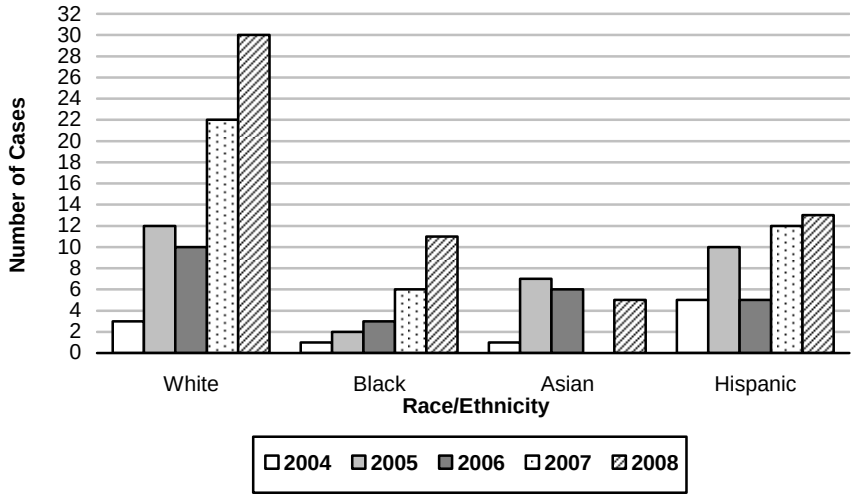
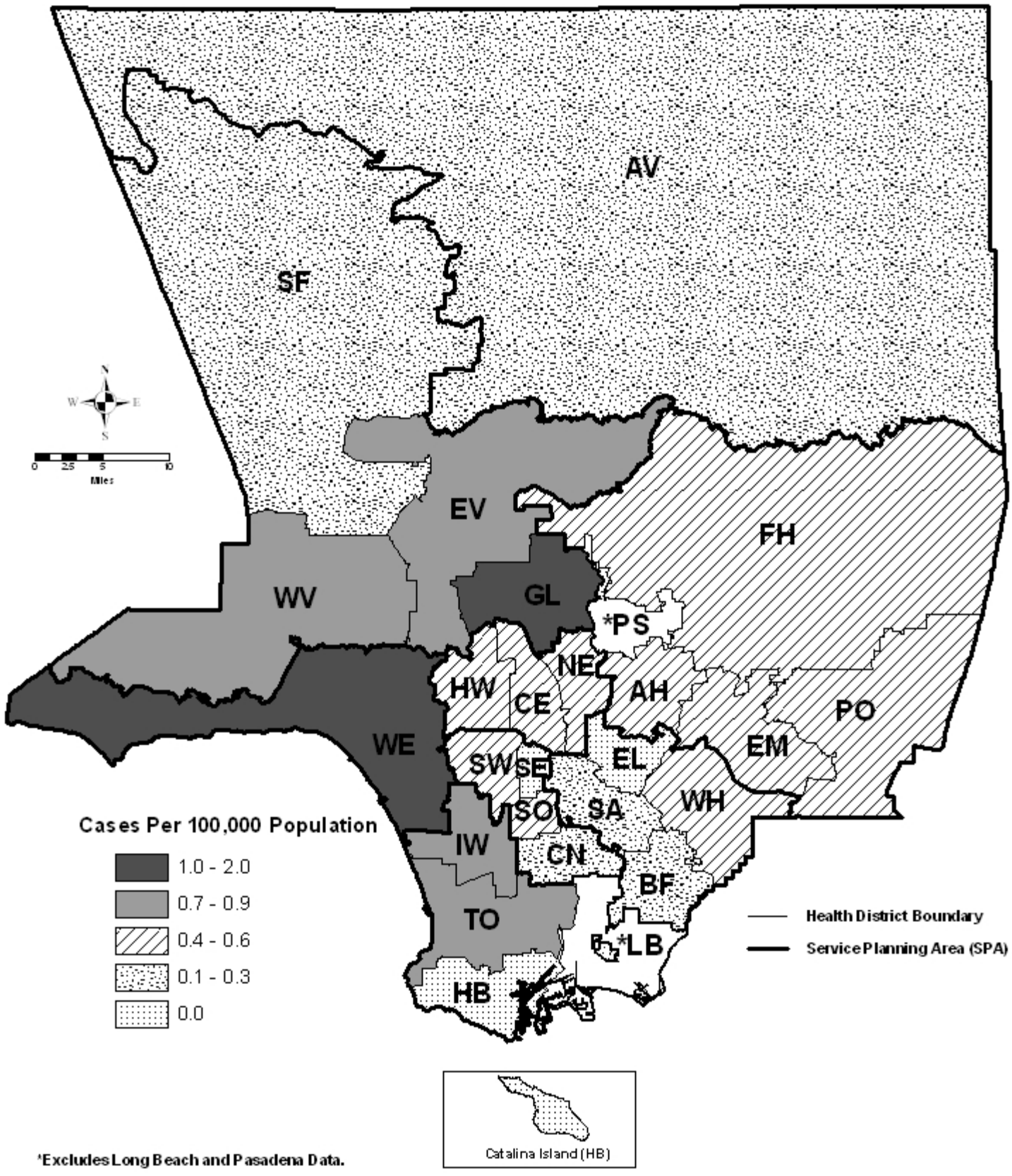


Figure 5. Legionellosis Incidence by Race/Ethnicity
LAC, 2004-2008



Map 9. Legionellosis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

LISTERIOSIS, NONPERINATAL

CRUDE DATA	
Number of Cases	20
Annual Incidence[a]	
LA County	0.21
California	n/a
United States	n/a
Age at Diagnosis	
Mean	60
Median	67
Range	9-80

[a]Cases per 100,000 population.

DESCRIPTION

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

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

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

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

2008 TRENDS AND HIGHLIGHTS

- Despite increased risk of having conditions (such as diabetes, respiratory and cardiovascular disease) that predispose them to contracting listeriosis, blacks comprise a relatively small proportion of listeriosis cases (5%). Close to half (40%) of cases of listeriosis occurred among whites. Asians comprised 30% of cases, and Hispanics comprised 25% of cases (Figure 3).
- Regionally there is greater incidence of listeriosis in Service Planning Area (SPA) 3 compared to other SPAs in Los Angeles County (Figure 4).
- The incidence of listeriosis in 2008 has been consistent with seasonal trends from the past five years (Figure 5). Historically the occurrence of listeriosis cases peaks in August and September.
- Nonperinatal listeriosis disproportionately affects the elderly and immunocompromised. The median age of nonperinatal cases is 67 years, consistently reflecting age as a risk factor for listeriosis.

Reported Listeriosis, nonperinatal Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=21)			2005 (N=25)			2006 (N=25)			2007 (N=21)			2008 (N=20)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	2	8.0	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	2	8.0	0.1	0	0.0	0.0	0	0.0	0.0	1	5.0	0.1
15-34	1	4.8	0.0	0	0.0	0.0	2	8.0	0.1	0	0.0	0.0	1	5.0	0.0
35-44	0	0.0	0.0	0	0.0	0.0	1	4.0	0.1	0	0.0	0.0	1	5.0	0.1
45-54	2	9.5	0.2	5	20.0	0.4	4	16.0	0.3	6	28.6	0.5	1	5.0	0.1
55-64	7	33.3	0.9	6	24.0	0.7	6	24.0	0.7	6	28.6	0.7	5	25.0	0.5
65+	11	52.4	1.2	10	40.0	1.0	12	48.0	1.2	9	42.9	0.9	11	55.0	1.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	4.8	0.1	4	16.0	0.3	3	12.0	0.2	3	14.3	0.2	6	30.0	0.5
Black	3	14.3	0.4	2	8.0	0.2	1	4.0	0.1	0	0.0	0.0	1	5.0	0.1
Hispanic	8	38.1	0.2	5	20.0	0.1	8	32.0	0.2	8	38.1	0.2	5	25.0	0.1
White	9	42.9	0.3	14	56.0	0.5	13	52.0	0.5	10	47.6	0.3	8	40.0	0.3
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	6	28.6	0.3	8	32.0	0.4	7	28.0	0.3	6	28.6	0.3	3	15.0	0.1
3	4	19.0	0.2	5	20.0	0.3	8	32.0	0.5	4	19.0	0.2	6	30.0	0.3
4	3	14.3	0.2	0	0.0	0.0	5	20.0	0.4	1	4.8	0.1	3	15.0	0.2
5	3	14.3	0.5	4	16.0	0.6	4	16.0	0.6	4	19.0	0.6	1	5.0	0.2
6	1	4.8	0.1	3	12.0	0.3	1	4.0	0.1	3	14.3	0.3	2	10.0	0.2
7	3	14.3	0.2	3	12.0	0.2	0	0.0	0.0	3	14.3	0.2	3	15.0	0.2
8	1	4.8	0.1	2	8.0	0.2	0	0.0	0.0	0	0.0	0.0	2	10.0	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Reported Cases of Nonperinatal Listeriosis LAC, 1999-2008

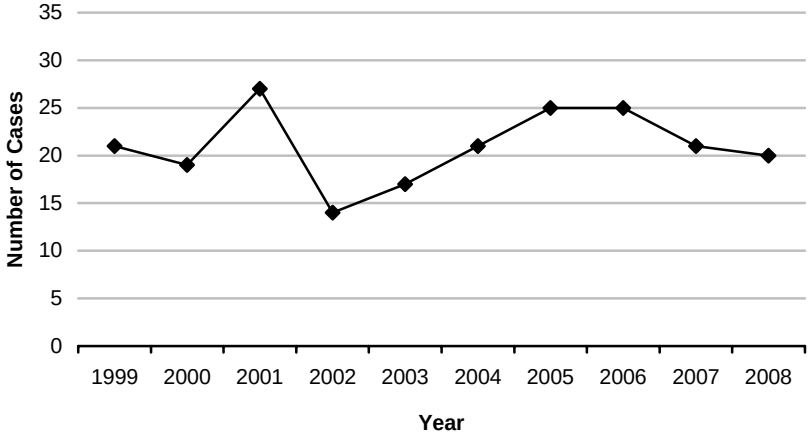


Figure 2. Reported Cases of Nonperinatal Listeriosis by Age Group, LAC, 2008 (N=20)

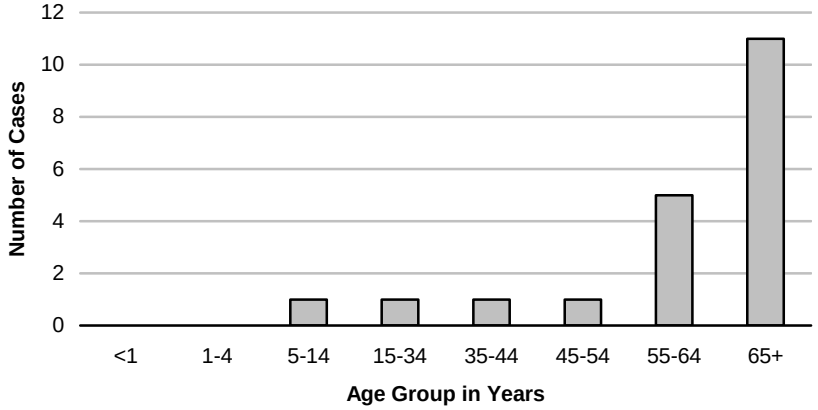


Figure 3. Percent Cases of Nonperinatal Listeriosis by Race/Ethnicity, LAC, 2008 (N=20)

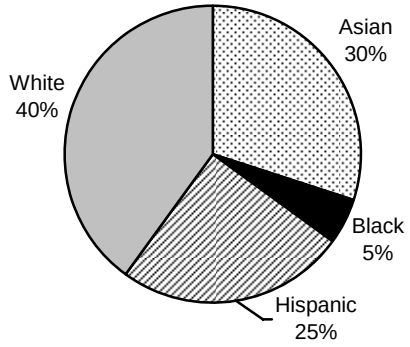


Figure 4. Reported Cases of Nonperital Listeriosis by SPA LAC, 2008 (N=20)

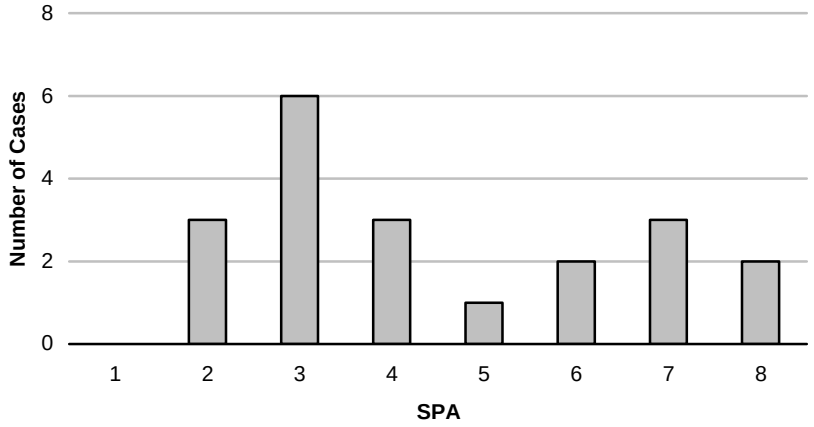
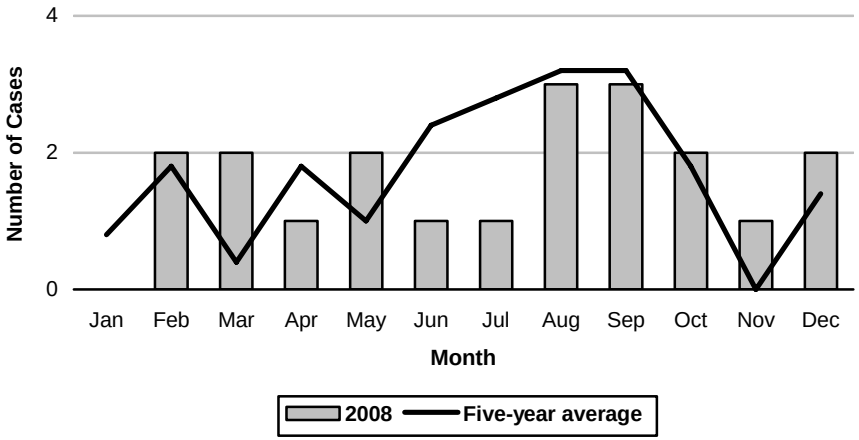


Figure 5. Reported Nonperinatal Listeriosis Cases by Month of Onset LAC, 2008



LISTERIOSIS, PERINATAL

CRUDE DATA	
Number of Cases	2
Annual Incidence[a]	
LA County [b]	1.45
California	N/A
United States	N/A
Age at Diagnosis	
Mean	28
Median	28
Range	27 - 29

[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; and cold cuts from deli counters; and unpasteurized dairy products—milk, milk products and soft cheeses (Mexican-style, Brie, feta, blue-veined, Camembert). The disease affects primarily persons of advanced age, pregnant women, newborns, and adults with weakened immune systems. On rare occasions, people without these risk factors have also contracted listeriosis. Symptoms of listeriosis include: fever, muscle aches, and sometimes nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage or stillbirth, premature delivery, or infection of the newborn.

Pregnant women should avoid foods associated with *Listeria*. In particular, cheese sold by street vendors or obtained from relatives/friends in other countries, where food processing quality assurance is unknown, should be avoided by pregnant women.

In addition, fruits and vegetables should be thoroughly washed. Uncooked meats should be stored separately from vegetables, cooked foods, and ready-to-eat foods. Hands, utensils, and cutting boards should be washed after handling uncooked foods. Leftover foods or ready-to-eat foods, such as hot dogs, should be cooked until steaming hot before eating. Finally, although the risk of listeriosis associated with foods from deli counters is relatively low, pregnant women may choose to avoid these foods or thoroughly reheat cold cuts before eating. Prevention strategies for healthcare providers include education during prenatal checkups, outreach to Hispanic communities, and food safety notices at food and deli markets.

2008 TRENDS AND HIGHLIGHTS

- In 2008 there were two cases of perinatal listeriosis, both occurring among Hispanic women who delivered prematurely. One woman delivered fraternal twins, but one of the infants died of infection. The other woman delivered a baby boy who survived, but was very ill at birth.
- The two women are in the age group 15-34 years and reside in Service Planning Area 3 and 7.
- The number of perinatal listeriosis cases in 2008 is consistent with a downward trend in incidence of listeriosis overall (Figure 1).
- Hispanic women are at greatest risk of developing perinatal listeriosis (Figure 2).

Reported Perinatal Listeriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=6)			2005 (N=3)			2006 (N=12)			2007 (N=6)			2008 (N=2)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	5	83.3	0.2	2	66.7	0.1	8	66.7	0.3	5	83.3	0.2	2	100.0	0.1
35-44	1	16.7	0.1	1	33.3	0.1	3	25.0	0.2	1	16.7	0.1	0	0.0	0.0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	8.3		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	3	25.0	0.4	0	0.0	0.0	0	0.0	0.0
Hispanic	4	66.7	0.1	2	66.7	0.0	7	58.3	0.2	5	83.3	0.1	2	100.0	0.0
White	2	33.3	0.1	1	33.3	0.0	1	8.3	0.0	1	16.7	0.0	0	0.0	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	1	8.3	0.3	0	0.0	0.0	0	0.0	0.0
2	2	33.3	0.1	0	0.0	0.0	1	8.3	0.0	1	16.7	0.0	0	0.0	0.0
3	0	0.0	0.0	0	0.0	0.0	2	16.7	0.1	0	0.0	0.0	1	50.0	0.1
4	0	0.0	0.0	1	33.3	0.1	3	25.0	0.2	2	33.3	0.2	0	0.0	0.0
5	2	33.3	0.3	1	33.3	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	0	0.0	0.0	1	33.3	0.1	2	16.7	0.2	1	16.7	0.1	0	0.0	0.0
7	2	33.3	0.1	0	0.0	0.0	2	16.7	0.1	1	16.7	0.1	1	50.0	0.1
8	0	0.0	0.0	0	0.0	0.0	1	8.3	0.1	1	16.7	0.1	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Reported Cases of Perinatal Listeriosis LAC, 1999-2008

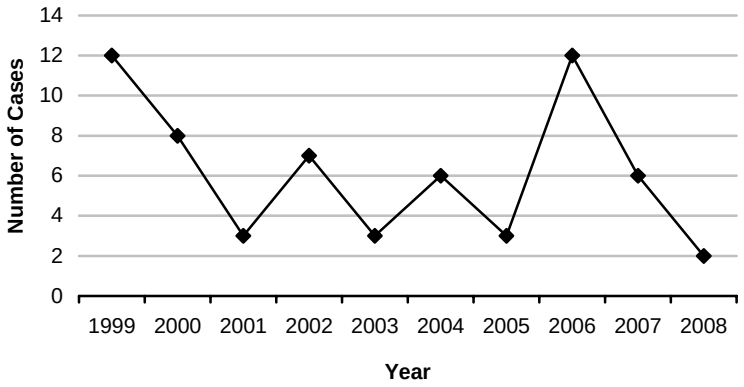


Figure 2. Perinatal Listeriosis Incidence by Race/Ethnicity LAC, 2004-2008

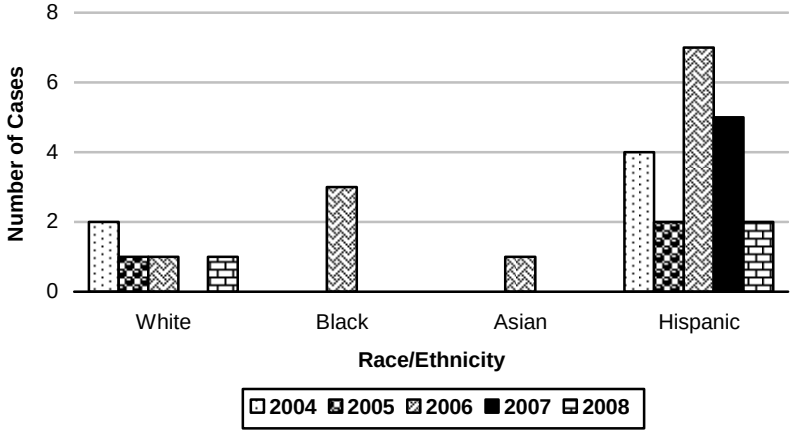
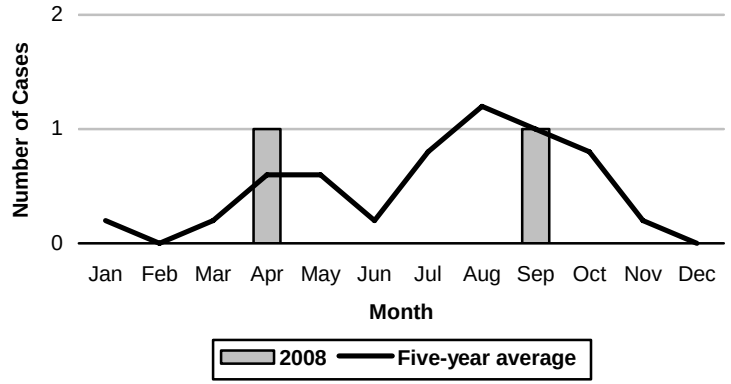


Figure 3. Reported Perinatal Listeriosis Cases by Month of Onset, LAC, 2008



LYME DISEASE

CRUDE DATA	
Number of Cases	9
Annual Incidence[a]	
LA County	0.09[b]
California[c]	0.20
United States[c]	9.6
Age at Diagnosis	
Mean	31.4
Median	43
Range	3-65

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

DESCRIPTION

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

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

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

2008 TRENDS AND HIGHLIGHTS

- Even as the national incidence increases (from 6.3 per 100,000 in 2000 to 9.1 per 100,000 in 2007), the incidence in LAC (0.09 per 100,000) has remained stable and well below the national rate (Figures 1 and 3).
- All cases in 2008 (n=9) reported a travel history to an endemic area outside of LAC.
- Fifty-six percent (n=5) recalled a tick bite prior to onset of rash.
- Onset of symptoms continues to be limited to the summer months of June through August (Figure 2).

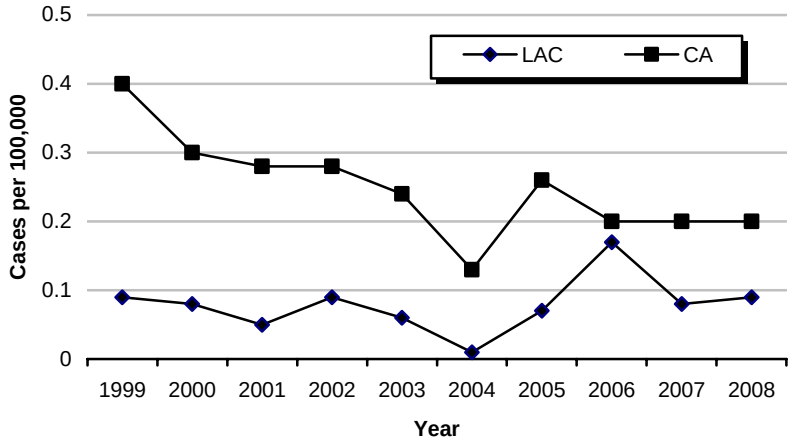
[1]Notice to Readers Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease. MMWR August 11, 1995/44(31);590-591, http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm.

Reported Lyme Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=1)			2005 (N=7)			2006 (N=17)			2007 (N=8)			2008 (N=9)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	2	22.2	0.4
5-14	0	0.0	0.0	1	14.3	0.1	3	17.6	0.2	2	25.0	0.1	1	11.1	0.1
15-34	1	100.	0.0	2	28.6	0.1	7	41.2	0.3	3	37.5	0.1	1	11.1	0.0
35-44	0	0.0	0.0	1	14.3	0.1	2	11.8	0.1	0	0.0	0.0	1	11.1	0.1
45-54	0	0.0	0.0	1	14.3	0.1	2	11.8	0.2	2	25.0	0.2	3	33.3	0.2
55-64	0	0.0	0.0	1	14.3	0.1	1	5.9	0.1	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	1	14.3	0.1	1	5.9	0.1	1	12.5	0.1	1	11.1	0.1
Unknown	0	0.0		0	0.0		1	5.9		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	1	14.3	0.1	1	5.9	0.1	1	12.5	0.1	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	0	0.0	0.0	4	57.1	0.1	1	5.9	0.0	1	12.5	0.0	0	0.0	0.0
White	1	100.	0.0	0	0.0	0.0	13	76.5	0.5	3	37.5	0.1	9	100.	0.3
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		2	28.6		2	11.8		3	37.5		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	2	28.6	0.1	6	35.3	0.3	2	25.0	0.1	2	22.2	0.1
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	12.5	0.1	0	0.0	0.0
4	0	0.0	0.0	1	14.3	0.1	5	29.4	0.4	2	25.0	0.2	1	11.1	0.1
5	1	100.	0.2	2	28.6	0.3	2	11.8	0.3	2	25.0	0.3	4	44.4	0.6
6	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	1	12.5	0.1	0	0.0	0.0
8	0	0.0	0.0	2	28.6	0.2	1	5.9	0.1	0	0.0	0.0	2	22.2	0.2
Unknown	0	0.0		0	0.0		1	5.9		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Lyme Disease
LAC* and CA, 1999-2008



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

Figure 2. Reported Lyme Disease Cases by Month of Onset
LAC, 2008

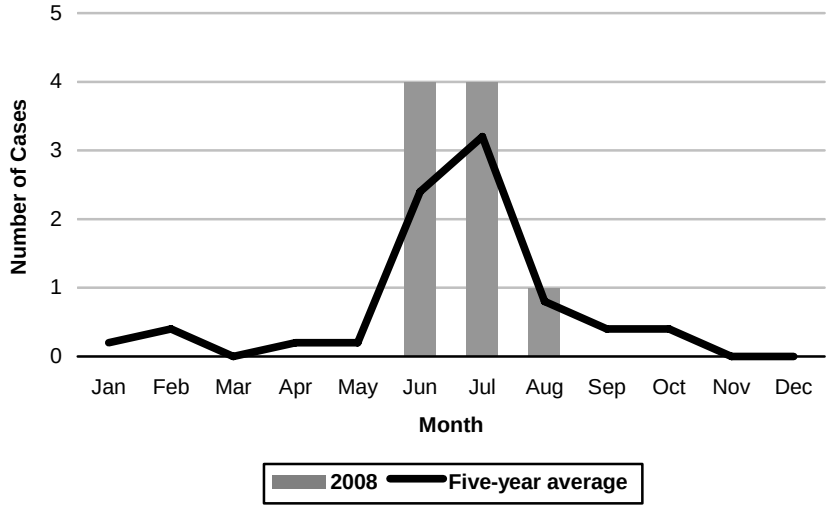
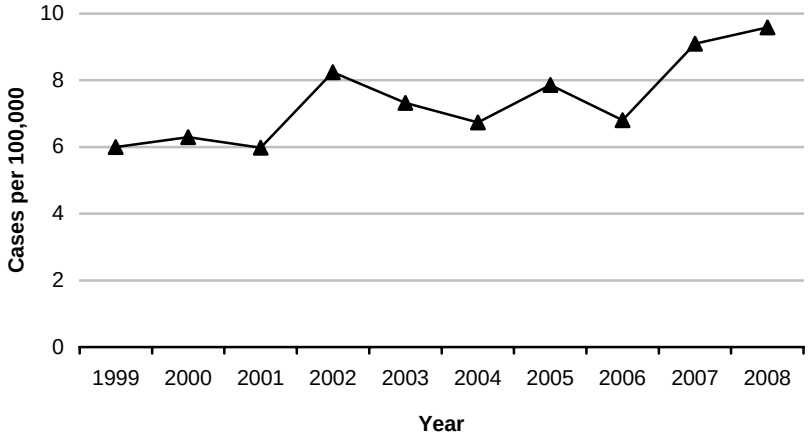


Figure 3. Incidence Rates of Lyme Disease
US, 1999-2008



MALARIA

CRUDE DATA	
Number of Cases	30
Annual Incidence[a]	
LA County	0.31
California[b]	0.34
United States[b]	0.42
Age at Diagnosis	
Mean	37.4
Median	35
Range	9-59

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

DESCRIPTION

Human malaria is a febrile illness caused by the protozoan parasites *Plasmodium vivax*, *P. falciparum, P. malariae,* and *P. ovale*. The disease is transmitted by the bite of an infected *Anopheles* mosquito and is characterized by episodes of chills and fever every 2 to 3 days. *P. falciparum* is found primarily in tropical regions and 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, regardless of whether the person experienced previous episodes of malaria.

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

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

2008 TRENDS AND HIGHLIGHTS

- The number of reported cases (N=30) continues to decrease since 2003.
- Almost half of all cases (n=14) were caused by *P. falciparum*. The remainder of cases with identified species were caused by *P. vivax* (n=12).
- All cases reported a travel history to a country with endemic malaria. This year, travelers to Africa represented 60% of all cases and 100% of *P. falciparum* cases.
- Among cases with a known reason for travel (n=21), there was a higher proportion of cases among refugees and immigrants (38%) compared to those traveling to visit friends and relatives (33%). This is a higher proportion than among previous years when refugees/immigrants made up less than 20% of cases annually.
- Only four of twelve US residents (33%) used prophylaxis during their travels, two of whom reported completing their regimen. A greater proportion of cases who traveled for work purposes reported using prophylaxis more commonly than those traveling for leisure (i.e., visiting friends and relatives).

Reported Malaria Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=51)			2005 (N=45)			2006 (N=33)			2007 (N=26)			2008 (N=30)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	1	2.0	0.2	0	0.0	0.0	2	6.1	0.3	0	0.0	0.0	0	0.0	0.0
5-14	6	11.8	0.4	3	6.7	0.2	2	6.1	0.1	2	7.7	0.1	1	3.3	0.1
15-34	20	39.2	0.7	21	46.7	0.7	8	24.2	0.3	11	42.3	0.4	12	40.0	0.4
35-44	10	19.6	0.7	8	17.8	0.5	7	21.2	0.5	3	11.5	0.2	6	20.0	0.4
45-54	9	17.6	0.7	10	22.2	0.8	11	33.3	0.8	5	19.2	0.4	7	23.3	0.5
55-64	4	7.8	0.5	2	4.4	0.2	1	3.0	0.1	5	19.2	0.6	4	13.3	0.4
65+	1	2.0	0.1	1	2.2	0.1	2	6.1	0.2	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	7	13.7	0.6	7	15.6	0.6	5	15.2	0.4	7	26.9	0.5	4	13.3	0.3
Black	26	51.0	3.0	22	48.9	2.6	22	66.7	2.6	11	42.3	1.3	16	53.3	1.9
Hispanic	13	25.5	0.3	7	15.6	0.2	1	3.0	0.0	4	15.4	0.1	1	3.3	0.0
White	5	9.8	0.2	6	13.3	0.2	5	15.2	0.2	1	3.8	0.0	4	13.3	0.1
Other	0	0.0	0.0	1	2.2	3.5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		2	4.4		0	0.0		3	11.5		5	16.7	
SPA															
1	2	3.9	0.6	2	4.4	0.6	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	12	23.5	0.6	11	24.4	0.5	5	15.2	0.2	10	38.5	0.5	8	26.7	0.4
3	9	17.6	0.5	5	11.1	0.3	4	12.1	0.2	2	7.7	0.1	3	10.0	0.2
4	7	13.7	0.6	8	17.8	0.6	5	15.2	0.4	4	15.4	0.3	2	6.7	0.2
5	7	13.7	1.1	3	6.7	0.5	3	9.1	0.5	2	7.7	0.3	3	10.0	0.5
6	5	9.8	0.5	7	15.6	0.7	8	24.2	0.8	3	11.5	0.3	5	16.7	0.5
7	2	3.9	0.1	3	6.7	0.2	2	6.1	0.1	1	3.8	0.1	1	3.3	0.1
8	6	11.8	0.5	6	13.3	0.5	6	18.2	0.5	2	7.7	0.2	6	20.0	0.5
Unknown	1	2.0		0	0.0		0	0.0		2	7.7		2	6.7	

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

Figure 1. Incidence Rates of Malaria
LAC, CA and US, 1999-2008

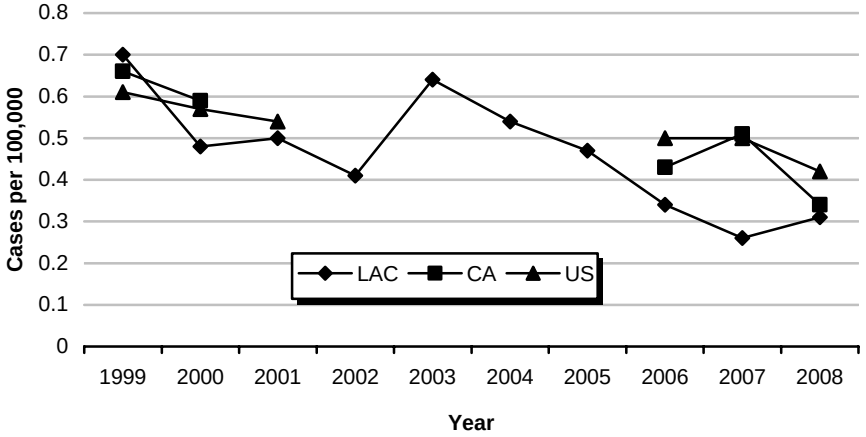


Figure 2. Incidence Rates of Malaria by Age Group
LAC, 2008

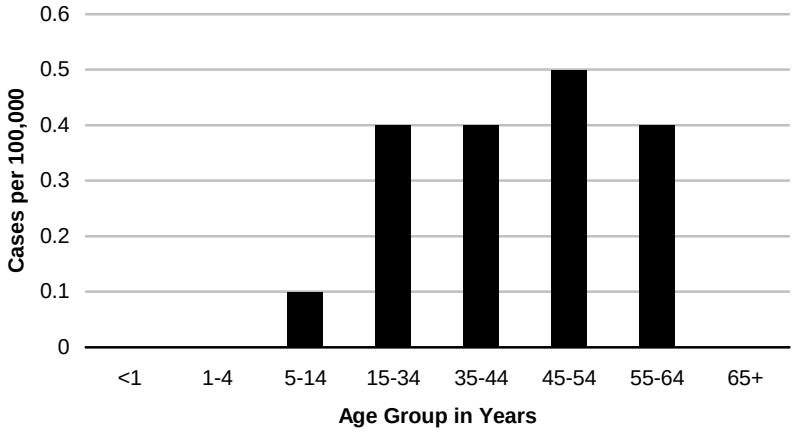


Figure 3. Percent Cases of Malaria by Race/Ethnicity
LAC, 2008

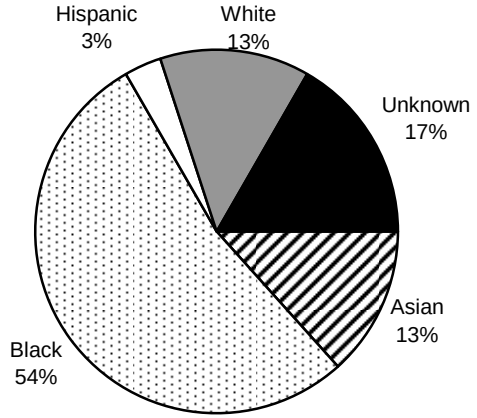


Figure 4. Number of Reported Malaria Cases by Race/Ethnicity
LAC, 2004-2008

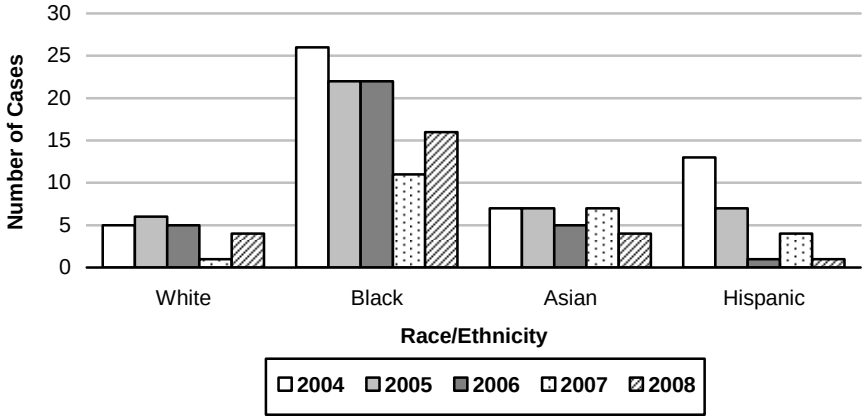


Figure 5. Percent Cases of Malaria by Species LAC, 2008

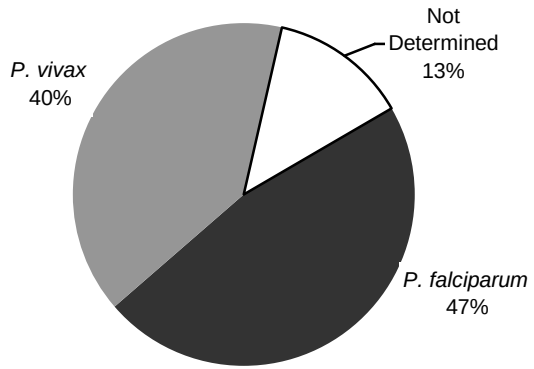


Table 2. Prophylaxis Use Among US Residents with Malaria, 2008

Reason for Travel	Total Cases (n)	Prophylaxis Use (n)	(%)
Pleasure	6	2	33
Work	4	2	50
Other/Unknown	2	0	0
Total	**12**	**4**	**33**

Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* species, 2008

Country of Acquisition	*P. falciparum*	*P. vivax*	Not Determined	Total
Africa	**12**	**3**	**3**	**18**
- Cameroon	1	0	1	2
- Central African Republic	1	0	0	1
- Congo	0	1	0	1
- Ethiopia	1	1	0	2
- Ghana	1	0	1	2
- Liberia*	1	0	0	1
- Nigeria	7	0	1	8
Asia/Oceania	**0**	**5**	**0**	**5**
- India	0	4	0	4
- Pakistan	0	1	0	1
Latin America	**0**	**3**	**0**	**3**
- Guatemala	0	1	0	1
- Honduras	0	1	0	1
- Nicaragua	0	1	0	1
Unknown	**2**	**1**	**1**	**4**
Overall Total	**14**	**12**	**4**	**30**

*Case also traveled to Togo

MEASLES

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

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

DESCRIPTION

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

Immunization Recommendations:

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

2008 TRENDS AND HIGHLIGHTS

- During January to July 2008, 131 measles cases were reported in the US, compared with an average of 63 cases per year during 2000 to 2007. Approximately 91% of these cases were unvaccinated and 89% were associated with importations from other countries. (MMWR 2008; 57:893-896)
- Only one measles case was reported in Los Angeles County (LAC) (Figure 2). The single case was a 23-month old unvaccinated child who was hospitalized for five days with pneumonia. The child was unvaccinated because she presented to a health clinic without an immunization record (Table 1). Clearly, this was a missed opportunity for vaccination since the case did not receive a reminder to return for a follow-up visit to check the immunization record or to catch up on vaccinations.
- As long as measles continues to circulate in other parts of the world, unvaccinated individuals will continue to be at risk for measles infection.

Reported Measles Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=1)			2005 (N=0)			2006 (N=1)			2007 (N=0)			2008 (N=1)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	1	100.	0.2	0	0.0	0.0	1	100.	0.2
5-14	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	1	100.	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
35-44	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
45-54	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
55-64	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	1	100.	0.1	0	0.0	0.0	1	100.	0.1	0	0.0	0.0	0	0.0	0.0
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100.	0.0
White	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	0	0.0	0.0	1	100.	0.0	0	0.0	0.0	1	100.	0.0
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
8	1	100.	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Measles
US, CA and LAC, 1999-2008

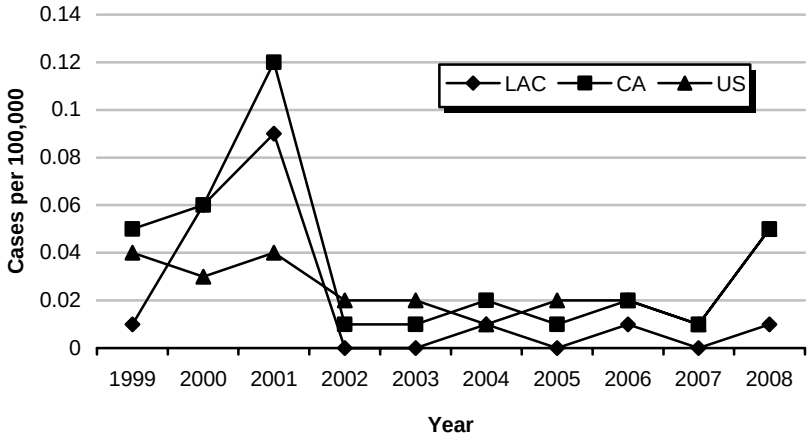


Figure 2. Reported Measles Cases
LAC, 1999-2008

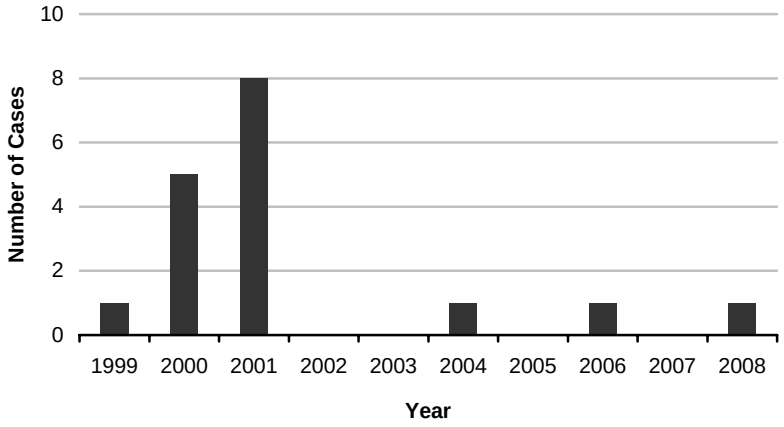


Figure 3. Reported Measles Cases by Month of Onset
LAC, 2008 vs. Previous Five-Year Average

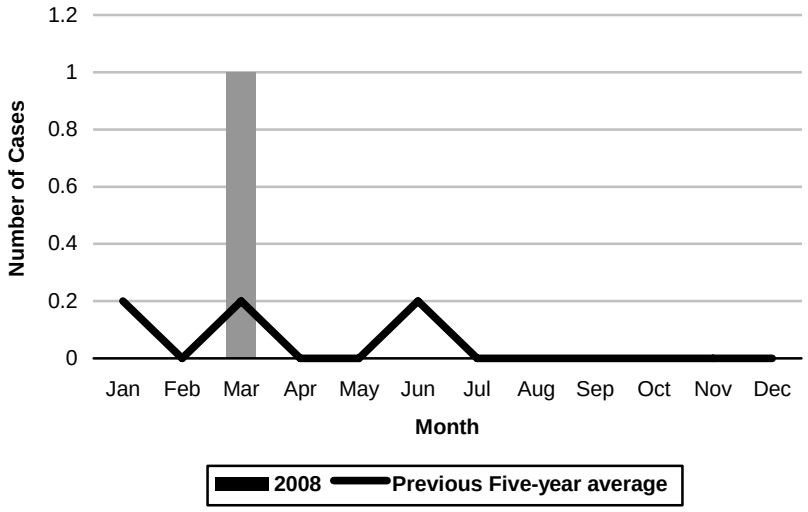


Table 1. Vaccination Status of Reported Measles Cases
LAC, 2008

	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)
No.	1	0	0	1	0
%	100%	0%	0%	100%	0%

[1] Cases less than 12 months of age

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

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

MENINGITIS, VIRAL

CRUDE DATA	
Number of Cases	597
Annual Incidence[a]	
LA County	6.1
Age at Diagnosis	
Mean	25.3
Median	18
Range	0-100

[a]Cases per 100,000 population.

DESCRIPTION

Viruses are the major cause of aseptic meningitis syndrome, a term used to define any meningitis (infectious or noninfectious), particularly one with a cerebrospinal fluid lymphocytic pleocytosis, for which a cause is not apparent after initial evaluation and routine stains and cultures do not support a bacterial or fungal etiology. Viral meningitis can occur at any age but is most common among the very young. Symptoms are characterized by sudden onset of fever, severe headache, stiff neck, photophobia, drowsiness or confusion, nausea and vomiting and usually last from 7 to 10 days.

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

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

2008 TRENDS AND HIGHLIGHTS

- In 2008, viral/aseptic meningitis incidence increased by approximately 33 % compared to 2007 (6.1 per 100,000 from 4.1 per 100,000) (Figure 1). This is most likely due to a pediatric enterovirus active surveillance project that began in late 2007, as the increase is seen specifically in younger age groups.
- Of the 157 (26%) cases in which an etiology was identified, 81 (52%) were caused by an enterovirus and 55 (35%) by WNV.
- Three deaths were reported; the etiologies were not determined.

Reported Viral Meningitis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=807)			2005 (N=530)			2006 (N=373)			2007 (N=395)			2008 (N=597)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	85	10.5	59.7	73	13.8	51.8	71	19.0	49.0	75	19.0	50.7	80	13.4	57.3
1-4	37	4.6	6.4	23	4.3	4.0	14	3.8	2.4	11	2.8	1.9	24	4.0	4.2
5-14	192	23.8	12.9	91	17.2	6.1	47	12.6	3.2	45	11.4	3.1	148	24.8	10.5
15-34	202	25.0	7.2	147	27.7	5.2	111	29.8	4.0	120	30.4	4.3	164	27.5	5.7
35-44	112	13.9	7.5	91	17.2	6.0	53	14.2	3.5	58	14.7	3.9	52	8.7	3.4
45-54	78	9.7	6.3	49	9.2	3.9	42	11.3	3.2	42	10.6	3.2	44	7.4	3.3
55-64	51	6.3	6.4	31	5.8	3.7	23	6.2	2.6	14	3.5	1.6	29	4.9	3.2
65+	47	5.8	5.0	23	4.3	2.4	10	2.7	1.0	29	7.3	2.9	51	8.5	5.0
Unknown	3	0.4		2	0.4		2	0.5		1	0.3		5	0.8	
Race/Ethnicity															
Asian	33	4.1	2.7	41	7.7	3.3	29	7.8	2.3	30	7.6	2.3	37	6.2	2.8
Black	85	10.5	9.9	56	10.6	6.6	33	8.8	3.9	28	7.1	3.3	43	7.2	5.0
Hispanic	416	51.5	9.3	250	47.2	5.5	195	52.3	4.2	179	45.3	3.9	275	46.1	5.9
White	224	27.8	7.7	155	29.2	5.3	101	27.1	3.5	108	27.3	3.7	121	20.3	4.2
Other	9	1.1	32.4	3	0.6	10.6	5	1.3	17.5	6	1.5	28.8	20	3.4	81.1
Unknown	40	5.0		25	4.7		10	2.7		44	11.1		101	16.9	
SPA															
1	41	5.1	12.4	41	7.7	12.0	45	12.1	12.9	35	8.9	9.8	69	11.6	18.8
2	152	18.8	7.2	98	18.5	4.6	72	19.3	3.4	84	21.3	3.9	80	13.4	3.7
3	169	20.9	9.9	106	20.0	6.2	78	20.9	4.5	63	15.9	3.6	86	14.4	5.0
4	56	6.9	4.5	42	7.9	3.4	23	6.2	1.8	16	4.1	1.3	24	4.0	1.9
5	28	3.5	4.4	11	2.1	1.7	10	2.7	1.6	13	3.3	2.0	29	4.9	4.5
6	87	10.8	8.5	40	7.5	3.9	31	8.3	3.0	42	10.6	4.0	79	13.2	7.5
7	177	21.9	13.0	118	22.3	8.6	59	15.8	4.3	73	18.5	5.3	131	21.9	9.5
8	88	10.9	8.0	64	12.1	5.8	52	13.9	4.7	63	15.9	5.6	90	15.1	8.0
Unknown	9	1.1		10	1.9		3	0.8		6	1.5		9	1.5	

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

Figure 1. Incidence Rates of Viral Meningitis LAC, 1999-2008

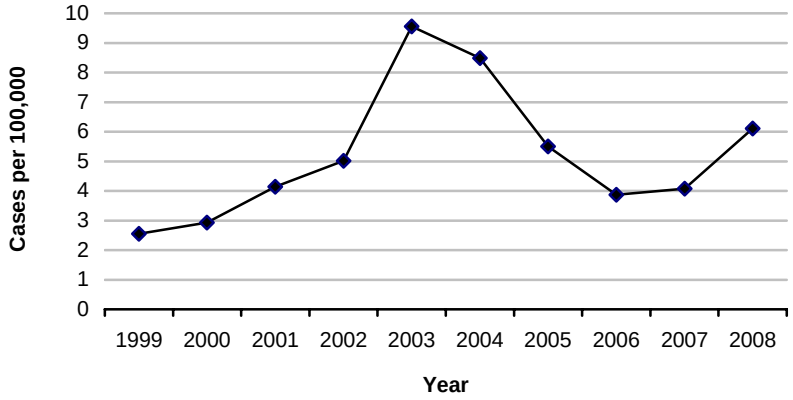


Figure 2. Incidence Rates of Viral Meningitis by Age Group LAC, 2008

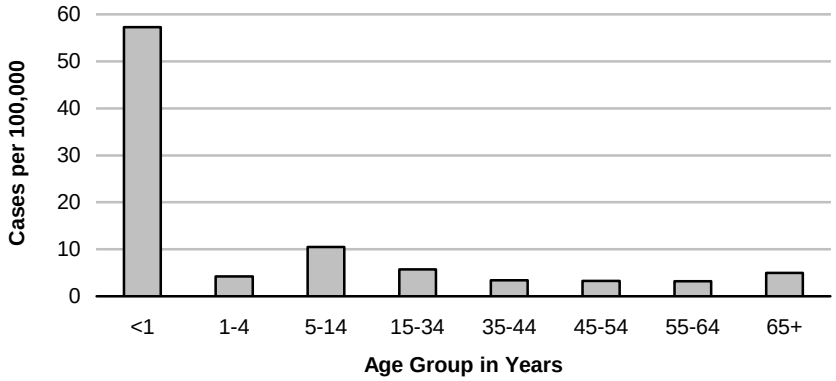


Figure 3. Percent Cases of Viral Meningitis by Race/Ethnicity, LAC, 2008

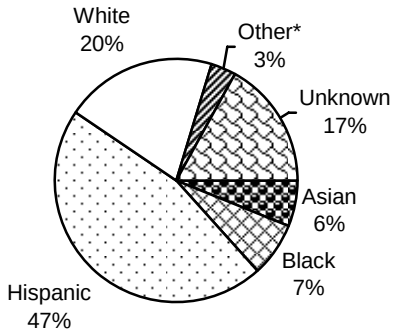
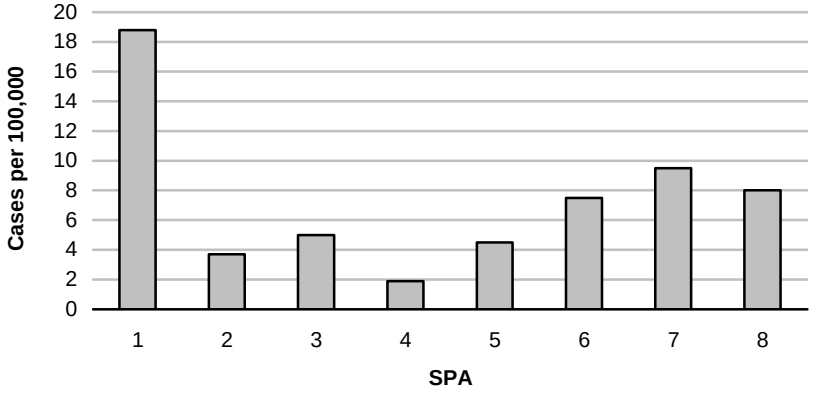


Figure 4. Incidence Rates of Viral Meningitis by SPA LAC, 2008



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

**Figure 5. Reported Viral Meningitis Cases by Month of Onset
LAC, 2008**

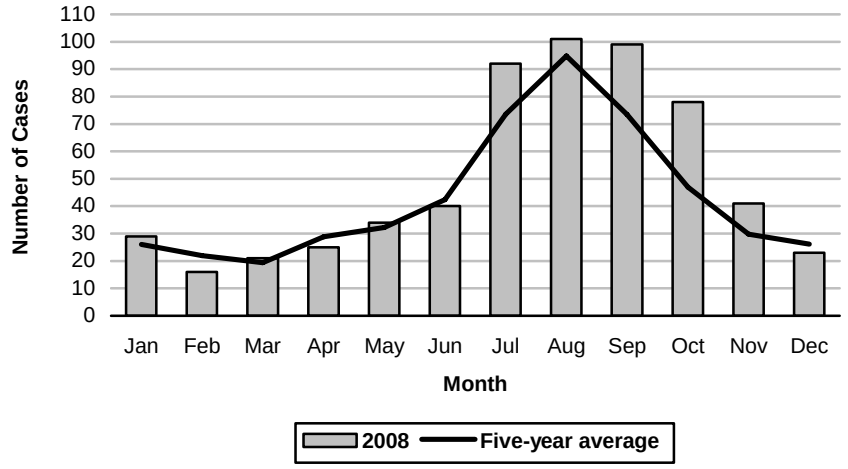
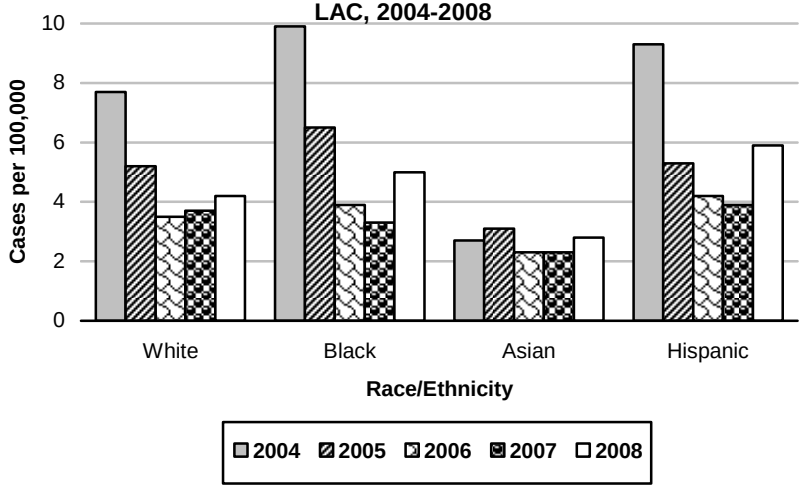
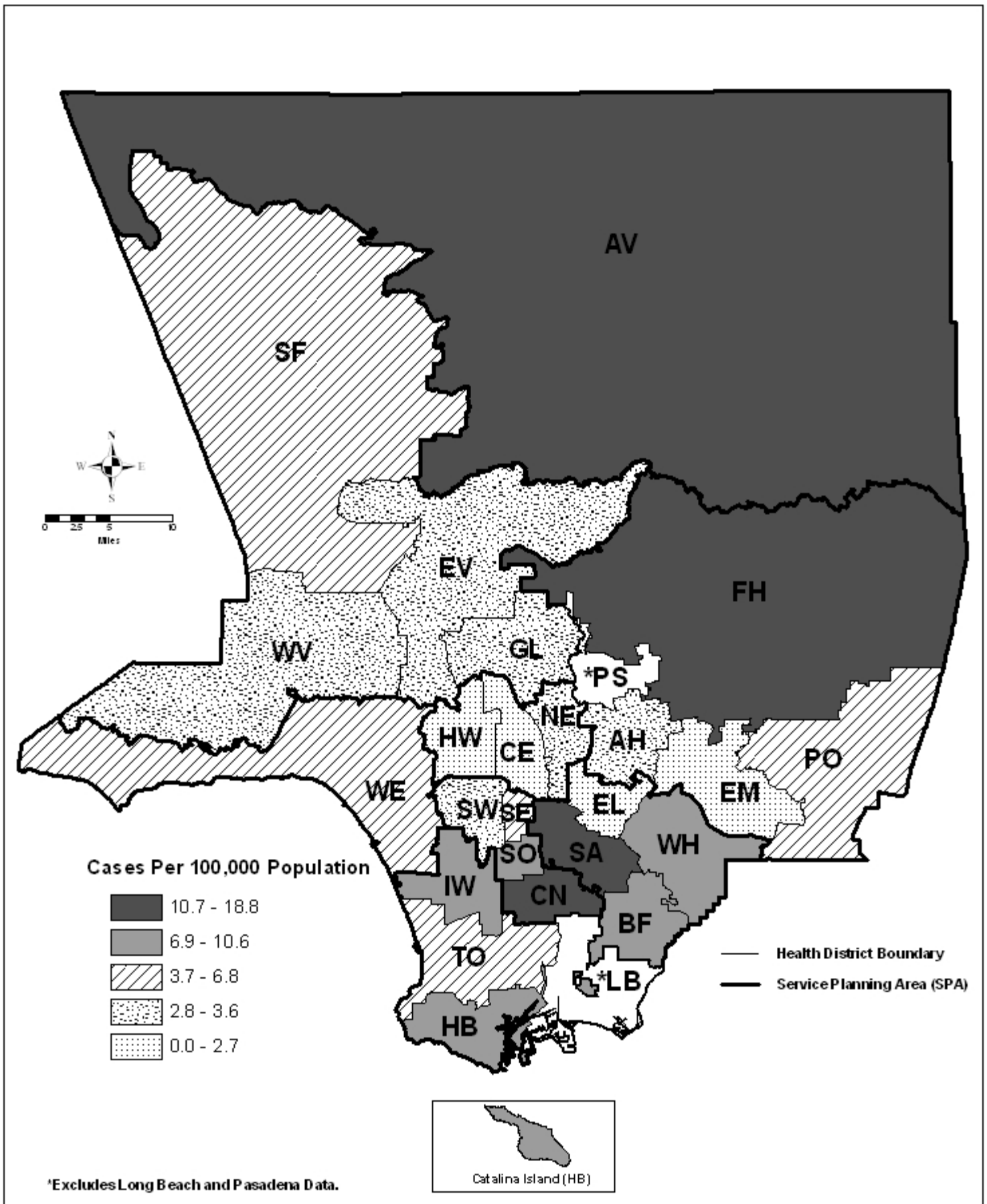


**Figure 6. Incidence Rates of Viral Meningitis by Race/Ethnicity
LAC, 2004-2008**



Map 10. Meningitis, Viral
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

MENINGOCOCCAL DISEASE

CRUDE DATA	
Number of Cases	30
Annual Incidence[a]	
LA County	0.31
California[b]	0.59
United States[b]	0.39
Age at Diagnosis	
Mean	32
Median	33
Range	0-87

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

DESCRIPTION

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

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

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

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

2008 TRENDS AND HIGHLIGHTS

- The incidence of meningococcal disease in LAC (0.31 per 100,000) has been stable since 2003 and similar to the overall US incidence.
- Four deaths were documented (13%) in 2008, compared to three in 2007(12%) and one in 2006 (2%).
- There were 27 (90%) culture-confirmed cases: 6 (20%) from cerebrospinal fluid (CSF), 18 (60%) from blood, and 3 from both CSF and blood (10%). Of the twenty-seven (90%) cases that were serogrouped, 5 (19%) were identified as serogroup B, 12 (44%) serogroup C, and 10 (37%) serogroup Y.
- The first documented secondary meningococcal case in LAC was recorded in February 2008. The case was a relative who visited the index case and was not a household contact. He already displayed symptoms by the time he was brought in for prophylaxis. His onset was four days after his last contact with the index and three days after the index case became ill.

Reported Meningococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=28)			2005 (N=37)			2006 (N=46)			2007 (N=24)			2008 (N=30)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	2	7.1	1.4	3	8.1	2.1	4	8.7	2.8	3	12.5	2.0	3	10.0	2.1
1-4	2	7.1	0.3	2	5.4	0.3	5	10.9	0.9	3	12.5	0.5	1	3.3	0.2
5-14	4	14.3	0.3	6	16.2	0.4	8	17.4	0.5	1	4.2	0.1	6	20.0	0.4
15-34	9	32.1	0.3	12	32.4	0.4	9	19.6	0.3	6	25.0	0.2	6	20.0	0.2
35-44	3	10.7	0.2	3	8.1	0.2	2	4.3	0.1	5	20.8	0.3	5	16.7	0.3
45-54	3	10.7	0.2	3	8.1	0.2	3	6.5	0.2	1	4.2	0.1	3	10.0	0.2
55-64	3	10.7	0.4	5	13.5	0.6	7	15.2	0.8	3	12.5	0.3	4	13.3	0.4
65+	2	7.1	0.2	3	8.1	0.3	8	17.4	0.8	2	8.3	0.2	2	6.7	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	1	3.6	0.1	5	13.5	0.4	2	4.3	0.2	1	4.2	0.1	1	3.3	0.1
Black	4	14.3	0.5	2	5.4	0.2	3	6.5	0.4	3	12.5	0.4	4	13.3	0.5
Hispanic	15	53.6	0.3	21	56.8	0.5	28	60.9	0.6	11	45.8	0.2	20	66.7	0.4
White	8	28.6	0.3	9	24.3	0.3	13	28.3	0.5	9	37.5	0.3	4	13.3	0.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		1	3.3	
SPA															
1	1	3.6	0.3	0	0.0	0.0	0	0.0	0.0	1	4.2	0.3	1	3.3	0.3
2	8	28.6	0.4	7	18.9	0.3	11	23.9	0.5	4	16.7	0.2	3	10.0	0.1
3	6	21.4	0.4	7	18.9	0.4	4	8.7	0.2	1	4.2	0.1	4	13.3	0.2
4	4	14.3	0.3	9	24.3	0.7	4	8.7	0.3	3	12.5	0.2	6	20.0	0.5
5	1	3.6	0.2	0	0.0	0.0	1	2.2	0.2	1	4.2	0.2	5	16.7	0.8
6	2	7.1	0.2	5	13.5	0.5	14	30.4	1.3	7	29.2	0.7	7	23.3	0.7
7	4	14.3	0.3	6	16.2	0.4	6	13.0	0.4	4	16.7	0.3	2	6.7	0.1
8	2	7.1	0.2	3	8.1	0.3	4	8.7	0.4	3	12.5	0.3	1	3.3	0.1
Unknown	0	0.0		0	0.0		2	4.3		0	0.0		1	3.3	

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

Figure 1. Incidence Rates of Meningococcal Disease LAC and US, 1999-2008

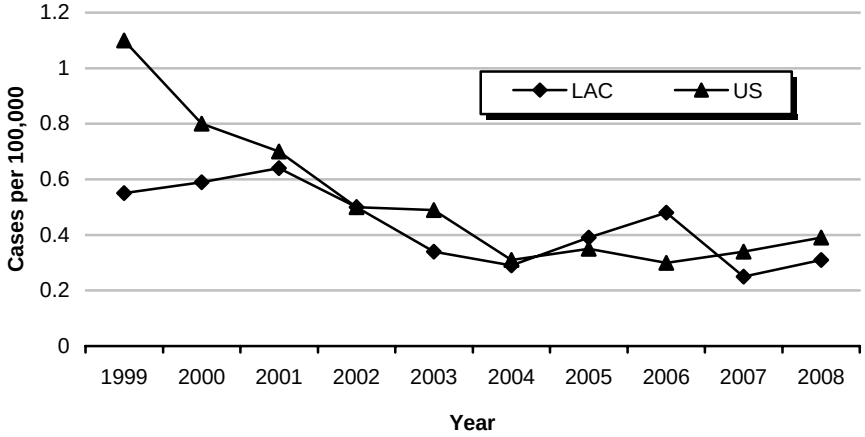


Figure 2. Incidence Rates of Meningococcal Disease by Age Group, LAC, 2008

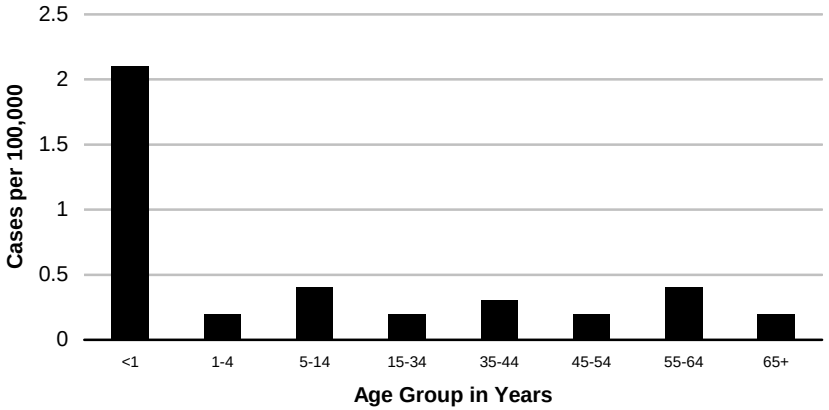


Figure 3. Percent Cases of Meningococcal Disease by Race/Ethnicity, LAC, 2008

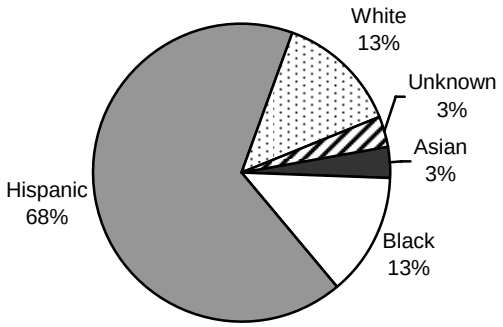


Figure 4. Incidence Rates of Meningococcal Disease by SPA LAC, 2008

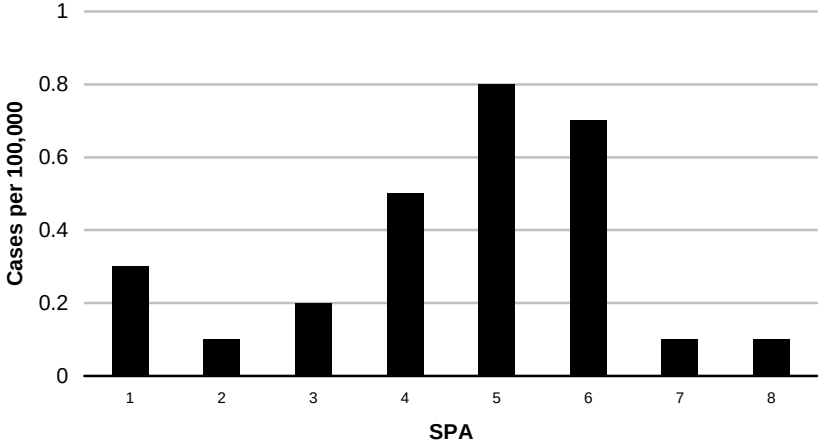


Figure 5. Reported Meningococcal Disease Cases by Month of Onset, LAC, 2008

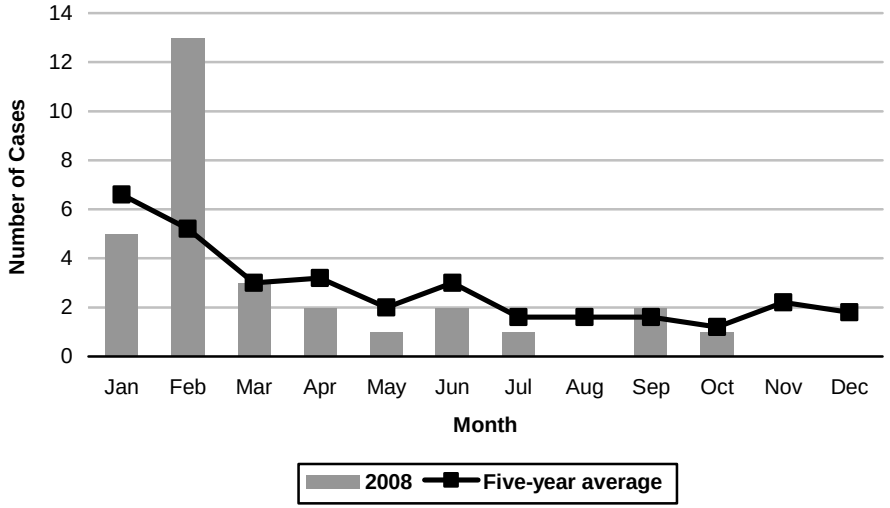


Figure 6. Reported Meningococcal Disease Cases by Race/Ethnicity, LAC, 2004-2008

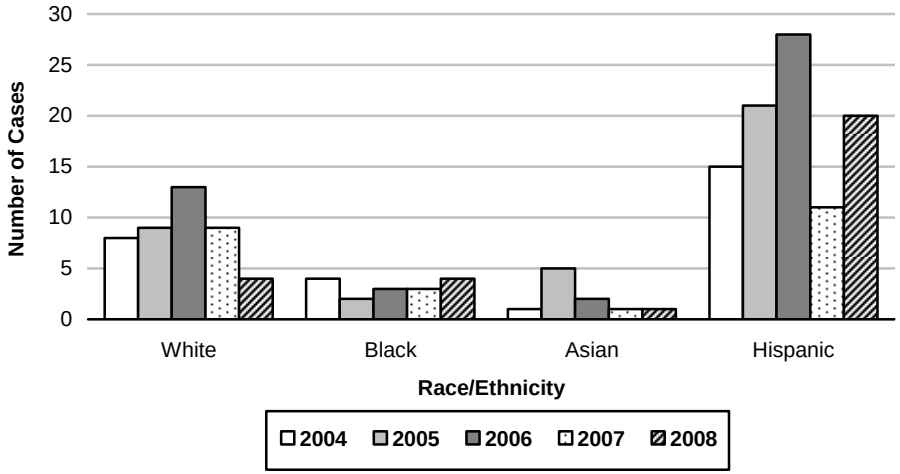
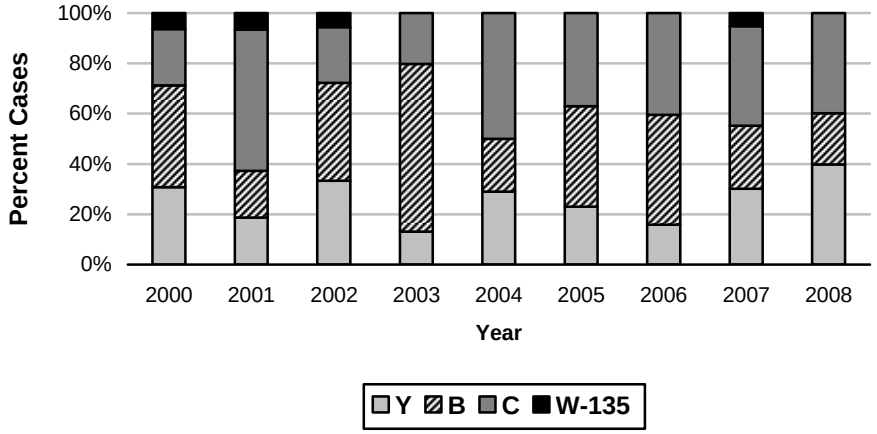


Figure 7. Meningococcal Disease by Serogroup LAC, 2000–2008



MUMPS

CRUDE DATA	
Number of Cases	7
Annual Incidence[a]	
LA County	0.07
California[b]	0.08
United States[b]	0.15
Age at Diagnosis	
Mean	35.3 years
Median	44.0 years
Range	12 – 53 years

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

DESCRIPTION

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

Immunization Recommendations:

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

2008 TRENDS AND HIGHLIGHTS

- Applying the lessons learned from the 2006 national mumps outbreak (Figure 1), the CDC changed the case classifications in 2008. A confirmed case meets the case definition and is either laboratory confirmed or is epidemiologically linked to a confirmed case. A probable case meets the case definition without laboratory confirmation and is epidemiologically linked to a clinically compatible case. Thus, comparing probable cases from 2008 with previous years is not meaningful.
- The number of cases has remained relatively steady at 5 to 10 cases per year since 2003 (Figure 2). Of the 7 confirmed cases in 2008, the majority were at least 15 years of age (Figure 3) and Hispanic or white (Figure 4). One case was exposed to mumps during international travel (SPA 2), one was linked to a 2007 case (SPA 3), and two were household contacts (SPA 5) (Figure 5).
- None of the confirmed cases had valid documentation of receiving mumps vaccine prior to disease onset (Figure 7). Since mumps continues to be endemic globally and cases continue to be identified in LAC, more work needs to be done to increase mumps vaccination coverage to prevent further transmission.

Reported Mumps Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=5)			2005 (N=10)			2006 (N=10)			2007 (N=5)			2008 (N=7)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	1	10.0	0.2	1	10.0	0.2	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	2	20.0	0.1	1	20.0	0.1	1	14.3	0.1
15-34	1	20.0	0.0	3	30.0	0.1	2	20.0	0.1	1	20.0	0.0	2	28.6	0.1
35-44	2	40.0	0.1	0	0.0	0.0	1	10.0	0.1	1	20.0	0.1	1	14.3	0.1
45-54	1	20.0	0.1	4	40.0	0.3	3	30.0	0.2	2	40.0	0.2	3	42.9	0.2
55-64	1	20.0	0.1	1	10.0	0.1	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	4	40.0	0.3	3	30.0	0.2	3	60.0	0.2	1	14.3	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	1	20.0	0.0	1	10.0	0.0	3	30.0	0.1	2	40.0	0.0	3	42.9	0.1
White	3	60.0	0.1	4	40.0	0.1	3	30.0	0.1	0	0.0	0.0	3	42.9	0.1
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	1	20.0		1	10.0		1	10.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.3	1	14.3	0.3
2	3	60.0	0.1	2	20.0	0.1	4	40.0	0.2	1	20.0	0.0	2	28.6	0.1
3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	1	14.3	0.1
4	0	0.0	0.0	2	20.0	0.2	2	20.0	0.2	0	0.0	0.0	1	14.3	0.1
5	1	20.0	0.2	5	50.0	0.8	2	20.0	0.3	0	0.0	0.0	2	28.6	0.3
6	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	20.0	0.1	0	0.0	0.0
7	0	0.0	0.0	0	0.0	0.0	2	20.0	0.1	1	20.0	0.1	0	0.0	0.0
8	1	20.0	0.1	1	10.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Confirmed Mumps US, CA and LAC, 1999-2008

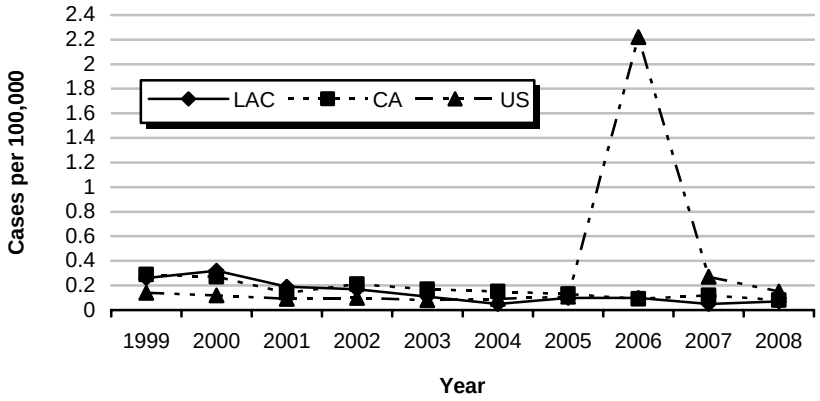


Figure 2. Reported Confirmed Mumps Cases LAC, 1999-2008

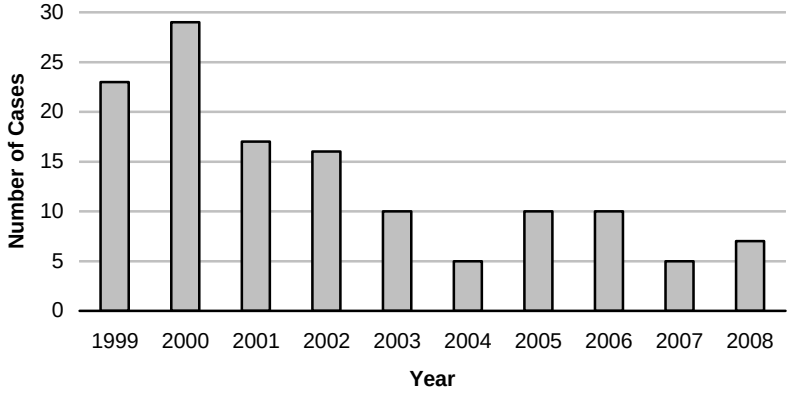


Figure 3. Reported Confirmed Mumps Cases by Age Group LAC, 2008

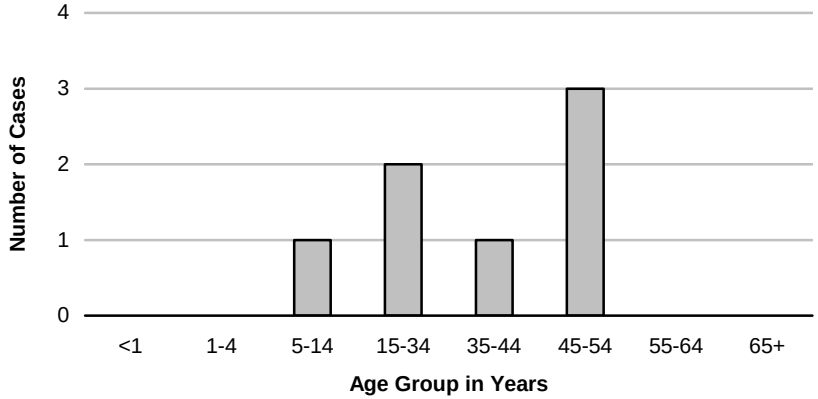
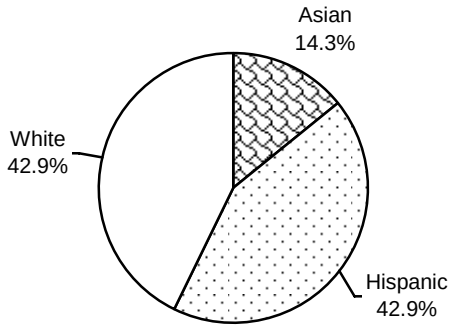


Figure 4. Percent Cases of Confirmed Mumps by Race/Ethnicity LAC, 2008



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

Figure 5. Reported Confirmed Mumps Cases by SPA LAC, 2008

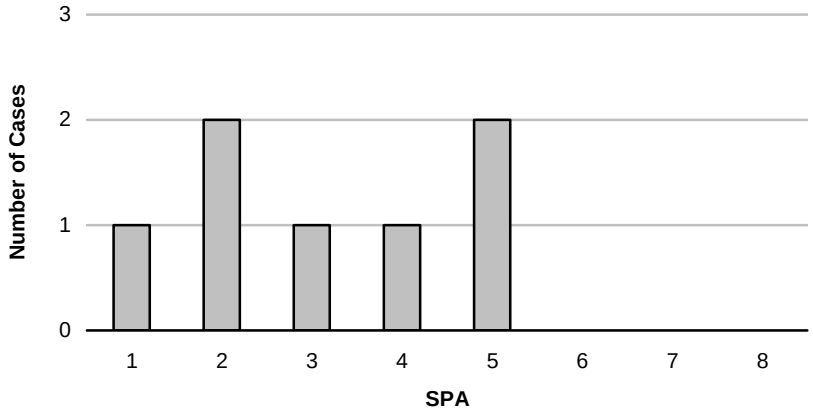


Figure 6. Reported Confirmed Mumps Cases by Month of Onset LAC, 2008 vs. Previous Five-Year Average

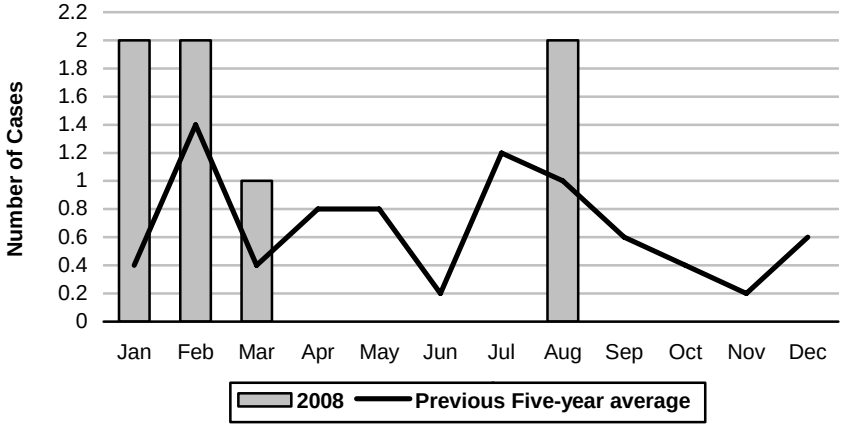


Figure 7. Vaccination Status of Reported Mumps Cases, LAC, 2008

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

[1] Cases less than 12 months of age.

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

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

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

	Confirmed	Probable
Total Cases	7	2
Age at Onset (years)		
Mean	35.3	9.0
Median	44.0	9.0
Range	12.0 – 53.0	6.0 – 12.0

PERTUSSIS (WHOOPING COUGH)

CRUDE DATA	
Number of Cases	80
Annual Incidence[a]	
LA County	0.82
California[b]	1.46
United States[b]	4.40
Age at Diagnosis	
Mean	9.4 years
Median	5.5 months
Range	12 days – 72 years

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

DESCRIPTION

Pertussis, commonly known as whooping cough, is a vaccine-preventable disease spread by close contact with the respiratory secretions of infected individuals. The clinical case definition for pertussis is a cough lasting at least two weeks with paroxysms of coughing, inspiratory "whoop," or post-tussive vomiting, without other apparent causes. Complications include pneumonia, seizures, and encephalopathy. Infants under 1 year of age are at highest risk for developing severe complications. Pertussis is confirmed by either positive *Bordetella pertussis* culture or PCR.

Immunization Recommendations:

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

2008 TRENDS AND HIGHLIGHTS

- Pertussis incidence has peaked every 3 to 5 years, with the last peak occurring in 2005. Although a higher incidence was expected in 2008, only 80 cases (55 confirmed, 25 probable) were reported (0.82 cases per 100,000), which is the second lowest annual number of reported cases and incidence rate since 1999 (Figure 1, Figure 2). Tdap usage may be a contributing factor.
- Similar to previous years, infants less than one year of age accounted for the highest proportion of cases (52.5%) and incidence rate (30.1 cases per 100,000) (Figure 3). Cases appear to be decreasing among adolescents and adults, as evidenced by the fact that 22.5% (n=18) of the cases were over 14 years of age in 2008 compared to an average of 30.8% (n=63) from 2004-2007.
- Similar to previous years, Hispanics and whites accounted for the highest proportion of cases and age-adjusted incidence rates (Figure 4, Figure 5).
- For the second year in a row, SPA 5, SPA 4, and SPA 8 reported the highest incidence rates (Figure 6). Household clusters were identified in SPA 2 (n=4), SPA 4 (n=4), SPA 8 (n=4), and SPA 7 (n=2).
- The fact that the only pertussis-related death in 2008 was in an infant that was less than one month of age underscores the need to vaccinate individuals of all ages in order to protect young children.
- 65% (n=52) of the cases were either too young to be vaccinated or were not up-to-date with the immunization recommendations for their age indicating that more work needs to be done to increase pertussis vaccination rates (Figure 8).

Reported Pertussis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=156)			2005 (N=439)			2006 (N=150)			2007 (N=69)			2008 (N=80)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	87	55.8	61.1	180	41.0	127.8	58	38.7	40.0	31	44.9	21.0	42	52.5	30.1
1-4	10	6.4	1.7	27	6.2	4.7	14	9.3	2.4	4	5.8	0.7	7	8.8	1.2
5-14	17	10.9	1.1	88	20.0	5.9	33	22.0	2.2	13	18.8	0.9	13	16.3	0.9
15-34	29	18.6	1.0	83	18.9	3.0	21	14.0	0.8	14	20.3	0.5	12	15.0	0.4
35-44	4	2.6	0.3	32	7.3	2.1	8	5.3	0.5	4	5.8	0.3	1	1.3	0.1
45-54	5	3.2	0.4	16	3.6	1.3	7	4.7	0.5	1	1.4	0.1	2	2.5	0.1
55-64	2	1.3	0.3	8	1.8	1.0	6	4.0	0.7	2	2.9	0.2	2	2.5	0.2
65+	1	0.6	0.1	5	1.1	0.5	3	2.0	0.3	0	0.0	0.0	1	1.3	0.1
Unknown	1	0.6		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	5	3.2	0.4	14	3.2	1.1	8	5.3	0.6	8	11.6	0.6	4	5.0	0.3
Black	7	4.5	0.8	31	7.1	3.7	4	2.7	0.5	1	1.4	0.1	4	5.0	0.5
Hispanic	101	64.7	2.3	245	55.8	5.4	79	52.7	1.7	42	60.9	0.9	52	65.0	1.1
White	41	26.3	1.4	148	33.7	5.1	59	39.3	2.1	18	26.1	0.6	18	22.5	0.6
Other	0	0.0	0.0	1	0.2	3.5	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	2	1.3		0	0.0		0	0.0		0	0.0		2	2.5	
SPA															
1	5	3.2	1.5	46	10.5	13.5	12	8.0	3.5	1	1.4	0.3	2	2.5	0.5
2	21	13.5	1.0	113	25.7	5.3	32	21.3	1.5	16	23.2	0.7	12	15.0	0.5
3	24	15.4	1.4	50	11.4	2.9	21	14.0	1.2	8	11.6	0.5	4	5.0	0.2
4	25	16.0	2.0	37	8.4	3.0	14	9.3	1.1	9	13.0	0.7	17	21.3	1.3
5	10	6.4	1.6	31	7.1	4.9	11	7.3	1.7	8	11.6	1.2	10	12.5	1.5
6	24	15.4	2.3	61	13.9	5.9	17	11.3	1.6	9	13.0	0.9	9	11.3	0.9
7	18	11.5	1.3	39	8.9	2.8	27	18.0	2.0	8	11.6	0.6	13	16.3	0.9
8	29	18.6	2.6	62	14.1	5.6	16	10.7	1.4	10	14.5	0.9	13	16.3	1.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of Pertussis
US, CA and LAC, 1999-2008

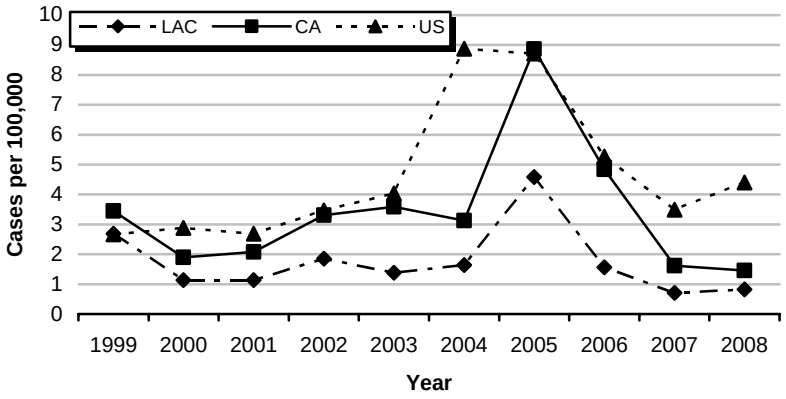


Figure 2. Reported Cases of Pertussis
LAC, 1999-2008

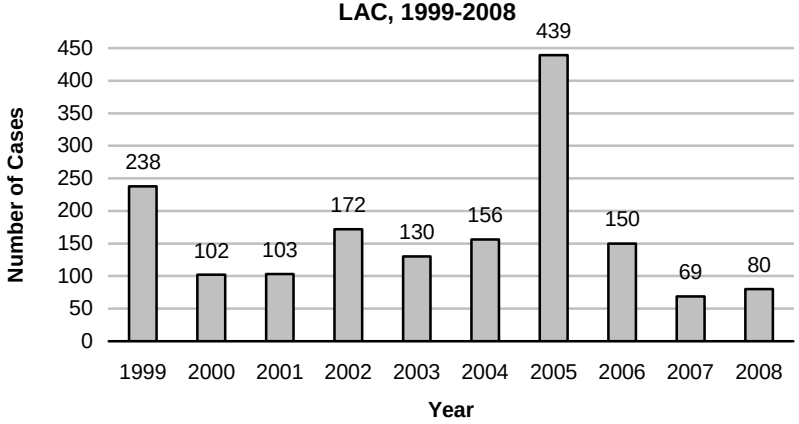


Figure 3. Incidence Rates of Pertussis by Age Group
LAC, 2008

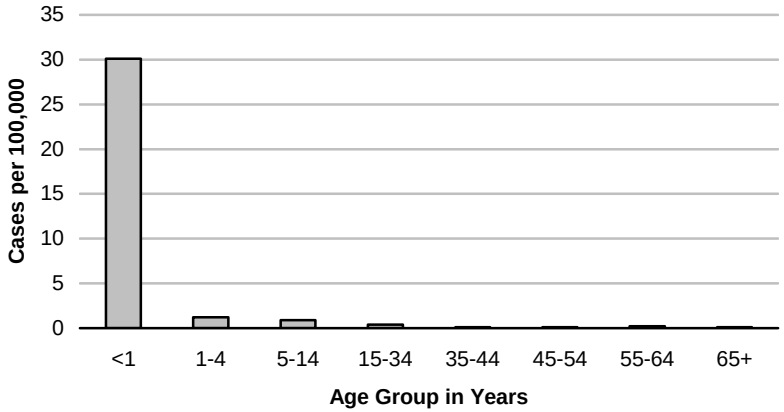
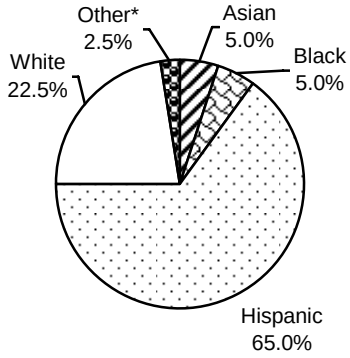
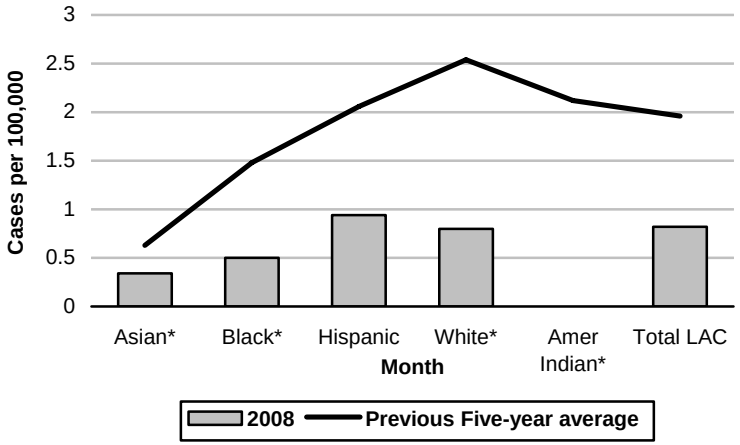


Figure 4. Percent Cases of Pertussis by Race/Ethnicity
LAC, 2008



* 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, 2008 vs. Previous Five-Year Average



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

Figure 6. Incidence Rates of Pertussis by SPA LAC, 2008

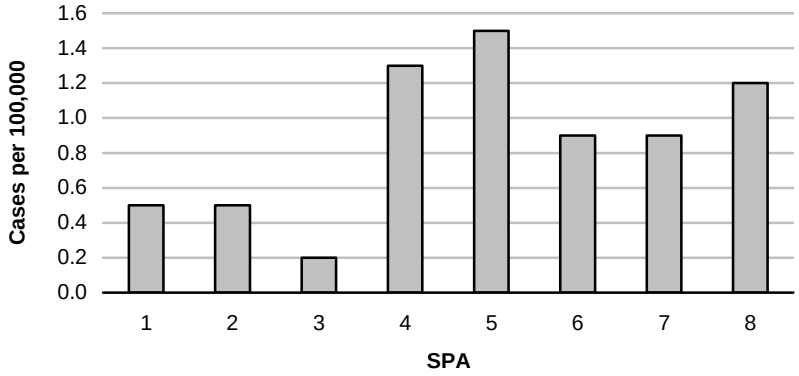


Figure 7. Reported Pertussis Cases by Month of Onset LAC, 2008 vs. Previous Five-year Average

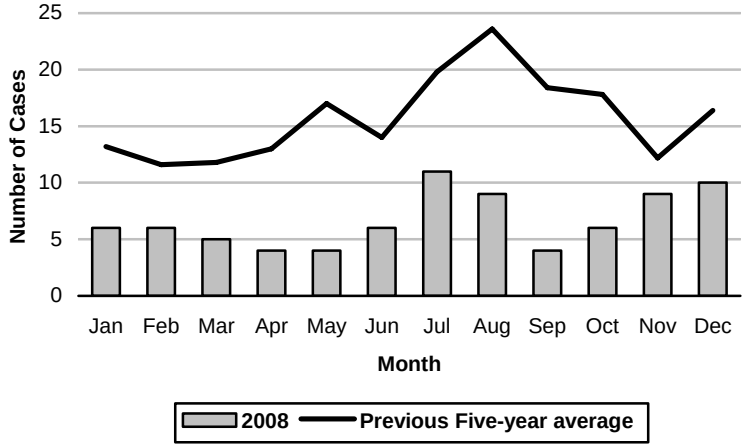
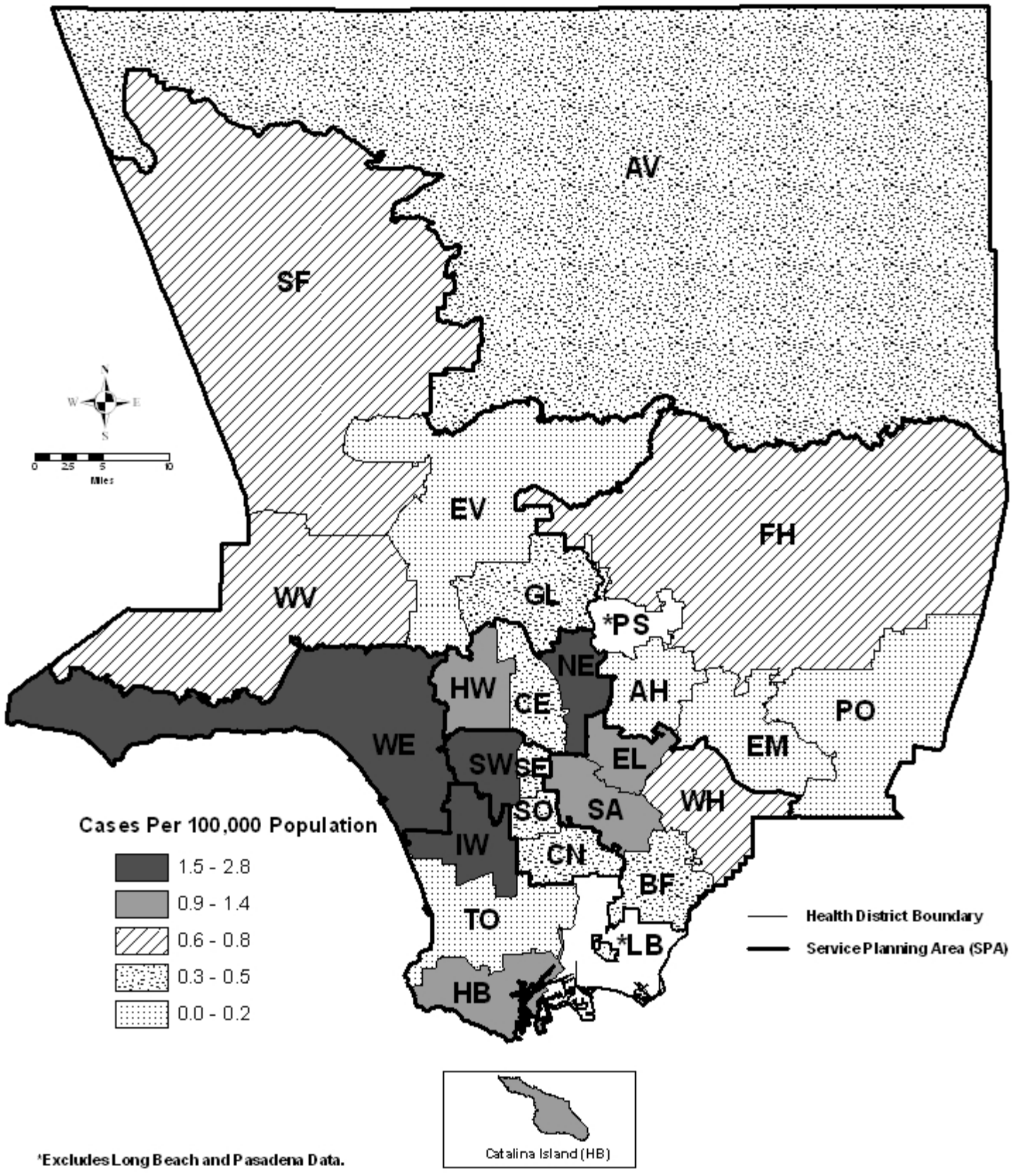


Figure 8. Vaccination Status of Reported Pertussis Cases, LAC, 2008

	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=65)
No.	80	23	28	29	3
%	100%	28.8%	35.0%	36.2%	4.6%

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

Map 11. Pertussis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

PNEUMOCOCCAL DISEASE, INVASIVE

CRUDE DATA	
Number of Cases	661
Annual Incidence[a]	
LA County	6.8
California[b]	N/A
United States	14.3
Age at Diagnosis	
Mean	55
Median	59
Range	3 mos – 102 yrs

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

DESCRIPTION

Invasive pneumococcal disease (IPD) is a leading cause of illness in young children and causes considerable illness and death in the elderly. The infectious agent, *Streptococcus pneumoniae*, is spread by direct and indirect contact with respiratory discharge and attacks various parts of the body resulting in pneumonia, bacteremia, and meningitis. *S. pneumoniae* has become increasingly resistant to antibiotics during the last decade. Disease caused by *S. pneumoniae* is vaccine-preventable.

ACDC has followed IPD as a special surveillance project since late 1995 and added IPD to its list of reportable diseases in October 2002. Cases are defined as LAC residents with a positive isolate for *S. pneumoniae* collected from a normally sterile site (e.g., blood, cerebral spinal fluid). Antibiotic susceptibility is determined by disk or dilution diffusion. Minimum inhibitory concentration (MIC) breakpoints utilized by participating laboratories are based on standards developed by the Clinical and Laboratory Standards Institute. For this report, an isolate of *S. pneumoniae* is considered nonsusceptible to an antibiotic if the results indicate intermediate or high-level resistance.
S. pneumoniae is one of the most common bacterial causes of community acquired pneumonia and otitis media (ear infections). However, these non-invasive forms of infection are not counted in LAC surveillance. Therefore, the data presented in this report underestimate all disease caused by *S. pneumoniae* in LAC.

Two effective vaccines are available for pneumococcal disease. Heptavalent pneumococcal conjugate vaccine (Prevnar®) is recommended by the Advisory Committee on Immunization Practices (ACIP) for all children under 2 years, and for children up to 5 years at high risk of invasive pneumococcal infections. The 23-valent pneumococcal polysaccharide vaccines (Pnu-Imune®23 and Pneumovax®23) are recommended for all adults ≥65 years and those >2 years at high risk of IPD. For children aged 2 to 5 years at high risk of invasive pneumococcal infections, ACIP recommends the use of pneumococcal conjugate vaccine followed at least 2 months later by the 23-valent pneumococcal polysaccharide vaccine. This regimen provides protection against a broader range of serotypes, although supporting data are limited. While the current vaccines are still effective, the incidence rate for IPD has increased since 2006 due to serotype replacement. A new vaccine is scheduled to be released in late 2009 or 2010 that will cover the more prevalent of these replacement serotypes.

2008 TRENDS AND HIGHLIGHTS

- The incidence rate has continued to increase slightly from a low in 2006 (Figure 1).
- Cases aged 65 years and older have the highest incidence rate (26.1 per 100,000) of all age groups followed by those aged 55 to 64 years. In 2008, the rate among those aged 65 and older was the highest it has been in the past five years (Figure 2).
- The rates of IPD in all races were within historical norms. Similar to previous years, the rate in blacks was 2 to 4 times higher than the rate in other race/ethnic groups (Figure 3).
- Similar to previous years, Service Planning Area (SPA) 6 had the highest rate of IPD (10.9 cases per 100,000) followed by SPA 8 with 7.0 cases per 100,000 (Figure 4).
- IPD peaked in February in 2008 in contrast to previous years when it peaked in December (Figure 5).
- The percentage of isolates susceptible to penicillin increased just slightly compared to the previous five years. The same is true of isolates susceptible to trimethoprim-sulfamethoxazole (TMP-SMZ) and to the fluoroquinolones. In contrast, the percentage of isolates susceptible to cefotaxime, ceftriaxone, and erythromycin decreased relative to the past five years (Figure 6).

Reported Invasive Pneumococcal Disease Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=603)			2005 (N=590)			2006 (N=533)			2007 (N=624)			2008 (N=661)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	14	2.3	9.8	18	3.1	12.8	10	1.9	6.9	23	3.7	15.6	16	2.4	11.5
1-4	58	9.6	10.1	52	8.8	9.0	48	9.0	8.3	46	7.4	8.0	57	8.6	10.1
5-14	15	2.5	1.0	23	3.9	1.6	17	3.2	1.2	24	3.8	1.7	12	1.8	0.9
15-34	42	7.0	1.5	35	5.9	1.2	34	6.4	1.2	48	7.7	1.7	29	4.4	1.0
35-44	56	9.3	3.7	66	11.2	4.4	52	9.8	3.5	68	10.9	4.5	70	10.6	4.6
45-54	98	16.3	7.9	94	15.9	7.4	92	17.3	7.1	92	14.7	7.0	94	14.2	7.0
55-64	95	15.8	11.9	79	13.4	9.5	95	17.8	10.9	105	16.8	11.8	115	17.4	12.6
65+	224	37.1	23.7	219	37.1	22.7	179	33.6	18.3	212	34.0	21.0	266	40.2	26.1
Unknown	1	0.2		4	0.7		6	1.1		6	1.0		2	0.3	
Race/Ethnicity															
Asian	37	6.1	3.0	18	3.1	1.4	18	3.4	1.4	32	5.1	2.5	28	4.2	2.1
Black	101	16.7	11.8	82	13.9	9.7	86	16.1	10.2	70	11.2	8.2	75	11.3	8.8
Hispanic	138	22.9	3.1	164	27.8	3.6	107	20.1	2.3	135	21.6	2.9	124	18.8	2.6
White	149	24.7	5.1	130	22.0	4.5	136	25.5	4.7	102	16.3	3.5	131	19.8	4.5
Other	1	0.2	3.6	1	0.2	3.5	1	0.2	3.5	0	0.0	0.0	0	0.0	0.0
Unknown	177	29.4		195	33.1		185	34.7		285	45.7		303	45.8	
SPA															
1	26	4.3	7.8	17	2.9	5.0	20	3.8	5.8	23	3.7	6.4	18	2.7	4.9
2	124	20.6	5.9	105	17.8	4.9	91	17.1	4.2	98	15.7	4.5	136	20.6	6.2
3	70	11.6	4.1	103	17.5	6.0	88	16.5	5.1	100	16.0	5.8	98	14.8	5.6
4	54	9.0	4.4	74	12.5	5.9	52	9.8	4.1	66	10.6	5.2	62	9.4	4.9
5	47	7.8	7.4	28	4.7	4.4	27	5.1	4.2	27	4.3	4.2	40	6.1	6.2
6	104	17.2	10.2	93	15.8	9.0	89	16.7	8.5	100	16.0	9.6	115	17.4	10.9
7	75	12.4	5.5	65	11.0	4.7	66	12.4	4.8	77	12.3	5.6	73	11.0	5.3
8	71	11.8	6.4	68	11.5	6.1	66	12.4	5.9	97	15.5	8.7	79	12.0	7.0
Unknown	32	5.3		37	6.3		34	6.4		36	5.8		40	6.1	

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

Figure 1. Incidence Rates of Invasive Pneumococcal Disease LAC and US, 1999-2008

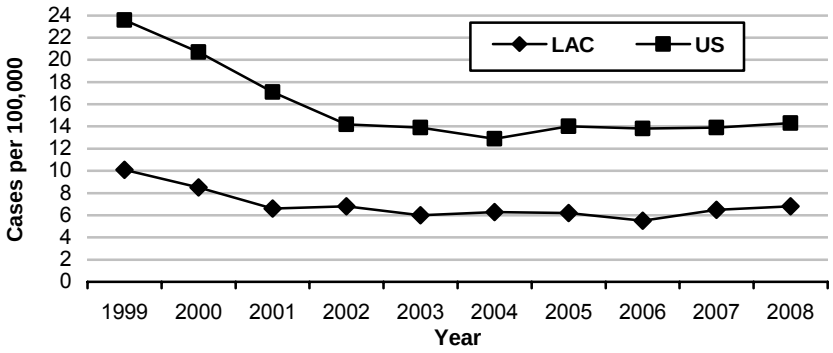


Figure 2. Incidence Rate of Invasive Pneumococcal Disease by Age Group, LAC, 2008

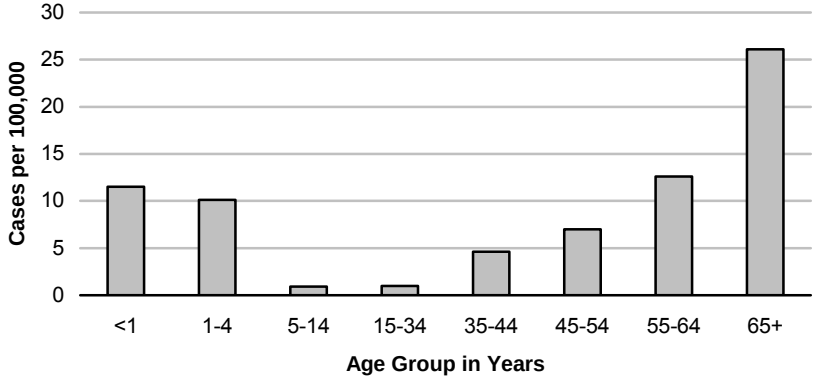
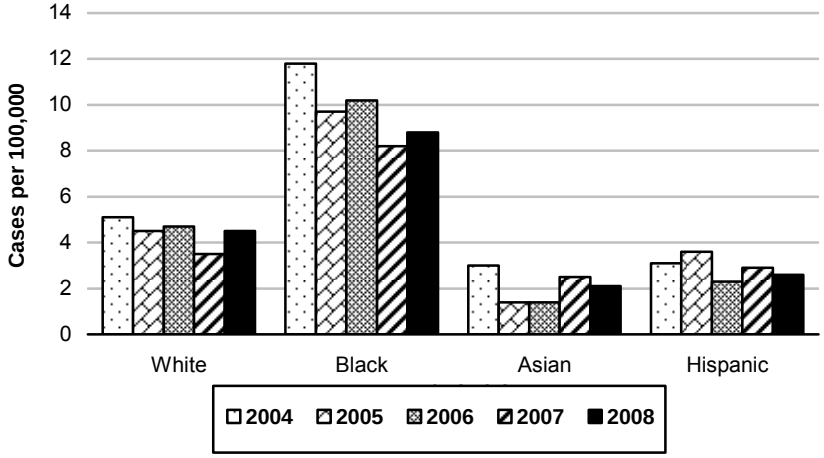


Figure 3. Invasive Pneumococcal Disease Incidence by Race/Ethnicity, LAC, 2004-2008



*Race/Ethnicity information was missing for up to 47% of cases in a given year. Thus, rates are underestimates.

Figure 4. Rates of Invasive Pneumococcal Disease by SPA LAC, 2008

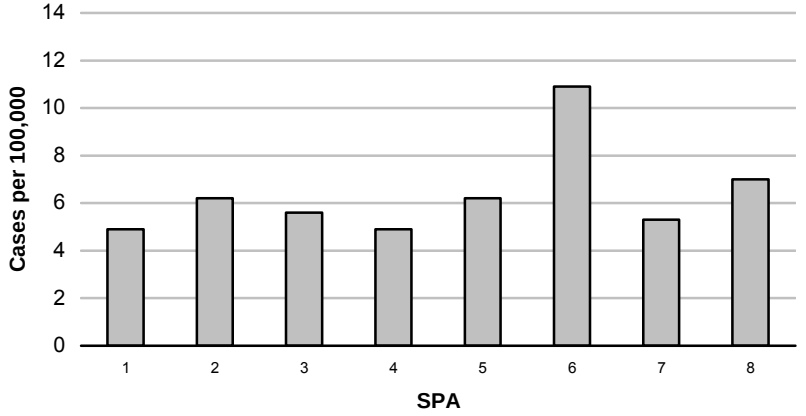


Figure 5. Invasive Pneumococcal Disease Cases by Month of Onset LAC, 2008

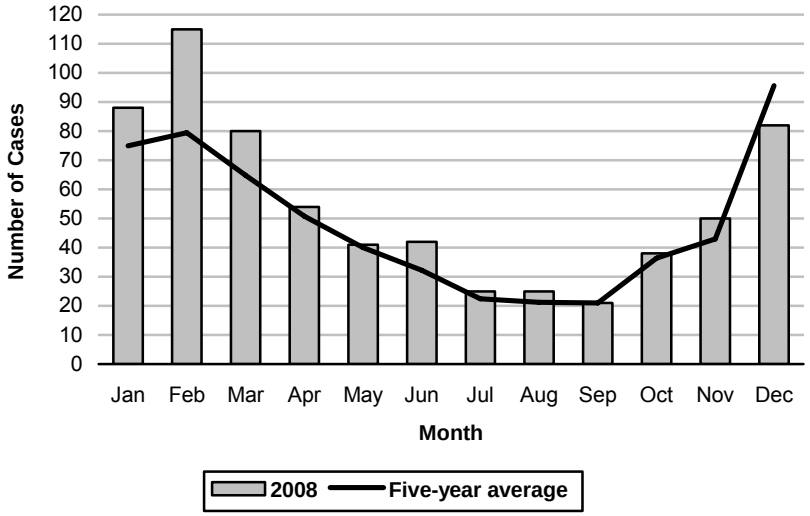
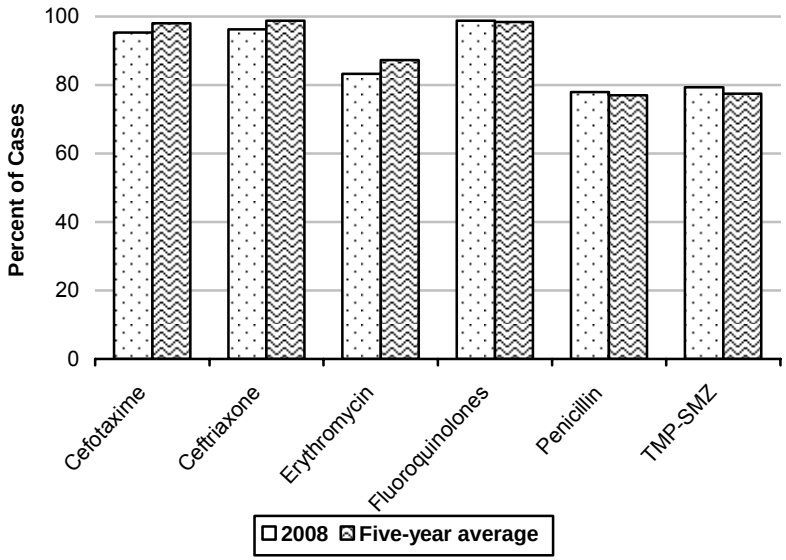
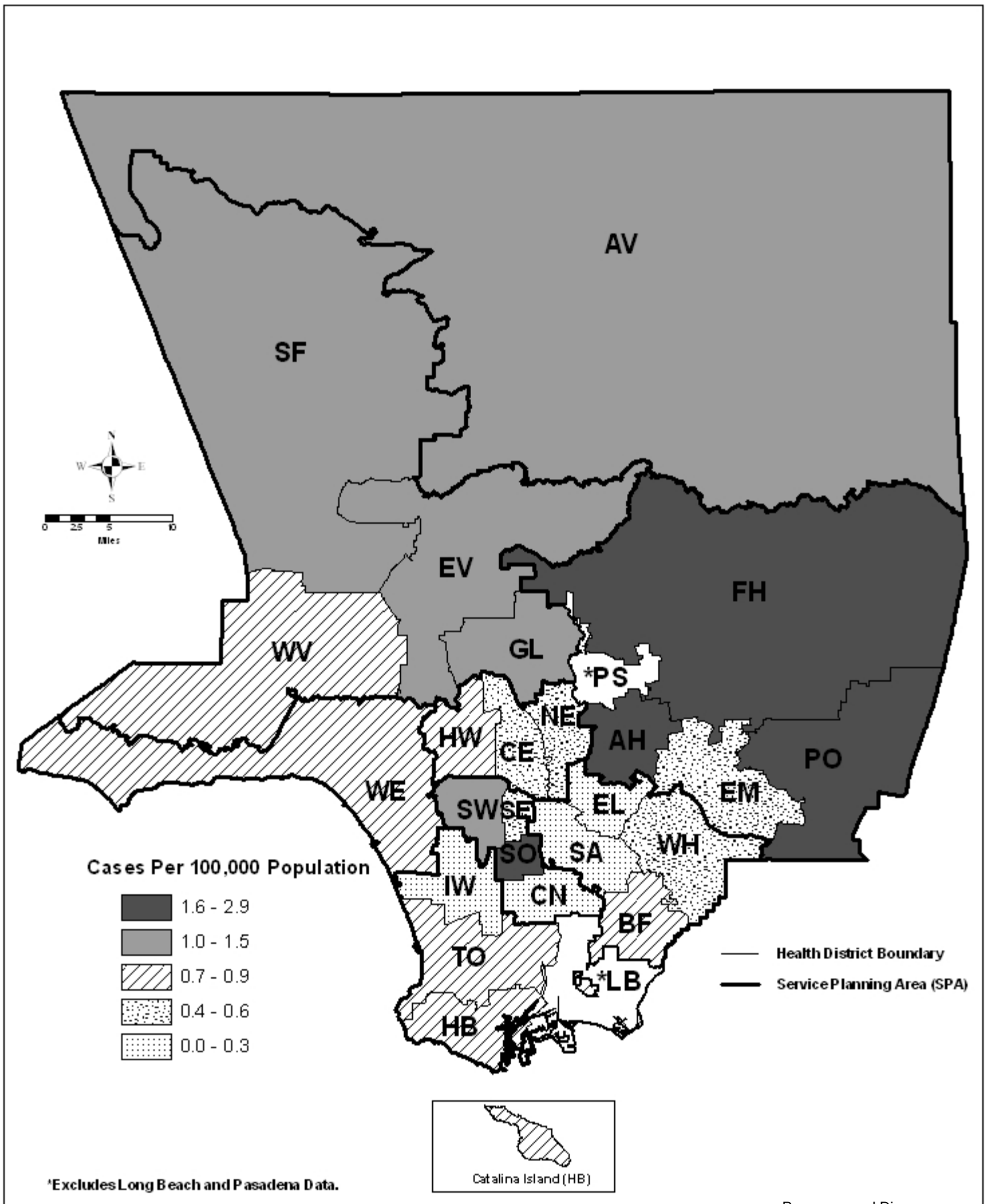


Figure 6. Invasive Pneumococcal Disease Antibiotic Susceptibility LAC, 2008



Map 12. Pneumococcal Disease, Invasive
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

SALMONELLOSIS

CRUDE DATA	
Number of Cases	1638
Annual Incidence[a]	
LA County	16.8
California[b]	13.8
United States[b]	16.9
Age at Diagnosis	
Mean	22.5
Median	10
Range	<1- 96

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

DESCRIPTION

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

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

Reptile-associated salmonellosis (RAS) has been a consistent problem in LAC and nationally for eleven years. In 2008, 10.1% (n = 97) of non-outbreak cases had some type of reptile exposure, 68% of which were turtle related. These animals remain popular and many people are not aware of laws controlling their sale.

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

2008 TRENDS AND HIGHLIGHTS

- A large outbreak occurred in a multiple site preschool setting in October. There were nine other outbreaks in 2008 with a total of 83 LAC cases. For more information see 2008 ACDC Special Studies Reports and the Foodborne Outbreak summary in this report.
- For the first time in ten years, the LAC rate was higher than both the US and CA rates. Without outbreak cases, the rate would have been lower in 2008 (Figure 1).
- The high incidence rate in the 1 to 4 year age group was due to the October outbreak (Figure 2).
- The high representation of Hispanic cases was due to the October outbreak (Figure 3, 6).
- The incidence rates presented in Service Planning Areas (SPAs) 2 and 7 were due to the October outbreak (Figure 4).
- The October outbreak greatly impacted the number of cases by month of onset when compared to other months and previous years (Figure 5).
- Fifteen percent of cases were hospitalized for two or more days; there were five deaths in persons diagnosed with salmonellosis. Ages ranged from 45 to 88 years; all cases had other medical problems such as cancer and diabetes.

Reported Salmonellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=1205)			2005 (N=1085)			2006 (N=1217)			2007 (N=1081)			2008 (N=1638)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	99	8.2	69.5	95	8.8	67.5	100	8.2	69.0	99	9.2	66.9	89	5.4	63.7
1-4	178	14.8	30.9	191	17.6	32.9	221	18.2	38.1	183	16.9	31.7	613	37.4	108.
5-14	218	18.1	14.6	189	17.4	12.8	208	17.1	14.1	172	15.9	12.0	170	10.4	12.1
15-34	270	22.4	9.6	220	20.3	7.9	251	20.6	9.0	226	20.9	8.0	278	17.0	9.7
35-44	129	10.7	8.6	117	10.8	7.8	105	8.6	7.0	114	10.5	7.6	151	9.2	10.0
45-54	109	9.0	8.8	88	8.1	6.9	112	9.2	8.6	85	7.9	6.4	116	7.1	8.6
55-64	68	5.6	8.5	73	6.7	8.7	80	6.6	9.2	75	6.9	8.5	91	5.6	10.0
65+	133	11.0	14.1	110	10.1	11.4	140	11.5	14.3	124	11.5	12.3	127	7.8	12.4
Unknown	1	0.1		2	0.2		0	0.0		3	0.3		3	0.2	
Race / Ethnicity															
Asian	98	8.1	7.9	105	9.7	8.3	138	11.3	10.9	114	10.5	8.9	114	7.0	8.7
Black	104	8.6	12.2	74	6.8	8.7	95	7.8	11.3	64	5.9	7.5	77	4.7	9.0
Hispanic	574	47.6	12.8	494	45.5	10.9	609	50.0	13.2	539	49.9	11.6	1071	65.4	22.9
White	367	30.5	12.6	392	36.1	13.5	351	28.8	12.2	339	31.4	11.7	326	19.9	11.2
Other	1	0.1	3.6	7	0.6	24.8	4	0.3	14.0	10	0.9	48.0	3	0.2	12.2
Unknown	61	5.1		13	1.2		20	1.6		15	1.4		47	2.9	
SPA															
1	31	2.6	9.3	28	2.6	8.2	33	2.7	9.5	39	3.6	10.9	35	2.1	9.5
2	286	23.7	13.5	249	22.9	11.7	270	22.2	12.6	243	22.5	11.3	657	40.1	30.0
3	189	15.7	11.1	161	14.8	9.4	189	15.5	11.0	186	17.2	10.8	204	12.5	11.8
4	169	14.0	13.7	148	13.6	11.9	179	14.7	14.2	148	13.7	11.7	135	8.2	10.6
5	96	8.0	15.1	87	8.0	13.7	104	8.5	16.3	74	6.8	11.5	46	2.8	7.1
6	128	10.6	12.5	109	10.0	10.6	142	11.7	13.6	132	12.2	12.6	123	7.5	11.7
7	136	11.3	10.0	157	14.5	11.4	175	14.4	12.7	146	13.5	10.6	309	18.9	22.3
8	168	13.9	15.2	141	13.0	12.7	123	10.1	11.1	113	10.5	10.1	129	7.9	11.5
Unknown	2	0.2		5	0.5		2	0.2		0	0.0		0	0.0	

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

**Figure 1. Reported Salmonellosis Rates by Year
US, CA and LAC, 1999-2008**

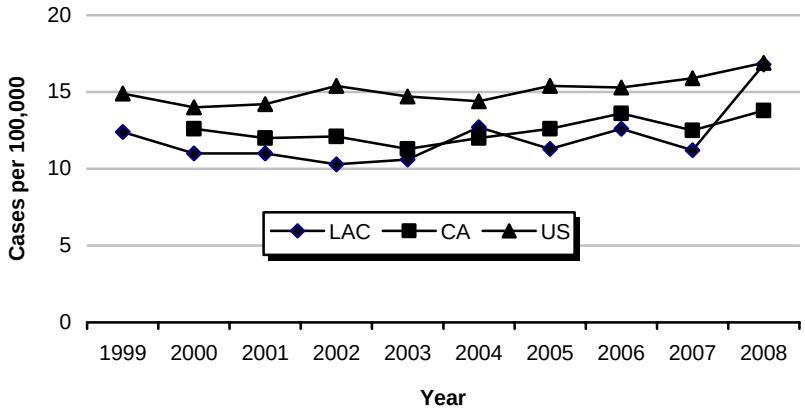


**Figure 2. Reported Salmonellosis Rates by Age Group
LAC, 2008**

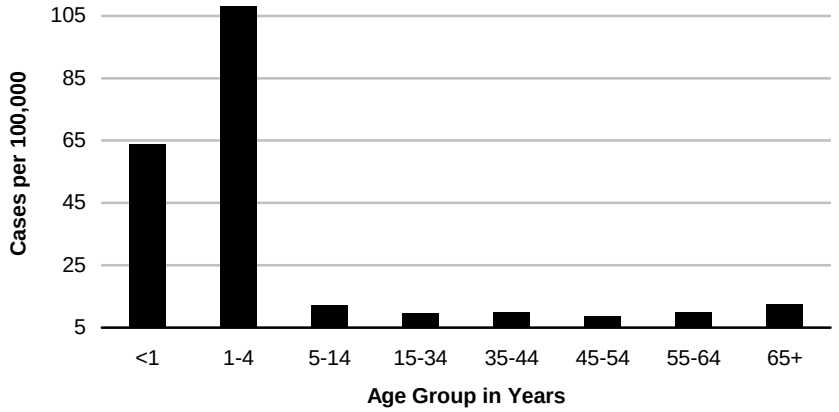


**Figure 3. Reported Cases of Salmonellosis by
Race/Ethnicity LAC, 2008**

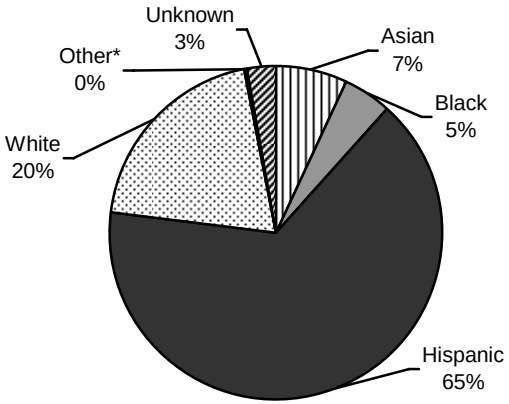
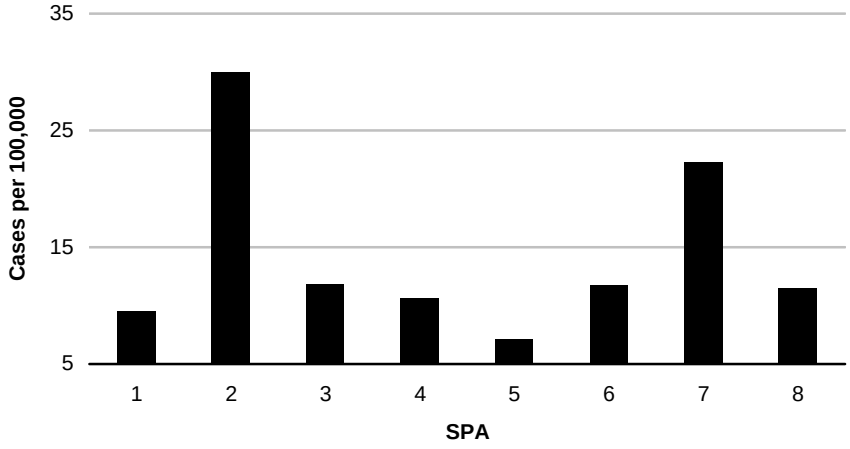
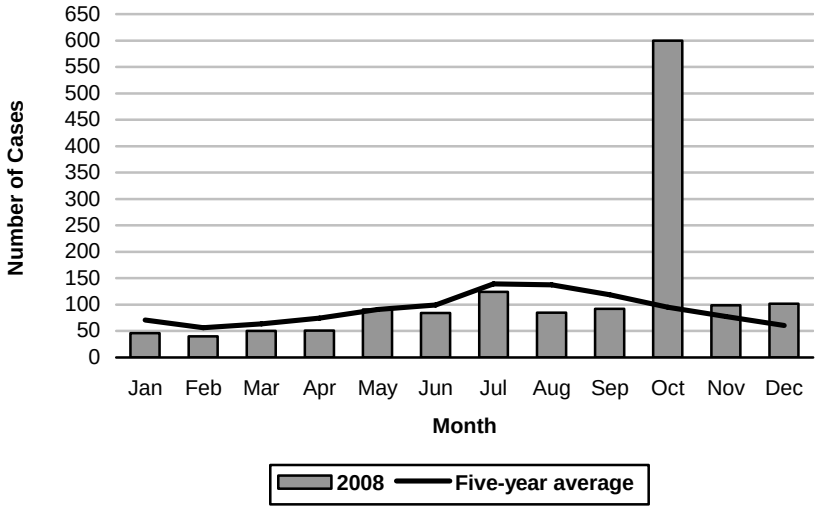


**Figure 4. Reported Salmonellosis Rates by SPA
LAC, 2008**

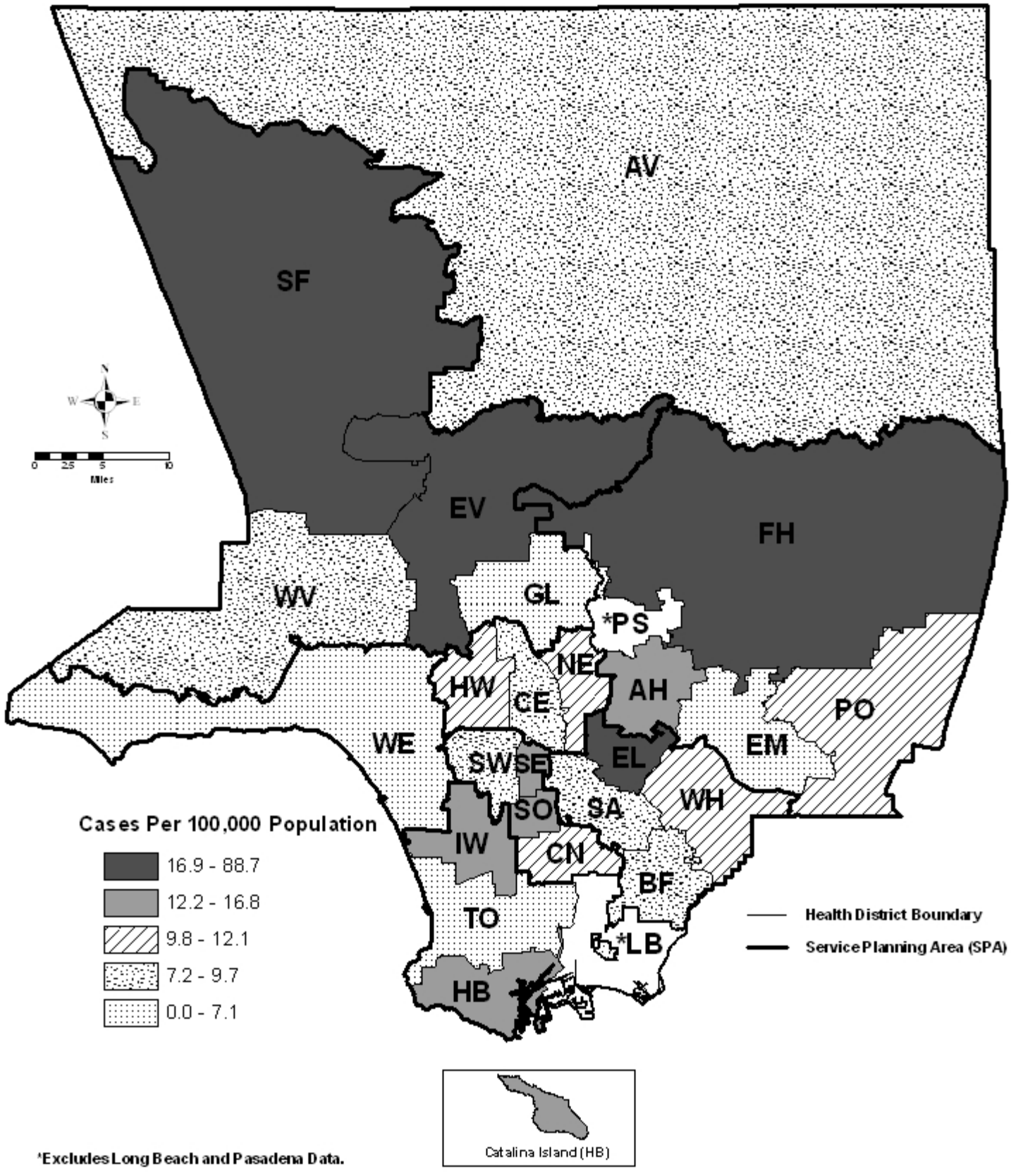


* Other includes Native American and any additional racial/ethnic group that cannot be categorized as Asian, black, Hispanic, or white.

Figure 5. Reported Salmonellosis Cases by Month of Onset
LAC, 2008



Map 13. Salmonellosis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

SHIGELLOSIS

CRUDE DATA	
Number of Cases	498
Annual Incidence[a]	
LA County	5.1
California[b]	4.6
United States[b]	7.5
Age at Diagnosis	
Mean	20.8
Median	12
Range	0-93

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

DESCRIPTION

Shigellosis is caused by a Gram-negative bacillus with four main serogroups: *Shigella dysenteriae* (group A), *S. flexneri* (group B), *S. boydii* (group C) and *S. sonnei* (group D). Incubation period is 1 to 3 days. Human are the definitive host; fecal-oral transmission occurs when individuals fail to thoroughly wash their hands after defecation and spread infective particles to others, infected either directly by physical contact, including sexual behaviors, or indirectly by contaminating food. Infection may occur with ingestion of as few as 10 organisms. Common symptoms include diarrhea, fever, nausea, vomiting, and tenesmus. Stool may contain blood or mucous. In general, the elderly, the immunocompromised, and the malnourished are more susceptible to severe disease outcomes.

Hand washing is vital in preventing this disease. Young children or anyone with uncertain hygiene practices should be monitored to promote compliance. Hand washing is especially important when out in crowded areas such as amusement parks or shopping malls. Children should not be allowed to swim or wade while ill with diarrhea; ill children (exhibiting symptoms) in diapers should never be allowed in public swimming areas. Swimming or wading in areas not designated for such activities should be avoided, especially in areas where there are no toileting or hand washing facilities. In Los Angeles County (LAC), cases and symptomatic contacts in sensitive occupations or situations (e.g., food handling, daycare and healthcare workers) are routinely removed from work or the situation until they have culture negative stool specimens tested in the LAC Public Health Laboratory.

2008 TRENDS AND HIGHLIGHTS

- There was a 7.6% increase in reported cases in 2008 after an 11.6% decrease in cases during 2007 (Figure 1).
- The highest incidence rate was observed in the 1 to 4 years age group (20.8 per 100,000) followed by the 5 to 14 years age group (9.8 per 100,000) (Figure2).
- The incidence of shigellosis among the Hispanic population (76%, 8.0 per 100,000) remained highest consistent with previous years (Figure 3, 6). Much of this is believed to be due to overcrowding living situations in addition to the higher overall rate of Hispanic population.
- Service Planning Area (SPA) 6 had the highest rate (10.3 per 100,000), consistent with last two previous years (Figure 4).
- In 2008, the monthly incidence peaked in May above the previous five-year average due to several family clusters; however during the summer the incidence decreased below the five-year average, possibly due to a reduction in summer travel (Figure 5).
- Two shigellosis outbreaks were investigated in 2008.
- Sixteen percent of shigellosis cases (n=78) were hospitalized for at least two days. One death was reported who was diagnosed with shigellosis; the case had other medical problems (cirrhosis, cardiomegaly, and sepsis) contributing to the death.

Reported Shigellosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=625)			2005 (N=710)			2006 (N=524)			2007 (N=463)			2008 (N=498)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	9	1.4	6.3	13	1.8	9.2	5	1.0	3.5	13	2.8	8.8	8	1.6	5.7
1-4	139	22.2	24.1	170	23.9	29.3	118	22.5	20.3	100	21.6	17.3	118	23.7	20.8
5-14	181	29.0	12.2	213	30.0	14.4	134	25.6	9.1	90	19.4	6.3	137	27.5	9.8
15-34	110	17.6	3.9	149	21.0	5.3	111	21.2	4.0	104	22.5	3.7	122	24.5	4.3
35-44	82	13.1	5.5	70	9.9	4.6	71	13.5	4.7	67	14.5	4.5	42	8.4	2.8
45-54	58	9.3	4.7	34	4.8	2.7	39	7.4	3.0	43	9.3	3.3	26	5.2	1.9
55-64	26	4.2	3.3	31	4.4	3.7	17	3.2	2.0	20	4.3	2.3	23	4.6	2.5
65+	20	3.2	2.1	28	3.9	2.9	29	5.5	3.0	26	5.6	2.6	22	4.4	2.2
Unknown	0	0.0		2	0.3		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	11	1.8	0.9	27	3.8	2.1	23	4.4	1.8	26	5.6	2.0	10	2.0	0.8
Black	24	3.8	2.8	43	6.1	5.1	42	8.0	5.0	27	5.8	3.2	25	5.0	2.9
Hispanic	461	73.8	10.3	500	70.4	11.0	356	67.9	7.7	281	60.7	6.1	376	75.5	8.0
White	113	18.1	3.9	126	17.7	4.3	99	18.9	3.4	56	12.1	1.9	71	14.3	2.4
Other	0	0.0	0.0	3	0.4	10.6	1	0.2	3.5	4	0.9	19.2	3	0.6	12.2
Unknown	16	2.6		11	1.5		3	0.6		69	14.9		13	2.6	
SPA															
1	8	1.3	2.4	21	3.0	6.2	6	1.1	1.7	10	2.2	2.8	11	2.2	3.0
2	116	18.6	5.5	133	18.7	6.2	87	16.6	4.1	93	20.1	4.3	89	17.9	4.1
3	65	10.4	3.8	80	11.3	4.7	62	11.8	3.6	72	15.6	4.2	66	13.3	3.8
4	147	23.5	11.9	146	20.6	11.7	103	19.7	8.2	87	18.8	6.9	71	14.3	5.6
5	40	6.4	6.3	43	6.1	6.8	34	6.5	5.3	29	6.3	4.5	23	4.6	3.6
6	104	16.6	10.2	120	16.9	11.6	106	20.2	10.2	80	17.3	7.7	109	21.9	10.3
7	93	14.9	6.8	107	15.1	7.8	84	16.0	6.1	64	13.8	4.6	93	18.7	6.7
8	52	8.3	4.7	60	8.5	5.4	41	7.8	3.7	28	6.0	2.5	34	6.8	3.0
Unknown	0	0.0		0	0.0		1	0.2		0	0.0		2	0.4	

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

Figure 1. Reported Shigellosis Rates by Year
US, CA and LAC, 1999-2008

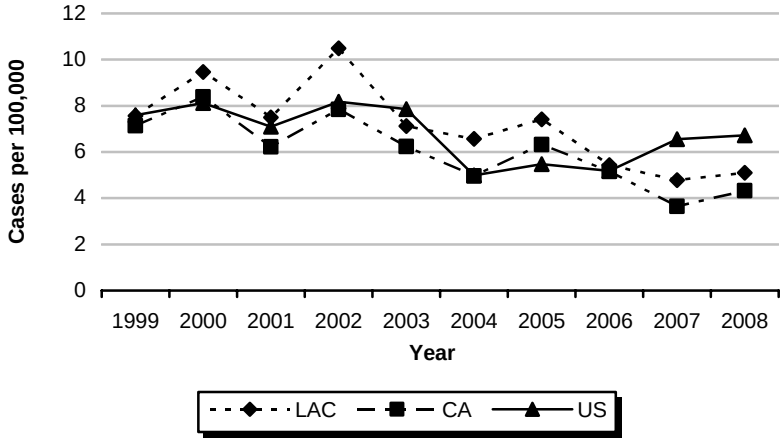


Figure 2. Reported Shigellosis Rates by Age Group
LAC, 2008

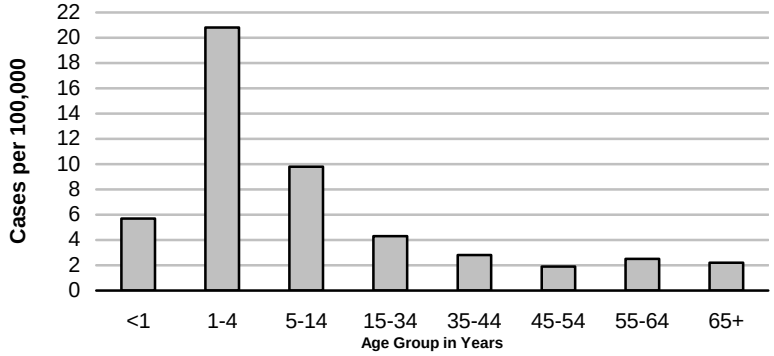
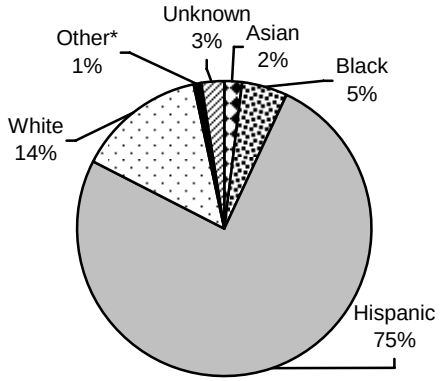


Figure 3. Percent Cases of Shigellosis by
Race/Ethnicity LAC, 2008



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

Figure 4. Reported Shigellosis Rates by SPA
LAC, 2008

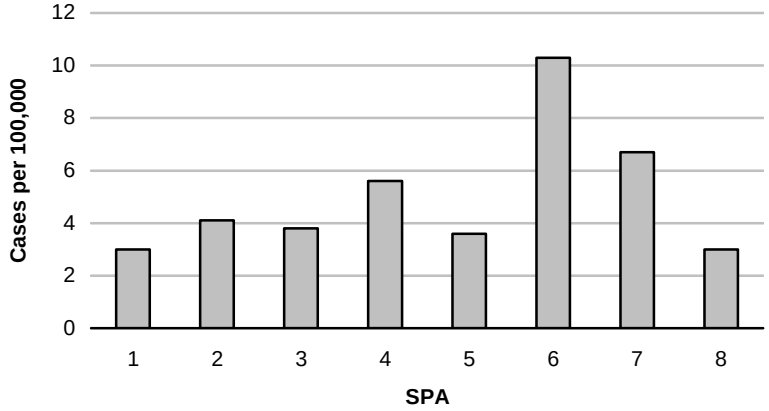


Figure 5. Reported Shigellosis Cases by Month of Onset
LAC, 2008

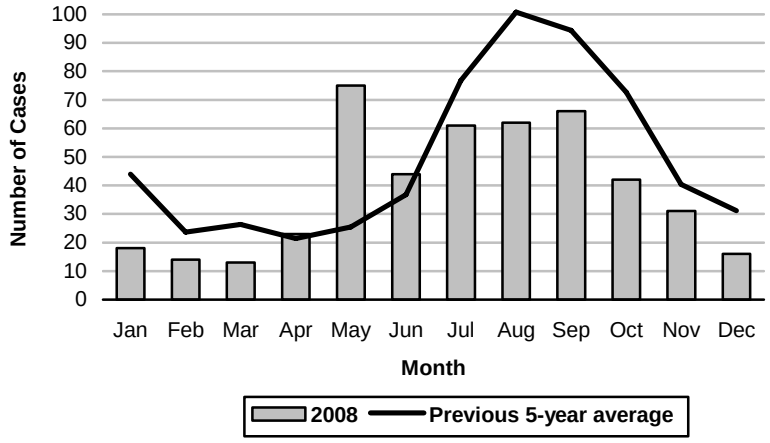
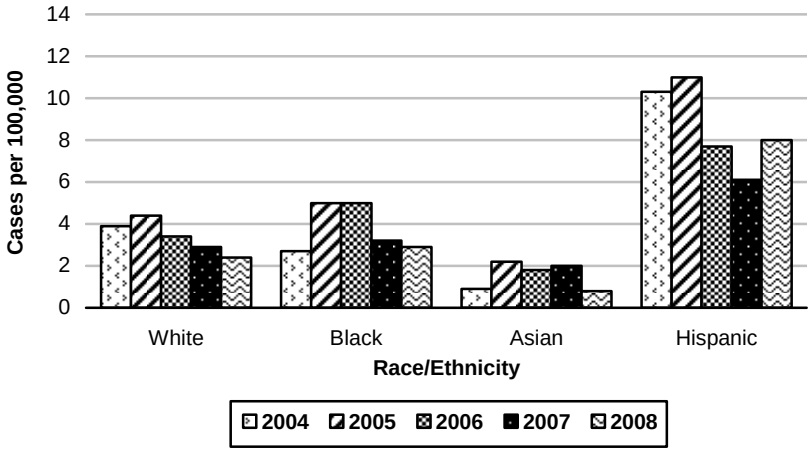
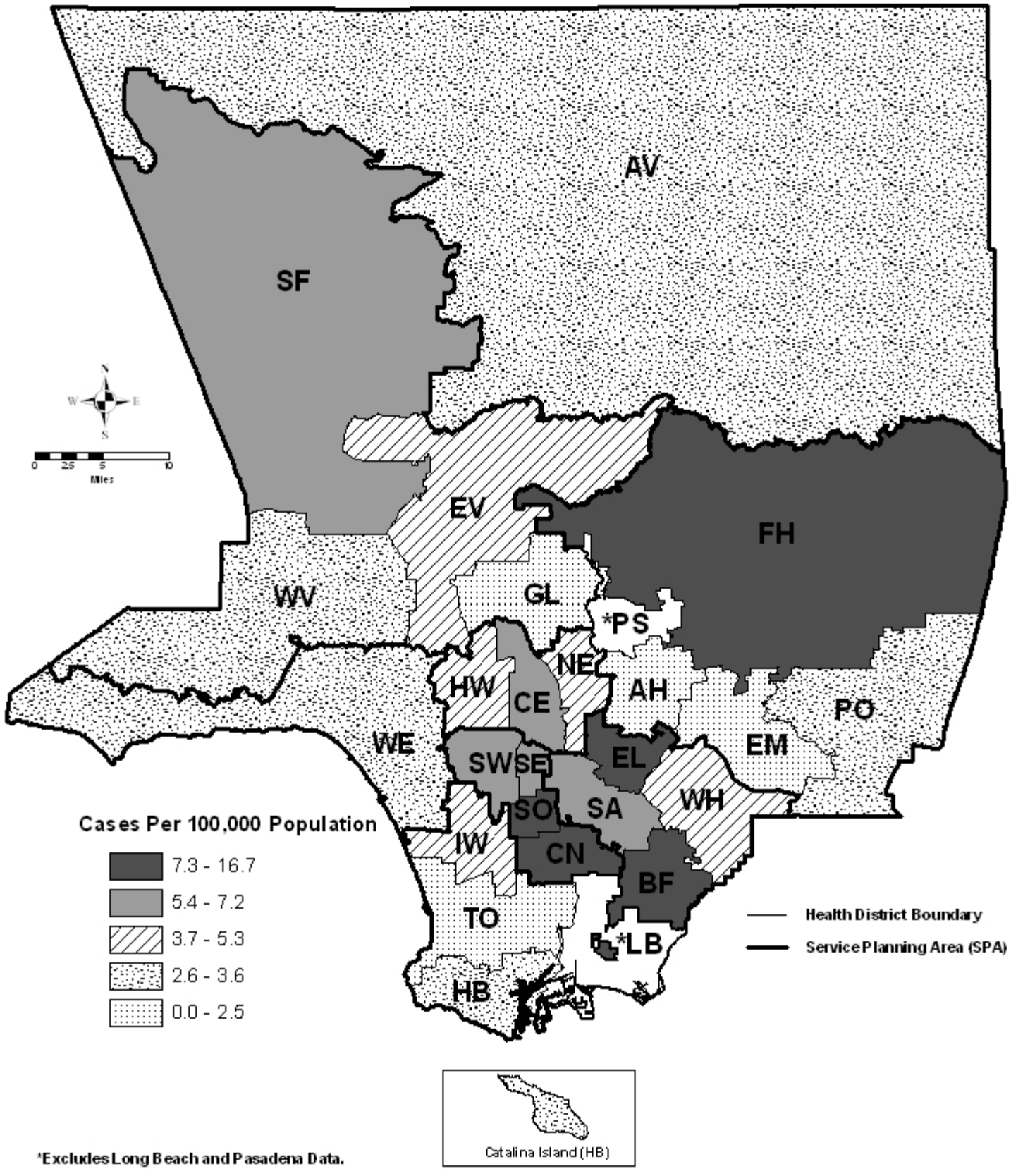


Figure 6. Shigellosis Incidence by Race/Ethnicity
LAC, 2004-2008



Map 14. Shigellosis
Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

SEVERE *STAPHYLOCOCCUS AUREUS* INFECTION IN PREVIOUSLY HEALTHY PERSONS

CRUDE DATA	
Number of Cases	25
Annual Incidence	
LA County[a]	0.26
California	N/A
United States	N/A
Age at Diagnosis	
Mean	52
Median	53
Range	3 weeks – 88 years

[a]Cases per 100,000 population.

DESCRIPTION

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

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

2008 TRENDS AND HIGHLIGHTS

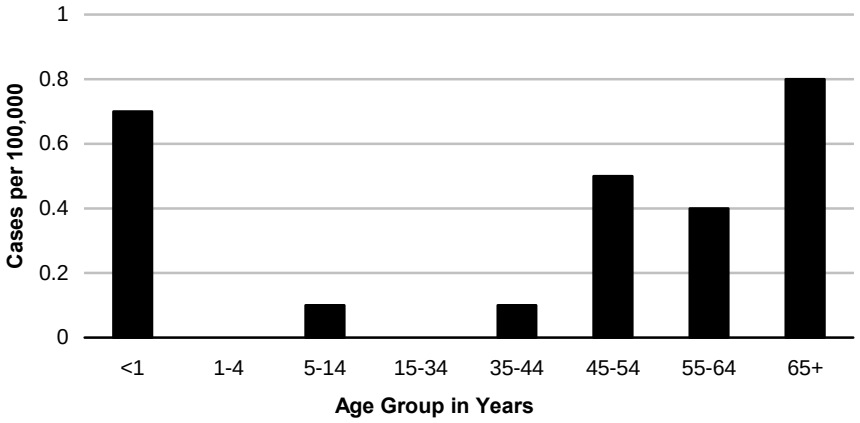
- The incidence rate of severe *Staphylococcus aureus* infection was 0.26 per 100,000 (N=25) in 2008.
- Cases aged 65 years and older had the highest rate (0.8 per 100,000) followed by cases aged less than one year which had a rate of 0.7 cases per 100,000 (Figure 1).
- Blacks had the highest rate of severe *S, aureus* infection at 0.5 cases per 100,000 followed by whites at 0.4 cases per 100,000 (Figure 2).
- Service Planning Areas (SPAs) 1, 3, and 5 had the highest rate of severe *S. aureus* infection at 0.5 cases per 100,000 (Figure 3).
- The number of cases of severe *S. aureus* infection peaked during the month of June (Figure 4).
- The percentage of *S. aureus* infections resistant to methicillin was 52% (Figure 5).
- Diabetes and smoking were reported more than any other risk factors (Table 1).
- Severe *S. aureus* cases presented most often with pneumonia or bacteremia (Table 2).
- The majority of cases (52%) were reported by only four hospitals in LAC. Thus, it is suspected that there has been significant underreporting of severe *S. aureus* infections in LAC.

Reported Severe *Staphylococcus Aureus* Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004			2005			2006			2007			2008 (N=25)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.7
1-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0
5-14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1
15-34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.0
35-44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.1
45-54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	28.0	0.5
55-64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.4
65+	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.8
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	
Race / Ethnicity															
Asian	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.2
Black	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	16.0	0.5
Hispanic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.1
White	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13	52.0	0.4
Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	0.0
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	
SPA															
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.5
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5	20.0	0.2
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	32.0	0.5
4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1
5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.5
6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	8.0	0.2
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	4.0	0.1
8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	12.0	0.3
Unknown	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0.0	

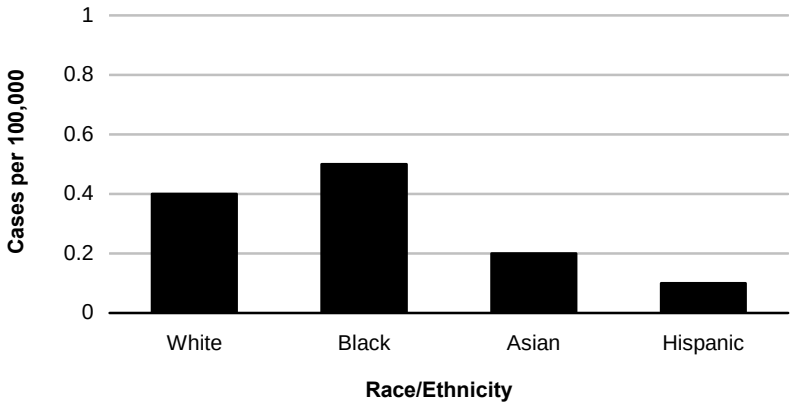
*Rates calculated based on less than 19 cases or events are considered unreliable.

Figure 1. Incidence Rates of Severe *S. aureus* Infection by Age Group LAC, 2008



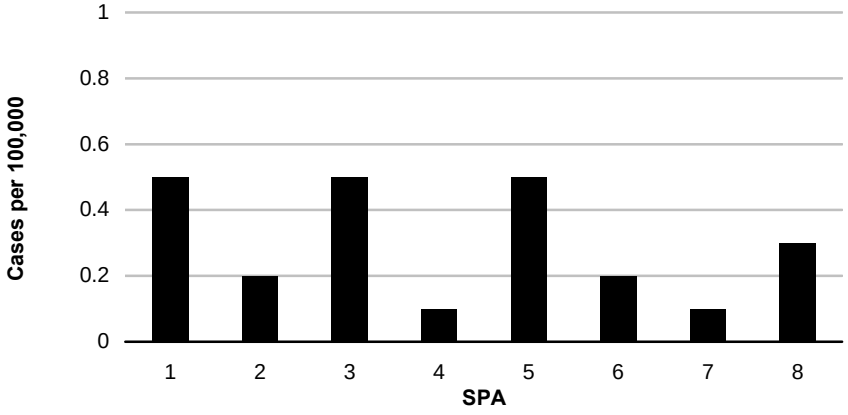
*Rates based on fewer than 19 cases are unreliable

Figure 2. Severe *S. aureus* Infection Incidence by Race/Ethnicity LAC, 2008



*Rates based on fewer than 19 cases are unreliable

Figure 3. Incidence Rates of Severe *S. aureus* Infection by SPA LAC, 2008



*Rates based on fewer than 19 cases are unreliable

Figure 4. Reported Severe *S. aureus* Cases by Month of Onset LAC, 2008 (N=25)

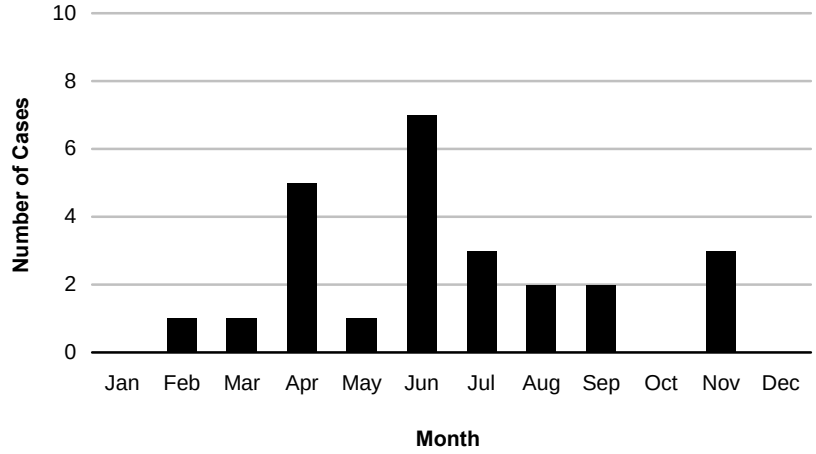
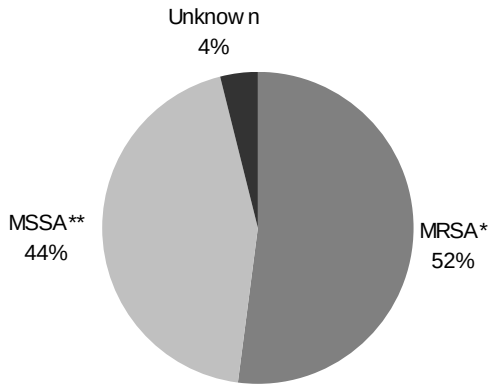


Figure 5. Percent Cases of Severe *S. aureus* Infection by Type LAC, 2008



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

Table 1. Percentage of Severe *S. aureus* Risk Factors – Based on Date of Onset Between 1/1/08-12/31/2008

	2008
	N = 25
Diabetes	28%
Current Smoker	28
Emphysema	20
Alcohol Abuse	16
Asthma	16
Intravenous Drug Use	8
HIV/AIDS	4
Malignancy	4
Other	24
None	16

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

Table 2. Frequency and Percentage of Severe *S. aureus* Clinical Syndromes, LAC, 2008

Syndrome	Number	Percent*
Pneumonia	9	36
Bacteremia (without focus)	7	28
Wound Infection	4	16
Skin Infection	3	12
Meningitis	1	4
Septic Arthritis	1	4
Osteomyelitis	1	4
Bursitis	1	4
Endocarditis	1	4

*Overlapping syndromes will total over 100%.

INVASIVE GROUP A STREPTOCOCCUS (IGAS)

CRUDE DATA	
Number of Cases	155
Annual Incidence[a]	
LA County	1.6
California[b]	N/A
United States	3.8
Age at Diagnosis	
Mean	50
Median	54
Range	1 month – 94 years

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

DESCRIPTION

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

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

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

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

2008 TRENDS AND HIGHLIGHTS

- The incidence rate of reported IGAS was 1.6 per 100,000 (n=156) during 2008, slightly less than that of 2007 and 2006 (Figure 1).
- Cases aged 65 years and older had the highest rate (4.7 per 100,000) followed by cases aged 55 to 64 years. The incidence rate for cases aged 45 to 54 years was lower than previous years at 1.0 per 100,000 in 2008 compared to 2.5 and 2.8 per 100,000 in 2007 and 2006 respectively (Figure 2).
- While blacks had the highest rate of IGAS, the rate decreased in this group relative to 2007. The rate among whites is the lowest it has been in the past 5 years while the rate in Asians is the highest it has been in the past 5 years. The rate among Hispanics is within historical norms (Figure 3).
- SPA 5 had the highest incidence rate at 2.6 cases per 100,000 (Figure 4).
- Unlike previous years when the number of cases peaked during spring months, in 2008 the number of cases peaked in January and February (Figure 5).
- IGAS cases presented most often with bacteremia and cellulitis (Table 1).
- Diabetes was reported more than any other risk factor followed by malignancy and chronic heart disease. A large percentage 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, 2004-2008

	2004 (N=147)			2005 (N=179)			2006 (N=197)			2007 (N=173)			2008 (N=156)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	4	2.2	2.8	1	0.5	0.7	3	1.7	2.0	2	1.3	1.4
1-4	9	6.1	1.6	8	4.5	1.4	9	4.6	1.6	6	3.5	1.0	6	3.8	1.1
5-14	6	4.1	0.4	11	6.1	0.7	15	7.7	1.0	8	4.6	0.6	14	9.0	1.0
15-34	20	13.6	0.7	20	11.2	0.7	20	10.2	0.7	20	11.6	0.7	24	15.4	0.8
35-44	23	15.6	1.5	28	15.6	1.9	34	17.3	2.3	18	10.4	1.2	22	14.1	1.5
45-54	29	19.7	2.3	30	16.8	2.4	36	18.4	2.8	33	19.1	2.5	13	8.3	1.0
55-64	19	12.9	2.4	30	16.8	3.6	29	14.8	3.3	29	16.8	3.3	27	17.3	3.0
65+	41	27.9	4.3	48	26.8	5.0	52	26.5	5.3	56	32.4	5.5	48	30.8	4.7
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race/Ethnicity															
Asian	11	7.5	0.9	9	5.0	0.7	9	4.6	0.7	11	6.4	0.9	14	8.3	1.1
Black	8	5.4	0.9	22	12.3	2.6	23	11.7	2.7	34	19.7	4.0	30	17.8	3.5
Hispanic	50	34.0	1.1	70	39.1	1.5	59	29.9	1.3	49	28.3	1.1	50	29.6	1.1
White	58	39.5	2.0	52	29.1	1.8	65	33.0	2.3	52	30.1	1.8	49	29.0	1.7
Other	6	4.1	21.6	5	2.8	17.7	3	1.5	10.5	4	2.3	19.2	0	0.0	0.0
Unknown	14	9.5		21	11.7		38	19.3		23	13.3		26	15.4	
SPA															
1	5	3.4	1.5	10	5.6	2.9	7	3.6	2.0	5	2.9	1.4	4	2.6	1.1
2	33	22.4	1.6	32	17.9	1.5	43	21.8	2.0	43	24.9	2.0	35	22.4	1.6
3	22	15.0	1.3	28	15.6	1.6	28	14.2	1.6	20	11.6	1.2	19	12.2	1.1
4	18	12.2	1.5	21	11.7	1.7	27	13.7	2.1	15	8.7	1.2	24	15.4	1.9
5	16	10.9	2.5	23	12.8	3.6	23	11.7	3.6	15	8.7	2.3	17	10.9	2.6
6	14	9.5	1.4	24	13.4	2.3	24	12.2	2.3	35	20.2	3.3	14	9.0	1.3
7	18	12.2	1.3	11	6.1	0.8	16	8.1	1.2	18	10.4	1.3	15	9.6	1.1
8	15	10.2	1.4	19	10.6	1.7	19	9.6	1.7	17	9.8	1.5	22	14.1	2.0
Unknown	6	4.1		11	6.1		10	5.1		5	2.9		6	3.8	

*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, 1999-2008

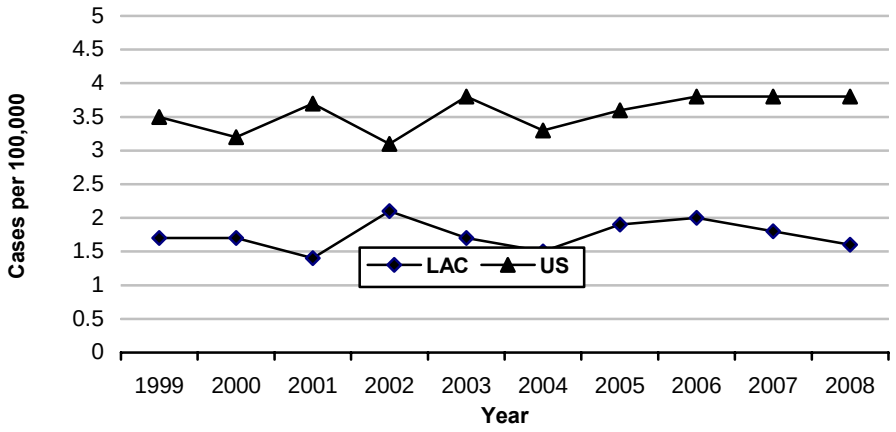
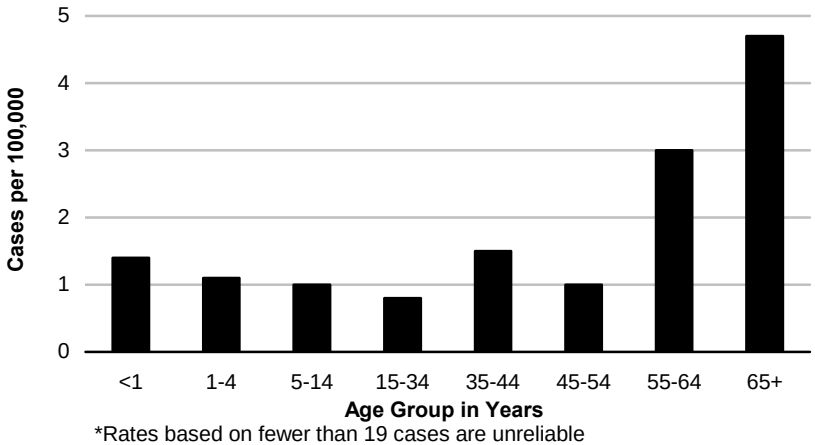
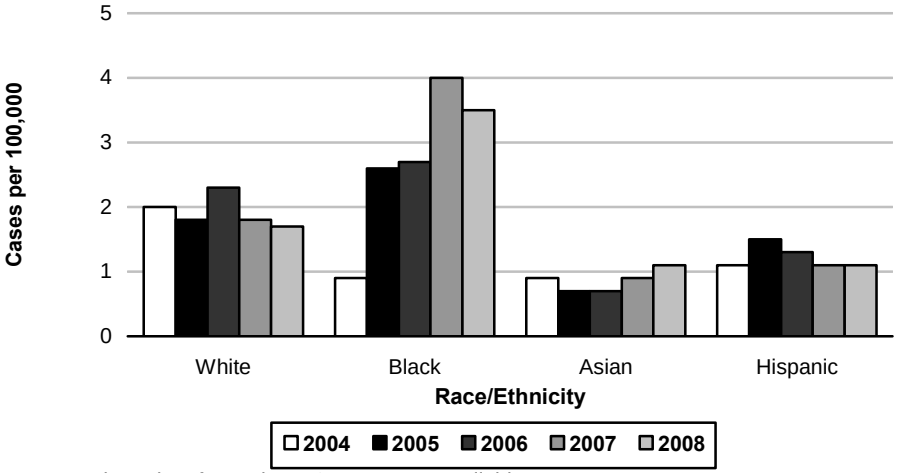


Figure 2. Incidence Rates* of Invasive Group A Streptococcus by Age Group LAC, 2008



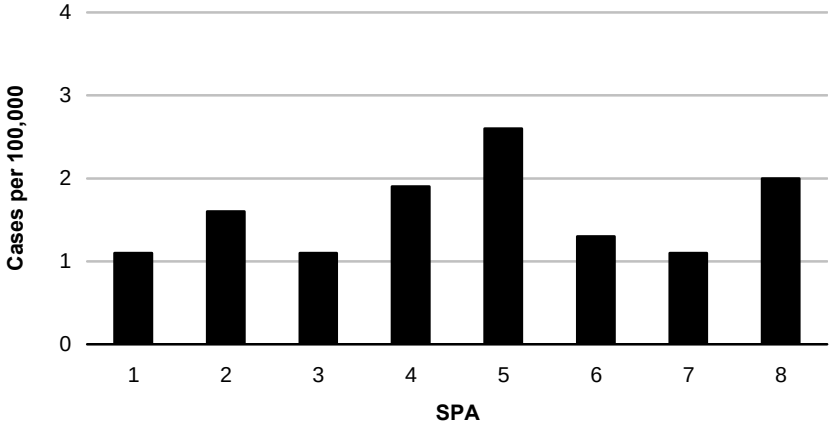
*Rates based on fewer than 19 cases are unreliable

Figure 3. Invasive Group A Streptococcus Incidence by Race/Ethnicity LAC, 2004-2008



*Rates based on fewer than 19 cases are unreliable

Figure 4. Incidence Rates of Invasive Group A Streptococcus by SPA LAC, 2008



*Rates based on fewer than 19 cases are unreliable

Figure 5. Reported Invasive Group A Streptococcus Cases by Month of Onset, LAC, 2008

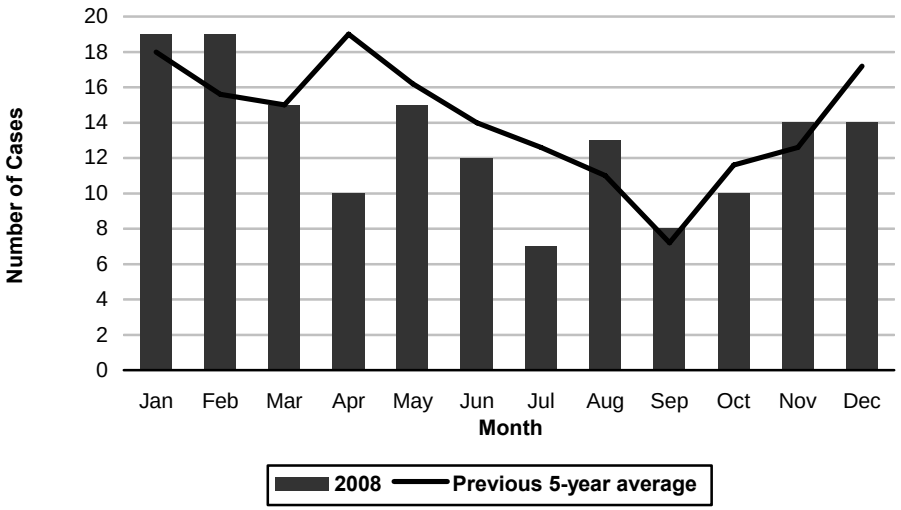


Table 1. Frequency and Percentage of IGAS Clinical Syndromes LAC, 2008

Syndrome	Number	Percent*
Cellulitis	48	29
Bacteremia (without focus)	53	32
STSS	20	11†
Non-Surgical Wound Infection	10	6
Pneumonia	22	13
Necrotizing Fasciitis	14	8
Other	27	16

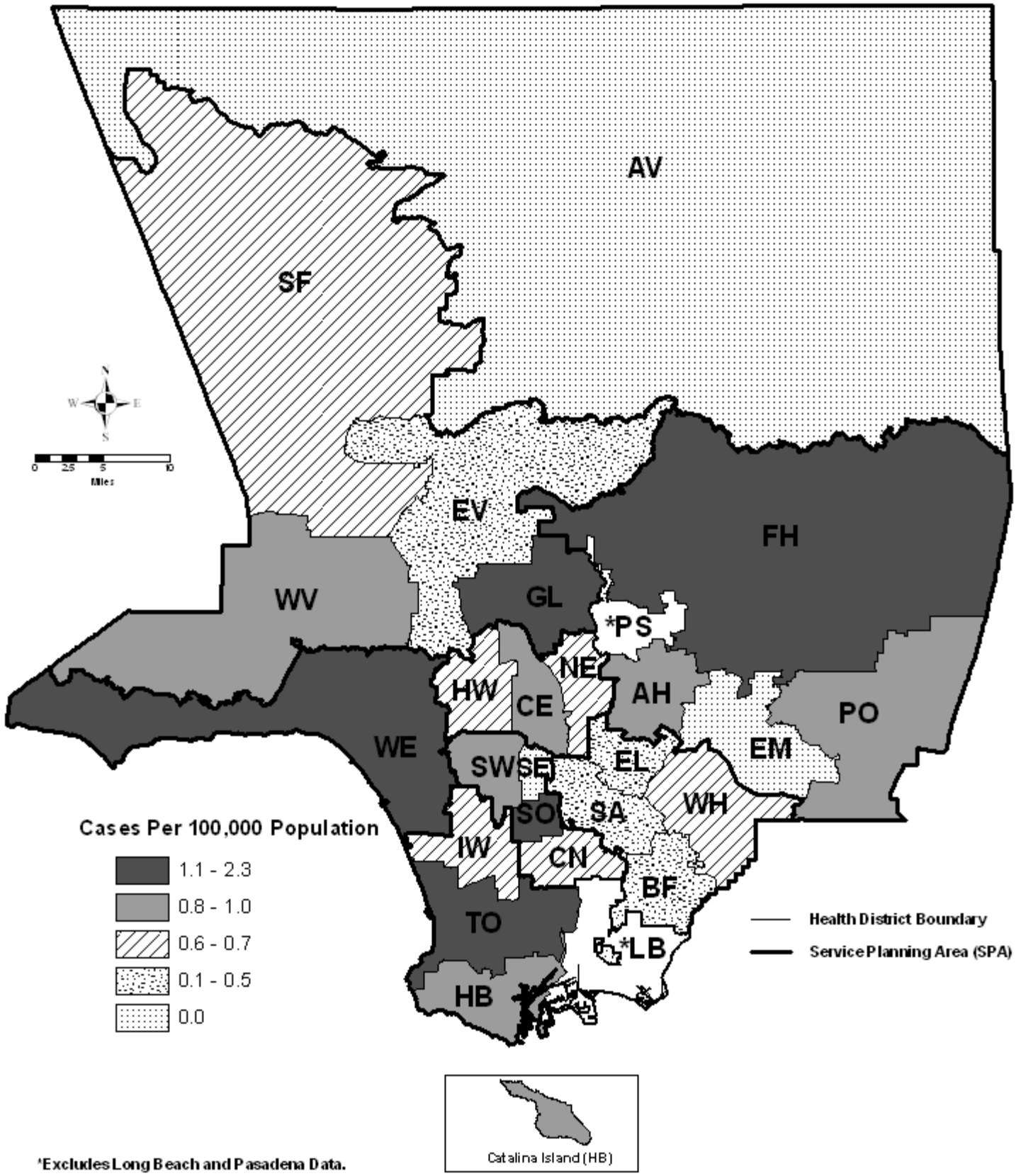
*Overlapping syndromes will total over 100%.
†Denominator data is slightly different for STSS than other syndromes (n=176 for STSS, n=166 for all other syndromes).

Table 2. Percentage of IGAS Risk Factors – Based on Date of Onset Between 1/1/06-12/31/2008

	2006	2007	2008
	N = 156	N = 145	N = 143
Chronic Heart Disease	13%	19%	11%
Malignancy	13	10	12
IV Drug Use	8	4	4
Alcohol Abuse	14	14	10
Cirrhosis	7	6	6
Diabetes	24	26	22
HIV/AIDS	3	6	4
History of Blunt Trauma	15	12	6
Other	12	21	12
None	31	33	41

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

Map 15. Streptococcus, Group A Invasive Disease Rates by Health District, Los Angeles County, 2008*



*Excludes Long Beach and Pasadena Data.

TYPHOID FEVER, ACUTE AND CARRIER

ACUTE TYPHOID CRUDE DATA	
Number of Cases	14
Annual Incidence[a]	
LA County	0.14[b]
California[c]	0.21
United States[c]	0.15
Age at Diagnosis	
Mean	25.8
Median	17
Range	1-75

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

DESCRIPTION

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

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

Hand washing after using the toilet, before preparing or serving food, and before and after caring for others is important in preventing the spread of typhoid. When traveling to locations where sanitary practices are uncertain, foods should be thoroughly cooked and served at appropriate temperature; bottled water should be used for drinking as well as for brushing teeth and making ice. Vaccination should be considered when traveling in high endemic areas. LAC tests household contacts of confirmed cases for *S. typhi* to identify any previously undiagnosed carriers or cases.

2008 TRENDS AND HIGHLIGHTS

- The Los Angeles County (LAC) rates for acute typhoid fever cases continue to be higher than the US rates (Figure 1).
- The incidence of acute cases aged 5 to 14 years has increased (Figure 2).
- Asians continue to have the highest percentage of acute cases (Figure 3).
- Service Planning Area (SPA) 2 continues to have the highest number of acute cases (Figure 4).
- Typically most cases occur in the summer; in 2008, the majority of cases occurred in April (Figure 5).
- Four new chronic carriers were identified.
- Eight carriers are on the state typhoid registry and are monitored by LAC semi-annually.

Reported Acute Typhoid Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=13)			2005 (N=12)			2006 (N=17)			2007 (N=17)			2008 (N=14)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	1	7.7	0.2	1	8.3	0.2	2	11.8	0.3	0	0.0	0.0	1	7.1	0.2
5-14	2	15.4	0.1	2	16.7	0.1	5	29.4	0.3	1	5.9	0.1	5	35.7	0.4
15-34	3	23.1	0.1	7	58.3	0.2	8	47.1	0.3	10	58.8	0.4	5	35.7	0.2
35-44	3	23.1	0.2	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0	1	7.1	0.1
45-54	2	15.4	0.2	2	16.7	0.2	1	5.9	0.1	2	11.8	0.2	0	0.0	0.0
55-64	1	7.7	0.1	0	0.0	0.0	0	0.0	0.0	3	17.6	0.3	1	7.1	0.1
65+	1	7.7	0.1	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	1	7.1	0.1
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	3	23.1	0.2	6	50.0	0.5	7	41.2	0.6	9	52.9	0.7	8	57.1	0.6
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	5	38.5	0.1	6	50.0	0.1	8	47.1	0.2	7	41.2	0.2	5	35.7	0.1
White	5	38.5	0.2	0	0.0	0.0	1	5.9	0.0	1	5.9	0.0	1	7.1	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		1	5.9		0	0.0		0	0.0	
SPA															
1	1	7.7	0.3	1	8.3	0.3	0	0.0	0.0	2	11.8	0.6	0	0.0	0.0
2	1	7.7	0.0	2	16.7	0.1	3	17.6	0.1	6	35.3	0.3	5	35.7	0.2
3	1	7.7	0.1	0	0.0	0.0	7	41.2	0.4	4	23.5	0.2	3	21.4	0.2
4	5	38.5	0.4	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	3	21.4	0.2
5	2	15.4	0.3	1	8.3	0.2	2	11.8	0.3	0	0.0	0.0	0	0.0	0.0
6	1	7.7	0.1	3	25.0	0.3	1	5.9	0.1	2	11.8	0.2	1	7.1	0.1
7	1	7.7	0.1	2	16.7	0.1	3	17.6	0.2	1	5.9	0.1	2	14.3	0.1
8	1	7.7	0.1	3	25.0	0.3	1	5.9	0.1	1	5.9	0.1	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Reported Typhoid Fever Carrier Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=3)			2005 (N=4)			2006 (N=3)			2007 (N=1)			2008 (N=4)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
15-34	0	0.0	0.0	1	25.0	0.0	0	0.0	0.0	0	0.0	0.0	1	25.0	0.0
35-44	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	2	50.0	0.1
45-54	2	66.7	0.2	2	50.0	0.2	0	0.0	0.0	1	100.0	0.1	0	0.0	0.0
55-64	1	33.3	0.1	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0
65+	0	0.0	0.0	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	1	25.0	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	1	25.0	0.1	1	33.3	0.1	0	0.0	0.0	1	25.0	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	2	66.7	0.0	3	75.0	0.1	2	66.7	0.0	1	100.0	0.0	3	75.0	0.1
White	1	33.3	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
SPA															
1	0	0.0	0.0	1	25.0	0.3	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	100.0	0.0	1	25.0	0.0
3	1	33.3	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	25.0	0.1
4	0	0.0	0.0	0	0.0	0.0	1	33.3	0.1	0	0.0	0.0	2	50.0	0.2
5	1	33.3	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
6	1	33.3	0.1	1	25.0	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
7	0	0.0	0.0	2	50.0	0.1	2	66.7	0.1	0	0.0	0.0	0	0.0	0.0
8	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates by Years of Onset of Acute Typhoid Fever, LAC and US, 1999-2008

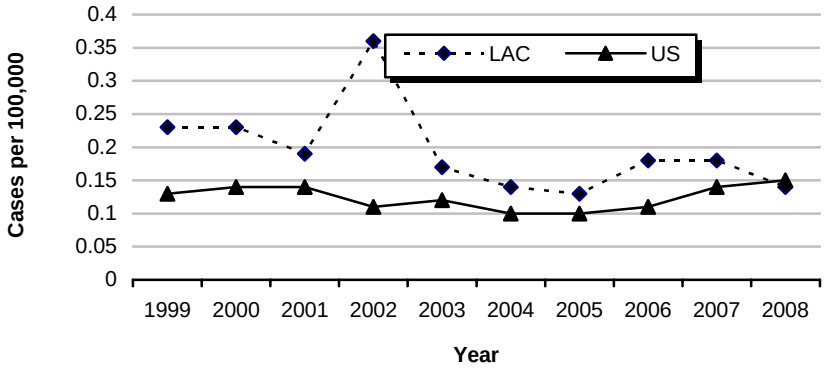


Figure 2. Acute Typhoid Fever Cases by Age Group LAC, 2008

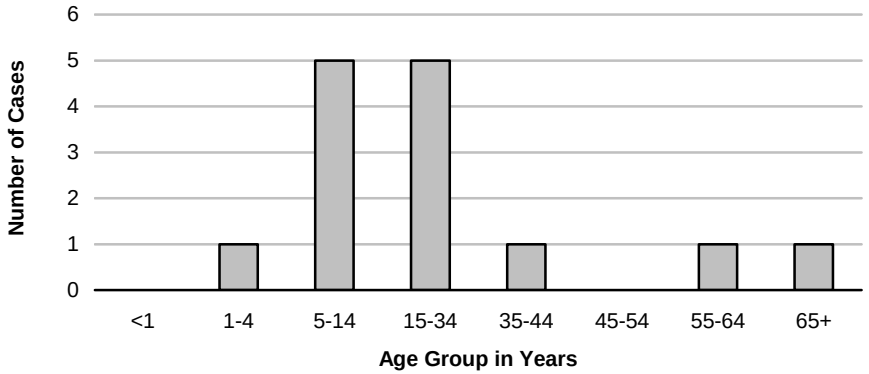


Figure 3. Reported Acute Typhoid Fever Cases by Race/Ethnicity LAC, 2008

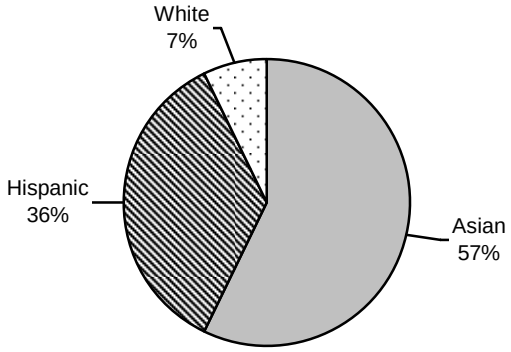


Figure 4. Reported Acute Typhoid Fever Cases by SPA LAC, 2008

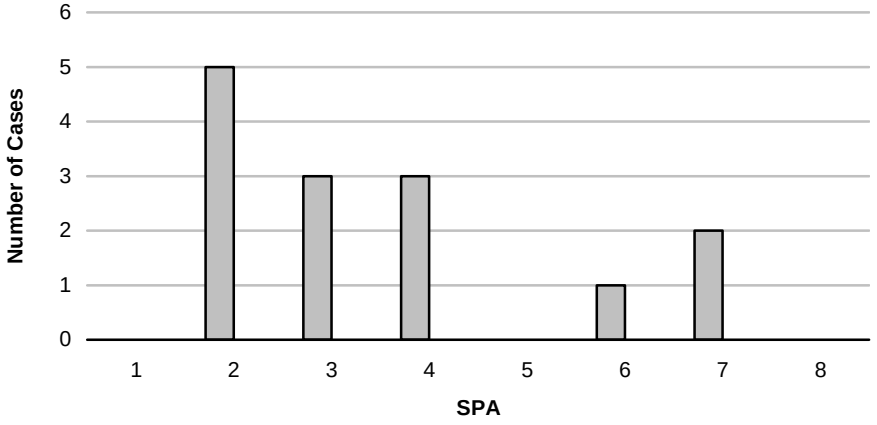


**Figure 5. Acute Typhoid Fever Cases by Month of Onset
LAC, 2008 (N=14)**

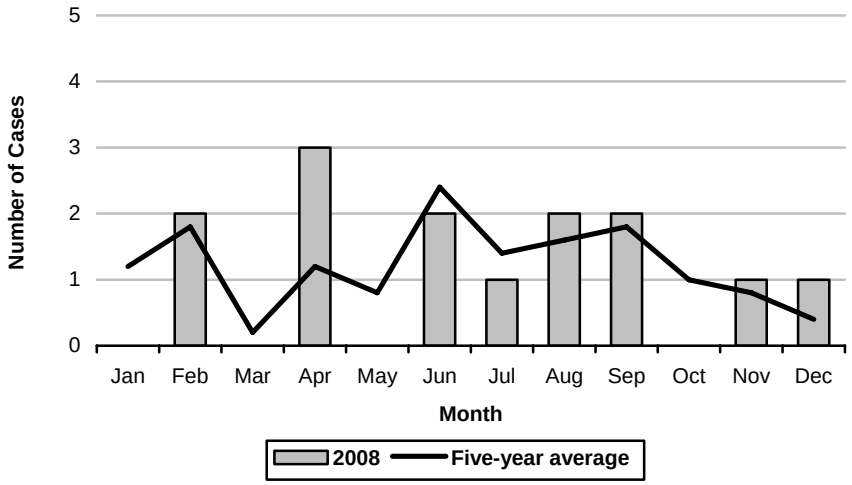
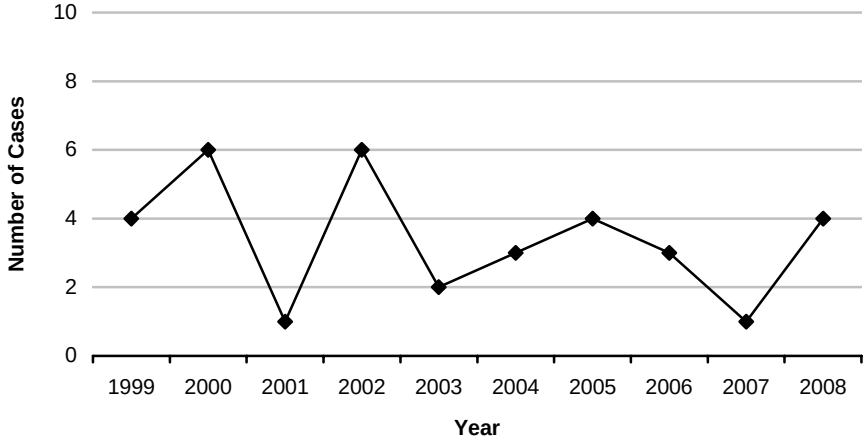


**Figure 6. Cases of Chronic Typhoid Carrier by Year of Detection
LAC, 1999-2008**



TYPHUS FEVER

CRUDE DATA	
Number of Cases	18
Annual Incidence[a]	
LA County[b]	0.18
California	N/A
United States	N/A
Age at Diagnosis	
Mean	39.3
Median	39
Range	7-65

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

DESCRIPTION

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

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

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

2008 TRENDS AND HIGHLIGHTS

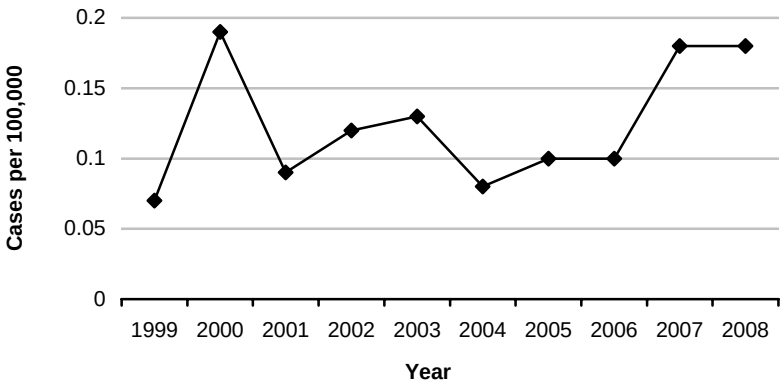
- Both the incidence (0.18 per 100,000) (Figure 1) and number of reported cases (n=18) continue to be about twice as high as the several years prior to 2006.
- Typhus has spread out from its historically endemic areas within the Service Planning Area (SPA) 3-San Gabriel Valley and north central LAC, and is now commonly reported among residents in the west LAC (SPA 5), particularly Venice and Santa Monica.

Reported Typhus Fever Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=8)			2005 (N=10)			2006 (N=10)			2007 (N=17)			2008 (N=18)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.9	0.2	0	0.0	0.0
5-14	0	0.0	0.0	3	30.0	0.2	1	10.0	0.1	1	5.9	0.1	3	16.7	0.2
15-34	4	50.0	0.1	6	60.0	0.2	1	10.0	0.0	3	17.6	0.1	3	16.7	0.1
35-44	0	0.0	0.0	0	0.0	0.0	5	50.0	0.3	3	17.6	0.2	4	22.2	0.3
45-54	2	25.0	0.2	0	0.0	0.0	0	0.0	0.0	6	35.3	0.5	4	22.2	0.3
55-64	1	12.5	0.1	0	0.0	0.0	1	10.0	0.1	2	11.8	0.2	3	16.7	0.3
65+	0	0.0	0.0	0	0.0	0.0	2	20.0	0.2	1	5.9	0.1	1	5.6	0.1
Unknown	1	12.5		1	10.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	0	0.0	0.0	0	0.0	0.0	1	10.0	0.1	1	5.9	0.1	1	5.6	0.1
Black	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	1	12.5	0.0	3	30.0	0.1	3	30.0	0.1	1	5.9	0.0	5	27.8	0.1
White	6	75.0	0.2	7	70.0	0.2	6	60.0	0.2	13	76.5	0.4	12	66.7	0.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	1	12.5		0	0.0		0	0.0		2	11.8		0	0.0	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
2	0	0.0	0.0	1	10.0	0.0	3	30.0	0.1	2	11.8	0.1	2	11.1	0.1
3	3	37.5	0.2	6	60.0	0.4	3	30.0	0.2	8	47.1	0.5	9	50.0	0.5
4	4	50.0	0.3	3	30.0	0.2	1	10.0	0.1	1	5.9	0.1	1	5.6	0.1
5	0	0.0	0.0	0	0.0	0.0	1	10.0	0.2	4	23.5	0.6	3	16.7	0.5
6	0	0.0	0.0	0	0.0	0.0	1	10.0	0.1	0	0.0	0.0	1	5.6	0.1
7	0	0.0	0.0	0	0.0	0.0	1	10.0	0.1	1	5.9	0.1	2	11.1	0.1
8	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	5.9	0.1	0	0.0	0.0
Unknown	1	12.5		0	0.0		0	0.0		0	0.0		0	0.0	

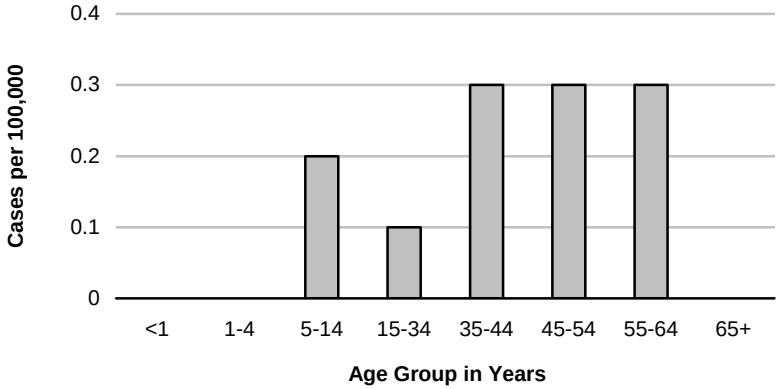
*Rates calculated based on less than 19 cases or events are considered unreliable.

**Figure 1. Incidence Rates* of Typhus Fever
LAC, 1999-2008**



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

**Figure 2. Incidence Rates* of Typhus Fever by Age Group
LAC, 2008**



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

**Figure 3. Percent Cases of Typhus Fever by Race/Ethnicity
LAC, 2008**

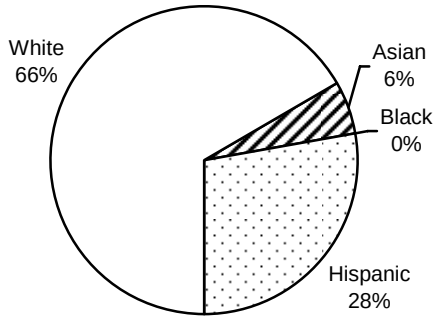
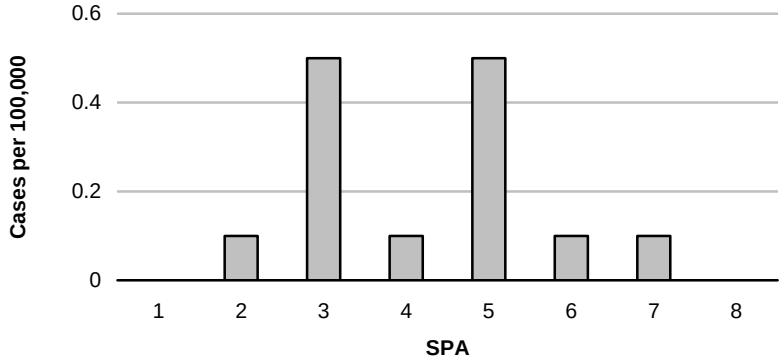


**Figure 4. Incidence Rates* of Typhus Fever by SPA
LAC, 2008**



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

Figure 5. Reported Typhus Fever Cases by Month of Onset
LAC, 2008

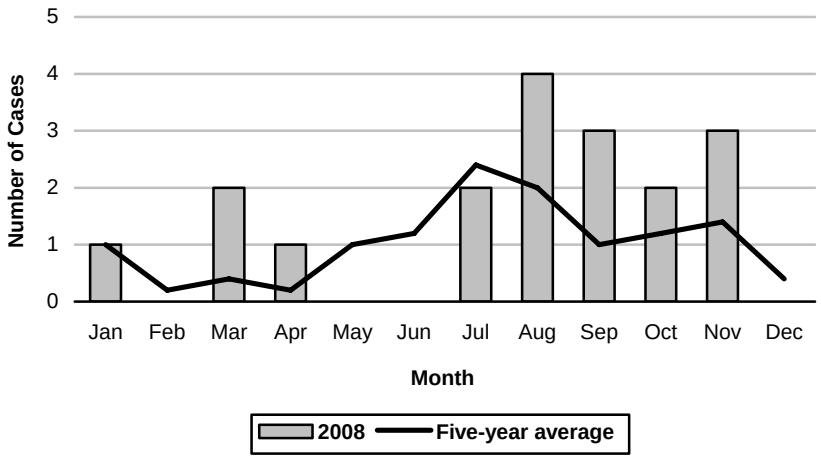
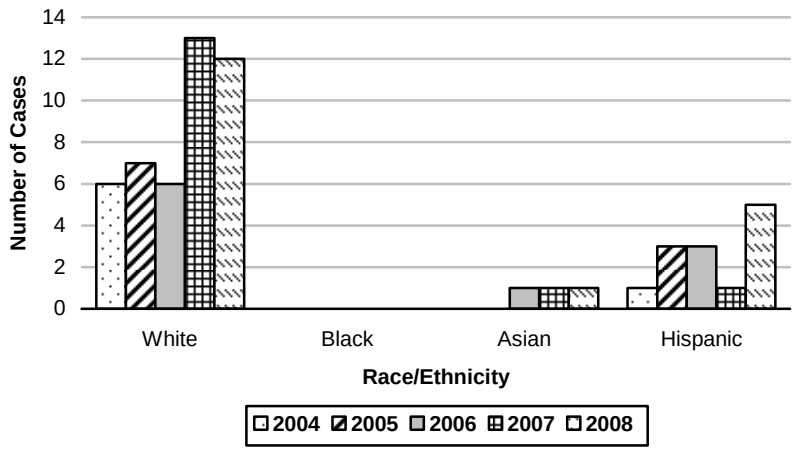


Figure 6. Reported Typhus Fever Cases by Race/Ethnicity
LAC, 2004-2008



VIBRIOSIS

CRUDE DATA	
Number of Cases	18
Annual Incidence[a]	
LA County[b]	18
California[c]	0.28
United States[c]	0.19
Age at Diagnosis	
Mean	46
Median	46
Range	10-91

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

DESCRIPTION

Vibriosis is an infection caused by comma-shaped, Gram-negative bacteria of the genus Vibrio. Vibriosis most commonly presents as acute diarrhea, but may also occur as wound infection or septicemia. Vibriosis is transmitted by ingesting food or water contaminated with *Vibrio*, or by contact between open wounds and contaminated water. The most common species that cause vibriosis are *V. parahæmolyticus*, *V. alginolyticus*, *V. vulnificus* and *V. choleræ*.

Two serotypes of a *V. choleræ* may cause cholera, an acute life-threatening, diarrheal illness. The infection may be mild or without symptoms, but sometimes it can be severe. Approximately one in 20 infected persons has severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these persons, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.

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

2008 TRENDS AND HIGHLIGHTS

- Vibriosis incidence remains too low to extract reliable rate data.
- In 2008, whites comprised majority (67%) of all vibriosis cases (Figure 3). There was an increase in the number of vibriosis cases among whites compared to 2007. In contrast, the reported number of Hispanic infected with vibriosis in 2008 was lower than in previous years. The number of cases among Asians and blacks remains consistently low to absent (Figure 6).
- Vibriosis in Los Angeles County generally is more common in Service Planning Area (SPA) 5 and 8, both of which are coastal (see Figure 4).
- Typically vibriosis cases peak during the summer months of June through August. However, there was a notably low number of cases in the summer of 2008, with a shift in cases peaking in September and October (Figure 5).
- Five cases of vibriosis occurred among women, while 13 cases occurred among men. This is consistent with past years, and reflects the greater likelihood of recreation water exposure and raw seafood consumption among men compared to women.

Reported Vibriosis Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=26)			2005 (N=14)			2006 (N=18)			2007 (N=13)			2008 (N=18)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	1	3.8	0.7	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
5-14	0	0.0	0.0	1	7.1	0.1	1	5.6	0.1	1	7.7	0.1	2	11.1	0.1
15-34	8	30.8	0.3	3	21.4	0.1	5	27.8	0.2	4	30.8	0.1	3	16.7	0.1
35-44	4	15.4	0.3	4	28.6	0.3	3	16.7	0.2	2	15.4	0.1	3	16.7	0.2
45-54	1	3.8	0.1	3	21.4	0.2	3	16.7	0.2	1	7.7	0.1	3	16.7	0.2
55-64	4	15.4	0.5	2	14.3	0.2	3	16.7	0.3	3	23.1	0.3	5	27.8	0.5
65+	8	30.8	0.8	1	7.1	0.1	3	16.7	0.3	2	15.4	0.2	2	11.1	0.2
Unknown	0	0.0		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	1	3.8	0.1	1	7.1	0.1	2	11.1	0.2	2	15.4	0.2	2	11.1	0.2
Black	2	7.7	0.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Hispanic	12	46.2	0.3	7	50.0	0.2	4	22.2	0.1	6	46.2	0.1	4	22.2	0.1
White	9	34.6	0.3	4	28.6	0.1	12	66.7	0.4	2	15.4	0.1	12	66.7	0.4
Other	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Unknown	2	7.7		2	14.3		0	0.0		3	23.1		0	0.0	
SPA															
1	1	3.8	0.3	2	14.3	0.6	0	0.0	0.0	0	0.0	0.0	1	5.6	0.3
2	5	19.2	0.2	3	21.4	0.1	2	11.1	0.1	1	7.7	0.0	4	22.2	0.2
3	2	7.7	0.1	1	7.1	0.1	0	0.0	0.0	1	7.7	0.1	3	16.7	0.2
4	5	19.2	0.4	1	7.1	0.1	3	16.7	0.2	4	30.8	0.3	0	0.0	0.0
5	3	11.5	0.5	3	21.4	0.5	6	33.3	0.9	1	7.7	0.2	3	16.7	0.5
6	4	15.4	0.4	2	14.3	0.2	0	0.0	0.0	1	7.7	0.1	1	5.6	0.1
7	2	7.7	0.1	1	7.1	0.1	6	33.3	0.4	1	7.7	0.1	0	0.0	0.0
8	3	11.5	0.3	1	7.1	0.1	1	5.6	0.1	4	30.8	0.4	5	27.8	0.4
Unknown	1	3.8		0	0.0		0	0.0		0	0.0		1	5.6	

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

Figure 1. Reported Cases of Vibriosis
LAC, 1999-2008

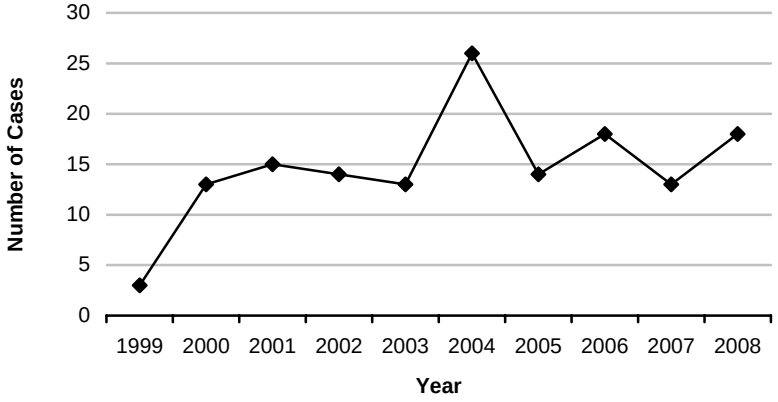


Figure 2. Reported Cases of Vibriosis by Age Group
LAC, 2008 (N=18)

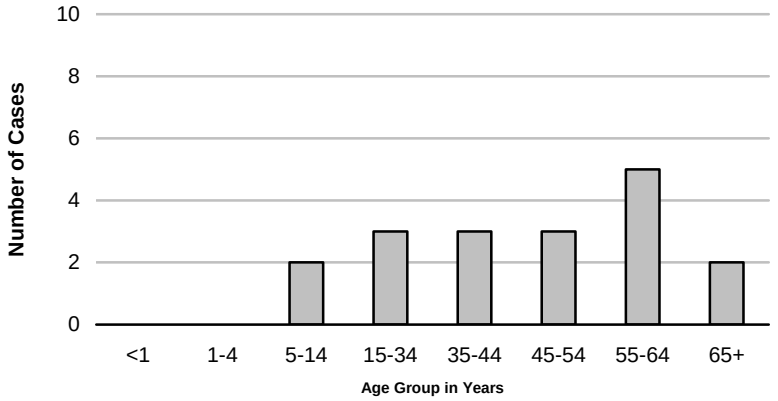


Figure 3. Percent Cases of Vibriosis by Race/Ethnicity
LAC, 2008

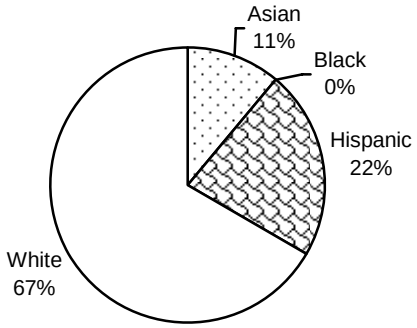


Figure 4. Reported Cases of Vibriosis by SPA
LAC, 2008 (N=18)

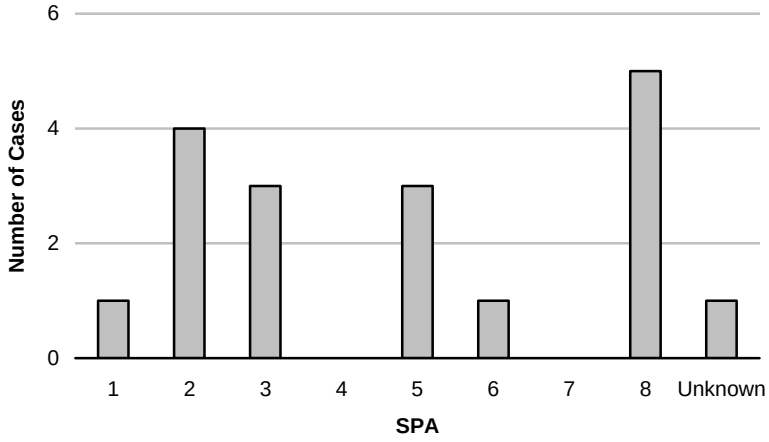


Figure 5. Reported Vibriosis Cases by Month of Onset
LAC, 2008

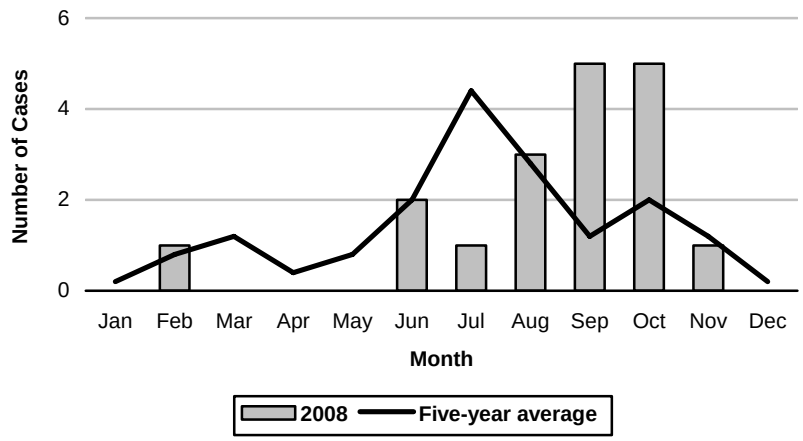
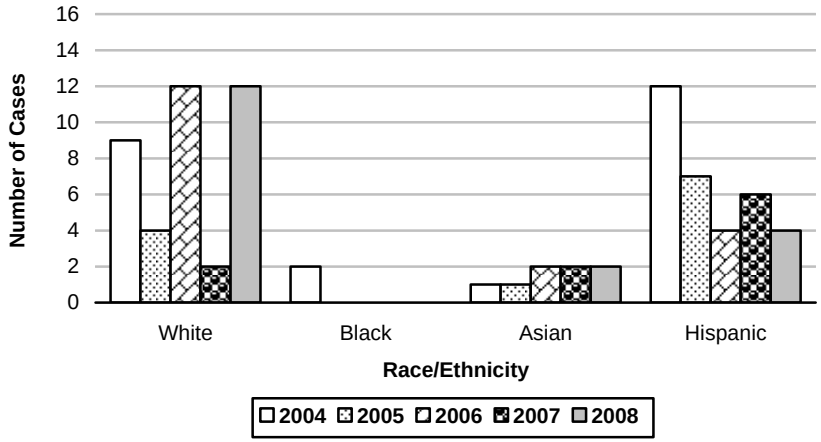


Figure 6. Reported Cases of Vibriosis by Race/Ethnicity
LAC, 2004-2008



WEST NILE VIRUS

CRUDE DATA	
Number of Cases	170
Annual Incidence[a]	
LA County	1.74
California[b]	1.22
United States[b]	0.45
Age at Diagnosis	
Mean	57
Median	59
Range	4-94

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

DESCRIPTION

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

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

Most persons who become infected with WNV will not develop clinical illness or symptoms, which can be problematic in blood donation. Beginning 2003, blood donors were screened for WNV infection utilizing polymerase chain reaction (PCR) testing.

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

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

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

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

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

2008 TRENDS AND HIGHLIGHTS

- The number of WNV infections reported in 2008 (n=170) increased almost four times from the previous year (n=43), including 22 asymptomatic donors and six deaths.
- WNV manifested as neuro-invasive disease in 105 reported infections (62%) including 54 meningitis, 49 encephalitis, and 2 AFP.
- As occurred in 2004, the highest incidence was reported from Service Planning Area (SPA) 3, the San Gabriel Valley (Figure 4).
- The WNV season has extended slightly with onset as early as June and as late as November, whereas in most previous years, onset was limited to July through October (Figure 5).

Reported West Nile Virus Cases and Rates* per 100,000 by Age Group, Race/Ethnicity, and SPA
Los Angeles County, 2004-2008

	2004 (N=309)			2005 (N=43)			2006 (N=16)			2007 (N=43)			2008 (N=170)		
	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000	No.	(%)	Rate/ 100,000
Age Group															
<1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
1-4	0	0.0	0.0	1	2.3	0.2	0	0.0	0.0	0	0.0	0.0	1	0.6	0.2
5-14	10	3.2	0.7	1	2.3	0.1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
15-34	32	10.4	1.1	7	16.3	0.2	2	12.5	0.1	3	7.0	0.1	19	11.2	0.7
35-44	46	14.9	3.1	4	9.3	0.3	5	31.3	0.3	0	0.0	0.0	15	8.8	1.0
45-54	70	22.7	5.7	8	18.6	0.6	3	18.8	0.2	9	20.9	0.7	34	20.0	2.5
55-64	59	19.1	7.4	8	18.6	1.0	3	18.8	0.3	12	27.9	1.4	36	21.2	3.9
65+	91	29.4	9.6	14	32.6	1.5	3	18.8	0.3	19	44.2	1.9	65	38.2	6.4
Unknown	1	0.3		0	0.0		0	0.0		0	0.0		0	0.0	
Race / Ethnicity															
Asian	8	2.6	0.6	2	4.7	0.2	1	6.3	0.1	0	0.0	0.0	6	3.5	0.5
Black	3	1.0	0.4	1	2.3	0.1	0	0.0	0.0	0	0.0	0.0	5	2.9	0.6
Hispanic	118	38.2	2.6	17	39.5	0.4	2	12.5	0.0	12	27.9	0.3	68	40.0	1.5
White	170	55.0	5.8	22	51.2	0.8	13	81.3	0.5	29	67.4	1.0	75	44.1	2.6
Other	7	2.3	25.2	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	3	1.8	12.2
Unknown	3	1.0		1	2.3		0	0.0		2	4.7		13	7.6	
SPA															
1	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	2.3	0.3	5	2.9	1.4
2	79	25.6	3.7	18	41.9	0.8	9	56.3	0.4	27	62.8	1.3	37	21.8	1.7
3	113	36.6	6.6	4	9.3	0.2	4	25.0	0.2	9	20.9	0.5	61	35.9	3.5
4	14	4.5	1.1	0	0.0	0.0	3	18.8	0.2	2	4.7	0.2	12	7.1	0.9
5	2	0.6	0.3	1	2.3	0.2	0	0.0	0.0	0	0.0	0.0	1	0.6	0.2
6	8	2.6	0.8	2	4.7	0.2	0	0.0	0.0	1	2.3	0.1	6	3.5	0.6
7	74	23.9	5.4	12	27.9	0.9	0	0.0	0.0	2	4.7	0.1	44	25.9	3.2
8	5	1.6	0.5	6	14.0	0.5	0	0.0	0.0	1	2.3	0.1	4	2.4	0.4
Unknown	14	4.5		0	0.0		0	0.0		0	0.0		0	0.0	

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

Figure 1. Incidence Rates of West Nile Virus LAC, 2004-2008

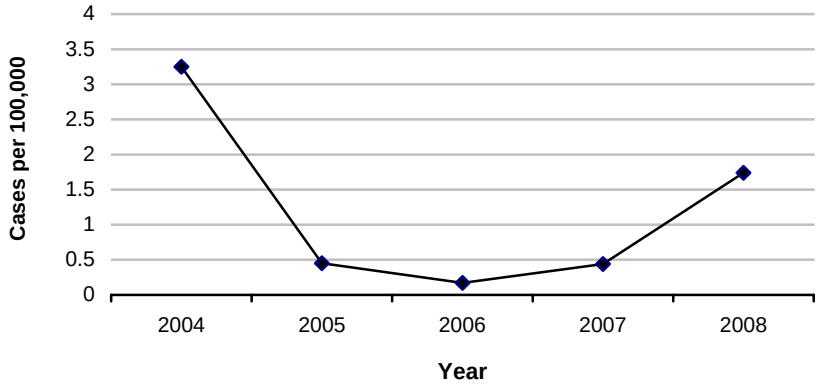


Figure 2. Incidence Rates of West Nile Virus by Age Group LAC, 2008

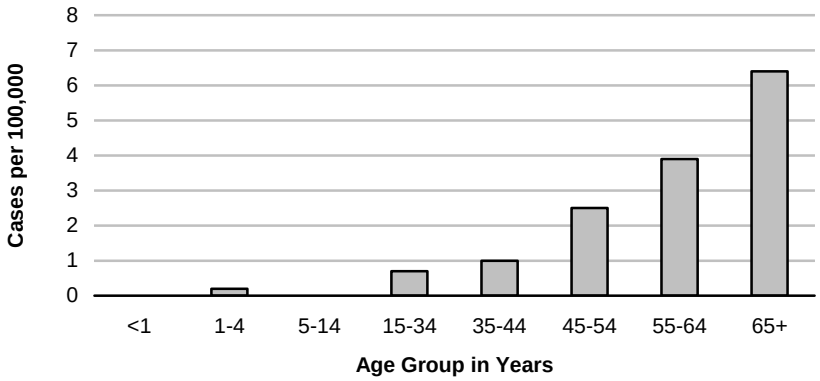
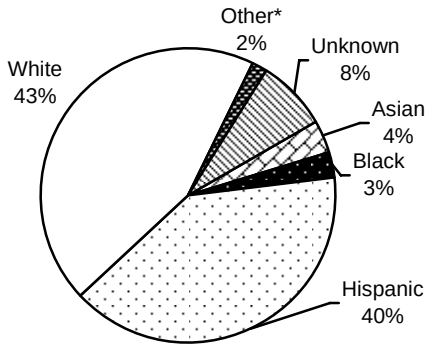


Figure 3. Percent Cases of West Nile Virus by Race/Ethnicity LAC, 2008



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

Figure 4. Incidence Rates of West Nile Virus by SPA LAC, 2008

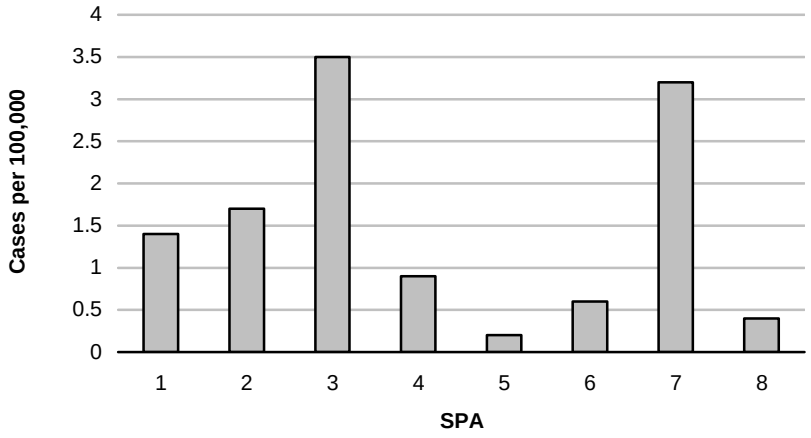


Figure 5. Reported West Nile Virus Cases by Month of Onset LAC, 2008

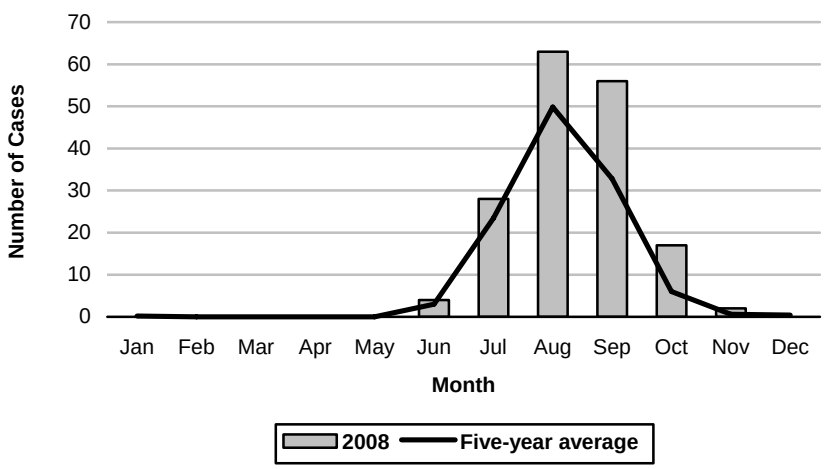
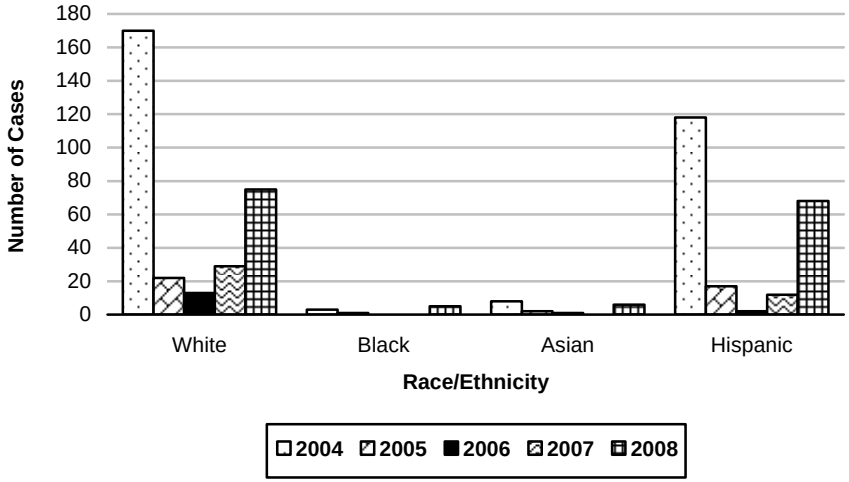


Figure 6. West Nile Virus Incidence by Race/Ethnicity LAC, 2004-2008



DISEASE OUTBREAK SUMMARIES

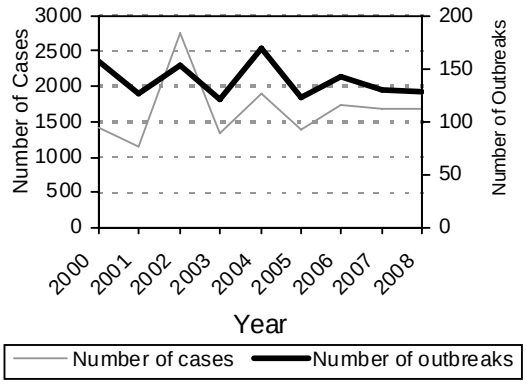
2008

COMMUNITY-ACQUIRED DISEASE OUTBREAKS

ABSTRACT

- In 2008, 129 community-acquired disease outbreaks accounted for 1,693 cases of illness (Figure 1). This finding was a similar to 2007 results—130 outbreaks with 1690 individual cases.
- The top three disease categories: ectoparasites, gastroenteritis of various causes, and varicella accounted for 66% of all closed confirmed outbreaks for 2008 (Figure 2). In yearly findings from the previous three years, 2005-2007, these categories accounted for 75% of the total outbreaks confirmed.
- Schools (kindergarten and higher) and preschools were the most common setting of community-acquired outbreaks, with 38% and 31% of all outbreaks (Figure 3).
- The number of community outbreaks caused by varicella dramatically declined in 2008 to 19; previous five-year average was 46.

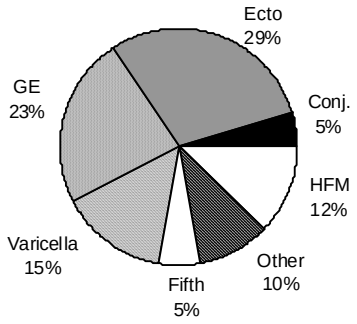
Figure 1.
Community Acquired Outbreaks
Number of Persons Affected
LAC, 2000–2008



DATA

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

Figure 2.
Community-Acquired Outbreaks by Type of Disease* LAC, 2008 (N=129)

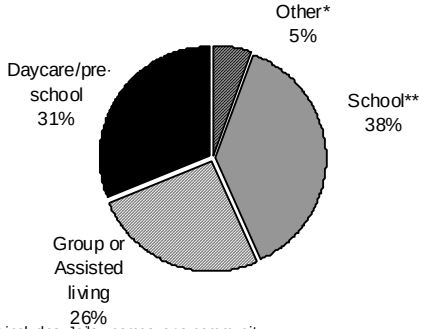


* Ecto=ectoparasites; HFM=Hand, foot & mouth; GE = Gastroentestinal; Conj. = Conjuctivitis;

Ectoparasites (scabies and pediculosis) accounted for 29% of all confirmed outbreaks in 2008. Gastroenteritis (GE) of various etiologies and varicella were the second and third most common cause of outbreaks, comprising 23% and 15% of all outbreaks respectively (Figure 2, Table 1). Of interest, included in the 'other' category is a community outbreak of wound botulism (type A) among IV drug abusers (see Botulism Special Studies Report section).

GE outbreaks specifically caused by norovirus infection had the highest incident-specific case average attributed to the ten confirmed norovirus outbreaks with a mean of 27 cases per outbreak. Outbreaks caused by an undetermined GE etiology had a mean of 15 cases per outbreak. Many of the undetermined GE outbreaks had similar characteristics

Figure 3.
Community Outbreaks by Setting
LAC, 2008 (N=129)



*Other includes: Jails, camps, or a community
** school can include K thropugh university

to the confirmed norovirus outbreaks, but were not tested for confirmation. These figures highlight the increased circulation of norovirus and reflect the ease this agent can be transmitted from person-to-person in community settings (Table 1). The single outbreak with the highest number of cases (120) was an unknown respiratory outbreak at an elementary school.

The most common outbreak settings (Figure 3) for illness transmission were schools—elementary schools (36), middle schools (3), and high schools (10) accounting for 38% of all outbreaks. High schools played a larger role for outbreak location site in 2008 going to ten outbreaks compared to only one the previous year. Of note in 70% of the high school outbreaks the etiology was varicella. The predominance of reported outbreaks affecting children in school settings can be seen over the last several years. Settings with young children in daycare or pre-school accounted for an additional 31%. Group and retirement home settings were the third most common site of community-acquired outbreaks reported in 2008, accounting for 26% of all outbreaks. The 2006 year also reported high impact in this setting (30%).

Outbreaks were reported from all eight Service Planning Areas (SPAs) (Figure 4). SPA 2, the San Fernando Valley, had the most outbreaks (38) for 2008.

The chart of community-acquired outbreaks by onset month (Figure 5) shows a bimodal distribution. Varicella outbreaks predominated the early months of the year. GE occurred throughout the year, but tended towards the cooler months with outbreaks focused in the winter, spring and fall. This cooler season predominance illustrates the importance of norovirus circulation during this reporting period.

COMMENTS

The overall number of outbreaks and outbreak associated cases in 2008 was similar to the prior year. A major finding for 2008 was the dramatic decrease in varicella cases and the first time since 1999 varicella was not the most common cause of community-acquired outbreaks in LAC (also see summary of the Varicella Project in the Special Studies Reports section). It is illustrative to note that in 2007, eight varicella outbreaks were identified in the Antelope Valley Health District (SPA 1), where the LAC DPH Varicella Acute Surveillance Project is in place; there was only one varicella outbreak in spa one for 2008.

- Community-acquired outbreaks result in an interaction among particular age groups, location and specific diseases. A profile emerges where the very young and early adolescent acquire infection/infestation at school (69% in preschool, elementary, middle, or high school). Varicella, pediculosis (head lice), and gastroenteritis were most common in this young group. The second age group affected by outbreaks is in the older population associated with group-home settings (26%). In this age category, GE and scabies are the most common causes (Table 2). The increased ranking of the group and retirement home as a setting for outbreaks was fueled by the increased norovirus activity during 2007.

Figure 4.
Community Outbreaks by SPA
LAC, 2008 (N=129)

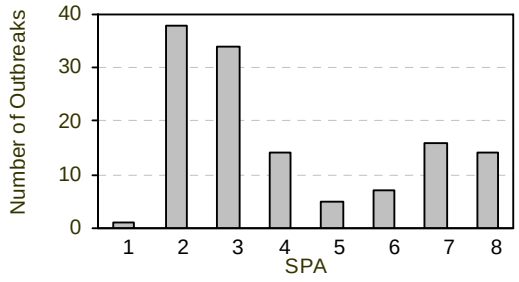


Figure 5.
Community Outbreaks by Selected Diseases
by Onset Month
LAC, 2008 (N=129)

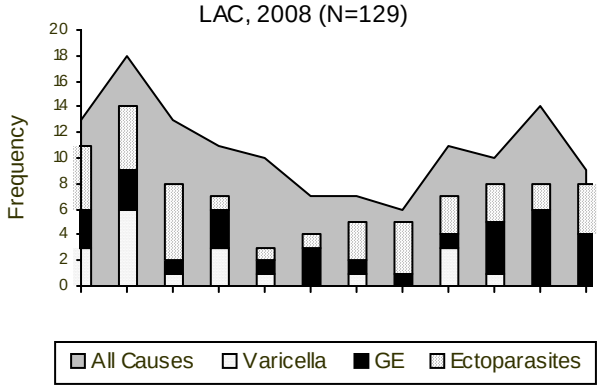


Table 1. Community-Acquired Outbreaks by Disease— LAC, 2008

Disease	No. of outbreaks	No. of cases	Cases per outbreak (average)	Cases per outbreak (range)
Varicella	19	189	10	4-24
Scarlet fever/strep throat	2	45	23	5-40
Scabies	16	49	3	2-7
Hand, foot & mouth disease	16	136	9	3-24
Pediculosis	22	192	9	2-39
GE illness - Norovirus	10	267	27	7-64
GE illness - Shigella	2	9	5	3-6
GE illness – Salmonella	2	10	5	5
GE illness - Rotavirus	1	25	25	25
GE illness - Unknown	15	321	21	6-55
Fifth disease	7	88	13	1-19
Conjunctivitis	6	61	10	5-24
Influenza	2	8	4	3-5
Other*	9	293	33	2-120
Total	**129**	**1,693**	**13**	**2–120**

* Includes: unknown respiratory, RSV, impetigo, unknown febrile illness.

Table 2. Community-Acquired Outbreaks by Disease and Setting — LAC, 2008

Disease	Group Home[a]	School[b]	Preschool or Daycare	Other[c]	TOTAL
Varicella	0	18	0	1	**19**
Scarlet fever/strep throat	0	1	1	0	**2**
Scabies	12	2	0	2	**16**
Hand, foot & mouth disease	0	2	14	0	**16**
Pediculosis	1	12	8	1	**22**
GE illness - Norovirus	6	2	2	0	**10**
GE illness - Shigella	0	0	2	0	**2**
GE illness - Salmonella	0	0	1	1	**2**
GE illness - Rotavirus	1	0	0	0	**1**
GE illness - Unknown	8	2	5	0	**15**
Fifth disease (Parvovirus)	0	6	1	0	**7**
Conjunctivitis	2	0	4	0	**6**
Influenza	2	0	0	0	**2**
Other	1	4	2	2	**9**
Total	**33**	**49**	**40**	**7**	**129**

[a] Includes centers for retirement, assisted living, rehabilitation, and shelter.
[b] Includes elementary (36), middle (3), and high schools (10).
[c] Includes jail, camp, community.

FOODBORNE OUTBREAKS

DESCRIPTION

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

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

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

RESULTS

The number of FBIRs received in 2008 was comparable to the number reported in 2007 (2003 vs. 2019). The F&M program contacted each person making the FBIR, and performed a site inspection on 25.5% of FBIR reports that were deemed high priority (n=511). There were 56% of complaints referred to district offices, specialty programs, or other agencies (n=1122). The remaining 18.5% of FBIR's were lost to follow-up.

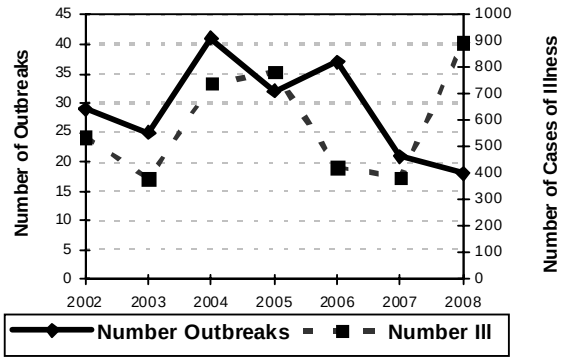
The ACDC Food Safety Unit conducted 31 outbreak investigations this year; 17 were initiated by FBIR complaints and 14 were initiated through other surveillance activities. Of these 31 investigations, 13 (42%) where not considered to be foodborne as the evidence collected during the investigations did not support a foodborne source. Twelve of these outbreaks were due to norovirus which can easily be spread person-to-person in a food setting if one guest is sick when attending. In some of these investigations an ill guest at the party was identified. In other investigations a judgment is made based on a combination of the following: 1) no food item implicated in the case-control study, 2) no significant food violations or ill food handler identified by the inspection or 3) the shape of the epidemiological curve of symptoms onsets was not consistent with a point source outbreak. In some cases there is not enough participation from those affected to conduct a thorough case-control study.

Determining whether a food item is the source of an outbreak can be challenging and time consuming, as exemplified by the very large norovirus outbreak that occurred on a university campus this year involving at least 712 students (OB# 141; see 2008 Special Studies Report section). Much effort and resources were put into this investigation but there was no determination of food item as the outbreak source.

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

The 18 outbreaks determined to be foodborne are summarized below. These 18 outbreaks represent 887 cases of foodborne illness, with one outbreak accounting for 598 of these illnesses (Figure 1). These outbreaks occurred throughout 2008, with no seasonal pattern (Figure 2).

Figure 1.
Foodborne Outbreaks
Number of Persons Affected
LAC, 2002–2007

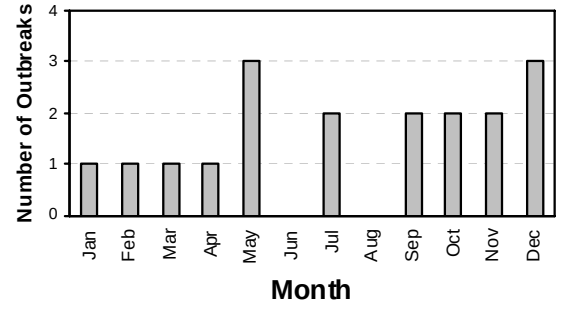


Causes of Foodborne Outbreaks

A food vehicle was epidemiologically implicated in 67% of foodborne outbreaks this year. Implicated food items included produce (n=5), eggs dishes (n=3), poultry (n=2), and mole dish with multiple ingredients (n=1).

An ill food handler was implicated as the cause of two foodborne outbreaks this year . F&M inspections identified contributing factors such as temperature violations, and contamination or proliferation issues that contributed to seven other outbreaks.

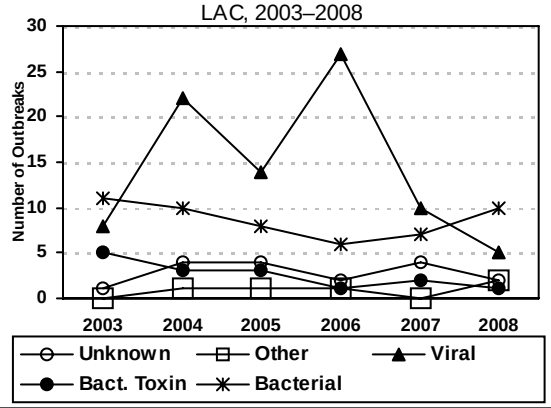
Figure 2.
Foodborne Outbreak Investigations
by Month of Onset
LAC, 2008 (N=18)



An agent was identified in 89% of foodborne outbreaks this year (n=16) and confirmed in 67% (n=12) (Figure 3). Bacterial agents were responsible for ten of the outbreaks, norovirus for five outbreaks, and bacterial toxin for one outbreak (Figure 3). There were two outbreaks that the agent could not be determined. Reasons for no laboratory testing include lack of cooperation, delayed notification and cases being out of town or unavailable.

Salmonella was responsible for all the foodborne bacterial outbreaks this year and 67% of all foodborne outbreaks (n=10), an increase from 23% from the previous year (n=5). One of the largest salmonellosis outbreaks ever in LAC affected 598 students and staff at 27 preschool sites served by their central kitchen (OB# 145). This outbreak sickened 438 children, 144 staff and volunteers, and 12 kitchen employees; 30 cases were hospitalized. A food handler working with diarrhea and later confirmed to have salmonellosis was implicated as the cause of this outbreak.

Figure 3.
Foodborne Outbreaks
by Etiologic Agent Category
(Lab Confirmed and Suspect)
LAC, 2003–2008



Two other salmonellosis outbreaks this year occurred in two different locations of the same restaurant chain six months apart involving a total of 20 ill persons (OB# 11 and OB# 186). The same food dish (macaroni and cheese) cooked with shell eggs was implicated in case-control studies of both outbreaks. Other salmonellosis outbreaks involved an undercooked eggs dish served at a catered party, homemade pork pozalé served at an office party and taco garnishes prepared by an unlicensed caterer. No food items could be implicated in three additional salmonellosis outbreaks. In addition, there were also two national salmonellosis outbreaks (S# 17 and S# 32) involving 26 LAC residents. The CDC implicated contaminated chilly peppers in one outbreak and contaminated peanut butter in the other.

Norovirus was confirmed or suspected in five foodborne outbreaks this year (28%) which is comparable to year 2007 (n=8), but a considerable drop from the 25 foodborne outbreaks in seen in 2006. This reduction may be due to the ability to better recognize a situation where person-to-person spread is responsible for the cluster and not a food item. One norovirus outbreak this year involved 80 ill persons attending a hotel banquet, where fresh fruits and salads were implicated in the case-control study (OB# 183). Other norovirus outbreaks this year involved food items such as tuna salads, green salads, and fruit salads.

Outbreak Locations

The most common locations for reported foodborne outbreaks were restaurants (28%) and residences (28%). Other locations include church-sponsored events, schools, and fairs. The largest number of outbreaks was reported from Service Planning Area (SPA) 2 (22%) (Table 1). There was two multi-district and one multi-county outbreak, and three national outbreaks that involved multiple states.

Table 1. Frequency of Foodborne Outbreaks by Location LAC, 2008 (N=18)

SPA	Frequency	Percent
1	1	6
2	5	29
3	0	0
4	2	11
5	1	6
6	2	11
7	0	0
8	2	11
Multi-district	1	6
Multi-county	1	6
Multi-state	3	17

Foodborne Outbreaks Investigations 2008 (N=18)

	Agent	Confimed/ Suspected	Species	Source	Setting	OB#	Ill	Health District
1	Bact-Toxin	Suspected	C. perfringens	Chicken	Restaurant	70	7	86
2	Norovirus	Confirmed		Tuna Salad	Banquet Hall	178	16	62
3	Norovirus	Confirmed	GII.4 Minerva	Fruit & Salad	Banquet Hall	183	80	9
4	Norovirus	Suspected		Salad	Residence	84	10	5
5	Norovirus	Suspected		Undetermined	Restaurant	63	31	37
6	Norovirus	Suspected		Salad	Restaurant	127	9	86
7	Salmonella	Confirmed	Newport	Onions/ Cilantro	Residence	114	6	47
8	Salmonella	Confirmed	Blockly	Mole- HomeMade (poultry)	Residence	120	8	37
9	Salmonella	Confirmed	Poona	Undetermined	Community	139	21	Multi
10	Salmonella	Confirmed	St. Paul	Undetermined	Community	S#17	4	Multi
11	Salmonella	Confirmed	Typhimurium var Copenhagen	Mac & Cheese (egg)	Restaurant	11	4	9
12	Salmonella	Confirmed	Typhimurium	Peanut butter	Community	S#32	22	Multi
13	Salmonella	Confirmed	Enteritidis	Eggs	Residence	187	12	79
14	Salmonella	Confirmed	Heidelberg	Mac and Cheese (Eggs)	Restaurant	186	16	62
15	Salmonella	Confirmed	Javiana	Undetermined	School	145	598	Multi
16	Salmonella	Confirmed	Typhimurium var. 05 negative.	Pozolé (pork)	Work Place	184	9	72
17	Unknown GI			Undetermined	Banquet Hall	58	30	86
18	Unknown GI			Undetermined	Residence	81	4	84

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:

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

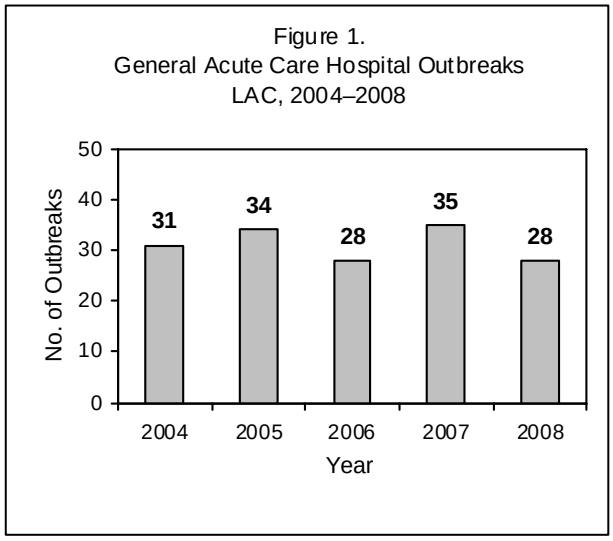
Other national agencies:

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

HEALTHCARE-ASSOCIATED OUTBREAKS
GENERAL ACUTE CARE HOSPITAL

DEFINITION

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



ABSTRACT

Confirmed acute care hospital outbreaks decreased 20% from 2007 to 2008.

There were 28 outbreaks reported in acute care hospitals in 2008 (Figure 1). Thirty-two percent (n=9) occurred in a unit providing intensive or focused specialized care (e.g., neonatal intensive care, burn and hematology-oncology units) (Table 1). Twenty-one percent (n=6) occurred in a sub-acute unit located within the acute care hospital. Scabies outbreaks decreased by 50% in 2008 (n=7) as compared to 2007 (n=14), and accounted for 25% of overall outbreaks reported. Fifty percent (n=14) of acute care hospital outbreaks were of bacterial etiology (Table 2). Drug resistant organisms such as *Acinetobacter baumannii* (*A. baumannii*), *Serratia marcescens* (*S. marcescens*) and *Clostridium difficile* (*C. difficile*) were responsible for 14 outbreaks (50%) in 2008, with more than half attributed to *A. baumannii* (n=10). In 2008, the etiologic agents contributing the largest number of cases in acute care outbreaks were *A. baumannii* (n =117 or 32%) followed by *scabies* (n=106, 29%) and norovirus (n=87, 24%).

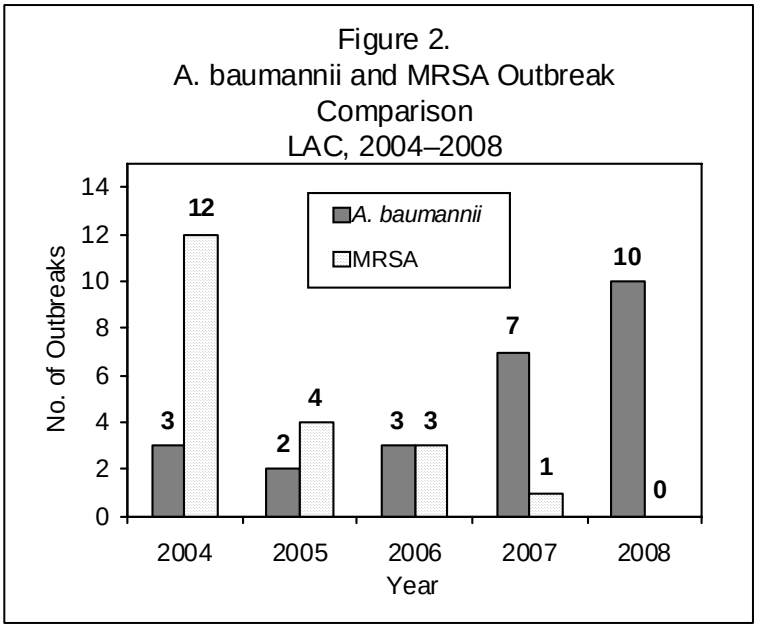
Table 1. General Acute Care Hospital Outbreaks by Unit—LAC, 2008

Outbreak Location	No. of Outbreaks
Burn	2
Definitive Observation	1
Hematology-Oncology	1
Intensive Care – Adult	5
Intensive Care- Neonatal	2
Medical-Surgical	3
Multiple Units	8
Psychiatric	1
Sub-acute Unit within a Hospital - Adult	2
Sub-acute Unit within a Hospital - Pediatric	1
Rehabilitation	1
Transitional Care	1
Total	**28**

Table 2. General Acute Care Hospital Outbreaks by Disease/Condition—LAC, 2008

Disease/Condition/ Etiologic Agent	No. of Outbreaks	No. of Cases
Acinetobacter baumannii	10	117
Clostridium difficile	1	6
E. meningoseptica	1	10
Norovirus	4	87
Parainfluenza	1	4
Scabies	7	106
Serratia marcescens	2	14
Unknown Gastroenteritis	2	21
Total	**28**	**365**

COMMENTS



Superbugs, killer bugs and flesh-eating bacteria are words frequently used to describe antibiotic resistant organisms. These sensational terms helped fuel a media frenzy and recent consumer interest in healthcare-associated infections (HAIs). Twenty-six states, including California, now mandate public reporting of hospital associated infection rates. In 2008, California passed two major HAI related Senate Bills (SB): 1) SB 1058, Medical Facility Infection Control and Prevention Act or Nile's Law requires health facilities to report specified HAIs including central line associated blood stream infections, surgical site infections, and healthcare associated methicillin-resistant *Staphyloccus aureus* (MRSA) and Vacomycin-resistent Enterococci (VRE) blood stream infections and *C. difficile* infections. It also requires MRSA surveillance upon hospital admission for certain high risk conditions, and requires California Department of Public Health (CDPH) to develop and implement various internet-based reporting systems intending to make the reporting publicly available; 2) SB 158 specifies hospital staff training for infection control, mandates hospitals create a patient safety plan, and mandates a state HAI program.

In 2008, nine outbreaks (32%) occurred in a neonatal intensive care unit (NICU), adult ICU or specialized care unit of the hospital. Outbreaks occurring in multiple hospital units made up 29% (n=8) of all outbreaks. Multi-drug resistant organisms (MDRO) accounted for fifty percent of all acute care hospital outbreaks reported to Los Angeles County (LAC), which was a 21% increase from 2007. The majority of MDRO outbreaks were due to *A. baumannii,* with ten outbreaks involving 117 cases. Outbreaks of *C. difficile*, *Elizabethkingia meningoseptica* and *S. marcescens*, all multi-drug resistant, were also reported, with four outbreaks involving 30 cases. In recent years, *A. baumannii* has emerged as a significant hospital-acquired organism, particularly in critical care areas. Since 2004, the number of *A. baumannii* outbreaks have slowly increased each year, from three outbreaks reported in 2004 to ten outbreaks reported in 2008 (Figure 2). The opposite can be said for another prominent MDRO, MRSA, which has steadily declined each year and went from 12 outbreaks reported in 2004 to zero outbreaks reported in 2008.

Scabies outbreaks were responsible for 25% (n=7) of total acute care hospital outbreaks reported. Although not a frequent cause of significant morbidity or mortality, it does cause considerable expense in staff time, medication and personal protective equipment and supplies. LAC Department of Public Health Acute Communicable Disease Control (ACDC) staff continues to work closely with hospital staff on appropriate scabies prevention and outbreak management.

The ACDC Hospital Outreach Unit's Liaison Public Health Nurses (LPHNs) continue to collaborate with partners in the hospital, clinics, and other healthcare settings to enhance emerging infectious disease preparedness and increase communicable disease and outbreak reporting. Established relationships are maintained with the hospital Infection Preventionist to communicate essential health information that can be disseminated quickly throughout the facility. Among LPHN responsibilities are to make an annual visit to their assigned acute care and psychiatric hospitals, attend Association of Professionals in Infection Control and Prevention (APIC) chapter meetings, and monthly hospital infection control committee (ICC) meetings, if invited. In 2008, the LPHNs conducted 303 hospital visits to update the hospital profile and distribute pandemic influenza, hand washing and other communicable disease related education materials. As of the end of 2008, the LPHNs were invited to ICC meetings at 27 acute care hospitals.

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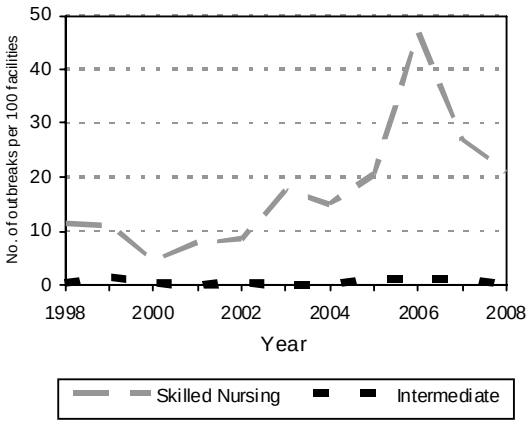
HEALTHCARE-ASSOCIATED OUTBREAKS
SUB-ACUTE CARE FACILITIES

DEFINITION

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

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

Figure 1.
Sub-acute Facility Outbreaks
LAC, 1998–2008



ABSTRACT

- Total confirmed sub-acute care associated outbreaks decreased by 25% from 116 outbreaks in 2007 to 87 outbreaks in 2008. This was largely due to a decrease in gastroenteritis outbreaks.
- The number of skilled nursing facility outbreaks decreased by 23% in 2008 from 110 in 2007 to 85. (Table 1). The rate of skilled nursing facility outbreaks decreased from 27 per 100 facilities in 2007 to 21 per 100 facilities in 2008 (Figure 1).
- There were two outbreaks in psychiatric care facilities in 2008, of which one was investigated by the Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control Program (ACDC).

Table 1. Number of Reported Outbreaks in Sub-acute Healthcare Facilities LAC, 2004–2008

	YEAR				
Type of Facility	**2004**	**2005**	**2006**	**2007**	**2008**
Intermediate Care Facilities	0	0	3	3	-
Psychiatric Care Facilities	-	-	-	3	2
Skilled Nursing Facilities	63	76	173	110	85
Total	63	76	176	116	87

Intermediate Care Facilities: No outbreaks were reported in intermediate care facilities in 2008, compared to 3 in 2007.

Psychiatric Facilities: In 2008, there were 2 outbreaks in psychiatric care facilities. One was an acute Hepatitis B outbreak which was investigated by LAC DPH ACDC with assistance from the Centers for Disease Control and Prevention (CDC)'s Epidemiologic Intelligence Services. The other was a norovirus outbreak investigated by LAC DPH Community Health Services (CHS) (Table 2).

Table 2. Psychiatric Care Facility Outbreaks by Disease/Condition—LAC, 2008		
Disease/Condition	**No. of Outbreaks**	**No. of Cases**
Acute Hepatitis B	1	9
Norovirus	1	8
Total	2	17

Skilled Nursing Facilities: Reported skilled nursing facility outbreaks decreased by 23% in 2008, with 85 outbreaks compared to 110 outbreaks in 2007. Scabies was the most frequently reported disease agent, accounting for 44% of outbreaks in 2008 and 29% of total outbreak cases. However, outbreaks due to gastroenteritis accounted for 60% of outbreak cases in 2008 (Table 3).

Table 3. Skilled Nursing Facility (SNF) Outbreaks by Disease/Condition—LAC, 2008		
Disease/Condition	**No. of Outbreaks**	**No. of Cases**
Adenovirus	1	10
Conjuctivitis	1	9
Clostridium difficile	1	3
Gastroenteritis • Unspecified (n=16) • Norovirus (n=17)	33	631
Scabies	37	303
Scabies, atypical	2	12
Unknown Rash	4	14
Respiratory illness • Unspecified (n=4) • Influenza (n=2)	6	68
Total	**85**	**1050**

COMMENTS

LAC skilled nursing facilities experienced a decrease in the total number of reported outbreaks. More specifically there was a 39% decrease in gastrointestinal outbreaks in 2008 compared to 2007, and a 43% decrease in the number of cases reported in these outbreaks. Single outbreaks caused by adenovirus, conjunctivitis of probable viral etiology and *Clostridium difficile* were also reported in 2008; such outbreaks are not commonly reported to DPH.

Two confirmed influenza outbreaks occurred early in 2008. The first outbreak occurred in January and had a total of four cases, three residents tested positive for Influenza A. The second influenza outbreak occurred in February and had a total of 18 cases; two residents tested positive for Influenza B. In this outbreak ten cases had been previously vaccinated for influenza. No ill staff were identified in either outbreak.

Two outbreak investigations were conducted by LAC DPH ACDC in 2008. The first was a respiratory outbreak in a skilled nursing facility for medically fragile children. A total of ten cases were identified, with two deaths. Respiratory specimen testing identified as adenovirus type 3 as the likely etiology. The second investigation focused on an increase in cases of acute hepatitis B virus (HBV) infection in a psychiatric care facility. Three cases were reported initially, however upon further serological testing an additional six acute cases were identified. Review of medical records revealed that previously identified risk factors for healthcare-associated HBV infection, such as diabetes testing and treatment, were not

involved. Additional information describing the investigation and results can be found in the 2008 Special Studies Report "Hepatitis B Outbreak In A Skilled Nursing Facility".

Twenty-one LAC DPH districts investigated at least one healthcare facility outbreak during 2008. The Foothill, Hollywood-Wilshire, and West Valley health districts investigated ten outbreaks each in 2008, a larger proportion of outbreaks compared to other districts. Service Planning Area (SPA) 3 reported the largest proportion of gastrointestinal outbreaks (14, 41%). SPA 2 and 3 each reported eight scabies outbreaks, accounting for 43% of outbreaks throughout LAC.

PREVENTION

The majority of outbreaks in sub-acute care facilities are caused by agents that are spread via person-to-person contact. Thus, appropriate hand hygiene by staff and residents is a crucial infection control measure. Influenza vaccination for skilled nursing facility staff and residents as well as proper handwashing, administrative controls, and isolation where necessary will be essential in the prevention of seasonal as well as pandemic influenza.

Acute Communicable Disease Control
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2008

LOS ANGELES COUNTY
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ACUTE COMMUNICABLE DISEASE CONTROL
2008 ANNUAL MORBIDITY REPORT

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ACUTE COMMUNICABLE DISEASE CONTROL PROGRAM
PUBLICATIONS AND PRESENTATIONS
2008

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Acute Communicable Disease Control Program

Special Studies Report

2008

Los Angeles County
Department of Public Health

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

ACDC SPECIAL STUDIES REPORT 2008

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Vaccine Preventable & Vaccination:

CLUSTER OF ENTEROVIRUS INFECTIONS AMONG DAY CARE ATTENDEES

Lauren A. Burwell, M.D.

INTRODUCTION

On November 6, 2007, the Los Angeles County Department of Public Health Acute Communicable Disease Control Program (ACDC) was notified by the infection preventionist at a local children's hospital of a previously healthy 3-month-old male found unresponsive in his crib. One day prior to his death, he had been febrile to 101°F, but no other symptoms were documented. The infant and his mother lived in a residential facility A for young mothers located on the same campus as the day care center that he attended. Eight days after the first report, ACDC was notified of the death of a 4-month-old female also found unresponsive in bed at home by her mother. The second infant and her mother lived in the community and received day care services at facility A.

METHODS AND RESULTS

ACDC immediately began its investigation and performed a site visit to facility A. ACDC staff noted that while the two infants received day care in the same classroom, they were in separate small groups of three infants each with separate dedicated caretakers. Facility A staff reported that several staff members and children at the day care had recent illnesses with symptoms consistent with upper respiratory infections. ACDC recommended that the facility exclude ill children and staff, emphasize handwashing, and encourage appropriate respiratory hygiene/cough etiquette.

At the time of the investigation, six staff members and 25 children were evaluated by their physicians for symptoms that included irritability, cough, congestion, and rhinorrhea. ACDC staff reviewed laboratory testing performed on the ill staff and children. One of the symptomatic children was the 14-month-old brother of the second case. He also attended day care at facility A and was seen in a local ER on November 15, 2007. Serum PCR was positive for enterovirus. Another ill child had a viral throat culture that grew adenovirus. No other respiratory viruses were identified on testing of ill children or staff.

ACDC staff reviewed medical records and laboratory results of the deceased infants. Post-mortem testing of the first case identified *Enterobacter cloacae* and *Acinetobacter calcoacetius/baumannii* complex in blood culture and nasopharyngeal wash grew *Staphylococcus aureus* and *Acinetobacter calcoacetius/baumanii* complex. Viral respiratory testing, including influenza, was negative. Post-mortem microbiological testing of the second case was negative for influenza A and B and no organisms were identified on blood cultures.

Final autopsy results on the second case were available in February 2008, and revealed focal myocarditis and focal brainstem encephalitis. The final autopsy report on the first case was available in May 2008, and revealed meningoencephalitis. Upon review of the autopsy findings, specimens were sent to the Viral and Rickettsial Disease Laboratory (VRDL) for additional testing. Real time PCR identified the presence of enterovirus nucleic acid in lung and brain tissue from the first case and from brain tissue from the second case. Serotype assessment is being attempted by VRDL from fixed tissues.

CONCLUSION

There may have been more than one respiratory virus circulating concomitantly in facility A at the time of this investigation. ACDC identified three confirmed cases of enterovirus, one confirmed case of adenovirus, and multiple staff members and children who exhibited symptoms of upper respiratory illness but either did not have viral respiratory testing performed or from whom virus was not identified from the submitted specimen. The two deceased infants were clustered in time and place, but a common etiology of death was not confirmed until additional laboratory testing was performed at VRDL and identified enterovirus. While adenovirus and enterovirus infections may manifest with similar respiratory symptoms, the deceased cases had evidence of encephalitis on autopsy. These cases are similar to the previously described neonatal cases due to Coxsackievirus B1 as seen in Los Angeles County and other sites in the United States (MMWR May 23, 2008).

NOROVIRUS OUTBREAK AT A LARGE SOUTHERN CALIFORNIA UNIVERSITY

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BACKGROUND

On Friday evening, October 3, 2008, the Los Angeles County Department of Public Health (LAC DPH) Acute Communicable Disease Control Program (ACDC) received notification from the student health center (SHC) at a large university of more than 20 students presenting with gastroenteritis symptoms, some of whom had been seen in a local emergency room and admitted to the school's contracted hospital for dehydration. In conjunction with the LAC DPH Environmental Health and Community Health Services, ACDC initiated an epidemiological investigation on Sunday, October 5, 2008, to determine the etiology of the outbreak, risk factors for the disease, and steps needed to prevent further infections.

METHODS

Case Investigation: An outbreak-associated case was defined as an individual who was ill between September 24, and October 13, 2008 with: (1) vomiting and diarrhea or (2) vomiting or diarrhea with two or more of the following symptoms: stomach cramps, nausea, fever, body aches, headache or fatigue or (3) laboratory confirmation of norovirus via RT-PCR. Frequency and distribution of symptoms among cases were calculated. ACDC toured the campus to inspect food venues and interview ill students at the SHC on Sunday, October 5, 2008. A standardized questionnaire was created to interview patients at the SHC and also for phone interviews. Later a web-based questionnaire was created and administered to all students on October 10, 2008. For both questionnaires, students answered questions regarding illness history, eating places and sports or other social events attended from October 1-3, 2008.

Case Risk Analysis: A case-control analysis was performed to identify a possible eating place on campus or sports or social event responsible for the illnesses. Chi-square and Fisher exact tests were used to compare exposures of interest for cases and controls via SAS 9.1 software.

Laboratory Testing: Stool samples were collected from ill students and analyzed in the Public Health Laboratory for enteric bacteria and norovirus using RT-PCR testing methods.

Outbreak Monitoring: ACDC monitored the progress of hospitalized students by receiving updates from the hospital's infection preventionist. ACDC also maintained frequent contact with the SHC, school administration and sports coaching staff to monitor the outbreak and assure containment.

Dining Hall Inspections: The LAC DPH Environmental Health Food and Milk Program (F&M) inspected two major campus dining halls on October 4, 2008 and again on October 10, 2008, to identify any possible food handling violations or ill food handlers.

Sporting Event Surveillance and Prevention Efforts: F&M also conducted investigations of vendors and restrooms at a home football game on October 4, 2008 and again on October 11, 2008 at the university. The LAC DPH Environmental Health, Housing and Institutions Program inspected selected student dormitories on October 4, 2008. The LAC DPH Community Health Services performed an in-service providing health education to fraternity presidents on October 18, 2008.

RESULTS

There were ten sites identified where students could obtain food on campus. ACDC toured three of the larger dining facilities on campus. One of the largest dining facilities is all self-serve style dining where there are many food stations with many food items. ACDC also visited a coffee and packaged snacks facility, and a food court which has several different name-brand vendors. ACDC interviewed 17 students who were discharged from the SHC with acute gastroenteritis on Sunday, October 5, 2008. Symptoms,

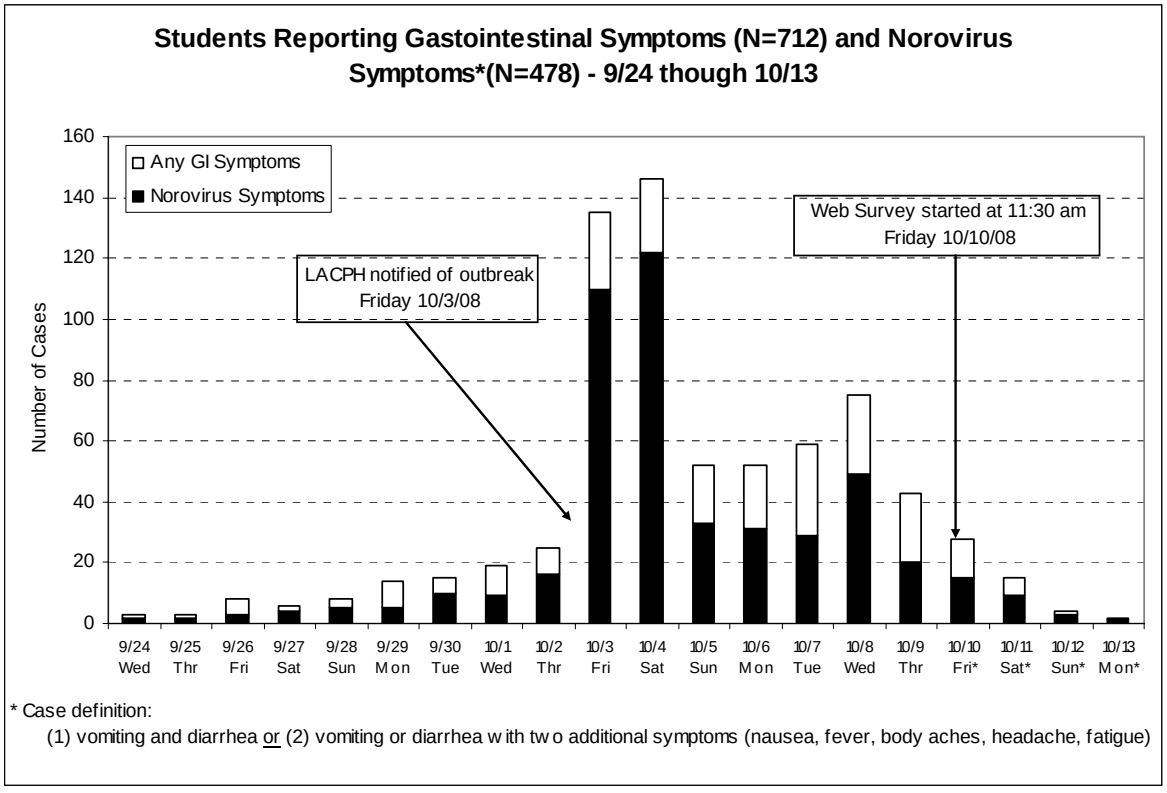
onset times, and possible exposures such as eating places and social events were assessed. The SHC provided ACDC with a list of students ill with gastrointestinal (GI) symptoms in the last week. The SHC was instructed to send stool specimens from several patients to the Public Health Laboratory for viral and bacterial testing. A total of 43 interviews were performed by ACDC; 17 interviews were performed at the SHC with ill students that had visited the SHC and 26 interviews were performed over the telephone using the contact list provided by the SHC.

Thirty-eight ill students fit the case definition. A majority of the cases occurred on October 3, 2008 and October 4, 2008 (n=30), but cases did occur as early as September 26, 2008 and as late as October 8, 2008. Most students reported living on campus (71%) with many residing in one particular dormitory (34%). However, other cases reported living in eight other campus dormitories, indicating that the outbreak was widespread.

Web-Based Case Investigation: Because of the scope of the outbreak, and because most students have access to computers and are familiar with the web, ACDC designed and administered a web-based survey which was sent to all students (N=32,418) inquiring about symptoms and illness history for those reporting illness. The survey was administered on October 12, 2008, and information was collected over five days. Of these students, 5,227 students completed the survey (16%). Students completing the web survey were slightly more likely to be female than the general student population (female 63% versus 49%) and were more likely to be undergraduates (70% versus 49%, $p<0.01$), but similar in age (mean age 23.1 versus 24.7 years). The demographics of web-based cases (n=440) were very similar to those cases interviewed by ACDC from the SHC (n=38); mean age was 20.4 versus 19.3 years and both groups were 64% female.

Combined Case Investigation: The web-based questionnaires were combined with the earlier questionnaires assessed by phone and in person. In total, there were 712 students reporting GI illness, 478 meeting the case definition, and 4,756 healthy controls identified. Students reported illness onsets from September 24, 2008 through October 13, 2008 (Figure 1). The epidemiological curve indicated a sharp increase in the number of cases on Friday, October 13, 2008, but also indicated a gradual increase in cases in the nine days prior.

Figure 1



A majority of cases were female (64%) and the average age of a case was 20.4 years (Table 1). Cases were just as likely to be an undergraduate student as graduate student (49% versus 51%) and 45% of cases reported living on campus. Cases were identified from almost every dormitory on campus. Cases that occurred prior to October 3, 2008 were slightly older than the students ill on October 3, 2008 (mean age 22.7 versus 19.0), more likely to be an undergraduate student (62% versus 56%) and to reside on campus (48% versus 38%).

Symptoms of cases included nausea (87%), fatigue (83%), vomiting (78%), stomach cramps (73%), diarrhea (70%), headaches (61%), body aches (55%), and subjective fevers (47%) (data not shown). Fourteen percent of cases reported that they were still ill at the time of the interview. The average duration was 2.4 days (range: 1-6 days) with median duration of 2.0 days. One hundred eighty-five students sought medical care, 35 students visited an emergency room, and 10 students were hospitalized. No students died.

Case Risk Analysis: The epidemiological curve of cases reveals an apparent increase in the number of cases that occurred on Friday, October 3, 2008, indicating a possible point source exposed to norovirus during a social event, eating event, or in a restroom (Figure 1). Cases after October 3rd may have also been exposed to the same place or event, but ACDC would expect many person-to-person secondary cases after

October 3rd that would complicate the analysis of the exposures. For this reason ACDC restricted the exposure analysis to cases with illness onset occurring only on Friday, October 3, 2008 (N=94). Because symptoms of norovirus illness typically begin about 24 to 48 hours after ingestion of the virus [1], ACDC limited the analysis of exposures to the previous day October 2, 2008. Controls were selected from healthy students completing the survey (N=4,756).

Table 1 - Case Demographics

	All Cases	Cases ill 10/3/08	Early Cases ill 9/24/08 - 10/2/08
	(N=478)	(n=110)	(n=55)
Demographic	n (%)	n (%)	n (%)
Gender			
Female	304 (64)	78 (71)	38 (76)
Male	171 (36)	31(28)	17 (34)
missing	3(0)	1 (1)	0 (0)
Age			
17	16 (3)	9 (8)	8 (16)
18	206 (43)	70 (64)	9 (18)
19	91 (19)	16 (15)	25 (50)
20-24	108 (23)	10 (9)	7 (14)
25-39	51(11)	3 (3)	6 (12)
40-49	4 (1)	1 (1)	1 (2)
missing	2	1 (1)	0 (0)
	Mean	**Mean**	**Mean**
	(95% CL)	**(95% CL)**	**(95% CL)**
Mean Age	20.4	19.0	22.7
	(20.0-20.8)	(18.3-19.8)	(21.4-24.6)
Student Level	n (%)	n (%)	n (%)
Freshmen	61 (14)	9 (8)	7 (14)
Sophomore	54 (12)	16 (15)	10 (20)
Junior	51 (12)	10 (9)	7 (14)
Senior	57 (13)	11 (10)	7 (14)
Graduate Student	213 (49)	48 (44)	19 (38)
missing	42 (9)	16 (15)	5 (5)
Residents			
Main Campus	199 (45)	42 (38)	24 (48)

Cases were just as likely to have eaten at a campus facility as controls (45% versus 50%, p=0.305) (Table 2). Sites where less than 3% of cases reported eating were dropped from the analysis, leaving three of ten sites for the analysis. None of these sites sustained a high attack rate. The analysis of dining place by eating time (breakfast, lunch, dinner) was also performed, but did not revealed any more significant information in regards to a source for this outbreak (data not shown).

Students were asked about any social and sporting events that they attended or participated in from October 1–3, 2008. For the reasons stated previously, only exposures on October 2, 2008 were analyzed among cases ill on October 3, 2008. Sporting events included swimming, football, soccer, softball, tennis, volleyball and marching band. Students were also asked about any fraternity or sorority events attended on these days. None of the events represented more than 4% of the cases (data not shown). The small number of responses may be due the fact that these questions were asked at the end of the survey and students may have not completed the information as requested. In addition to ill students, there were about 70 staff members who were reported ill from the school administration over the outbreak period.

Table 2 - Eating Places On Thursday (10/2/08) For Cases with Illness Onset on Friday (10/3/08) and Controls							
	Attack Rate	Cases (N=94)		Controls (N=4756)		Chi-Square	p-value*
Meal Eaten From		n	%	n	%		
Fraternity or Sorority House	3%	8	9%	238	5%	1.7	0.12
Any Campus Site (10)	2%	42	45%	2355	50%	1.5	0.35
Site #1	3%	7	7%	215	5%	1.6	0.17
Site #2	3%	20	21%	754	16%	1.6	0.15
Site #3	4%	5	5%	137	3%	1.2	0.16
Other 7 Sites	2%	9	10%	473	10%	0.0	0.92
*Chi-Square testing performed for cell sizes >5, otherwise a Fisher Exact test was used							

Laboratory Testing: A total of 14 stool samples were submitted to the Public Health Laboratory for testing. Eight of 14 stools tested positive for norovirus using RT-PCR techniques and were forwarded to California Department of Public Health Viral Rickettsial Disease laboratory for sequence analysis. The eight isolates matched genetically and were assigned to Genogroup 2, cluster 6 (GII.6 Seacroft), a genotype that had not been found previously in California. The earliest laboratory confirmed case had onset on October 3, 2008.

Outbreak Monitoring: Throughout the outbreak ACDC maintained communication with the school administration, SHC and local hospitals. The school administration continually assembled a list of new SHC visits for gastroenteritis, admissions to the contracted hospital, and calls of illness received from students or parents (intelecare) and calls from dormitory staff (residential case). ACDC received frequent list updates and any new reports of illness were graphed by the date the school was notified. Onset dates and symptom details were not reported on these lists, and illness notification dates were not available for 33% of the 492 illness reports received by ACDC. From October 3-10, 2008, the university was notified of 314 reports of GI illness. The first reports occurred on Friday, October 3, 2008, with a majority of reports occurring on Saturday, October 4, 2008 (N=93).

Dinning Hall Inspections: F & M conducted an inspection of the major food facilities on campus on October 4, 2008. These food facilities serve about 1,800 students per day. The food service operation appeared to be well run at the time of inspection. The attendance policy and the time cards of food employees who called in sick or left early due to sickness for the previous week were reviewed. No employees ill with GI illness were identified. The senior managers also stated that they assess (verbal questioning) the employees' health condition prior to their returning to work after an illness. The hand washing facilities were maintained clean, dishwashers in good repair, and open food at buffet was protected from consumers. The "Recommendations for Restaurants with an Outbreak of Norovirus" was reviewed with senior managers on site. Facilities were instructed to use chlorine solutions to sanitize all the surfaces to eliminate norovirus. Canisters of chlorine wipes and hand sanitizers were observed at customer service areas (dormitory lobbies), classrooms, restrooms, and under a tented area where any students could take some free of charge with student identification.

Sporting Event Surveillance and Prevention Efforts: LAC DPH Environmental Health Services (EHS) made a visible presence prior to and during a football game on 10/4/08 at the Los Angeles Coliseum to ensure that all employees at food concession stands were adhering to good personal hygiene practice and all restrooms were maintained clean and sanitary. Los Angeles Coliseum staff were informed of the norovirus outbreak and were advised to pay special attention to any report of GI illness. The coliseum manager stated that he did not receive any calls regarding GI illnesses or unsanitary conditions due to vomit/diarrhea in restrooms and public areas for this event on October 4, 2008. EHS returned to observe a football game on the following week, October 11, 2008. One ill person was identified with GI symptoms at the game and was held in the paramedics room. Vomit was also identified outside of two different restrooms and the janitorial staff were directed to clean and sanitize the affected area.

CONCLUSION

A GI illness outbreak occurred on a large university campus in LAC, with 478 students reporting symptoms and durations consistent with a norovirus infection between September 24, 2008 and October 13, 2008. A majority of cases were confined to a nine-day period (October 3 through October 11, 2008). Stool specimens from ill students tested at the Public Health Laboratory confirmed the outbreak etiology as norovirus. The Centers for Disease Control and Prevention (CDC) confirmed the norovirus strain as Genogroup 2, cluster 6 (GII.6 Seacroft), the first detection of this strain in California. The first lab confirmed case had symptoms onset on October 3, 2008. A majority of the cases were reported on Friday, October 3, 2008 and Saturday, October 4, 2008, indicating that some highly frequented place (restroom, study lounge), event (eating, sports or social), or contact surface may have served as a point of distribution for the virus from a few ill students to a large number of students on Thursday, October 2, 2008. Norovirus has a human reservoir and can be found in the stool or vomitus of infected individuals. Transmission occurs from ingestion of the virus, either by direct person-to-person contact, or via food or vomite contamination. The case-control analysis of student eating locations and events attended on Thursday, October 2, 2008, did not identify a particular risk factor for illness in this outbreak. ACDC could not rule out a possible foodborne source, but the outbreak was most likely due to the person-to-person spread of norovirus on a campus setting originating from the community. Intervention and education efforts by ACDC, Environmental Health, Community Health Services and the school administration were successful in containing the outbreak to nine days, and preventing the spread of this very contagious illness to a large university population.

LIMITATIONS

The results of food analyses are limited by the large number of possible eating venues and eating times for cases. Students answered questions about exposures that occurred one week earlier, which may have introduced some recall bias. As the web survey was anonymous, duplicate submissions could not be excluded from the analysis.

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SALMONELLA JAVIANA OUTBREAK AT A MULTI-SITE PRESCHOOL PROGRAM

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BACKGROUND

Acute Communicable Disease Control Program (ACDC) of Los Angeles County (LAC) Department of Public Health (DPH) was notified on October 16, 2008 by the Infection Preventionist (IP) at a local hospital of a cluster of ill persons admitted with gastrointestinal (GI) symptoms. A second call was received from the same IP of additional persons ill on October 17, 2008 and all ill persons had contact with multi-site preschool program centers. ACDC discovered by October 17, 2008 that five centers had staff with illness (N=23) and four centers had children with an undiagnosed GI illness. ACDC concluded that this was an outbreak in need of further investigation, as it involved a large number of ill persons connected in time at multiple operating sites of this organization, and furthermore may be deemed a critical incident as it involved young children. ACDC became the lead investigator and notified LAC DPH administration. On October 17, 2008 it was discovered that LAC DPH Community Health Services (CHS) had already been working with one of the sites as a community outbreak and efforts were coordinated.

METHODS

Case Definition: An outbreak-associated case was defined as an individual employed by, attending, or with contact to a person associated with the multi-site preschool program who was ill between October 13, 2008 and November 4, 2008 with: (1) fever and diarrhea; or (2) fever or diarrhea with two or more of the following symptoms: nausea, vomiting, body aches, headache or fatigue; or (3) laboratory confirmation of *Salmonella* Javiana.

Case Investigation: ACDC made a site visit to view the central kitchen and interview all staff at the kitchen on October 17, 2008. A standardized questionnaire was created to interview the ill kitchen staff; those not available in person were interviewed by telephone. All kitchen staff were required to submit stool specimens for culture. For surveillance at the preschool program sites, line lists were created to collect summary data on ill persons first by the program site and then a line list was created for individuals at each site. CHS Public Health Nurses conducted the site-specific surveillance. ACDC heightened surveillance by contacting local hospitals in affected areas asking them to report cases of salmonellosis immediately by phone. Frequency and distribution of symptoms among cases were calculated.

Case Control Study: A case-control study was performed only of staff and volunteers (excluding food workers), since adults are capable of providing their food history. A questionnaire on food history, symptoms and onset dates was developed, lists of all staff and volunteers at each preschool program site were obtained and interviews were conducted by phone. Data was analyzed using SAS 9.1 software.

Public Health Laboratory Testing: *Salmonella* isolates from private laboratories were submitted to the LAC Public Health Laboratory (PHL) for confirmation and serotyping. The testing scheme instituted required stool testing in the PHL of all employees from the central kitchen (including administrative staff), preschool teachers, aides, and volunteers at all preschool program sites regardless of symptoms. Symptomatic children were tested by PHL only if someone in their household was noted to be working in a sensitive occupation or situation (SOS). Food from the implicated meal on October 14, 2008 was sought for culture. Rodent feces collected from the central kitchen and nearby exterior sites were collected for culture.

Outbreak Monitoring: ACDC monitored the outbreak progress by receiving daily updates from the affected LAC Service Planning Areas (SPA). ACDC maintained frequent contact with the preschool program administration and LAC SPA staff to monitor case ascertainment and assure outbreak containment. Asymptomatic children and those who had recovered who did not have SOS in the

household, were allowed to attend preschool. Children with SOS in the household had to undergo stool clearance as per the usual protocol.

EH Inspections: The LAC Environmental Health Food and Milk Program (F&M) inspected the preschool program central kitchen on October 17, 2008, and on several subsequent dates for food handling violations or ill food handlers, to provide education, and make recommendations. Meal preparation was reviewed and food source records were obtained.

The Vector Management Program from the LAC Environmental Health also conducted a rodent inspection because of evidence of rodents inside and outside of the central kitchen building. Rodent dropping samples were submitted for culture at the LAC PHL.

RESULTS

Case Investigation: This outbreak of *Salmonella* Javiana affected 28 preschool sites. One site made a report of illness on October 15, 2008. On the same day, multiple preschool sites were queried and numerous students and staff were reported ill. A comprehensive survey of the 28 sites identified cases of gastroenteritis in all but one location.

All food is prepared at a central kitchen and delivered in bulk to the preschools where site staff serve breakfast, lunch and snack in a family style. The breakfast is a cold meal delivered the day before and refrigerated. Lunch is prepared starting the afternoon before and usually is a hot entrée served shortly after delivery. The food is measured out in bulk, packaged for transport at the central kitchen and delivered to each site, where it is served family style by the teachers for each student.

There were 594 people that met the case definition, including 438 children, 144 staff and volunteers, and 12 kitchen employees (Figure 1). Cases presented with diarrhea, fever, nausea, cramps, vomiting, headache, chills and body aches (Table 1). Demographics of cases are presented in Table 2. There were 308 cases confirmed to have *Salmonella* Javiana*;* the remaining 286 were presumptive cases (Table 3). There were ten secondary cases included in the above totals. A total of 30 cases were hospitalized, four adults and 26 children; there was one case of bacteremia and no deaths.

Figure 1. Illness Onset for Laboratory Confirmed Cases with Recorded Onsets by Children, Adult Staff, and Kitchen Staff (n=220) Multi-Site Preschool Outbreak

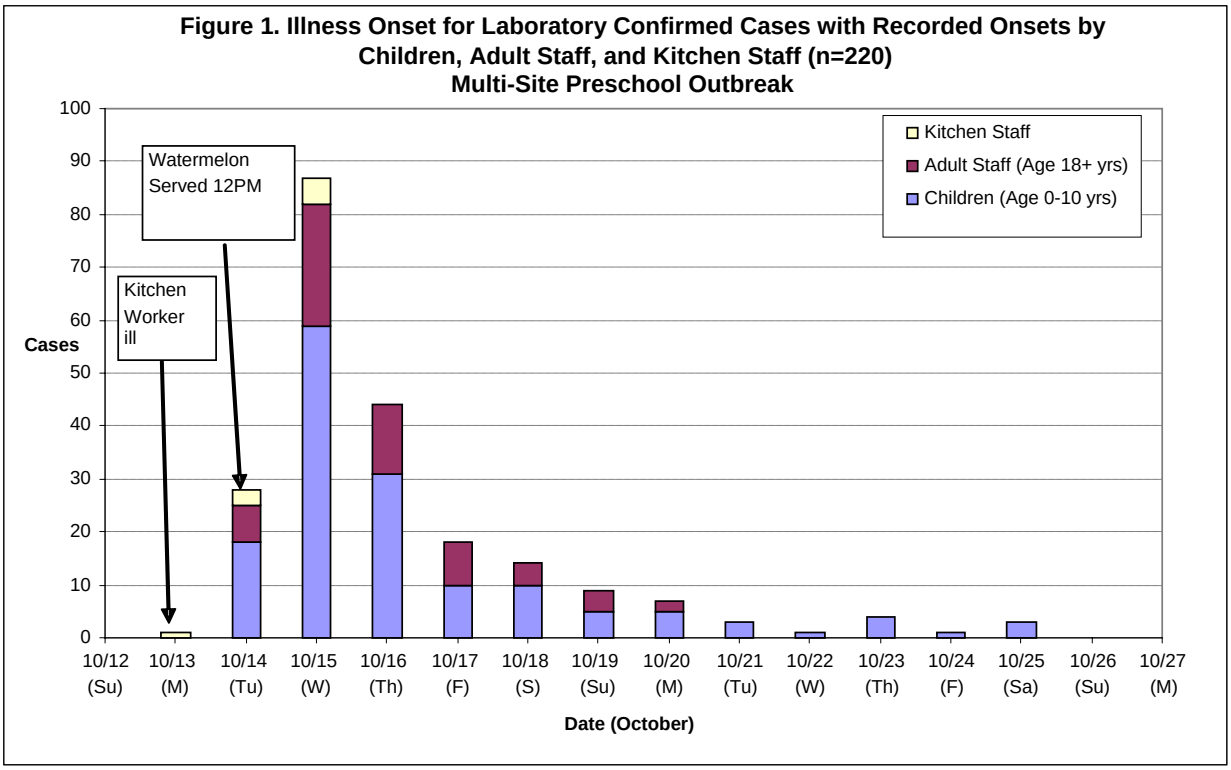

Table 1. Symptoms of Children and Staff (N=454) Multi-site Preschool *S.* Javiana outbreak						
	Children		Adults		Total	
	n	Percent	n	Percent	n	Percent
Total reporting symptoms	**386**	100%	**66**	100%	**454**	100%
Symptoms						
Diarrhea*	380	98%	66	100%	446	98%
Fever	347	90%	39	59%	386	85%
Cramps	315	82%	60	91%	375	83%
Vomiting	265	69%	34	52%	299	66%
Nausea	232	60%	48	73%	280	62%
Chills	226	59%	37	56%	263	58%
Symptoms duration**					**Mean**	**Range**
Duration (days)					5.0	1-18 days

*6 lab conf child cases with GI or fever symptoms excluding diarrhea (2% of total)
** Children only (n=332)

Table 2. Demographics of Cases (N=594) Multi-site Preschool *S.* Javiana Outbreak		
Age (years)	**n**	**Percent**
1-2	4	1%
3-4	420	71%
5-9	13	2%
10-19	5	1%
20-39	77	13%
40-59	69	12%
60+	6	1%
Gender		
Male	219	37%
Female	375	63%

Thirteen central kitchen staff were positive by stool culture for *S*. Javiana. Interviews revealed that an ill food handler came to work on Monday, October 13, 2008. This person cut up watermelon that day to be served the next day. One employee from an office adjoining the kitchen was not a food worker and did not eat food from the central kitchen but did assist this ill food worker by holding her hands and steadying her as she was leaving the toilet on October 13, 2008; she became a case on October 14, 2008. Some of the other kitchen staff who became ill later during the week continued to work despite having paid sick leave.

Table 3. Multi-site Preschool *S.* Javiana Outbreak Confirmed and Presumptive Cases	
Children confirmed	177
Children presumptive	261
Adults confirmed	120
Adults presumptive	24
Kitchen staff confirmed	12
Kitchen staff presumptive	0
TOTAL	594

Environmental Health Investigation: On October 17, 2008, the central kitchen was inspected and closed for evidence of rodents. Three follow-up inspections were conducted to ensure that recommendations and mitigation measures were being followed. All preschool sites also voluntarily closed for cleaning on October 17 to 21, 2008. The central kitchen reopened after remediation which included disinfection and thorough cleaning with bleach and rodent control. Kitchen staff also received written, personal and group education on salmonellosis, good hygiene and food safety.

Case Control Analysis: A case control study of preschool staff (excluding food workers) was conducted. There were 255 employees that answered the case-control study questionnaire. Questions included basic demographics, symptoms, work location, days worked and food, meals and days eaten. In all there were 66 employees that complained of symptoms that were consistent with salmonellosis. There were 102 employees who were laboratory confirmed. The cohort was 95% female (n=239) with an average age of 40 years (Table 4). The study compared cases (employees with laboratory confirmed *Salmonella* Javiana) to controls (employees with no symptoms and no laboratory test or negative laboratory test for *S.* Javiana). This analysis revealed that those who ate on Tuesday had a statistically significant risk of being a case (p=0.04) and had an attack rate of 82%. Ninety percent of the cases ate on Tuesday, but no specific meal eaten on Tuesday reached statistical significance (alpha= 0.05), although eating breakfast had borderline statistical significance (p=0.0502). In addition, no individual food item reached statistical significance, although milk came close (p=0.0563).

Table 4. Demographic Information for Staff Case-Control Study (N=255)		
	Total	Confirmed Cases
Total (%)	255 (100)	89 (100)
Male	15 (6)	2 (1)
Female	239 (95)	87 (99)
Mean Age (year) (SD)	40 (12)	40 (11)

Community Health Services: All preschool sites were visited multiple times by public health nurses who offered education, collected data, and collected stool specimens for screening and sensitive occupation clearance activities (stool cultures) for all staff including teachers, volunteers, food workers and selected children who had sensitive occupation in the household.

Public Health Laboratory: There were 308 cases confirmed to have *S.* Javiana. The PFGE profile of the isolate was compared to other *S.* Javiana isolates in Los Angeles and the national PulseNet database, and was found to be unique. There were no other clusters of this PFGE pattern in the US at the time of the outbreak. Rodent feces collected by Vector Management inside and outside the premises of the central kitchen were negative on culture for *salmonella*.

LIMITATIONS

There may have been recall bias since adult staff and volunteers were interviewed two to three weeks after the outbreak. ACDC was unable to interview most children's families to confirm onset dates and symptoms; since small children are unable to give an accurate food history, they were not included in the case-control study. Language and cultural differences between interviewers and cases may have created barriers, as most children were from poor Hispanic families that were only Spanish-speaking. Kitchen staff were hesitant to disclose their symptoms when interviewed prior to stool specimen collection.

DISCUSSION

A very large salmonellosis outbreak caused by *Salmonella* serotype Javiana occurred in LAC during October 2008 at a multi-site preschool program. There were 594 cases, including 437 children, with most cases occurring between October 14 and 18, 2008. The first laboratory-confirmed case had onset of symptoms on October 14, 2008 and the last case on November 4, 2008 (a secondary case). A case-control study of staff indicated that the most likely source was a meal served on Tuesday, October 14th. The lunch meal on Tuesday included fresh watermelon that was cut up Monday afternoon by a food worker who was working while ill with diarrhea. Other kitchen staff became ill later in the week, presumably from consuming contaminated food themselves. Since many of them continued to work with food, additional contamination may have occurred on other days. It was disconcerting that ill food workers stayed on the job despite having a benefits package that includes sick leave.

Salmonella can survive and propagate on cut fruit, especially if it is not promptly cooled and kept cold. This particular serotype, Javiana, is an unusual serotype and it had a unique PFGE pattern not found before in the US. This outbreak appeared to have a prolonged incubation period for some cases. It is possible that some of the children included as part of the initial outbreak were actually secondary cases. However, in other outbreaks where a low dose of *salmonella* is in the source product, incubation may be as long as 18 days. It is plausible that some individuals were exposed to high doses with a short incubation, while others ate a lower dose, and thus took longer to develop symptoms.

Numerous control measures were taken including closing the kitchen and the preschool sites for terminal cleaning, removal of ill food handlers until cleared of infection, and recommendations for better hand hygiene were made. Considering the large number of cases, control measures appear to have been very effective in preventing further spread of salmonellosis, as only ten secondary cases were discovered after October 23, 2008.

State regulations require specific follow-up for cases with sensitive situation (California Code of Regulation, Title 17, Section 2612). Preschool is considered to be a sensitive situation. ACDC was able to conduct clearance on all those who prepared or served food to the children, including all teachers and aides. Because of the very large number of children (1639 enrolled at the time of the outbreak), clearance procedure for the children was modified. Clearance was required for those who had been symptomatic and had SOS in the household. This action was discussed and approved by California DPH. There were no apparent secondary cases from the preschool, and ten persons became ill from contact within the household to cases.

PREVENTION

A number of actions were taken by Public Health in order to prevent further transmission, even at the time when the cause of the outbreak had not been determined. These included:

1. Closure of preschool classes at all locations for environmental cleaning of the facilities.
2. Closure of the central kitchen by DPH Environmental Health for cleaning, health education and rodent abatement.
3. Stool culture screening with removal of infected staff, especially kitchen staff.
4. Removal of ill children from classes until recovered from diarrheal symptoms (note that most ill children were not culture confirmed unless their households included someone involved in a sensitive occupation or situation).

5. Exclusion from work and culture clearance of anyone working in a sensitive occupation or situation residing in case households.
6. Provision of a draft letter to be used to inform parents, plus additional technical information to help answer parents' questions.
7. Distribution of information about the control of norovirus and salmonellosis to the directors of all the multi-site preschool program centers, including brochures and letters with specific recommendations.
8. Presentations by LAC DPH Community Health Services staff to provide health education to staff at each site prior to reopening on October 21, 2008.

RESOURCES

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SEVERE ENTEROVIRUS INFECTION – LOS ANGELES COUNTY, 2007 AND 2008

Kanta Sircar, PhD, MPH and Laurene Mascola, MD, MPH

INTRODUCTION

Enteroviruses generally cause mild disease, however, neonates are at higher risk for severe illness because of the immaturity of their immune systems. The Los Angeles County (LAC) Department of Public Health (DPH) began an investigation of three cases of neonatal enteroviral infection with associated myocarditis during the months of July and August, 2007. All infants were diagnosed while in the neonatal intensive care unit. Two infants died. Two infants were confirmed to have Coxsackievirus B1 (CVB1) in their cerebral spinal fluid (CSF). The third infant was enterovirus positive by PCR, but the specimen was not saved for additional subtyping. In all three cases, the mothers were febrile at the time of birth. There are no known epidemiological associations among the three cases.

The states of Alaska and Illinois also reported temporally similar findings of severe enteroviral infections [1]. These deaths were the first due to (CVB1) reported to the National Enterovirus Surveillance System (NESS). It was also the most prevalent enterovirus reported that year to the NESS.

In 2008, LAC DPH initiated a surveillance project to understand the scope of severe enterovirus related disease in LAC. Its purpose was to describe the conditions and serotype of children who are admitted and found to be enterovirus positive. To accomplish this objective, the demographic, clinical and epidemiologic characteristics of all enteroviral cases aged <18 years who sought medical attention in 2007 and 2008 and were hospitalized or deceased, were identified. Their serotypes were described.

METHODS

In 2007, initial cases were identified by physician notification during June through December 2007, which was followed by active case finding for patients aged <18 years. Hospitals were asked to report cases. Cases where patients were hospitalized with severe disease (e.g., myocarditis, or required care in a pediatric/neonatal ICU, or died and had positive enterovirus laboratory results). Hospitals reporting the cases completed a reporting form.

In 2008, a health alert notification (HAN) was sent to all hospitals requesting them to report cases aged less than 18 years old, who died, had severe disease or admitted to the pediatric/neonatal ICU and had positive enterovirus laboratory results. Hospitals with cases completed a reporting form, submitted relevant medical record information and submitted specimen or isolates to the LAC public health laboratory (PHL).

Medical records were collected and abstracted. Death certificates were reviewed. Cases were reported in electronic disease reporting system—Visual Confidential Morbidity Reporting (VCMR) system. Access was used to manage the data and SAS was used to analyze the data.

RESULTS

In 2007, eight hospitals reported 46 cases from June through December 2007. Thirty-nine cases met the case definition for that year. In 2008, 12 hospitals and the coroner's office reported 68 cases during 2008. Four enterovirus positive cases were not included because they were over the age of 18 years. Thirty-seven patients were not admitted to the pediatric/neonatal ICU. For example, 18 patients were admitted in hospitals that do not have pediatric/neonatal ICUs. Therefore, only 27 patients met the case definition in 2008.

Table 1 describes the characteristics of cases from 2007 and 2008. Both years, viral meningitis was the most common diagnosis. In 2008, three cases were diagnosed with fever and enteroviral infection and two cases died. Both death cases were older than seven days old. There were also no cases diagnosed

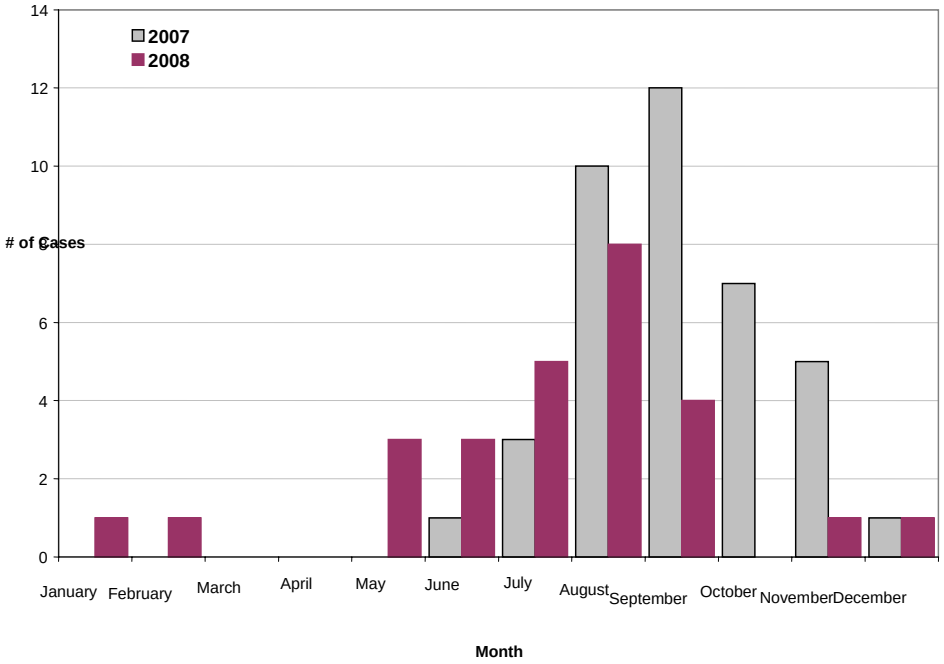
with myocarditis. In 2007, there were more deaths and there were cases with myocarditis. As the epidemiologic curve (Figure 1) demonstrates, most cases were diagnosed in August, with cases occurring throughout the year.

Table 1: Comparison of Characteristics of Reported Cases of Enteroviral Infections 2007 and 2008

	2007	2008
Reporting Period	June to December 2007	January to December 2008
N	39	27
Female N (%)	24 (62%)	11 (41%)
White N (%)	28 (90%)	10 (37%)*
Age (median, range)	24 days (1 day-14 years)	27 days (1 day -15 year)
Perinatal cases (aged < 7 days)	10 (26%)	15 (56%)
Death	4 (10%)	2 (7%)
Myocarditis	11 (28%)	0 (0%)
Meningitis	30 (77%)	22 (82%)
Febrile illness only	5 (13%)	3 (11%)

*37% of cases have unknown race.

Figure 1: Epidemiologic Curve of Enteroviral Infection Cases in 2007 and 2008



Compared to 2007, there were less cases than in 2008. In 2008, cases were more likely to be male. In 2008, cases were also older—average age of four years compared with average age of 24 days in 2007.

Race is difficult to compare because in 2008, 37% of the cases did not have a race listed or it was categorized as unknown.

Specimens: 17 specimens that were positive for enterovirus by PCR were typed by the LAC PHL. The most prevalent type was Echovirus 4 (n=12), followed by Echovirus 9 (n=2). There were one specimen each of Coxsackievirus B4, Coxsackievirus B6 and Echovirus 30. The two cases that died were enterovirus positive by PCR but they were not able to be typed.

DISCUSSION

In 2007 and 2008, LAC conducted surveillance projects to understand the scope of a cluster of pediatric severe neonatal enteroviral cases discovered in LAC in 2007. As enteroviruses are not reportable in LAC, there is no background rate for comparison. As the epidemiologic curve demonstrates, summer is when the number of cases peak. Therefore, in 2007, the majority of cases for that year are considered to be captured although the surveillance did not begin until June.

There were more cases in 2007 compared to 2008. Cases in 2007 had more deaths and were diagnosed with severe conditions such as myocarditis. CVB1 which was associated with deaths in neonates in 2007 was not identified in any case specimens in 2008. One reason for the difference in severity from 2007 to 2008 may be the presence of this enterovirus. However, CVB1 may have been present but not detected, as cases were confirmed by PCR only, and few were subtyped.

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ANALYSIS OF GIARDIASIS TRENDS IN GLENDALE HEALTH DISTRICT, 2005-2007

Patricia Marquez, MPH; Lauren Burwell, MD; Rachel Civen, MD, MPH

BACKGROUND

Giardia lamblia is a flagellated protozoan parasite that colonizes the small intestine and causes giardiasis. Infection begins when a cyst is ingested by a host; subsequent exposure to acids in the stomach leads to the excystation into trophozoites in the small intestine, where they can cause diarrhea [1]. Exposure to biliary fluid causes some of the trophozoites to form cysts which are excreted in feces, and if poor hand hygiene practices exist can then infect others. Travel to foreign countries, contact with diapered/incontinent children and adults, and outdoor exposure constitute some of the main risk factors for infection with giardiasis [2]. In Los Angeles County (LAC), giardiasis is a reportable disease that is investigated by public health nurses in the 23 health districts within the county.

Prior to 2005, the number of giardiasis case reports was in a steady decline in LAC. With a peak incidence of 8.6 cases per 100,000 persons in 1997, incidence decreased to 3.4 cases per 100,000 persons by 2004. However, beginning in 2005, giardiasis incidence increased by 40% from 3.27 per 100,000 in 2005 to 4.55 per 100,000 in 2007. While giardiasis is endemic to LAC, this increase in reports warranted further investigation. Of all the 23 health districts in LAC, a greater proportion of cases were reported from residents within the Glendale Health District (GHD). In 2007, 87 (20%) cases were reported from the GHD, compared to 23 cases (8%) in 2005. An investigation was initiated to determine the reasons for a three-fold increase in reported giardiasis cases during this three-year period and why cases were localized to GHD. In addition, a review of the Refugee Health Assessment Program (RHAP) parasitic disease screening practices was done in conjunction. The review was done to explore the role of immigration in giardiasis trends.

METHODS

Case Definition: a confirmed giardiasis case was defined as having positive laboratory criteria with the detection of the *Giardia* cysts or trophozoites by light microscopy in a stool specimen and a completed case investigation form.

Los Angeles County Department of Public Health Acute Communicable Disease Control Program (ACDC) reviewed all giardiasis case reports from GHD reported between 2005 and 2007. Additionally, a random sample of 75 giardiasis cases who had residence throughout LAC (excluding GHD) and were reported in 2007, were reviewed as a comparison group. Demographic, clinical and epidemiologic variables were taken from the Parasitic Epidemiology Case History form (T-102) and entered into an Access database. ACDC compared the demographic data for all cases from GHD by year of report. ACDC also compared various epidemiologic and clinical risk factors for 2007 cases from GHD versus 2007 cases from the random county sample.

Data Analysis: Chi-square analysis and the Wilcoxon rank-sum test were used to determine differences. Analysis was performed using SAS 9.1 software.

Refugee Health Assessment Program (RHAP) Site Visit: As part of the investigation into the increase in giardiasis cases within the GHD, ACDC made a site visit to the Hollywood-Wilshire RHAP to gain a better understanding of the parasitic disease and health screening process, specifically what refugee populations are served and what communicable disease protocols are used.

The screening protocols for all refugees was reviewed, including all screening tests performed for chronic and acute communicable diseases, as well as lifestyle and mental well-being assessments.

RESULTS

Demographics in total 143 giardiasis cases were identified from 2005-2007—23 occurred in 2005, 34 in 2006 and 87 in 2007. Most cases were male, comprising 57% of cases in 2005, 65% in 2006 and 74% in 2007. White cases made up 87-90% from 2005-2007. The median age of cases increased during the 3-year period from 21 (range: <1-73) in 2005 to 28 years of age (range: <1-80) in 2007 (Table 1). Stratifying by age group, in 2005, the 5-14 year-old group had the largest proportion of cases, 33%, whereas in 2006 and 2007, the 15-34 year-old age group had the largest proportion of cases, 30% and 45%, respectively.

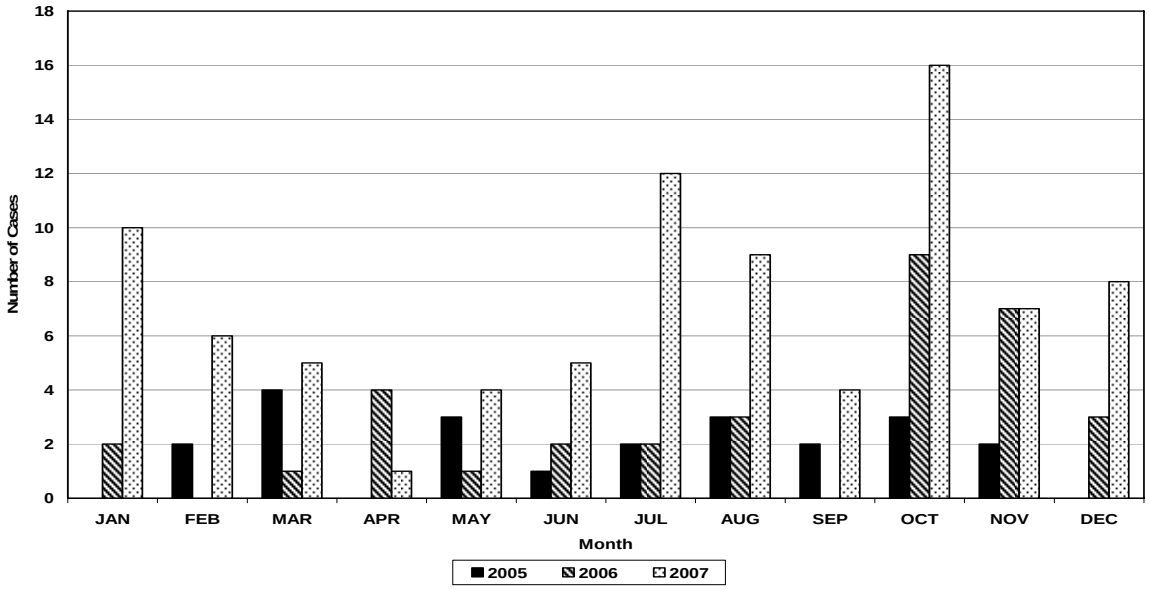
Table 1. Demographic Description: Giardiasis Cases, Glendale Health District, 2005-2007 (n=143)

	2005 n=23 (%)	2006 n=34 (%)	2007 n=87 (%)
White (non-Hispanic)	18 (87)	30 (88)	78 (90)
Hispanic	2 (10)	3 (9)	5 (6)
Black	-	-	1 (1)
Asian	1 (5)	-	2 (2)
Median age (years)	21	33	28
Age range (years)	<1 – 73	4 – 72	<1 – 80
Male	12 (57)	22 (65)	64 (74)

Seasonal Trends

Peak seasonality of GHD cases was consistent with the usual distribution seen in LAC with peak reports noted from late summer to early fall. A departure from the trend is noted in 2005 when a number of cases reported peaked in March, with 18% of cases. Cases reported from GHD in 2006 and 2007 (Figure 1) had a consistent peak in the number of cases in October, with 26% and 19%, respectively.

Figure 1. 2005-2007 Glendale Health District Giardiasis Cases



Clinical Presentation of Cases

Over 50% of Glendale cases reported no symptoms with the proportion of asymptomatic cases ranging from 11 (52%) in 2005 to 49 (57%) in 2007. In 2007, the most frequently reported symptoms were abdominal cramping (16, 40%), bloating (16, 40%), gas (22, 55%) and fatigue (20, 50%). The median numbers of symptoms reported during 2005-2007 were 2, 0.5, and 2 respectively, reflective of the few cases that reported experiencing any symptoms.

Refuge Health Assessment Program (RHAP)

As part the assessment, each refugee is required to submit three stool samples for ova and parasite screening within three months of entering the country as part of their visa requirements, even if they are clinically asymptomatic. Of note, many refugees enter the US via a resident country, which is not their country of origin, where they can live for up to a year waiting for visa paperwork to process [3]. The majority of refugees in the GHD are from Iran; Austria is the most frequently reported resident country.

Risk Factors

Risk factors reported by Glendale cases over the three year period changed significantly from 2005 as compared to 2006 and 2007. Examining immigration as a risk factor found that over the course of three years, proportions of immigrant cases ranged from 68% in 2005 to 92% in 2007 (p=0.003). In 2005 contact with animals accounted for 18% of reported exposures, the most frequently reported by all cases excluding immigrant status (Table 2). However, in 2006 and 2007 the most frequently reported exposure was travel to another country.

After excluding cases that did not meet the definition of travel exposure from analysis, travel still emerged as the most commonly reported exposure for 2006 (35%) and 2007 (41%). Other exposures that were consistently found to be reported included: contact with animals and outdoor activity such as hiking and swimming. While contact with animals stayed relatively consistent over the 3 year period, outdoor exposure increased from 14% of cases in 2005 to 29% and 27% in 2006 and 2007, respectively.

Table 2. Most Frequently Reported Risk Factors, Glendale 2005 - 2007

	2005 n=22 (%)	2006 n=34 (%)	2007 n=87 (%)	p-value
Travel	3 (14)	10 (29)	27 (31)	< 0.001
Outdoors	3 (14)	10 (29)	23 (27)	0.61
Contact with Animals	4 (18)	6 (18)	18 (21)	0.75
Immigrant	15 (68)	25 (74)	79 (92)	0.003

Random Sample Comparison

Comparing the 2007 GHD cases to a random sample of LAC cases from 2007, there were no significant differences in the median age and proportion of male cases. However, the race/ethnicity differed compared to the LAC sample with 36% Hispanic cases in the LAC sample and 6% in the Glendale cases (Table 3). Although there was no significant difference between the median ages among GHD cases and the random sample, the age of Glendale cases were more evenly dispersed over all age groups while a large proportion of GHD were in the 15-34 year-old age group; 44 %, compared to 22 % in the sample.

Table 3. Demographic Statistics for Glendale and Countywide Sample, 2007			
	Glendale n=87 (%)	Random n=75 (%)	p-value
White (non-Hispanic)	78 (90)	35 (47)	< 0.001
Hispanic	5 (6)	27 (36)	< 0.001
Black	1 (1)	3 (4)	0.2
Asian	2 (2)	4 (5)	0.4
Median Age (years)	28	31	0.31
Age Range	<1 – 80	1 – 78	-
Male	64 (74)	48 (65)	0.23

GHD cases had significantly fewer clinical symptoms associated with giardiasis compared to the random sample. The 2007 countywide sample had 19% reporting asymptomatic infection, whereas cases from GHD had 58%. Abdominal cramping (p<0.001), acute diarrhea (p<0.01), chronic diarrhea (p=0.02), fever (p=0.01) and weight loss (p<0.01) were more frequently indicated as symptoms among countywide cases than among Glendale cases. The median number of symptoms reported by the 2007 countywide and Glendale cases was also very different. Countywide cases reported a median of 3 symptoms, compared to the 2007 Glendale cases that reported a median of 1 (p<0.001).

Cases from Glendale had a significantly higher proportion of immigrants, 79 cases (92%) compared to 21 (29%) cases in the random sample (p<0.001). Most immigrants in the random sample were from Mexico (33%) whereas cases from GHD were from Iran (68%). A greater proportion of immigrants from GHD were refugee/asylees who had immigrated to the US within the six months prior to their diagnosis, compared to the immigrants in the LAC sample that had been in the county longer. Travel was a frequently reported risk factor among both groups, with 40% of cases from GHD and 22% of the LAC sample reporting this exposure (p=0.02.)

GHD cases reported a smaller proportion of animal contact as a risk factor compared to the random sample of LAC cases, 21% versus 36 % cases, (p=0.04). The majority of animal contact reported was with domesticated animals at home. The proportions of cases reporting an outdoor exposure such as hiking, drinking untreated stream water and fishing were not statistically significantly different among the two populations (Table 4).

Table 4. Giardiasis Risk Factors: Glendale and Countywide Sample, 2007			
	Glendale n=87 (%)	Random n=75 (%)	p-value
Immigrant	79 (92)	21 (29)	< 0.001
Travel	34 (40)	16 (22)	0.02
Outdoors	23 (27)	17 (23)	0.62
Animals	18 (21)	26 (36)	0.04

DISCUSSION

From 2006-2007, a large increase in giardiasis cases was observed compared to 2005 with the majority of cases being reported by individuals who resided in the GHD. ACDC found the increase was most likely due to increasing numbers of immigrants to this particular HD from countries where giardiasis is endemic. Furthermore, the RHAP's policy of conducting ova and parasite screening on all refugee entrants to the LAC would have contributed to this increase noted in GHD. Testing for the parasite in all refugees would detect large numbers of asymptomatic infections that would not have otherwise been diagnosed.

A major limitation of this investigation was data quality. Incomplete and blank T-102 forms were submitted for many cases from GHD and throughout LAC, missing clinical symptoms and/or exposure information. Language could have been a barrier to conducting complete interviews. Another limitation was a misunderstanding of risk factors among the Public Health Nurses who were completing the epidemiologic case history form; the same errors were seen frequently in the case history forms from the GHD. A recurrent error was the reporting of travel as a risk factor for refugee immigrant cases, when in fact the case had entered the US from a resident country. The evaluation of case history forms submitted from GHD revealed that the staff completing the T-102 form had incorrectly marked travel as a risk factor when actually immigrant status was the true risk factor.

CONCLUSION

After analysis of risk factor information revealed issues with many areas of the form, ACDC determined a revision in the case history form was warranted. The travel risk factor was a major source of misunderstanding for the nurses completing the forms for the immigrant/refugee cases. These individuals had traveled in the previous six months, however it was to enter the US, and not recreational travel from the US to another country as it is currently defined. After the completion of this investigation, the following was done by ACDC:

1. The definition was revised to make clear to the person completing the epidemiologic case history form that it was to capture information on individuals currently residing in the US that travel to another country.

2. Due to the risk factors associated with different immigrant, refugee and asylee immigration categories, a revision was also completed on the immigrant risk factor to obtain additional risk factor information. It was expanded to include a designation for refugee and asylee, as well as what resident country they lived in before immigrating to the US.

In conclusion, this study demonstrated that the increase in cases reported from the GHD is due to the RHAP's active screening process. As a result of this screening, many individuals with asymptomatic *Giardia* infections are being treated unnecessarily. Screening with ova and parasite should be limited to refugees who are clinically symptomatic, or have certain laboratory features warranting further work-up for parasites such as iron deficient anemia or abnormal liver enzymes or have immigrated or spent time in refugee camps with intestinal parasites that are a known public health threat.

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ANTIBIOTIC RESISTANT TYPHOID FEVER ASSOCIATED WITH TRAVEL TO INDIA LOS ANGELES COUNTY, 2000-2004

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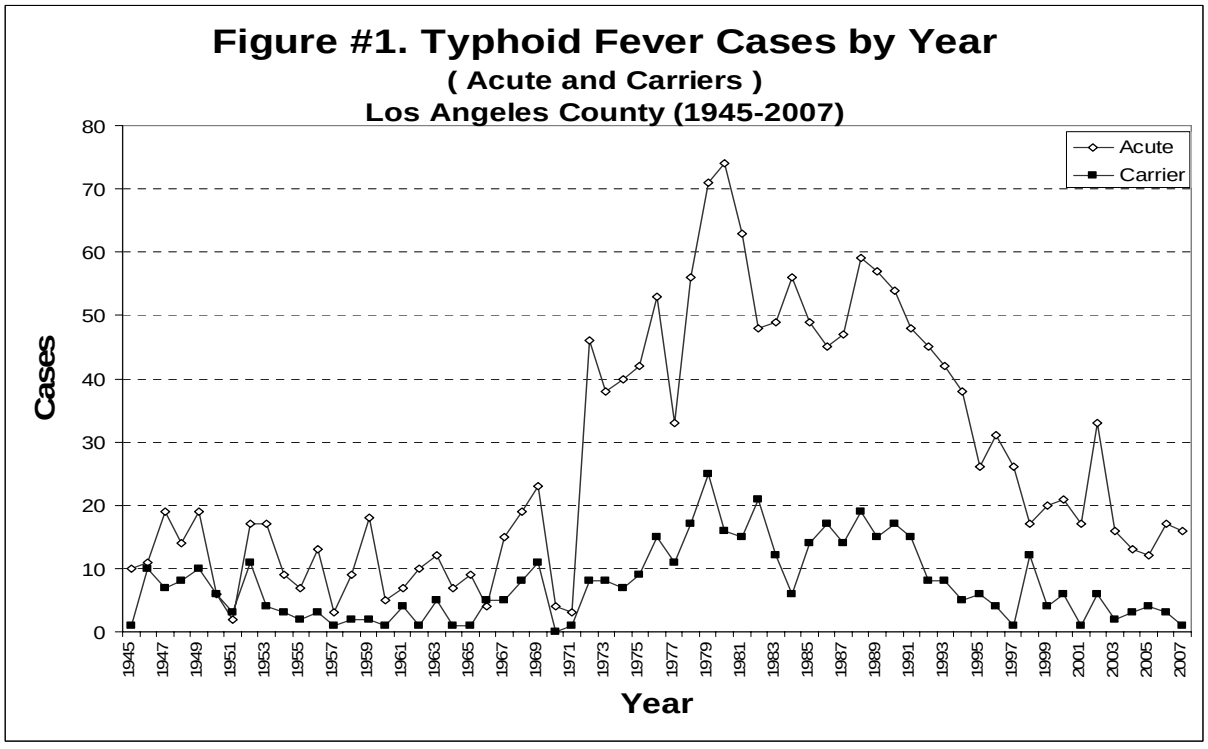
BACKGROUND

Typhoid fever is an acute systemic infectious disease caused by the bacteria *Salmonella typhi*. This species of salmonella has no known animal reservoir, and survives in the environment only by fecal oral person-to-person transmission. Three to five percent of cases who recovered from typhoid fever are estimated to become typhoid carriers [1]. Globally, it is estimated that 17 million new typhoid fever infections occur and about 600,000 persons die from the disease annually [2].

The impact of the disease in the United States (US) has been greatly reduced in the first half of the 20th century with the advent of municipal water chlorination and solid waste disposal, as well as personal hygiene and overall public awareness. Reduced disease burden in the later half of the century was accomplished with the introduction of antibiotics to treat carriers and the availability of vaccines to prevent illness in travelers. In 1900 the mortality incidence for typhoid fever was 25 per 100,000, but today mortality from typhoid fever is very rare. Currently about 400 cases of illness are reported annually in the US, with mortality occurring in less than 1% of cases [3]. Antibiotics such as chloramphenical were used historically to treat typhoid fever cases. Newer treatments include the quinalones ciprofloxacin and ofloxacin) for adults and the cephalosporin cefoxitin for children [1].

In contrast to the years prior to 1960 when the disease was acquired domestically, more US cases now are acquired while traveling overseas to typhoid endemic countries. Increases in the number of cases reported in the late 1960s through the 1970s have been associated with the combination of increased foreign travel of US residents and increased population growth (Figure 1). A study of cases reported in the US from 1996-97 (N=293) found that 81% were travel associated [4], This study found no resistance to ciprofloxacin or ofloxacin, however 7% of isolates were resistant to the quinalone naladixic acid, and 24% of isolates were resistant to other antibiotics. Cases traveling to South Asia (India, Pakistan, Bangladesh) were at higher risk of having multi-drug resistant typhoid (MDRST). Other studies of US cases have documented typhoid resistance to ciprofloxacin, with the first case documented in 1992 [5].



Typhoid fever is a reportable disease in California. The Los Angeles County Department of Public Health (LAC DPH) follows up all reported cases to ensure treatment and minimize continued public health risk. Since 1980, the number of annual reported cases in the county has dropped dramatically from 70 cases to about 18 cases annually. However, with the rise in travel related antibiotic cases, research is needed to track the extent of the antibiotic resistance and related travel regions and to ensure that the current suggested treatment regimen is still effective for LAC cases.

METHODS

LAC DPH Acute Communicable Disease Control Program (ACDC) reviewed acute typhoid fever cases reported in LAC from 2000 to 2004. Epidemiological case history forms were reviewed for demographics and travel history. Antibiotic resistance was reviewed by matching LAC cases to NARMS – the National Antimicrobial Resistance Monitoring System for enteric bacteria. Case isolates were analyzed by NARMS for susceptibility to 18 different antibiotics, covering 7 classes of antibiotics: phenicole (1), quinalone (3), penicillin (3), aminoglycoside (4), tetracycline (2), sulfonamide (2), and cephalosporin (3)**.** Because the NARMS data base is de-identified, matching was performed by using laboratory accession number first, if available, then by using combinations of the laboratory collection date with age, gender and/or race information. For cases where there were multiple isolate susceptibility results, the earliest result was used. Demographics and travel regions of cases were analyzed by antibiotic resistance using Chi-squared statistics and SAS 9.1 software.

RESULTS

Acute typhoid fever in LAC is a rare disease; just 101 cases of typhoid fever were reported to the LAC DPH from 2000 to 2004, with an annual average of 20 cases and incidence of 0.18 per 100,000. Cases were primarily young (mean age 25 years), Hispanic (43%) or Asian (47%), and just as likely to be male or female (F:M=1:1) (Table 1). A majority of cases (69%) reported recent foreign travel, with many traveling to Asia (46%, n=68) and Central America (17%, n=25). Vaccine usage was reported in only 2 travel related cases (3%), one oral and one injection. Several cases with no travel history (10%, n=13) were traced back to a previously undiagnosed carrier through public health investigations. Twenty-one percent of cases were considered to be locally acquired. Infection was successfully treated in almost all cases (93%, n=127) that remained in the county for LAC DPH follow up (n=136). Cases leaving LAC after diagnosis were reported to their new jurisdictions for follow up (n=11). One case expired after returning from India (1%).

Antibiotic resistance profiles were matched to 88 cases from 2000-2004 (88%); 60% of cases were matched using accession number and an additional 28% were matched using a combination of collection date with age, gender and/or race information. The remaining cases (n=13) could not be matched to NARMS results. Antibiotic resistance was found in 16% (n=14) of isolates tested, with 7% (n=6) of isolates having resistance to multiple antibiotic classes (MDRST) (Table 2). Antibiotic resistant cases were more likely to be Asian (71% vs. 34%, $p<0.05$), to have traveled internationally recently (86% vs. 69%, $p<0.01$), and to have traveled to Asia (86% vs. 34%, $p<0.01$), especially to India (64% vs. 8% $p<0.01$), than antibiotic susceptible cases. In contrast, no antibiotic resistance was found among persons acquiring infection in Central or South America. Two antibiotic resistant cases did not report any foreign travel.

Antibiotic resistance was found against each of the seven antibiotic compounds tested. Resistance to the quinalone class was most commonly identified, with 13% resistanat to naladixic acid; however no resistance was found to the quinalone ceprofloxin, the currently suggested for typhoid treatment. Antibiotic resistance to the traditional phenicole drug chloraphenical was 7%.

Table 1. Demographics and Travel Location of Acute Typhoid Fever Cases by Antibiotic (Abx) Resistance, Los Angeles County, 2000-2004

	All		Abx Susceptible		Abx Resistant*		Difference
	n	%	n	%	n	%	p-value
Typhoid Cases	101	100%	73	100%	14	100%	
Race/ Ethnicity							
Asian	45	44%	25	34%	10	71%	<0.01
Latino	42	41%	36	49%	2	14%	0.02
Caucasian	8	8%	7	10%	2	14%	0.29
African American	3	3%	2	3%	0	0%	NA
Gender							
Male	49	48%	34	47%	8	57%	0.18
Female	52	51%	38	52%	6	43%	0.18
Age Group							
0-19	46	45%	35	48%	7	50%	0.22
20-39	36	35%	23	32%	5	36%	0.23
40-59	15	15%	10	14%	2	14%	0.31
60+	4	4%	4	5%	0	0%	NA
Foreign Travel							
Recent Travel	69	68%	52	71%	12	86%	<0.01
Asia	44	44%	25	34%	12	86%	<0.01
India	19	19%	6	8%	9	64%	<0.01
Central America	12	12%	10	14%	0	0%	NA
South America	12	12%	11	15%	0	0%	NA
Africa	1	1%	1	1%	0	0%	NA
Europe	0	0%	0	0%	0	0%	NA

* 87 cases tested for Abx susceptibility. Group not tested (n=14) did not differ from the total group by age, race or sex.

Table 2. Abx Resistant Typhoid Fever Cases Los Angeles County, 2000-2004

Antibiotic Resistance	n	%
Any Resistance	14	100%
Resistant to 1 Abx	8	57%
Resistant to 2-6 Abx (MDRST)	3	21%
Resistant to 7Abx (MDRST)	3	21%
Abx Resistance Type		
Quinalone[a]	13	93%
Phenicoles[b]	6	43%
Sulfonamides	6	43%
Aminoglycoside	5	36%
Penicillins	5	36%
Tetracyclines	4	29%
Cephalosporin	1	7%

a. 13 cases resistant to nalidixic acid, all sensitive to ciprofloxacin, ofloxacin not tested

b. Traditional treatments (Chloramphenicol)

DISCUSSION

As in an earlier national study [4], persons with acute typhoid fever resistant to antibiotics were more likely to have traveled to Asia than to other parts of the world. Available data could not distinguish whether these cases were non-US born and returning home to visit friends or family in Asia, or US born tourists traveling to Asia. The proportion of antibiotic resistant cases found in our study was lower than that found in the national study (16% versus 25%). This may indicate that antibiotic resistance in typhoid fever is not worsening; however, it also indicates that the problem still persists. As with the earlier study of reported US cases, no resistance was identified to quinalone ciprofloxacin or the cephalosporin ceftriaxone. The current suggested treatment for typhoid fever in LAC, ciprofloxacin, appears to still be an effective in treatment.

CONCLUSION

Our results suggest that antibiotic resistant typhoid fever is a problem among foreign travelers in LAC not receiving typhoid vaccine, especially among Asians and among travelers to Asian countries. Vaccine usage in these travelers should be promoted in order to prevent infections, including antibiotic resistant cases. Continued studies are needed to monitor the development of antibiotic resistant typhoid cases in the US.

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REVIEW OF BOTULISM CASE REPORTS LOS ANGELES COUNTY, 2000-2007

David Dassey, MD, MPH

BACKGROUND

Botulism is a rare but serious paralytic illness caused by nerve toxins produced by the anaerobic bacterium *Clostridium botulinum* and rarely other species. These toxins block motor nerves, leading to paralysis. Death ensues if the respiratory muscles become paralyzed and mechanical ventilation is delayed. All suspected botulism reports are medical emergencies. Botulism is also a public health emergency because a food item contaminated with botulism toxin endangers others who may consume it. In recent years it has also been postulated that botulinum toxin could be used as a bio-weapon due to the extremely small dose required for clinical illness. Therefore, prompt and complete investigation of all reports of suspected botulism is a public health priority.

There are seven known botulinum toxins, four of which – types A, B, E, and F – affect humans. Clostridial spores germinate anaerobically and may produce toxin in a food item, a wound, or the intestine. Toxin may also be given therapeutically for medical or cosmetic reasons and cause paralysis if administered incorrectly or at too high a dose. Theoretically botulinum toxins could also be aerosolized as a bio-weapon and intoxicate victims by the respiratory route.

The patient's history, the progression of neurological findings, and specialized diagnostic procedures are integral to the diagnosis of botulism. The laboratory investigation is important to confirm the disease. An inadequate investigation has the potential to delay diagnosis or misclassify the type of botulism, for example calling a case wound botulism when it actually is foodborne botulism, endangering others at risk of consuming a contaminated food item.

The Los Angeles County (LAC) Department of Public Health has had a longstanding agreement with the California Department of Public Health permitting LAC to investigate all reports of suspected botulism in persons over the age of infancy. Infant botulism suspects in California are investigated and treated by the California Infant Botulism Program without assistance from local health departments.

The LAC Public Health Laboratory (PHL) conducts a complete range of botulism microbiological testing. Specimens of serum, stool, gastric contents, and food obtained can be tested for botulism toxin or clostridium culture. Clostridium isolates from patients' wounds are submitted by hospital laboratories for species confirmation and toxin production.

The objectives of this report were to summarize clinical and diagnostic results for investigations of suspected botulism cases reported to LAC from 2000-2007; describe confirmed botulism cases; evaluate completeness of laboratory investigations conducted; and identify investigatory aspects needing improvement.

METHODS

All available records of botulism cases and suspects over 1 year of age were reviewed; these included the botulism suspect worksheet, epidemiologic case history form, medical records on file, and laboratory records from the treating hospital and the PHL. Since 2005, the botulism suspect worksheet has been used to guide investigators and organize documentation of all botulism investigations. The epidemiologic case history form is completed only for confirmed cases meeting the following case definitions; these forms are then submitted to the California Department of Public Health in compliance with the California Code of Regulations, Title 17, Section 2502.

Standardized CDC case definitions for each form of botulism (excluding infant botulism) are as follows:

- A case of foodborne botulism is a clinically compatible case that is laboratory confirmed or that occurs among persons who ate the same food as persons who have laboratory-confirmed botulism.
- A probable foodborne botulism case is clinically compatible with an epidemiologic link to a suspicious food item.
- A case of confirmed wound botulism is a clinically compatible case that is laboratory confirmed in a patient who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the two weeks before onset of symptoms.
- If a patient aged greater than one year of age has no history of ingestion of suspect food and has no wounds, but botulinum toxin or organisms are detected in a clinical specimen, the disorder is described as botulism, other.
- For purposes of this review, a case of clinical botulism was defined as a patient whose illness is clinically compatible with botulism but for whom the laboratory tests necessary for confirmation were either non-supportive or not done, and there was no alternative diagnosis made by the treating physician.

A laboratory specimen instruction sheet has been distributed annually since 2005 to all hospital emergency departments and laboratories, neurologists, and infectious disease physicians. Investigations were conducted by medical epidemiologists in ACDC who rotate telephone duty and after-hours call for LAC DPH. The initial investigator was responsible for all follow-up and completion of required documentation. All decisions and documentation were reviewed and approved by a senior physician.

RESULTS

- A total of 54 suspected botulism cases were reported to LAC DPH during the eight-year period (Table 1); one third (18) were confirmed. The male to female case ratio was 3.5 to 1 for all suspects and for all confirmed cases. The ages of all suspects ranged from 10 to 82 years; the mean age of confirmed cases and unconfirmed suspects did not differ. Confirmed botulism cases were more likely to be injection drug users (IDU) than were unconfirmed suspects, 72% versus 56%. Sixty-nine percent of suspects received botulinum antitoxin treatment, including all 18 of the eventually confirmed cases. More than half of the unconfirmed cases (53%) were also treated with antitoxin.

Table 1. Botulism Case Reports by Gender, Mean Age, Injection Drug Use, Treatment, and Confirmation Status Los Angeles County, 2000-2007

	All Suspects n (%)	Confirmed Cases n (%)	Unconfirmed Suspects n (%)
Total	54 (100)	18 (33)	36 (67)
Male : Female	42 : 12	14 : 4	28 : 8
Mean age, years (range)	45.9 (10 – 82)	45.7 (17 – 82)	46.1 (10 – 55)
IDU	33 (61)	13 (72)	20 (56)
Got antitoxin	37 (69)	18 (100)	19 (53)

Figure 1 shows the confirmation status of the 54 suspected botulism cases by year of occurrence. The number of reports of suspected botulism ranged from 3 to 11 reports per year, while confirmed cases ranged from zero to eight cases annually. In 2000 and 2003, no botulism cases were confirmed.

Figure 1. Suspected Botulism Cases by Confirmation Status and year of Occurrence, Los Angeles County, 2000-2007

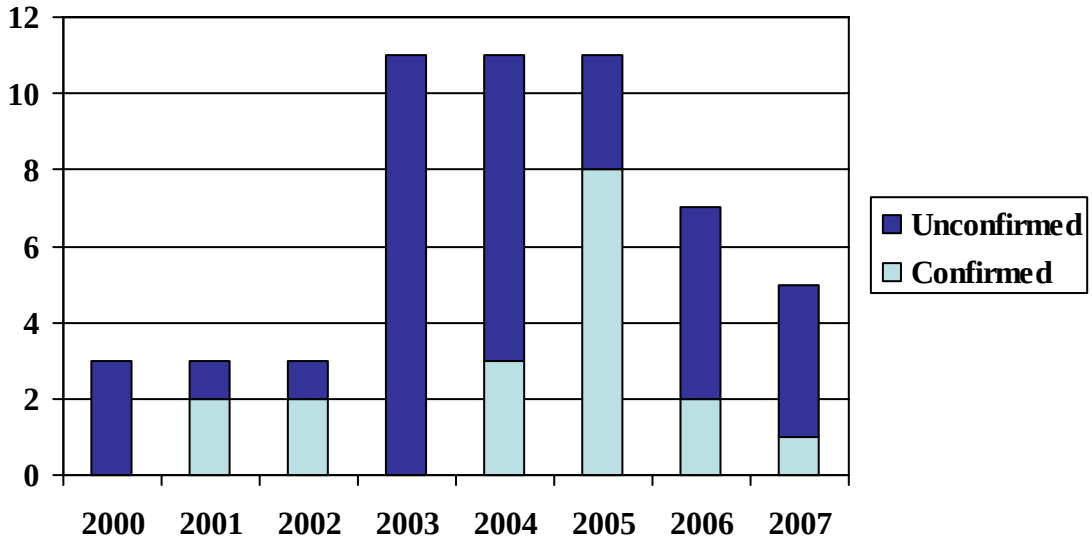


Table 2 breaks down the 18 confirmed botulism cases by year of occurrence, route of intoxication and toxin type. Fifteen of the 18 confirmed cases, 83%, were caused by botulinum toxin type A.

Table 2. Confirmed Botulism Cases by Year of Occurrence, Route of Intoxication, and Toxin Type* Los Angeles County, 2000-2007

Year	Foodborne Botulism Cases – Type*	Wound Botulism Cases - Type*
2000	-	-
2001	2 - AF	-
2002	-	2 - AA
2003	-	-
2004	-	3 - AA, not B
2005	2 - AA	6 - AAAABU
2006	-	2 - AA
2007	-	1 - A
Total	4	14

* A, type A toxin; B, type B toxin; F, toxin type F; U, unknown toxin type

There were three episodes of foodborne botulism with four confirmed cases: two isolated cases and one outbreak of two cases in a family. Sera and stool samples from all four cases were collected and tested. Food specimens were obtained in only two of the three episodes. One 2001 case was fatal and involved a mentally ill man. The case-patient's home had dozens of unrefrigerated containers of food; none of the food was tested for toxin since the patient's serum had already tested positive. The other 2001 case was caused by type F toxin produced by *Clostridium barratii*; toxin was detected in the case's serum, and the organism was isolated in two food items retrieved from the garbage. In 2005, a foodborne outbreak caused by type A occurred with a grandfather (fatal) and his grandson; the offending food item was not identified because a site visit to the home was delayed because other family members were unavailable for two days. By the time an investigator got into the home, no foods found in the home were a compatible medium for botulism, and the garbage had been tossed and collected by the sanitation department.

There were 14 confirmed wound botulism cases, 11 (79%) were due to type A toxin. Sera were collected from all wound botulism cases, and 13 were positive. The only type B case was diagnosed in 2005 in a patient whose serum tested negative for toxin but whose wound culture grew *C. botulinum* type B. A wound specimen for cultured was obtained from eight of the fourteen suspects (57%), of which two were positive, including one case whose serum was toxin negative. For two cases there was insufficient serum to permit definitive toxin typing; these were reported as "not B" and "toxin present, type unknown." Collection of other specimens that would assist with ruling out foodborne botulism was rarely done; only three gastric specimens and one stool specimen were submitted; LAC DPH did not obtain any food items from these eventually confirmed wound botulism cases.

Disposition of Remaining Suspects

Of the remaining 36 suspects, 17 (47%) were considered to have clinical botulism that was not confirmed, including 14 cases of possible wound botulism, two cases of possible foodborne botulism, and one possible iatrogenic case. Because these cases failed to meet the formal case definitions, they were not reported to the California Department of Public Health.

For the 14 suspected botulism cases believed to have unconfirmed wound botulism, serum samples were obtained and tested for twelve (86%); the other two were a married couple, both IDU, who presented together with compatible signs and symptoms but left the emergency department against medical advice before specimens were obtained. Wound cultures were obtained from 6 of the 14 clinical wound botulism suspects (43%), none of which grew *C. botulinum*. Stool specimens were available from only 3 of the 14 suspects (21%), and no gastric aspirates or food samples were obtained.

Two unconfirmed clinical botulism cases were investigated in persons who were not injection drug users and who had no other recent wounds. Specimens of serum, stool and food were obtained in both investigations, but tests did not identify botulinum toxin or toxigenic organisms. These suspects were felt to have possible foodborne botulism based on the clinical presentation and lack of an alternative diagnosis.

A case of possible iatrogenic botulism was reported in a child with cerebral palsy who received quarterly injections of botulinum toxin to relieve muscle spasms. Because of development of antibodies against BoTox® (type A toxin) his treatment was changed to Myobloc® (type B toxin). Because these products are not bioequivalent, there is the potential for overdosing the patient if the Myobloc dosage is not adjusted downward. Serum obtained one month after the change to Myobloc did not contain measurable botulinum toxin, but the clinical presentation and its timing after treatment were consistent with iatrogenic botulism.

Eighteen patients originally reported as possible botulism cases eventually received another diagnosis. The most common diagnosis was Guillain-Barré syndrome in nine patients; interestingly two of these were stool culture positive for campylobacter, and another had a history of recent diarrheal illness. In addition, there were four patients with nonspecific inflammatory conditions of the central nervous system, two patients with strokes, two with a neoplasm, and one case of myasthenia gravis. The remaining case had no alternative diagnosis but was not compatible with botulism.

Variations in Investigation by IDU Status

This analysis showed that botulism suspects who are injection drug users are investigated differently from other suspects. There were 33 IDU suspects and 20 suspects without a history of IDU (one omitted for missing data). Among IDU botulism suspects, 85% had serum tested, but only 65% of non-IDU suspects had serum tested. Wound specimens were obtained from just 45% of the IDU suspects; only one non-IDU had a wound that was screened as a potential toxin source. Samples of stool, food and gastric contents were more likely to be collected from non-IDU suspects; but in only 50% of those investigations was a stool sample collected.

CONCLUSION

From 2000 to 2007, LAC evaluated 54 reports of possible botulism, of which 18 were confirmed. A near equal number (17) were felt to be botulism based on clinical criteria and absence of an alternative diagnosis, but these cases were not laboratory-confirmed and thus not officially reported in state and national statistics. There were 19 patients with other diagnoses. Sixty-two percent of reported suspects were IDU, including 14 confirmed botulism cases, 14 unconfirmed cases of clinical botulism, and four patients with other or unknown diagnoses.

It is the responsibility of treating physicians to obtain clinical specimens from the patients; despite use of a detailed collection guide, specimen collection was often incomplete. Among suspects who were IDU, serum collection was high, but a wound specimen was obtained from fewer than half of the suspects; understandably, not every patient has an obvious wound to be drained.

In a number of investigations, the report to LAC DPH was made prior to obtaining diagnostic tests that pointed to an alternative diagnosis. For example, tests such as the edrophonium (Tensilon®) challenge, EMG, lumbar puncture, or visualization studies of the head often are pending when the case is first reported. A positive finding from one of these tests may cancel the need for further botulism work-up. Nonetheless Public Health must improve compliance with published specimen submission guidelines. Once specimens are in the hands of Public Health, tests can be cancelled in the event another diagnosis is reached.

Public Health depends on the treating physicians to get the patient's history of risk factors, especially exposure to suspicious foods. For suspected foodborne botulism, Public Health is responsible for collecting potentially contaminated food items. Unfortunately, many patients are already placed on a ventilator and sedated by the time Public Health is notified, so historical information is limited. Many of these individuals have no next of kin or are homeless, further limiting our ability to conduct a full investigation.

Failure to work up all suspected botulism cases fully could mask a foodborne botulism case as a wound botulism case. Delay in identification of foodborne botulism may endanger others exposed to a contaminated product. Investigators can improve diagnostic work-ups by interviewing the patient or close contacts quickly, especially when foodborne botulism is suspected, so that suspicious food items are gathered quickly. Treating facilities should be encouraged to follow specimen guidelines more carefully.

LOS ANGELES COUNTY OUTBREAKS OF ACINETOBACTER BAUMANNII

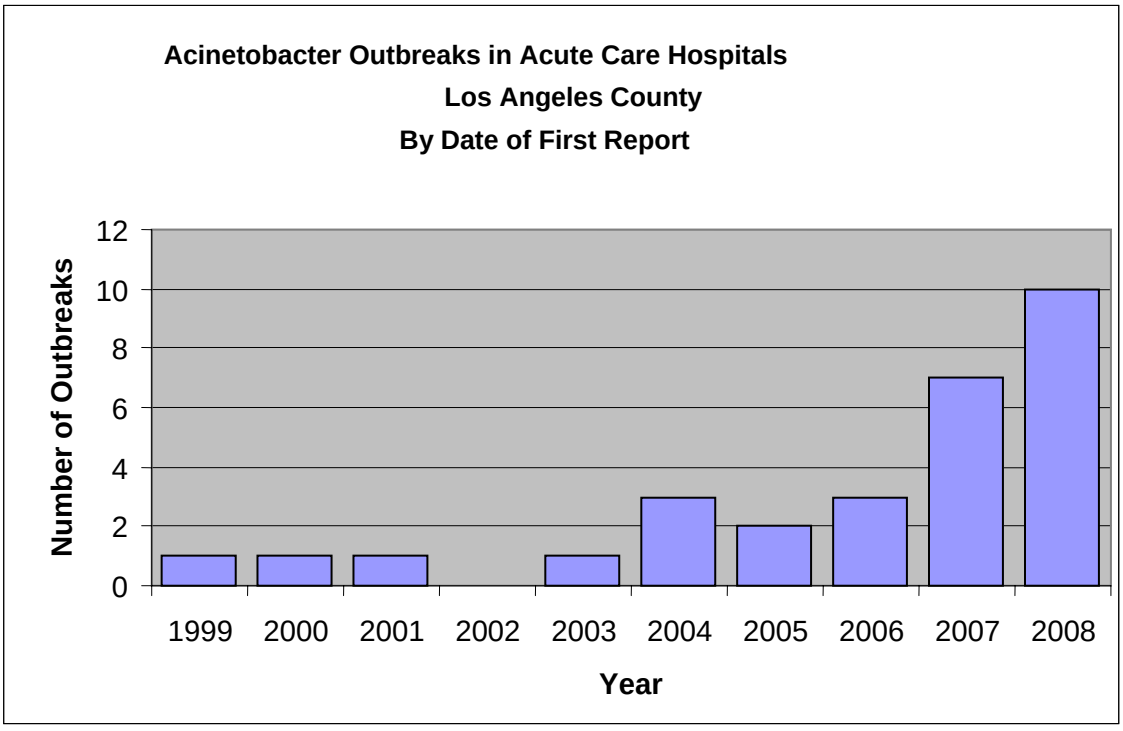
Dawn Terashita, MD, MPH and L'Tanya English, RN, MPH

BACKGROUND

Acinetobacter baumannii, also known as Acinetobacter calcoaceticus-baumannii complex, is an opportunistic pathogen emerging as an important cause of healthcare associated infections (HAI). It is a gram-negative coccobacillus commonly found in soil, water, and animals. The multi-drug resistant organism became an increasing problem among patients in intensive care units in the late 1980s. Of particular concern is the organism's propensity to accumulate mechanisms of antimicrobial resistance that lead to multi-or pan-drug resistance and may cause large HAI outbreaks. Reports of individual Acinetobacter outbreaks are found in the medical literature; though, there are far fewer Acinetobacter outbreaks documented than other gram negative organisms [1].

In Los Angeles County (LAC), prior to 2007, Acinetobacter outbreaks were either under-reported, under-recognized, or did not occur. Between 1999 through 2006, LAC averaged approximately one Acinetobacter outbreak reported per year (Figure 1). LAC Department of Public Health (DPH) investigated 10 outbreaks of Acinetobacter baumannii reported in 2008. The study includes characteristics of the affected patients, sources for the organism, efforts of infection control, and outcomes related to the control efforts. Further knowledge of these factors will help to increase understanding of this emerging healthcare associated organism and guide development and management of Acinetobacter infection surveillance, prevention, and control measures.

Figure 1



METHODS

This is a descriptive study of reported acute-care hospital Acinetobacter outbreaks in LAC in 2008. LAC DPH received reports of suspected outbreaks of any disease per Title 17, California Code of Regulations (CCR), Section §2500. Reports were telephoned to Acute Communicable Disease Control (ACDC)

program as well as DPH Health Facilities Inspection Licensing and Certification Division (HF) immediately after identification. HF determined their own outbreak definition. ACDC defined an outbreak as an increase in healthcare acquired Acinetobacter infection or colonization rates in patients above the baseline rate for the facility or a particular unit within the facility. Once an outbreak had been reported to public health staff, the investigation was initiated and the facility is contacted to collect data according to standard protocol.

Standard protocol during an outbreak investigation may have included but was not limited to the verification of the diagnosis and the occurrence of an outbreak, creating a line list of all patients involved with pertinent clinical information, case definition and additional case finding, chart review, additional clinical and/or environmental sampling, laboratory data including molecular typing of isolates with pulsed field electrophoresis (PFGE), site visit and inspection, staff interviews and surveys, data analysis, and recommendations of prevention and control measures.

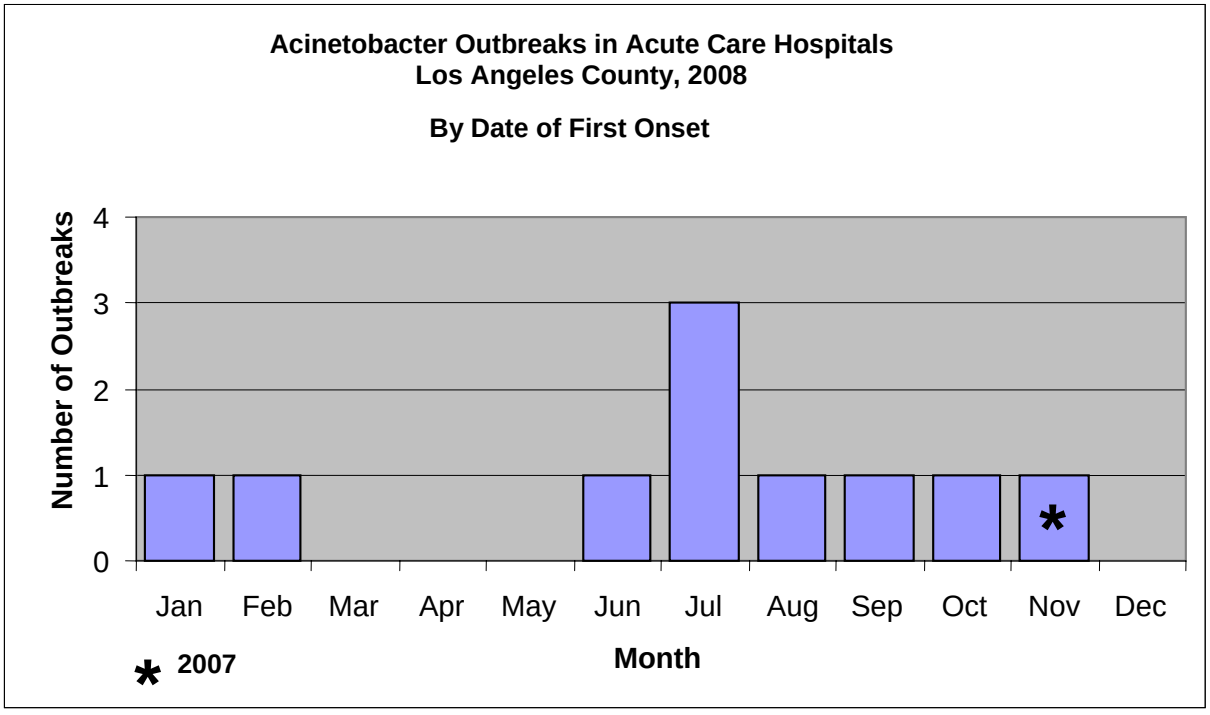
A case was defined as a patient who had a positive culture for Acinetobacter baumannii or calcoaceticus-baumannii complex from any site cultured more than 48 hours after admission with no signs or symptoms of infection on admission. Background and outbreak incidence rates of healthcare acquired Acinetobacter (cases per 1000 hospital days) were calculated for four hospitals reporting outbreaks.

RESULTS

General Outbreak Characteristics

There are 102 licensed acute-care hospitals in LAC. Between January 1, 2008 and December 31, 2008, ACDC received 10 confirmed outbreak reports from acute-care hospitals, representing 37% of the total outbreak reports received (N=27) in 2008. The onset of one outbreak was in November of 2007. All other outbreaks had onset in 2008. Three outbreaks were reported from the same hospital at separate times and on two separate units. July had the most number of reported outbreaks (n=3) with the other outbreaks spread through the summer, fall, and winter (Figure 2). Outbreaks lasted between 5 and 155 days, with the mean duration of 58.9 days.

Figure 2



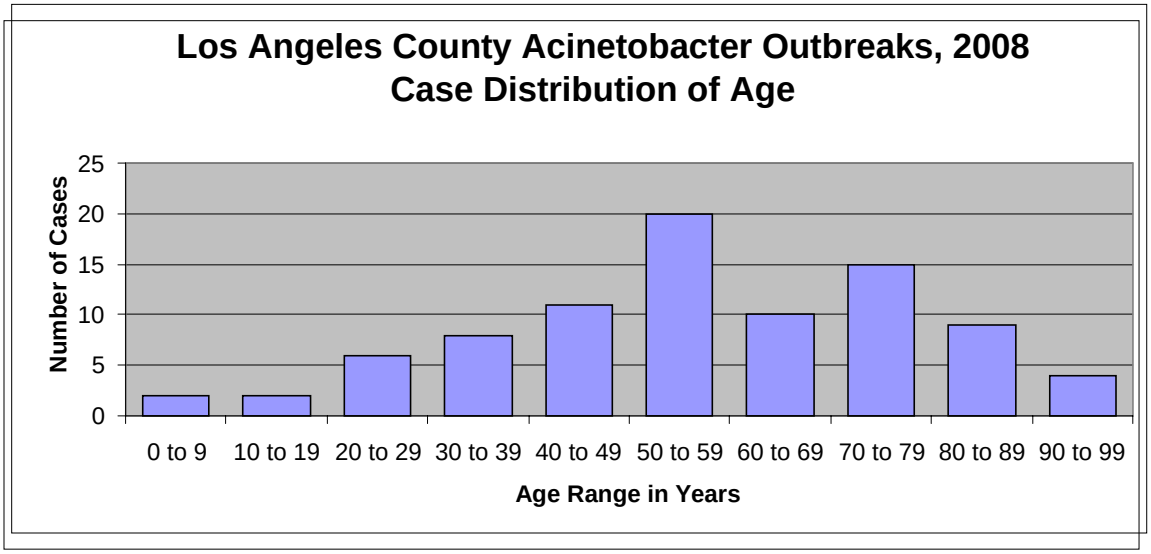
A total of 117 cases occurred with the number of cases per outbreak ranging from 3 to 36. One case was asymptomatic; 116 cases were considered infected; 29 cases died for a 25% case fatality rate (Table 1). Nine outbreaks occurred among adults, and one occurred in a pediatric facility. The mean age of the adult cases was 58.4 years; the mean age of pediatric cases was 5.5 years. (Figure 3). There were more males (56%) than females. Background incidence rates ranged from 0 to 1.4 cases per 1000 patient days. Outbreak incidence rates ranged from 0.89 to 3.14 cases per 1000 patient days.

TABLE I

Outbreak No.	No. Cases	Mean Age (years)	Age Range (years)	Sex Male (%)	Onset date	Stop date	Duration of Outbreak (days)	Setting	Ventilator	Background Incidence Rate Per 1000 Patient Days	Outbreak Incidence Rate per 1000 Patient Days
1	6	37.3	27-52	5 (83%)	11/20/2007	12/29/2007	39	Burn ICU	4 (67%)	NA	NA
2	4	61.3	39-81	4 (100%)	2/1/2008	2/14/2008	13	ICU	2 (50%)	NA	NA
3	13	56.8	19-87	7 (54%)	1/7/2008	3/25/2008	78	ICU	10 (77%)	1.45	3.14
4	3	5.5	0.58-13	1 (33%)	7/3/2008	7/8/2008	5	Pediatrics	0	NA	NA
5	7	79.4	58-94	5 (71%)	7/13/2008	8/31/2008	48	ICU, Rehab	4 (57%)	NA	NA
6	4	48.0	36-57	4 (100%)	8/1/2008	8/14/2008	13	Burn ICU	4 (100%)	NA	NA
7*	21	67.2	48-90	8 (47%)	6/1/2008	11/6/2008	155	General Hospital	13 (62%)	0.75	0.89
8	7	56.6	29-82	4 (57%)	9/16/2008	10/20/2008	34	ICU	4 (57%)	0	1.65
9**	16	48.8	23-79	9 (60%)	10/1/2008	11/26/2008	55	MICU	8 (50%)	NA	NA
10***	36	65.0	35-90	14 (42%)	7/1/2008	11/30/2008	149	ICU	unknown	1.01	2.63
	117	56.8	0.58-94	61 (56%)			58.9		49 (60%)		

*3 ages and 4 sexes unknown
**1 sex unknown
***27 ages and 3 sexes unknown

Figure 3



Eight of the 10 outbreaks occurred in an intensive care unit (ICU). The other two outbreaks occurred throughout the hospital. In the nine outbreaks where ventilator data was collected, 49 (60%) of 81 cases were on a ventilator; this included Acinetobacter infections from all sites. Of 54 patients with positive respiratory specimens, 49 (90%) were on a ventilator at the time of diagnosis. Respiratory specimens were the most common site of positive Acinetobacter culture. Other common sites include blood, wound, and urine. Five patients were positive from multiple sites. (Figure 4, Table 2)

Figure 4

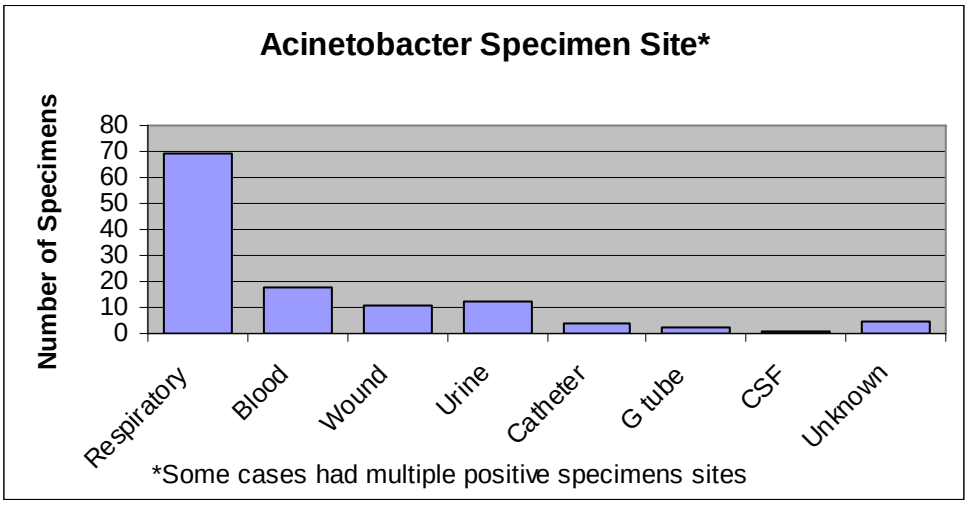


TABLE 2

Outbreak No.	Ill	Colonized	Died	Blood	Respiratory	Wound	Urine	Other
1	6	0	1	1	5	0	1	2
2	4	0	1	1	3	0	0	0
3	13	0	5	1	8	0	2	2
4	3	0	0	1	1	1	0	0
5	7	0	1	1	5	3	0	0
6	4	0	0	1	3	1	0	0
7	21	0	7	1	14	4	2	0
8	7	0	4	0	7	0	0	0
9	15	1	8	6	8	1	1	0
10	36	0	2	5	15	1	6	9
	116	1	29	18	69	11	12	13

Other than clustering in place and time, no commonalities or point sources were identified among the cases in each outbreak.

Laboratory Investigation

All outbreaks reported multi-drug resistant strains of the Acinetobacter isolates defined by resistance to one or more classes of antibiotics. PFGE was performed in three of the outbreaks with all results yielding no single predominant strain but multiple predominant strains.

Environmental surveillance cultures were performed in four of the outbreaks. Acinetobacter was cultured from multiple sites in three of these four outbreaks including the bed rails, sinks, and reusable suction tip stored at the patient's bedside.

Control Measures

Recommended control measures varied per facility and included: contact precautions; patient and staff cohorting; dedicated equipment; staff education; enhanced hospital-wide surveillance for Acinetobacter infections; open communication with ACDC; immediate reporting of new cases; increase environmental cleaning with particular attention to high-touch surfaces including thoroughness, frequency, and monitoring; observation and documentation of staff hand hygiene compliance as defined in the Joint Commission 2008 National Patient Safety Goals; increased infection control professional (ICP) to licensed acute care bed ratio; notifications to patient, visitors, staff, and physicians; limiting patient transfers as possible; discontinuance of multi-dose vials as possible; antibiotic stewardship; and observation of the CDC *2003 Guidelines for Environmental Infection Control in Healthcare Facilities*, the *2002 Guideline for Hand Hygiene in Health-Care Settings* and the *Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006*.

Many of the control measures were implemented by the facility prior to ACDC notification. Public Health conducted site visits in four of the outbreaks. Inspections identified no obvious lapses in infection control. Point surveillance cultures were recommended in three outbreaks on a total of 32 patients; however, no additional colonized cases were identified. The units affected were closed voluntarily to new admissions in two outbreaks.

DISCUSSION

No point source was identified nor determined to be the cause of any of the ten outbreaks investigated. Three outbreaks had patterns characterized by periods of increased incidence within sustained and ongoing healthcare associated transmission of Acinetobacter infections; therefore, definition of a true outbreak was controversial and calculation of an outbreak duration was difficult. Often, these periods of increased incidence were flanked by periods of decreased incidence artificially giving the impression of a larger problem. Whatever the true nature of the outbreak, hospitals should aim to decrease healthcare associated infections of any cause to zero.

ACDC did not analyze the antimicrobial resistance patterns of the outbreak isolates as concurrence between genotyping and phenotyping (antibiotic susceptibilities) has not been demonstrated in Acinetobacter [2]. The significance of multiple distinct patterns by PFGE is unknown. One or more epidemic Acinetobacter clones have been demonstrated to coexist within endemic strains [3,4]. The finding supports the hypothesis that most of these outbreaks are not from a single source but represent endemic transmission as a result of general lapses in staff infection control practices. For example, ACDC identified inadequate environmental cleaning, improper hand washing, and lapses in or a lack of process bundles designed to prevent central line associated blood stream infections, surgical site infections, and ventilator associated pneumonia.

It is not certain that the infections were all due to transmission within the hospital especially without a known organism source. The definition of positive culture after 48 hours after admission used for hospital acquisition of the organism may not represent the patient with an incubating or low level of infection who subsequently develops a defined Acinetobacter infection. No admission active surveillance cultures were performed on the cases, so the colonization status of cases prior to infection is unknown. The risk of Acinetobacter colonization on developing subsequent infection has not been established. However, in

the three outbreaks where hospitals did point surveillance, no colonized patients were identified, suggesting a low rate of colonization.

CONCLUSION

Overall the number of reported Acinetobacter outbreaks has been increasing. Though a thorough review of antibiotic resistance patterns was not performed, in many of the outbreaks, the organism was considered to be pan-resistant, often resistant to all antibiotics tested. Control of this organism has been shown to require a combination of judicious use of antibiotics, enhanced environmental cleaning, improved education and use of proven infection control measures such as process bundles to decrease healthcare associated infections, and lastly improved hand hygiene.

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HEPATITIS B OUTBREAK IN A SKILLED NURSING FACILITY

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BACKGROUND

Hepatitis B is a viral disease transmitted by contact with blood. In 2006, there were an estimated 46,000 acute cases in the United States (U.S.) and an additional 1.25 million people living with chronic Hepatitis B infection [1]. Infection with Hepatitis B can lead to serious sequel: 1% die of acute infection and approximately 40% are hospitalized. A total of 2-6% of adults who acquire acute infection with the virus develops chronic disease which can lead to liver failure, liver cancer, or death. Cases in children are rarely seen because of school vaccine requirements and aggressive follow-up of pregnant mothers who have chronic disease to ensure that their infants are fully vaccinated. In the U.S., the main adult risk groups are people with multiple sex partners, men who have sex with men, and injection drug users. Cases in adults >50 years are rare.

Healthcare associated Hepatitis B Virus (HBV) has been increasingly reported in the past 10-20 years. Outbreaks have been identified in long-term care facilities, mainly associated with sharing of diabetic testing equipment. A recent review of Hepatitis B in long-term care facilities revealed that all involved diabetic residents were associated with breaks in infection control, including using single-patient finger stick devices on multiple patients [2]. Outbreaks of Hepatitis B have also been associated with shared syringes and contaminated multi-use vials of medication. Outbreaks have been reported in homes for the developmentally disabled though the mode of transmission has not been well described. Since Hepatitis B has a long incubation period of up to six months, it is often difficult to conclusively identify a source.

In September of 2008, the Acute Communicable Disease Control Program (ACDC) of the Los Angeles County Department of Public Health (DPH) was notified of a single patient with a laboratory test indicative of acute Hepatitis B in a resident of a long-term care facility (Facility A). In October, the facility reported that two additional cases of acute Hepatitis B had occurred in patients between June 2008 and August 2008. None of the patients were diabetic and all were over 50 years. An investigation was begun to determine the cause of the outbreak and to implement control measures. Once the investigation identified a more extensive outbreak, investigators from the Centers for Disease Control and Prevention (CDCP) performed more extensive chart review and sent laboratory specimens for further analysis. This report will focus on the work performed by ACDC/DPH personnel.

METHODS

For this investigation, case definition of acute Hepatitis B was a patient who resided at Facility A anytime between January 2008 and December 2008 and who had a positive test for Hepatitis B IgM+ or a new test for Hepatitis B sAg, in the absence of previously documented chronic HBV infection. Case definition of chronic Hepatitis B was a patient who resided at Facility A between January 2008 and December 2008 who had a positive test for Hepatitis B sAg and a history of chronic HBV. A susceptible patient was one who tested negative for all markers of Hepatitis B infection. An immune patient was one who had a positive test for Hepatitis B sAb or Hepatitis B Ig total.

Setting: A 120-bed skilled nursing facility focusing primarily on people with mental health diagnoses with other chronic medical conditions.

Serological screening: ACDC tested the blood of all current residents for markers of Hepatitis B including IgM, sAg, sAb, and total Ab.

Additional case finding: For those residents between January and December 2008 who were not available to have their blood drawn, ACDC cross-referenced names against the Visual Confidential Morbidity (vCMR) database of all Los Angeles County residents who have been reported with acute or chronic Hepatitis B, as they are reportable conditions in California.

ACDC also sent the list of names to the California Department of Public Health to see if the former residents had been previously diagnosed with Hepatitis B in another jurisdiction in California. ACDC obtained the medical records of patients who had been discharged to acute care hospitals to see if their admissions were compatible with a diagnosis of acute Hepatitis B.

Chart review: ACDC reviewed charts of all patients who tested positive for acute Hepatitis B and reviewed the charts of 20 other non-case patients. Demographic information, medications, dates of blood draw, dental and podiatry visits were abstracted.

Case Interviews: ACDC interviewed cases with a standardized interview form, used for routine case investigation for acute cases of Hepatitis B in Los Angeles County. Questions included exposures to medications, sexual history and drug use history.

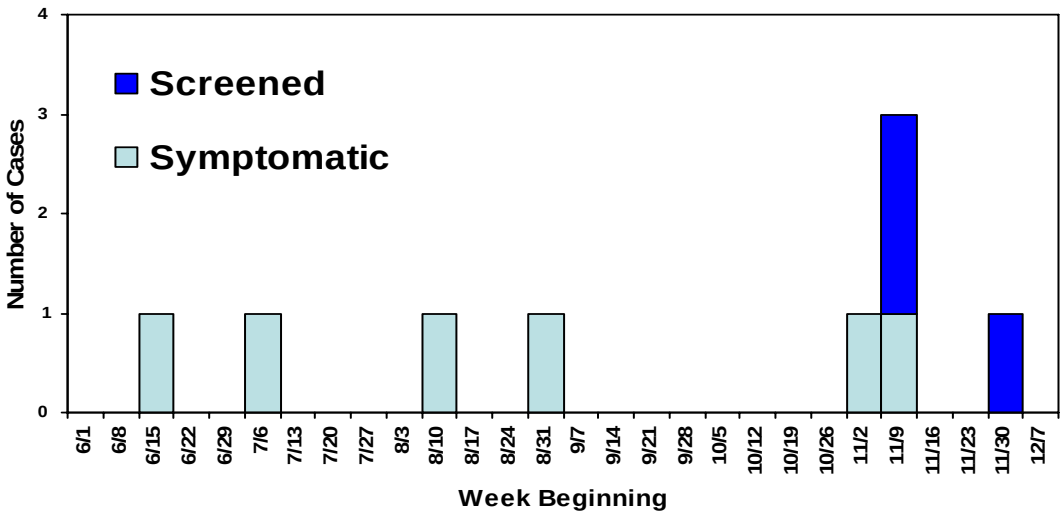
Infection Control Observation: Podiatry procedures were observed. Also inquired were finger stick, barbering, and nail cutting procedures. ACDC inspected the personal care cart used to hold shaving, cleaning, and nail cutting supplies.

Data and Statistics: All data were entered and managed in Microsoft Excel. Odds ratios and chi-square statistics were calculated using SAS v. 9.1, Cary NC and Epi Info 2000, Atl, GA.

RESULTS

A total of nine acute cases and five chronic cases were identified in current and former residents of Facility A. Five patients were symptomatic and tested positive for HBV IgM at Facility A. Review of the vCMR database revealed an additional patient with acute Hepatitis B who had been discharged over the summer. Upon serological screening of 120 residents, 9 (7.5%) patients tested positive for IgM, 5 of which had not symptoms; 3 (2.5%) patients were sAg+, 7 (6%) patients had evidence of immunity due to vaccination and 11 (9%) patients had evidence of prior HBV infection. The remaining 90 (75%) had no markers of Hepatitis B infection or vaccination. Two of the three current residents who tested positive for Hepatitis B sAg were in the local Hepatitis B registry. Review of vCMR database also identified an additional two discharged residents with previously reported chronic Hepatitis B. Review of the state Hepatitis B registry and of medical records for 21 of 37 former residents who had been discharged to acute care hospitals did not identify any other acute or chronic cases of Hepatitis B.

Figure: Acute Hepatitis B cases by means of detection and date of onset or diagnosis, Facility A, 2008



The onset of the symptomatic cases occurred between June-November 2008. The three asymptomatic cases were identified through serologic screening in November. Given an average onset of acute Hepatitis B from six weeks-six months, it appears that this may have been a point-source outbreak (Figure).

Chart Review: The acute cases were aged 49-72 years; six were male and three were female. Only one received finger sticks regularly to check blood glucose and four received injection medications during their incubation period but none of the medications or days of injections overlapped. Four had dentist appointments but none on the same day. None of the female cases had roommates with chronic or acute Hepatitis B. However, 5 of the male cases did have roommates with acute or chronic disease during their incubation periods.

Of the 5 chronic cases, 2 were female and 3 were male. Two of the chronic male cases were discharged early in the year and did not pose a risk of transmission for as long as the three other chronic residents, who resided in the facility from January to December 2008. One of the females received finger sticks regularly to check blood glucose levels. Two received injection medications and three had dentistry consults.

A cohort analysis revealed that male residents who were roommates of male residents who had chronic Hepatitis B or had acute Hepatitis B were more likely to be subsequently diagnosed with acute Hepatitis B. Of the six acutely infected male cases, five shared a room with a chronic case or a vermeil acute case. Males with a roommate who were acutely or chronically infected with Hepatitis were 14.6 times as likely to become acutely infected compared to males who did not have roommates ($p = 0.003$, 1.9-114.8, 95% CI). This increased risk was not found for the acute female cases all of whom had roommates who were neither acutely nor chronically infected.

Chart review revealed that five of the initial acute cases all had podiatry care on the same day in mid-March. On this day, one of the chronic cases (Patient A) also had podiatry care. The onset of these five cases occurred from mid June-mid November. Of the remaining four cases, one had podiatry care on the same day as Patient A in the beginning of October and had an onset of illness in mid-November, one had a reported sexual relationship with Patient A, one received finger sticks at the same time as Patient A, and one was a roommate of another acute patient who had podiatry care in March with Patient A.

One acute case had dentistry on the same day as a chronic case, but was unlikely the source of infection as the acute case was discharged two weeks later with acute Hepatitis B infection. There were no other overlapping risk factors between acute and chronic residents identified in the case chart review. All cases denied drug use or sexual contact with others at Facility A.

Infection Control Observations: ACDC observed the podiatrist perform routine procedures on residents at Facility A and identified breaches in infection control policies. There was a sink in the procedure room and hand washing protocols were generally followed. The procedure room was small and consequently, there was not sufficient counter space for the podiatrist (or dentist) to lay out their tools and separate contaminated tools from tools that had had no contact with patients. Furthermore, there was no dedicated sharps disposal container in the procedure room. After observing five patients receive procedures such as nail cutting and callous debridement, blood was visible on the skin of two of the patients. Used nail cutters, contaminated with blood, were placed in an open vinyl pouch on the counter next to the sterile nail cutters. Upon leaving Facility A, the podiatrist placed the open vinyl pouch into his medical tool box, potentially contaminating the surface of other medical equipment such as bandages, tape, and the sterile wrappers of the unused nail cutters.

ACDC also inspected the personal care cart which contained razors and personal use toe-nail clippers. Facility A does not allow patients to have individual razors; patients are issued individual disposable razors when they shave and these razors are thrown out after use. However, the nail clippers that patients use to clip their fingernails, or nurses use to clip patients' fingernails, are used repeatedly by multiple patients. The Facility says that it has a policy to wipe nail clippers with a disinfectant after each use. However, inspection of one of the nail clippers revealed nail clippings still caught in the clipper.

DISCUSSION

A total of nine acute Hepatitis B cases were identified in Facility A between September and December 2008. Additionally, five chronic Hepatitis B cases were also identified. The nature of the facility and residents in Facility A made this outbreak investigation unique from typical Hepatitis B outbreaks in skilled nursing facilities. Identifying a possible cause of the outbreak was difficult with a very mobile population that often interacts away from the watchful eye of staff members.

None of the traditional risk factors for Hepatitis B were identified as possible sources for the outbreak. Risk of infection through close household contacts was not a significant factor for this population, in part, because they are not confined to their rooms. Although assigned to the same rooms, residents wander throughout the facility and may interact with others more than their roommates. Routine distribution and disposal of individual razors and toothbrushes during grooming exercises also greatly decreased risk of infection via close contact.

The majority of acute cases received podiatry on March 19th, following Patient A. Podiatry has not previously been shown to pose a significant risk for transmission of Hepatitis B, especially in a skilled nursing facility. This outbreak highlighted how few infection control resources are available for podiatry care, especially for podiatry consultants. It also pointed out the importance of an appropriately designed procedure room in skilled nursing facilities to allow for ample space between designated clean and dirty areas to prevent the possibility of cross-contamination.

Infection control practices at Facility A, although adequate, still needed improvement. Since resident independence is promoted through grooming practices, it is vital that proper cleaning and disinfection of non-disposable grooming devices such as nail clippers be rigorously performed to prevent transmission of disease. It was also recommended that the facility follow the CDC's Recommended Infection Control and Safe Injection Practices to Prevent Patient-to-Patient Transmission of Bloodborne Pathogens for their diabetic patients.

CONCLUSIONS

ACDC conducted an investigation that included case identification, serological screening, additional case finding, chart review, patient interviews and an evaluation of infection control practices at the facility. A total of nine acute Hepatitis B cases were identified along with five chronic Hepatitis B cases. Previous investigations of acute Hepatitis B outbreaks in long-term care facilities have routinely involved diabetic patients and risk factors identified have been related to the care of the diabetic patient. In this investigation, these risk factors were not identified. Several breaks in infection control were observed including the mixing of dirty equipment with clean equipment during podiatry procedures and improper cleaning by the facility of non-disposable grooming devices such as nail clippers. It was found that the majority of acute cases received podiatry care on the same day as a resident who had chronic Hepatitis B. The findings of the investigation emphasize the need for long-term care facilities to establish an active, effective infection control program which includes observation of the infection control practices of consultants who deliver clinical services in the facility.

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MYCOBACTERIUM CHELONAE INFECTION FOLLOWING LIPOSUCTION

Moon Kim MD, MPH; Heidi Lee, PHN; Clara Tyson, PHN

INTRODUCTION

This report describes the investigation of a case of *Mycobacterium chelonae* infection following liposuction. Any known or suspected outbreaks of any disease are required to be immediately reported to public health[1]. After notification of this case, the Acute Communicable Disease Control Program (ACDC) at the Los Angeles County Department of Public Health (LAC DPH) conducted a case investigation, case finding, medical record review, environmental investigation, and laboratory investigation to determine if there were other cases of post-surgical atypical mycobacterial infections after receiving liposuction.

METHODS AND RESULTS

Case investigation: On November 12, 2008 an infectious disease (ID) physician at a local area hospital reported to ACDC a patient who had abdominal liposuction on August 30, 2008 at an outpatient medical office and was found to have subcutaneous abscesses with drainage from the anterior abdominal wall. The patient noticed "hard" red areas at the incision sites four weeks post-procedure, and first noticed drainage from the incision sites 6 weeks post-procedure. The patient was treated initially as an outpatient by the physician who performed liposuction with oral ciprofloxacin and telithromycin and subsequently intravenous (IV) cephazolin as an outpatient without any improvement. The patient was admitted to the hospital on November 4, 2008 and an aspirated subcutaneous abdominal abscess specimen obtained by the ID physician on November 7, 2008 showed 3+ acid-fast bacilli (AFB) on smear and culture grew *Mycobacterium chelonae*. The patient, who was interviewed by ACDC, had stated that the wounds were kept clean post-liposuction and denied immersing the wounds in water after the procedure.

Setting: Liposuction was being performed by one physician (board-certified in Internal Medicine with a valid license from the California Medical Board) in a single outpatient medical office. The office had 1 procedure room that was used for liposuction, flexible sigmoidoscopy, and esophagogastroduodenoscopy. There were a total of six(6) staff consisting of three (3) medical assistants (MA), two (2) oriental medical doctors, and the physician. The office staff and physician did not recall any differences in cleaning/sterilization of equipment or liposuction procedure steps during time of the case-patient's procedure compared to other patients who had liposuction.

Case finding: On November 13, 2008 a line list was obtained of all patients who had liposuction since May, 2008 when liposuction surgery first starting being performed by this physician at this outpatient office. Twenty-seven patients underwent 28 liposuction procedures from May 30, 2008 – November 15, 2008 (14 procedures done prior to the case-patient's procedure date of August 30, 2008 and 14 were done since August 30, 2008; one patient had liposuction done twice at different anatomic sites on different dates).

Medical record review was conducted on November 19, 2008. There was no documentation in the medical records of which staff were present during the liposuction procedure but the physician stated that it is usually himself, plus one other MA who is "sterile" and then one or two other MAs who are "non-sterile" documenting fluid aspirate volumes and times. Review of the liposuction procedures performed from May 30, 2008 through November 15, 2008 showed that all 27 patients followed up after their liposuction procedure within 1 week for stitch removal. After the one week stitch removal followup, patient follow-up varied from one month to three months post-procedure. Six patients had at least three months follow-up evaluation documented in the medical records, there was no documentation of infection at the liposuction wound sites. Sixteen patients between May 30, 2008 and October 4, 2008 had less than three months follow-up documented in the medical records. Five patients had liposuction performed after October 4, 2008 and had not yet reached their 2 and 3 month follow-up visits. Only one other patient (excluding the case-patient) who had liposuction since May 2008 was treated with antibiotics post-procedure. This patient was treated with antibiotics 1 week post-procedure but had no signs of infection at one month post-procedure follow-up according to the medical record review; telephone interview was conducted by ACDC with this patient, who reported no current signs or symptoms of infection. Of note, medical charting and phone conversations written in the medical records by medical assistants were in a

foreign language. Post-liposuction wound care instructions (e.g. do not bathe, touch wound, swim, etc.) were given verbally to patients but no written instructions were handed out for the patients to take home after the procedure.

Follow-up telephone interviews were conducted by ACDC on December 2 and 3, 2008 with the 16 patients who had received liposuction from May 30, 2008 through October 4, 2008 and had less than three months post-procedure follow up evaluation. None of these patients reported signs or symptoms of wound infection (e.g. fever, redness, "bumps" or nodules, drainage) at their liposuction sites and none had seen another physician due to concerns about their liposuction wound sites.

Because positive AFB tests are reportable under California Code of Regulations Title 17, Section 2505 to the LAC DPH Tuberculosis Control Program (TBC), ACDC contacted TBC to look for any positive AFB results from surgical wound sites. TBC's database was queried and did not show any other laboratory results of rapidly growing mycobacteria from surgical wound sites expect for that of the initial case-patient.

Environmental Investigation: On November 19, 2008 ACDC conducted a site visit consisting of a walk-through and interviews with the physician and office staff regarding the liposuction procedure including equipment cleaning and sterilization. The procedure room where liposuction was being performed was clean and orderly. There was one sink in the procedure room. Areas for cleaning/disinfection of equipment were separate from sterile equipment storage and medication preparation. The medical office did not have ice machines or water baths.

There was 1 liposuction machine (VASER®) bought new since May 2008, 1 tabletop steam autoclave (Validator 8®- Pelton & Crane Co.) several years old which had not undergone any repairs or preventive maintenance checks. Skin markings for liposuction preparation were done using sterile, single use markers that were included in sterile one time use procedure packs. The liposuction procedure was performed under local anesthesia using the tumescent technique under local anesthesia where normal saline IV bags are mixed with epinephrine (single use aliquots), lidocaine (multidose vial), and bicarbonate (multidose vial). The tumescent infusion solution was disposed of after each patient use. An open date was written (November 3, 2008) on one opened multidose lidocaine vial and there were no other open medication vials.

Single-use, disposal liposuction equipment consisted of the suction tubing, infusion tubing, and vacuum canisters. Reusable liposuction equipment consisted of skin ports, infiltrator cannulas, ultrasonic probes, suction cannulas (Figure 1), handpiece for cannulas, connectors, and a wrench (used to connect the handpiece). Reusable liposuction equipment was cleaned with soap and tap water with a bristle brush, then disinfected in CIDEX Plus™ (3.4% alkaline glutaraldehyde) solution by soaking for 30 minutes, then air dried, and steam-pressure autoclaved.

Infection Control: Office MA staff were trained by the manufacturer on cleaning, disinfecting, and sterilizing the liposuction equipment in May 2008 when the machine was initially purchased. Cleaning, disinfection, and sterilization of liposuction equipment were usually done primarily by one MA. Office staff indicated that sterilized equipment not used within two weeks, is re-sterilized prior to use.

The office did not have any written infection control policies or hand hygiene policies. The office did not have the manufacture's instructions for VASER® liposuction equipment cleaning, disinfection, and sterilization. There were no written procedures or logs for cleaning/disinfection of liposuction equipment and no written procedures or logs for autoclave sterilizing. The office did not have the manufacture's instructions for the autoclave and had never used biological indicators (monitors the effectiveness of the steam sterilization process) to assure sterilization as recommended by the autoclave manufacture's instructions (which were later obtained by ACDC). Indicator tape (adhesive tape used in autoclaving to indicate whether a specific temperature and pressure has been reached) was used on instrument bags and the physician and office staff were informed by ACDC that the indicator tape only showed that only a certain temperature was reached, not necessarily adequate sterilization.

The following was also noted: staff indicated they combine left over small 4 oz open bottles of povidone-iodine together, if needed, into larger containers; staff used cotton balls in small plastic containers moistened with alcohol for wiping tops of multidose vials instead of individual sterile alcohol wipes; MAs

describe assisting the physician in mixing and injecting intravenous cephazolin used for patients but it was unclear whether they had a direct role in administering any IV therapy; the physician indicated that during the liposuction procedure, he would insert the cannula into 70% isopropyl alcohol from an open bottle (non-sterile) and flush the suction cannula to dislodge tissue from ports then insert the cannula back into the patient for further suctioning.

Laboratory Investigation: The following environmental samples were taken for AFB testing: procedure room tap water, swabs from inside the faucet/aerator, autoclave reservoir water, autoclave distilled water, fresh CIDEX Plus™ disinfectant from an open container, opened containers of povidone-iodine gel, instrument cleaning brush rinse, and a container of cotton balls soaked in alcohol.

Procedure room tap water was AFB smear negative; culture grew *Mycobacterium gordonae*. The faucet and aerator swabs had 2+ AFB and 1+ AFB, respectively, and cultures for both grew *M. gordonae.* The remainder of the environmental specimens were AFB smear and culture negative.

DISCUSSION

Atypical mycobacterial infections have been associated with post-procedure skin and soft tissue infections including after cosmetic surgeries and outbreaks have been documented [2,3,4,5,6,7,8]. Potential sources of contamination reported in the literature were inadequate sterilization and rinsing of liposuction equipment with tap water, contaminated methylene blue used to mark incisions for face lifts, and contamination of the quaternary ammonium solution used to disinfect liposuction instruments [3,6,7,8]. *M. chelonae* can be found widely distributed in the environment in soil and water, including tap water. Facial procedures, abdominoplasty, liposuction, breast reduction or augmentation, mammoplasty, and nipple piercing have all been associated with cases of post-procedure infection with rapidly growing mycobacteria. Increased use of alternative medicine providers and increased numbers of procedures performed in freestanding surgical centers that are not routinely monitored by infection control committees or equivalent oversight bodies may be contributing factors [2].

Our investigation of this case of atypical mycobaterial wound infection following liposuction shows that it was likely an isolated occurrence as 100% case finding and AFB surveillance did not reveal any other infections. Although no other cases were found, proper cleaning, disinfection, and sterilization of liposuction equipment and other infection control issues at the office were of concern. The office did not have written procedures for processing reusable liposuction equipment, did not keep logs of using the autoclave for sterilization, and were not performing preventive maintenance checks or verification of sterility on the autoclave as recommended by the manufacturer.

In general, liposuction instruments by their nature (Figure 1) may be difficult to clean and proper sterilization steps need to be undertaken[9]. Decreasing lumen diameter and length are factors that affect the efficacy of sterilization and can impair sterilant penetration[10]; liposuction cannulas may retain unseen tissue posing sterilization difficulties[9].

Risk factors causing or contributing to infectious disease outbreaks in the outpatient settings that have been identified include: inadequate cleaning, disinfection, sterilization, and storage of instruments and equipment; inappropriate use of barrier equipment such as gloves by healthcare personnel; inadequate hand-washing practices by healthcare workers; failure to use aseptic technique; and lack of familiarity with established infection control practices on the part of ambulatory care personnel. Also, in the outpatient setting, the responsibility for implementing an infection control program is usually not assigned to a specific individual[11]. Following our site visit, our concerns regarding the absence of infection control procedures and the absence of equipment cleaning and sterilization procedures were discussed verbally with the physician. A letter was sent to the physician on December 8, 2008 summarizing the findings and making recommendations to improve his practice. These included developing an infection control policy; keeping written procedures and logs of cleaning, disinfecting, and sterilization procedures which are consistent with the manufacture's recommendations; performing preventive maintenance on the autoclave according to the manufacturer's instructions; and using biologic indicators to assure sterilization.

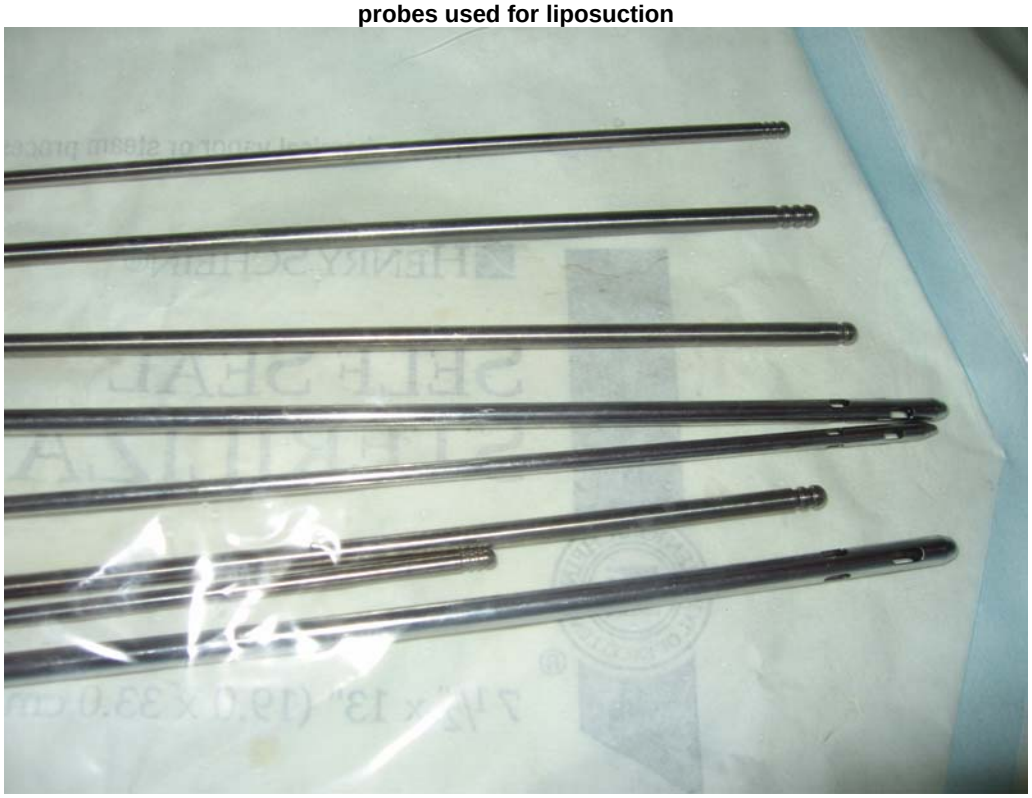
Regarding antiseptics and sterilization, we recommended the following: utilize single-use alcohol prep pads for cleaning multidose vials instead of cotton balls soaking in alcohol containers; avoid mixing/combining antiseptic solutions unless it is according to the manufacturer's instructions; and while performing liposuction, to only use sterile solutions or irrigations (not non-sterile bottles of isopropyl alcohol) to flush ports on previously sterilized liposuction equipment.

We also recommended that the physician provide patients with written, take home post-liposuction wound care instructions in the patient's preferred primary language which include instructions on avoidance of bathing or soaking wounds in water for the instructed time period. Additionally, the physician was instructed to review the duties of medical assistants; MAs may not place the needle or start and disconnect the infusion tube for IV therapy as these procedures are considered invasive, and therefore, not within the medical assistant's scope of practice. Medical assistants are not allowed to administer medications or injections into the IV line[12].

Although there have been many cases of atypical mycobacterial infections reported in the medical literature due to contamination during liposuction or other cosmetic procedures, a thorough investigation did not reveal any other cases nor a source for *M. chelonae* associated with this office. It is possible that the case-patient acquired the infection through an environmental source outside this particular office. However, since there were several infection control issues of concern and because the incubation period for atypical mycobacterial infections can be prolonged (the range has been reported to be from 2 weeks to 20 weeks [2]), the physician was reminded to be vigilant for any further wound infections in patients post-liposuction and to notify ACDC of any patient with wound infection post-liposuction.

Plastic surgeons and dermatologists are the types of physicians who most often perform liposuction, but any licensed physician may perform the procedure. While some physicians' professional societies recommend standardized training for such procedures, there is no standardized training required for liposuction[13]. Outpatient medical offices are also not routinely monitored by oversight bodies or infection control committees as are hospitals and outpatient surgical centers[14]. Due to this and other factors [2,15], lapses in infection control specifically in these outpatient settings may result in outbreaks [11,14,16]. Our findings during the investigation at this medical office further highlight the unaddressed infection control monitoring problems in outpatient settings.

Figure 1: Close up view of ports of reusable suction cannulas (with openings at the right end) and ultrasonic probes used for liposuction



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METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* ACTIVE SURVEILLANCE PRACTICES IN ACUTE CARE HOSPITALS IN LOS ANGELES COUNTY, 2008

Ashley Peterson, MPH; Patricia Marquez, MPH; Dawn Terashita, MD, MPH

BACKGROUND

Since its emergence in health care facilities in the 1960s, methicillin-resistant *Staphylococcus aureus* (MRSA) has become a leading cause of healthcare-associated infections and is associated with significant morbidity, mortality and increased costs of care. In 2003, it was estimated over 60% of Intensive Care Unit (ICU) patients with *Staphylococcus aureus* have MRSA [1]. Additionally, colonization with the organism is a risk factor for developing infection in severely ill patients [2].

Prevention of MRSA transmission within acute care hospitals has become a focus of many infection control programs but has been complicated by an influx of patients with community-associated and hospital-associated colonization and infection. Laboratory-based active surveillance (AS) for MRSA has been proposed as a method to screen and identify these patients as an important first step in implementing appropriate control measures to reduce transmission and to prevent colonized patients from developing severe infections. Research on the efficacy and cost-effectiveness of MRSA AS remains divided [3,4]; however, several states have adopted legislation requiring the reporting of or screening for MRSA.

In light of pending California legislation mandating the screening of high risk patients for MRSA, Los Angeles County (LAC) Department of Public Health Acute Communicable Disease Control (ACDC) administered a survey to infection preventionists (IPs) in all acute care hospitals in LAC to assess the current status of MRSA AS. Since completion of this survey, California has enacted legislation, Senate Bill 1058 of 2008, now Chapter 296, Sections 1255.8 and 1288.55 in the Health and Safety Code.

METHODS

The internet based SurveyMonkey© software was used to create and distribute a 29-question survey to IPs at all 102 LAC acute care facilities via email. Using features of SurveyMonkey©, the questionnaire was designed with skip logic to alter questions observed by the respondent based on the respondent's previous answers. Respondents were given one month to complete the questionnaire, from March 24, 2008 to April 21, 2008. During this one month period, LAC Department of Public Health liaison public health nurses (LPHNs) contacted respondents to encourage completion of the survey. Three weeks after survey collection began, on April 14, 2008, non-responders were sent a notification email requesting they complete the survey.

Respondents were asked if their facility was performing any self-defined active surveillance. If not, respondents were taken directly to the end of the questionnaire and asked about plans to begin active surveillance. All other respondents were asked about the type of active surveillance being performed, targeted populations, laboratory testing methods and time to results. Respondents were also asked about the patient environment prior to and after test results are available. Information was requested regarding who is notified of active surveillance results and any subsequent education regarding care of MRSA positive patients including education of patients, family members and other receiving facilities. Presence of active surveillance evaluation plans was also determined. Definitions of AS, MRSA, common infection control terms, and laboratory terms were not provided. Finally, ACDC assessed other bacteria for which hospitals routinely perform AS.

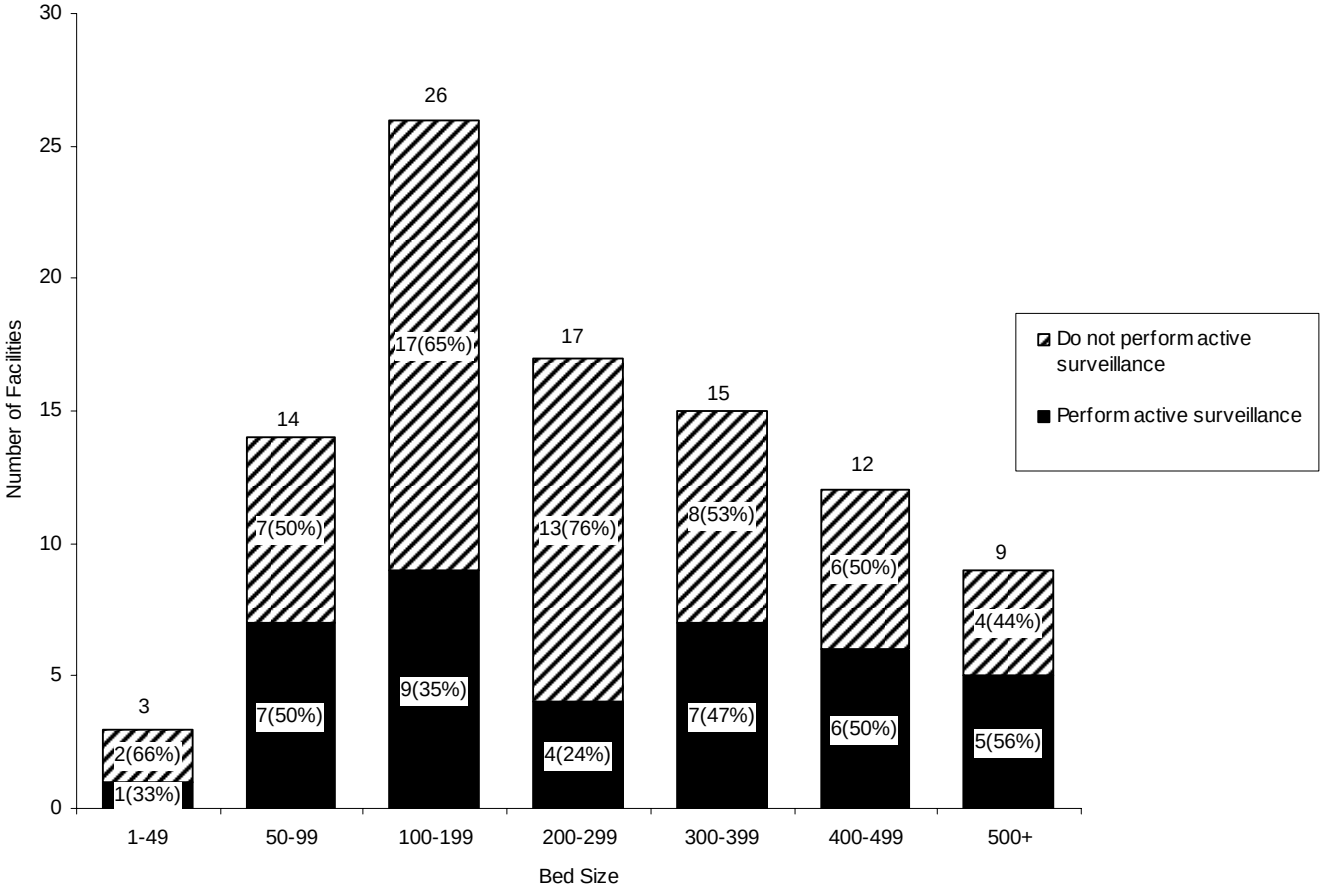
Following review of completed questionnaires, verbal contact may have been made with individual respondents to clarify free response answers or to adjust inappropriately completed questionnaires.

Data collected by SurveyMonkey© was downloaded into MS Access and imported into SAS version 9.1 for analysis. No incentive was provided to respondents.

RESULTS

Ninety-six acute care hospitals completed the survey yielding a 94% response rate (N=102). Thirty-nine (41%) hospitals were performing some kind of MRSA AS. Performance of MRSA AS was analyzed by bed-size category. No trend was observed between categories but ranged from 24-56% of hospitals in each category. The highest proportion of hospitals performing MRSA AS was seen in the 500+ bed-size hospitals, with 56% (Figure 1).

Figure 1: Los Angeles County acute care facilities active surveillance practices by facility bed size (n=96).



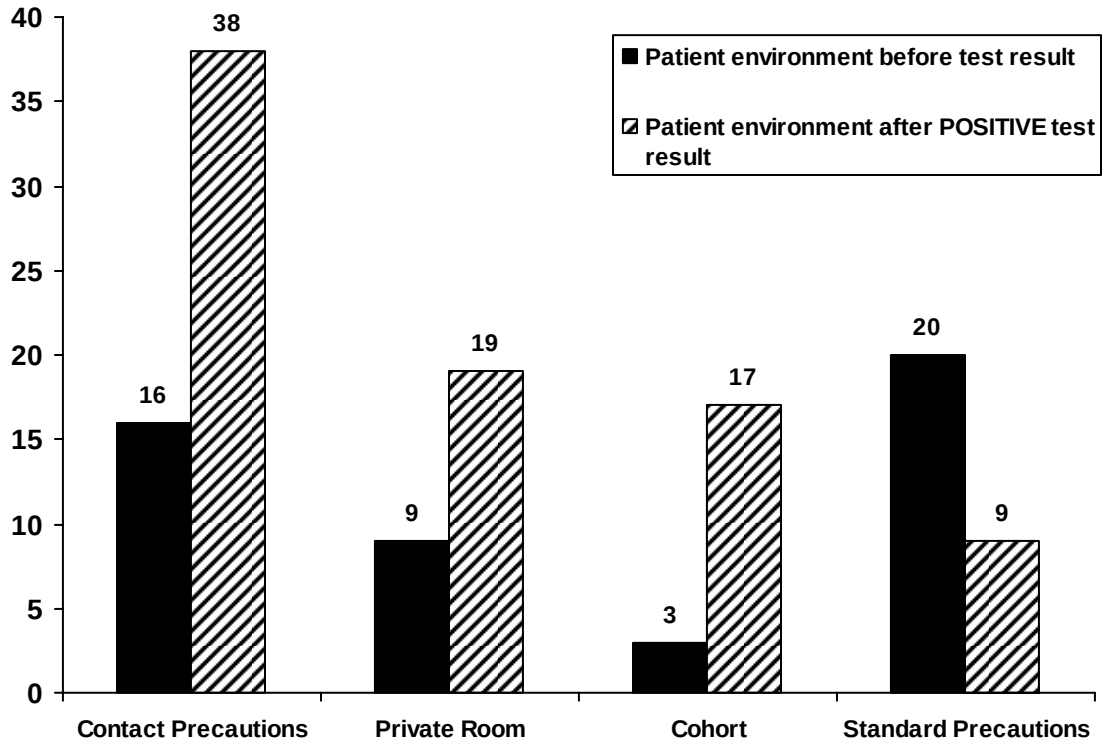
Among the 39 hospitals conducting MRSA AS, eight (21%) reported conducting universal surveillance in which they screen all patients. The remaining 31 (79%) hospitals were conducting targeted surveillance in which only select patient populations were screened. The most frequently indicated screening criteria listed included hospitalization in the ICU, history of colonization and/or infection, and presence of skin/wound infection. (Table 1)

All 39 (100%) AS hospitals performed testing upon patient admission. Some hospitals also tested upon patient transfer to another unit within the facility (8, 21%), as well as at patient discharge (9, 23%). Testing methods vary but the majority (34, 87%) of hospitals used only culture methods to screen for MRSA. A small number of hospitals used only molecular methods directly on specimens (3, 8%), and 2 facilities (5%) used both culture and molecular methods. Of the 36 respondents using culture methods, chromogenic agar (e.g., CHROMagar™) was the most frequently reported medium used (14, 39%) with oxacillin resistance screening agar (ORSAB) the next most frequent (10, 28%). Of the five hospitals using molecular methods, four (80%) reported using PCR. For hospitals using culture methods, results were available within 24-48 hours compared with 2-24 hours reported for hospitals using molecular methods. Higher costs associated with molecular methods was often cited as the reason for use of culture methods for MRSA screening.

Table 1. Criteria used by LAC acute care hospitals in targeted AS (n=39)	
Criteria	Number of hospitals n (%)
Hospitalization in ICU	18 (46)
History of colonization/infection	14 (36)
Presence of skin/wound infection	12 (31)
Transfer from all long-term care hospitals	11 (28)
Transfer from other acute care facility	8 (21)
Other	6 (15)

Patients were placed in contact precautions in 16 (41%) AS hospitals prior to MRSA AS results becoming available and in 38 (97%) AS hospitals after positive MRSA results. Patients were placed in standard precautions in 20 (51%) AS hospitals prior to MRSA AS results becoming available and in 9 (23%) AS hospitals after positive MRSA results. Private room and cohort environments were also assessed. (Figure 2) The IP was the person responsible for taking action on MRSA AS results (reported 26 times), but in most instances a combination of the IP, the charge nurse and the patient's physician determined the next courses of action (reported 33 times). In two hospitals, the infectious disease physician and an MRSA coordinator were indicated as the persons responsible for actions taken after MRSA AS results are available. These two facilities voluntarily reported having an MRSA coordinator separate from their IP(s) in the free-response portion of this question.

Figure 2. Patient environment before and after results of MRSA AS (n=39).



Assessment of decolonization practices revealed that 22 hospitals (56%) conducting MRSA AS did not decolonize patients identified as MRSA positive. Three hospitals (8%) always decolonize their patients and 14 (36%) decolonize based on patient characteristics (Table 2). Three hospitals indicated criteria to decolonize was decided by the patient's physician but did not disclose the criteria. The most frequently cited patient characteristic to call for decolonization was being a cardiac surgery patient. Of the 17 hospitals that decolonize their patients, a combination of methods was used. Intranasal mupirocin, chlorhexidine wash and use of oral/IV antibiotics were each listed seven times, the most common combination being intranasal mupirocin with chlorhexidine wash. Free responses to this question included one facility reporting use of topical antibiotics for wound infections only and another facility reporting use of Provon® body wash on all admissions.

Table 2. Patient characteristics determining decolonization upon positive MRSA testing

Patient Characteristics	Number of Hospitals
Cardiac Surgery Patient	4
Physician Discretion	3
Other*	3
Recent C-section	1
Solid Organ Transplant Patient	1
Bone-marrow Transplant Patient	1
Burn Patient	1

*Other – Presence of infected wound, patient acuity, and patients being discharged to home

The most common reasons hospitals performed AS were to prevent MRSA transmission (32, 92%), to reduce rates of MRSA in their hospitals (26, 67%), and to determine incidence and prevalence of hospital-acquired versus community-acquired MRSA infections (18, 46%). Also indicated, though not as frequently, were concerns regarding new federal Medicaid regulations that will block reimbursement of the facility for hospital acquired infection costs (10, 26%).

The most frequently reported organism for which hospitals routinely performed surveillance was vancomycin-resistant enterococcus (VRE) (22, 56%). Twelve (31%) hospitals also reported doing methicillin-sensitive *Staphylococcus aureus* surveillance. Other organisms being surveyed included *Clostridium difficile* (10, 26%), Acinetobacter spp. (9, 23%), and multi-drug resistant gram-negative rods (9, 23%).

Of the 55 hospitals not performing MRSA AS at the time of survey, 46 (84%) had had internal discussions on the matter. Twelve (26%) of the 46 hospitals planned to implement some form of AS in their facility within 1-12 months of the survey completion date. Twenty-seven (59%) facilities that had discussed MRSA AS did not have additional details. Seven (15%) hospitals stated they had no plans to implement active surveillance for MRSA. Reasons for this decision varied; however, most cited limited IP resources, no demonstrated cost-benefit of such surveillance, and cost of material resources as barriers to MRSA AS. One facility reported its cost estimate of implementing MRSA AS at upwards of $250,000 to screen all admitted patients using a rapid method. Many respondents also felt that other organisms such as VRE and *Clostridium difficile* represent a greater problem in their facility. In addition, numerous hospitals reported having space constraints, limited staffing resources, and patient care concerns which could not support patient isolation practices pending MRSA AS results.

DISCUSSION

The response rate was very high (94%) due to the efforts of the liaison public health nurses with hospital IPs and the controversial nature of this topic and the pending legislation. The small number of non-respondents limits the effect of any response bias on the results.

A significant limitation of this survey was the lack of an accompanying dictionary of terminology. A definition of active surveillance was not provided and three hospital IPs indicated that their hospitals did not perform MRSA AS when, according to subsequent responses, they did. In addition, some respondents used the term universal surveillance when in practice they performed targeted surveillance. The method in which the survey was disseminated was another limitation. However, in follow-up conversations with hospital IPs, ACDC was able to correct any confusion the survey distribution method introduced.

Unfamiliarity with laboratory test names and other laboratory terminology also proved to be a significant limitation; the response 'check with lab' was given several times when asking which methods their laboratories used to screen for MRSA. However, this provided an opportunity for IPs to become familiar with laboratory procedures associated with MRSA AS.

What was initially an example of unfamiliar terminology actually became an interesting finding. In assessing the use of standard and contact precautions, three hospitals did not indicate use of either before MRSA AS results are available. In fact, national standard guidelines require the use of standard precautions on all patients in all situations. This finding was concerning as the first step in effective infection control is grasping the associated terminology.

What is evident from the survey is the variety of MRSA AS implementation methods in LAC hospitals. As with any methodology, differences in implementation will result in differences in limitations and in efficacy. It must recognize that facilities will have varying success rates at preventing hospital-associated MRSA infections given their method of MRSA AS.

Many IPs commented that organisms other than MRSA were of greater concern and were more of a problem in their facilities. Consequently, it is apparent that MRSA infections are only a part of a greater problem of multidrug-resistant organisms (MDRO). Addressing the issue of all MDROs requires focus on these other organisms as well as MRSA.

CONCLUSION

An on-line survey was administered to IPs of the 102 acute care hospitals in LAC. Forty-one percent of respondents were conducting MRSA AS at the time of the survey. Many hospitals not currently performing AS reported they had discussed surveillance of MRSA in their facility. Since completion of the survey and enactment of California legislation, all hospitals are now required to screen select patients for MRSA.

Despite the large number of hospitals performing AS, the benefit of AS is controversial. It is unknown if actively screening for MRSA will limit transmission in hospitals, reduce associated morbidity and mortality, or limit outbreaks of this organism. Further cost-benefit analysis is warranted to objectively assess whether the benefits of knowing a patient's infection/colonization status offset the demonstrated costs.

This survey has prompted much discussion regarding mandated AS. In the absence of literature supporting MRSA AS as an effective method of controlling MRSA transmission in hospitals, California's choice to adopt MRSA AS legislation is an example of policy driven healthcare as opposed to science driven healthcare. Patient safety is the primary concern of hospitals. Simultaneously adhering to this legislation and working to decrease healthcare-associated infections has been difficult as demonstrated by many of the answers to the survey. Public health departments can perform an important role during these difficult transitions by facilitating communication and interaction between hospitals in response to emerging Public Health concerns.

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RESPONSIVENESS OF PUBLIC HEALTH PHYSICIANS ON-CALL: ANALYSIS OF LOS ANGELES COUNTY CALL OPERATOR DATA FOR 2007

Ramon E. Guevara, Ph.D., MPH

INTRODUCTION

The Los Angeles County (LAC) Department of Public Health (DPH) processes emergency calls made after regular business hours through the LAC Call Operator, who attempts to reach the assigned physician on-call to respond to the emergency. Since the bioterrorism preparedness efforts after September 11, 2001, the national goal for response to emergency calls by local public heath agencies has been 30 minutes or less [1]. Recently, LAC DPH Acute Communicable Disease Control Program (ACDC) has performed quality assurance by guising planned calls as emergency calls to measure the responsiveness of the department. This report emerges from an interest in exploring the LAC Call Operator data as an alternative method to measure the responsiveness of LAC DPH to emergency calls received outside of regular business hours. Furthermore, a description of how the data might be used for quality assurance and control purposes will be presented.

METHODS

The LAC Call Operator data is entered and stored in a computer database as emergency calls arrive and updates are made regarding the progress in the attempts to reach the physician on-call and the final resolution of the call. While the data exists electronically, it is not directly transferable to a standard database application such as Microsoft Access, Microsoft Excel, or SAS. As such, the LAC Call Operator provided their data for 2007 on a 20-page printout. Inquiries about missing data within records, such as when the resolution of the call was not indicated, were explained by the Call Operator as faults of the computer system database.

After a review of the data to determine measurement categorization and analysis, a Microsoft Access database was developed for data abstraction. Based on the available data, ACDC created the following fields: unique ID, page in the 20 pages, month of call, day in the week of call, date-time of call, date-time of operator connecting to the physician on-call, caller type, reason of call, physician recipient, and missing date-time of connection to the physician on-call. Categories for caller type were 1) hospital, 2) urgent care/emergency department, 3) sheriff/police of any jurisdiction, 4) medical professional, 5) other LAC agency (not sheriff/police), 6) public, and 7) other. Categories for reason of call were 1) report illness, 2) request for information/advice on current case, 3) advice for possible case/exposure, 4) report/request information/advice: possible OB (outbreak), 5) TB (tuberculosis) clearance, 6) advice/information on medicine/therapy, 7) other, and 8) not specified/unknown. Selection of categories for each entry were based only on available information in the data and performed by the same person for consistency. When the physician on-call was not listed in the call details, records of the same day or weekend were used to identify the physician on-call; otherwise, the physician on-call was categorized as “unknown/not specified.”

SAS 9.1 was used for data analysis, particularly to look at the distribution of response time, which was defined as date-time the emergency call was received by Call Operator to the date-time the Call Operator connected to the physician on-call (not the pager or voicemail, but the actual person assigned as the physician on-call).

RESULTS

The Call Operator data had 235 entries for 2007. Of these records, 52 (22%) were missing information on when the Call Operator connected to the physician on-call. For 183 entries, the median time to connect to the physician-on-call was seven minutes (range of one to 292 minutes) (Figure 1). One-hundred sixty (87%) of these calls were connected to the physician on-call within 30 minutes. However, 23 (13%) calls took longer than 30 minutes to connect to the physician on-call (Table 1). The five longest times to

connect to the physician on-call were 292, 246, 194, 177, and 69 minutes. Table 1 presents how the data on calls with long response time might be used for quality control.

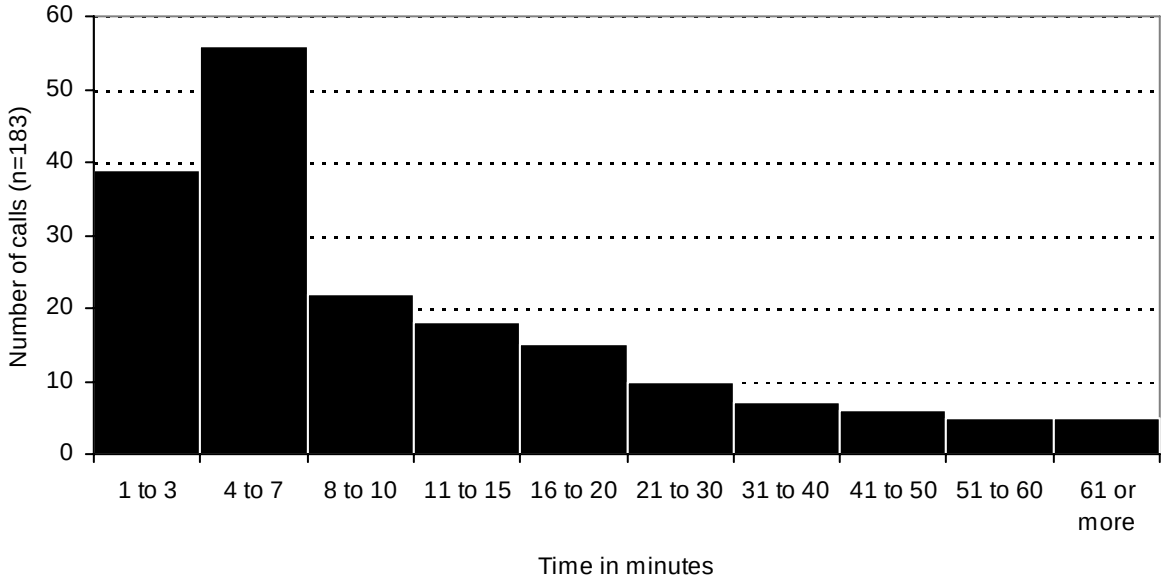

Figure 1. Minutes to connect emergency call to physicans on-call during non-office hours (during holidays, weekends, and weekdays 5pm - 8am), Los Angeles County Call Operator data for 2007. Median time was seven minutes (range one to 292 mintues).

Table 1. Details for the emergency calls (N=23) requiring more than 30 minutes for the Los Angeles County (LAC) Call Operator to connect to the physician on-call during non-office hours in 2007

Minutes to connect	Month	Day	Time	Caller type	Reason	Physician*
292	Jun	Sat	12pm - 5:59pm	Hospital	Info/advice on current case	0
246	May	Sun	12am - 5:59am	Sheriff/Police of any jurisdiction	Possible case/exposure	1
194	Jan	Sat	12pm - 5:59pm	Urgent Care/ ER	Report illness	2
177	Apr	Mon	12am - 5:59pm	Urgent Care/ ER	Possible outbreak	0
69	Aug	Sat	12pm - 5:59pm	Hospital	Tuberculosis clearance	2
58	Feb	Fri	12pm - 5:59pm	Other LAC agency (not police/sheriff)	Other	3
57	Feb	Mon	12pm - 5:59pm	Hospital	Tuberculosis clearance	3
57	Jun	Sun	12pm - 5:59pm	Hospital	Advice on medicine/therapy	4
55	Jan	Sun	6am - 11:59am	Med. professional	Report illness	5
52	Aug	Fri	12pm - 5:59pm	Hospital	TB clearance	0
48	Dec	Tue	6am - 11:59am	Hospital	Info/advice on current case	6
48	Aug	Sat	12pm - 5:59pm	Hospital	Info/advice on current case	0
47	Apr	Fri	6pm -11:59pm	Hospital	Info/advice on current case	4
44	Dec	Sun	6am -11:59am	Hospital	Info/advice on current case	6
44	Jan	Sat	12pm - 5:59pm	Med. professional	Possible case/exposure	4
44	Jan	Sat	12pm - 5:59pm	Hospital	Possible outbreak	2
40	Sep	Thr	12pm - 5:59pm	Hospital	Other	0
39	Oct	Sun	12pm - 5:59pm	Hospital	Tuberculosis clearance	3
36	Mar	Thr	6am - 11:59am	Public	Possible case/exposure	3
34	Jun	Fri	12am - 5:59am	Urgent Care/ ER	Possible case/exposure	7
34	Jul	Mon	12pm - 5:59pm	Hospital	Info/advice on current case	0
34	Oct	Sat	12pm - 5:59pm	Other	Advice on medicine/therapy	3
31	Dec	Fri	12pm - 5:59pm	Med. professional	Possible case/exposure	7

*Names of the physician on-call were masked for this table, 0=Unknown/Not specified

The rest of the results are presented from a quality assurance and control perspective. Hospitals were the most common caller type (n=98, 42%) in 2007 (Table 2). Advice for possible case/exposure was the most common reason for the call (n=66, 28%) (Table 3). Out of 38 calls from the sheriff/police (Table 2), 33 were made to seek advice for possible case/exposure. The sheriff/police made 50% of the calls pertaining to possible case/exposure (Table 3). Physician on-call was unknown/not specified for 80 (34%) of 235 emergency calls.

Regarding calendar time, June (n=30 calls), October (n=27), and November (n=27) had the most emergency calls outside of regular business hours (Figure 2). Saturday, Sunday, and Friday had the most number of calls (Figure 3). Most of the emergency calls from Saturday to Monday were between 12pm and 5:59pm, and from Tuesday to Friday were between 6pm and 11:59pm.

Table 2. Caller types (N=235) of the LAC Call Operator during non-office hours, 2007

Caller type	Number	Percent
Hospital	98	41.70
Sheriff/police of any jurisdiction	38	16.17
Urgent Care/ER	27	11.49
Medical professional	25	10.64
Other LA County agency (not police/sheriff)	17	7.23
Other	20	8.51
Public	10	4.26

Table 3. Reasons for calls (N=235) to the LAC Call Operator during non-office hours, 2007

Reason for call	Number	Percent
Advice for possible case/exposure	66	28.09
Report illness	41	17.45
Request for info/advice on current case	38	16.17
TB (tuberculosis) clearance	26	11.06
Other	23	9.79
Report/request info/advice: possible outbreak	20	8.51
Advice/info on medicine/therapy	15	6.38
Not Specified/Unknown	6	2.55

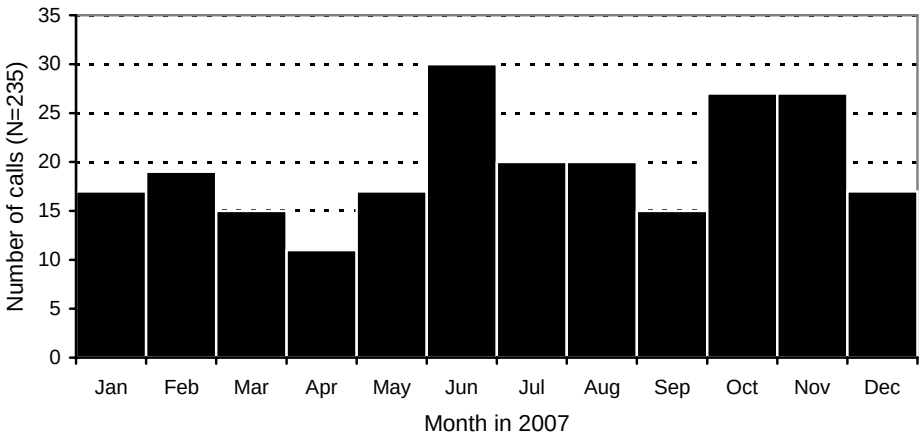

Figure 2. Number of emergency calls (N=235) outside of non-office hours to the Los Angeles County Call Operator by month in 2007.

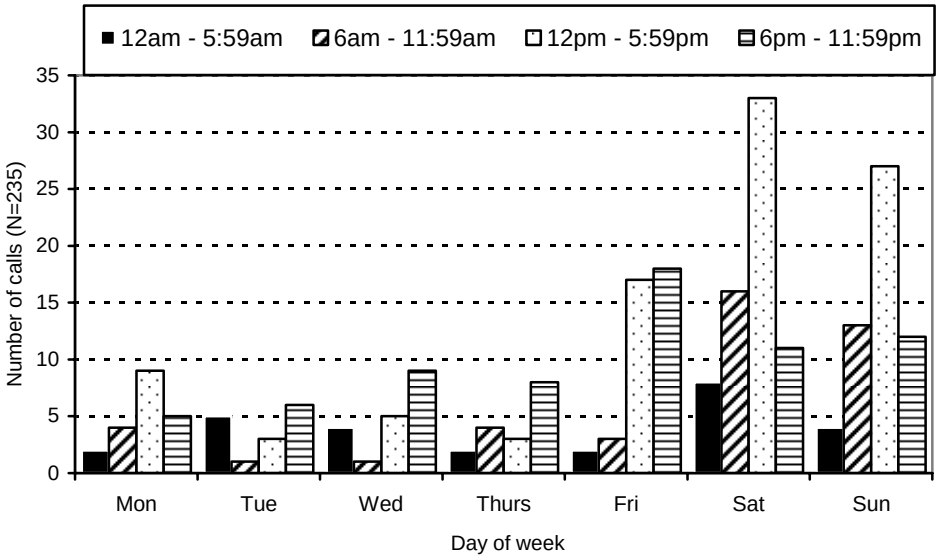

Figure 3. Number of calls (N=235) outside of non-office hours (holidays, weekends, and weekdays between 5pm and 8am) to the Los Angeles County Call Operator by day and time of day in 2007.

DISCUSSION

The accuracy, completeness, and non-transferability of the LAC Call Operator data are issues to be considered when regarding the data as a source to measure quality assurance. The details of the call are sometimes vague and categorizations can change with more specifics. For example, a call about a current case wanting to leave the hospital can change to a call about TB clearance with one mention of TB. Regarding completeness, details of the call are sometimes truncated or not entered. The details missing the most were time of connection and which physician was connected to the call. Finally, the Operator data could not be transferred into a database file and had to be manually entered. This was the most time-consuming part of this effort and took about an hour of data entry per page. The absence of transferability also allowed for data entry errors which had to be corrected during the analysis. In addition, the pages received from the LAC Call Operator had to be copied and adjusted in the photocopier because the call log came as one long sheet that folded between call entries.

LAC DPH may want to review or revise the standard operating procedures with the Call Operator and ACDC to prevent emergency calls from taking more than 30 minutes to get connected to a DPH physician. However, recommendations to decrease the response time of the physician on-call or to ensure a response within a certain time period are outside the scope of this report.

In summary, 87% of 183 calls were connected by the LAC Call Operator to the physician on-call within 30 minutes and the median response time for all emergency calls made outside of regular business hours was seven minutes. In addition, using the Call Operator data as source for quality assurance is a feasible alternative to making planned calls guised as emergency calls if new staff resources are made available to establish an efficient and routine system of data collection, analysis, and reporting. Finally, the results of this report are presented as a guide to perform quality assurance and control, and as a source of information for emergency call-related issues the LAC DPH might want to explore to improve emergency call management. LAC DPH aims to improve in responding to all emergency calls in a timely manner.

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REDDINET® TOOL FOR SITUATIONAL AWARENESS: SAN FERNANDO VALLEY WILDFIRES

Patricia Araki, MPH and Bessie Hwang MD, MPH

INTRODUCTION

During October of 2008, the Marek and Sesnon wildfires scorched nearly 15,000 acres of land and spread throughout the San Fernando Valley destroying fifteen residences and sixty three non-residential buildings [1]. ReddiNet® is a biosurveillance project which polls 65 participating hospitals throughout Los Angeles County on a daily basis to assess Emergency Department (ED) volume data. In order to gauge the burden of ED visits attributable to the wildfires, a special polling question was created and distributed to select ReddiNet®-participating hospitals within close proximity to the wildfire locations.

METHODS

On three consecutive days after the beginning of the wildfires, fifteen hospitals within geographic proximity were asked to additionally report the "Number of ED patients complaining of upper respiratory problems resulting from exposure to smoke/fire related particles". The questions were open to responses for one week from the date of posting, and no advanced warning or notification was given prior to posting of the additional question.

RESULTS

Data were received from 8 of the 15 hospitals (53.3%) (Table 1). Results from the eight hospitals show wildfire-related ED visits ranging anywhere from 0 to 10 per hospital, with a total of 20 visits observed overall for October 13. In contrast, visits for October 14 only totaled 7, with 6 hospitals reporting no visits, and two hospitals reporting more than 3 visits each. Only one hospital reported seeing any wildfire-related ED visits on the third day. The average number of wildfire-related ED visits seen on the first day was 2.5 per hospital (Table 2). This number dropped to less than one for the second and third days, collectively, which suggests that the burden of wildfire-related ED visits occur early, most likely due to sudden changes in air quality, especially for chronic respiratory or asthmatic sufferers, and larger initial exposure population (pre-evacuation). The total number of visits reported for all three days was 28. This, however, is likely an underestimate, given that there were a few hospitals in closer proximity to the wildfires than those reporting wildfire-related ED visits which did not respond to the poll.

Table 1. Number of wildfire-related ED visits reported per hospital for October 13-15, 2008

Hospital	Oct. 13	Oct. 14	Oct. 15	Total Visits
A	10	0	0	10
B	0	0	0	0
C	1	0	1	2
D	4	4	0	8
E	4	0	0	4
F	0	0	0	0
G	1	3	N/A	4
H	0	0	0	0
Total Visits	20	7	1	28

Table 2. Average number of wildfire-related ED visits per hospital and reporting date	
Day (Date)	Avg. per hospital
Monday, October 13, 2008	2.5
Tuesday, October 14, 2008	0.875
Wednesday, October 15, 2008	0.14

Reporting by the eight hospitals was highly consistent, with only one non-reporting hospital on October 15. Timeliness of reporting for October 13 ranged anywhere from 1 to 3 hospital responses per day, with complete reporting within four days. October 14-15 had similar rates of reporting, with the majority of hospitals responding within the first 24 hours (Table 3). The increase in timeliness of reporting between October 13 and those of October 14-15, collectively, may be a reflection of the hospitals' late observance of the additional polling question due to there being no prior training, notification, or warning. Consistency in reporting and thoroughness of responses throughout the exercise demonstrate high reliability by hospitals that choose to participate.

Table 3. Timeliness of reporting: no. of hospitals reporting per day (cumulative percentage)			
No. of hospitals Reporting (%):	Oct. 13	Oct. 14	Oct. 15
Within 1 day	1 (12.5)	5 (62.5)	5 (71.4)
Within 2 days	2 (37.5)	2 (87.5)	1 (85.7)
Within 3 days	3 (75)		
Within 4 days	2 (100)		
Within 5 days			
Within 6 days		1 (100)	1 (100)
Total	8	8	7*
*Total number of hospitals reporting for Oct. 15 was 7.			

DISCUSSION

Currently, no special polling sections exist on the ReddiNet® system. As a result, all additional polling questions presented to hospitals appear in the same font, font size, and text as all other daily polling questions. Future improvements may include the development of an additional polling section which will alert users when a special poll is being conducted.

Overall, this exercise provided a baseline for measurement of participation and response to any future special polls administered via the ReddiNet® system. Results from the exercise suggest possible increases in participation through regularly administered practice polls. This may breed familiarity for staff members entering data. In addition, improved communication with individual hospital staff responsible for entering polling data (e.g., email lists of key hospital staff) should be established for sufficient hospital notification of special polls or updates. With the stated improvements, the future shows promise for using this instrument to assess near real-time burden of ED visits attributable to large outbreaks, pandemics, and many other local public health emergencies.

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A CASE OF CONGENITAL RUBELLA IN LOS ANGELES COUNTY

Alvin Nelson El Amin, MD, MPH; Idriss Fassasi, MPH; Vi Nguyen, MPH; Dulmini Kodagoda, MPH

BACKGROUND

Women who are non-immune to rubella and who become infected with rubella during pregnancy are at risk for delivering an infant with Congenital Rubella Syndrome (CRS). About 85% of infants born to women that were infected with rubella during the first trimester of pregnancy will be affected. Congenital rubella can be a devastating disease with multi-organ involvement and severe congenital defects. Deafness is the most common single manifestation of congenital rubella; however, many infants will also have severe eye defects including cataracts and structural heart disease. These three features are the hallmark of CRS. Neurologic abnormalities, bone lesions, splenomegaly, hepatitis, and thrombocytopenia are also common.

The last major rubella epidemic in the US occurred in 1964-1965, during which there were an estimated 12.5 million cases of rubella infection with about 20,000 cases of CRS [1]. Following rubella vaccine licensure in 1969, the annual incidence of rubella rapidly declined reaching a record low of seven US cases in 2003. In October of 2004, CDC declared rubella to be no longer endemic in the US [1].

In Los Angeles County (LAC), rubella incidence has followed the national trend; the 5-year average incidence of rubella cases in LAC for the years 1992-1996 was only 0.04, equivalent to an average of 3.6 cases per year [2]. During the five-year period of 2003-2007, only one case of rubella was reported in LAC (2005) [3].

Despite the success in eliminating the endemic circulation of rubella in the US, the risk for importation of rubella from parts of the world where rubella continues to circulate is significant.

THE CASE

In November 2008, the Los Angeles County Department of Public Health received a confidential morbidity report on a suspect Congenital Rubella Syndrome (CRS) case from the neonatal department of a local hospital. The infant had a positive IgM serological test result for rubella. Upon interviewing the infectious disease physician who consulted on the case and reviewing the medical records, it became immediately clear that this was, in fact, a case of CRS. The infant was born at 34 weeks gestation, had significant thrombocytopenia requiring a platelet transfusion, bilateral cataracts, a patent ductus arteriosus, an atrial septal defect, an enlarged liver, and bone radiolucencies. Although not known initially, the infant went on to fail a hearing test at the time of hospital discharge. Subsequently, a viral culture from the nasopharynx yielded positive growth of rubella at the State of California Viral and Rickettsial Disease Laboratory.

The mother of the child was a 33 year old licensed health care professional, born in the US, without a history of acute or chronic illness. This infant was the result of her first pregnancy. She initiated prenatal care for this infant during her second trimester, upon returning to the US from a three month extended stay (with her husband) in India that included a two week trip to China. The result of her rubella screening test during her initial prenatal visit was positive (immune).

The mother stated that she became pregnant during the trip. She denied any signs or symptoms of rubella during her trip. (Rubella often presents as a very mild, minimally apparent disease in adults.) She did note that during her time overseas, she worked as a volunteer at an elementary school in a very poor area of Mumbai, India.

The mother believed that she was vaccinated as a child against rubella and this was further supported by a discussion with her mother. However, no immunization records could be found. When she first went to work at a local dental clinic two years ago, she was only required to be vaccinated against hepatitis B. At

that time, she was not assessed for immunity (or vaccination status) against rubella. She received services at a travel medicine clinic prior to her extended overseas trip and again there was no assessment of immunity (or vaccination status) against rubella.

DISCUSSION

Lessons Learned

This CRS case illustrates several important points. First, it's important to remember that exposure to a vaccine preventable disease that is no longer endemic in the US is often just an airplane ride away. With the significant number of US measles outbreaks in 2008, most of which were linked to importation cases, many foreign travelers are now aware of the importance of being protected against measles before embarking on their trip. However, there appears to be less emphasis on ensuring protection against rubella.

Lesson 1: The Centers for Disease Control and Prevention categorizes vaccines for travel into three categories: routine, recommended, and required. All travelers and their families must ensure they are up-to-date on all routine vaccinations. These vaccines are necessary for protection from diseases that are still common in many parts of the world even though they rarely occur in the US (http://wwwn.cdc.gov/travel/contentVaccinations.aspx).

Secondly, documentation of positive rubella immunity during an initial prenatal visit, especially if that visit is made late in the first trimester, does not rule out very recent maternal rubella infection that could put the developing fetus at risk. Most often, the only rubella test that is obtained is a single IgG and that test provides no information about current disease. Unfortunately when an IgM test is also obtained early in pregnancy, the high false-positive rates obtained by many laboratories limits the value of that test as well.

Lesson 2: Although serological testing during the first prenatal visit is important to assess rubella immunity, there can be rare instances where a positive serological test during pregnancy does not eliminate the possibility of an infant being born with congenital rubella. Ideally, women of childbearing age should have their rubella immunity status determined when not pregnant. Consideration should be given to making rubella immunity testing an important part of preconception care.

Thirdly, there is documentation in the medical literature of women who were previously immune to rubella (either by vaccination or natural disease) losing their immunity and subsequently becoming re-infected with rubella and giving birth to an infant with congenital rubella [4,5,6,7]. Vaccine failure probably accounts for some of these occurrences as it has been well documented that persons vaccinated with two of the early rubella vaccines (HPV-77 and Cendehill) had a 50% or greater risk of re-infection with rubella if exposed [8]. The much better performing RA27/3 rubella vaccine was licensed in the US in 1979 and the previously licensed vaccines were withdrawn from the market. If the mother of this CRS infant was, in fact, vaccinated against rubella, she would have been vaccinated in 1976, based on her birth year being 1975. She therefore would have received one of the two poorer performing vaccines. However, because her childhood vaccination records were never found, it is not possible to determine that she was ever vaccinated against rubella.

Lesson 3: Women of childbearing age who were vaccinated before 1979 could benefit from serological testing and subsequent rubella revaccination if the serological test result fails to show rubella immunity.

Fourthly, there were major "missed opportunities" to assess the rubella immunity status of the mother of this CRS case when she entered dental school several years ago as well as when she visited a travel medicine clinic prior to her travels. Furthermore, she only received immunizations against hepatitis B when she began her work at a local dental clinic two years ago. All health care workers are recommended to have immunity against rubella (among other diseases) and immunity is defined as serological evidence of past infection or documentation of vaccination [9]. Since she lacked documentation of vaccination, she should have received serological testing.

Lesson 4: Strict standards for health care worker immunity assessment and immunization for vaccine preventable diseases need to be implemented by all employee health departments that evaluate health care workers. In addition, all travelers and travel medicine service facilities and providers must visit the Centers for Disease Control and Prevention travel health website to ensure that all recommended, required, and routine (i.e., rubella) vaccines have been received prior to travel.

NEXT STEPS

The Los Angeles County Department of Public Health Immunization Program will be sharing this information along with additional "lessons learned" from previous years' rubella cases with the public, and general medical and travel medicine providers via presentations and published alerts.

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PERSONAL AND SYSTEM BARRIERS ASSOCIATED WITH LOW INFLUENZA IMMUNIZATIONS AMONG HEALTH CARE WORKERS: PRELIMINARY ANALYSIS OF TWO LOS ANGELES COUNTY HOSPITALS

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Carol Salminen, RN; Dulmini Kodagoda, MPH

INTRODUCTION

Voluntary influenza immunizations among Health Care Workers (HCW) have not improved above the national average of 40% in spite of a "call-to-action" from the National Foundation for Infectious Diseases [1]. Low rate of influenza immunizations are thought to be a source of infectious disease outbreaks in hospitals, especially influenza [2]. These outbreaks have been linked epidemiologically to higher patient morbidity, mortality, and cost in hospital settings.

BACKGROUND

From 2005 to 2007, the Immunization Coalition of Los Angeles County (ICLAC), a constituency of hospitals, clinics, health plans, and vaccine companies, collaborated with its members from two large urban hospitals in Los Angeles County (herein referred to as Hospital A and Hospital B) to recognize National Adult Immunization Awareness Week (NAIAW) activities. The adult population selected for vaccination outreach was hospital-based health care workers (HCW). The goal of the partnership was to increase baseline influenza vaccination coverage rates among HCW and provide technical assistance in promoting institution-wide awareness about the importance of influenza vaccinations for hospital employees. An influenza vaccine campaign promotional toolkit was developed and tailored for hospital managers to plan the components of an effective vaccination effort. Educational materials were compiled and distributed to HCW and placed in strategic locations throughout the hospital. Subsequently, this activity provided a brief "window of opportunity" to gather additional preliminary data to explore the specific factors influencing influenza immunization coverage rates among HCW at these two hospitals.

OBJECTIVES

The objectives of the collaborative project were to increase influenza vaccination coverage rates amongst employees from Hospital A and B by 10% from a baseline of less than 40%. Infection Control and Employee Health Managers at each hospital received the ICLAC Health Care Worker Influenza Toolkit which consisted of educational materials (template employee reminder letters, flyers, timelines for influenza promotion activities), and ready-made vaccination and influenza declination forms to monitor influenza vaccination and declination rates. In addition, ICLAC developed a brief, self-administered knowledge, attitude and behaviors (KAB) survey to assess the demographic and KAB factors associated with increasing influenza immunization coverage rates and to identify specific strategies and barriers to achieving optimal vaccination rates at both hospitals.

METHODS

Determination of Baseline Coverage Rates

At the time of collaboration, the baseline influenza immunization coverage rates at these two hospitals were self-reported by the manager of Infection Control and/or the Director of Employee Health. At Hospital A (2005), the baseline coverage rate was reported to be 36%. At Hospital B in 2006 and in 2007, the baseline coverage rate was reported to be 32% and 38%, respectively.

Overview of NAIAW Campaign Procedures

The NAIAW campaign activities were held during the influenza seasons 2005 through 2007; hospital-based NAIAW influenza campaigns were implemented at urban hospitals in Los Angeles County (LAC). Both of these hospitals were Level 3 trauma facilities and Hospital B has several primary care clinics.

A variety of participation strategies were used to engage both hospital managers (e.g., Employee Health Directors, Infection Control Practitioners) and employees. During the NAIAW campaigns, influenza vaccination posters were strategically placed in locations within the hospitals, such as employee/physician lounges, cafeterias, and on medical-surgical floors. The educational toolkit for HCW consisted of a "personalized health record" along with educational materials. Recruitment strategies included use of e-mail announcements, flyers and incentives.

Knowledge, Attitude and Behavior (KAB) Survey

The self-administered knowledge, attitude, belief (KAB) survey was distributed to assess demographic, attitudinal and behavioral factors associated with receiving an influenza immunization. Specifically, the survey measures included the following variables: 1) respondent demographics (i.e., age, gender and occupation); 2) self-reported measure of the physical proximity of HCW to patient's respiratory droplets; 3) self-report of receipt of a influenza vaccination in the previous year; 4) future intention to be vaccinated; 5) suggested strategies to increase vaccination rates; and 6) perceived barriers to vaccination for HCW.
Given that the original intent of the project was to improve vaccinations through social awareness activities, the KAB survey and methodology evolved over time. Therefore, in 2005 and 2006, the KAB survey was distributed simultaneously during the NAIAW campaigns. However, in 2007, only Hospital B chose to participate and administer the KAB survey. This report will highlight data from Hospital A in 2005; Hospital B in 2006 and 2007. The sampling methodology used at Hospital B in 2007 changed due to internal priorities and a desire to focus on high risk departments. In addition, the KAB survey was administered two weeks prior to the launch of their annual influenza campaign.

NAIAW Campaign at Hospital A – 2005

NAIAW was celebrated in the last week of September, 2005 during a hospital-wide employee barbeque luncheon. A "brown bag" influenza educational presentation was provided in a nearby auditorium to accommodate a large number of employees. These incentives were used to enhance employee participation in the NAIAW campaign. A vaccine clinic was held simultaneously during the barbeque luncheon to facilitate the employee's access to influenza vaccinations. At the time of vaccination, the influenza educational materials packet was provided to the employee along with a raffle ticket. The KAB survey was administered simultaneously during the barbeque event and vaccination clinic. For evening shift employees, a mobile vaccination cart was taken to each medical and surgical floor so employees could be vaccinated. For these evening shift employees, ICLAC educational materials and the KAB survey were provided and collected on the same day.

NAIAW Campaign at Hospital B – 2006

NAIAW was observed during Hospital B's annual employee influenza vaccination campaign the first week of October, 2006. The ICLAC HCW Influenza Toolkit was distributed to the hospital's Infection Control Practitioners and to the Employee Health Director. The Employee Health Department expanded the influenza vaccination hours and set up satellite clinics within the hospital, so that regardless of work shift, employees could easily obtain influenza vaccinations at various times. In addition, a mobile immunization cart was used in the morning and late afternoon to vaccinate employees from the Emergency Department (ED) and the Pediatric, Medical and Surgical hospital units. The KAB survey was administered at the same time as influenza vaccine was administered using the mobile vaccination carts. Special influenza vaccination clinics were also established at the hospital's three primary care comprehensive health centers for two full days.

NAIAW Campaign at Hospital B – 2007

In 2007, Hospital B modified the existing NAIAW campaign activity by administering the KAB survey two weeks prior to the influenza vaccination campaign and respondents consisted only of employees from departments identified to have patients at higher risk for influenza (i.e., Medical and Surgical, Pediatric, Neonatal, Burn Intensive Care Units (ICUs), and ED). Otherwise, Hospital B implemented similar methods to promote vaccination and completion of the KAB survey as in 2006.

Data Analyses

The data presented in this report was stored, managed, and analyzed by the Epidemiology Unit of the Los Angeles County Immunization Program (LACIP). Descriptive and bivariate analyses were performed using SAS System for Windows, version 9.0 (SAS Institute, Carey, NC). Chi-square tests were used to determine significant associations between demographic variables, receipt of vaccination in prior year and future intention to be vaccinated for Hospital A (2005); Hospital B (2006) and Hospital B (2007). Two logistic regression models were created to determine independent predictors of "future intention to vaccinate" controlling for age, gender, occupation, prior receipt of vaccine. Four independent variables were tested for association with either receiving influenza vaccinations or not receiving influenza vaccinations. The first set of independent variables were categorized as "passive" strategies (reminder emails, letters, and flyers), and "active" strategies (employee luncheons, raffle prizes, mobile vaccination carts). The last sets of independent variables were categorized as "personal" barriers (perceptions about disease risk, vaccine side effects, vaccine efficacy, and fear of needles) or "system" barriers (accessibility to vaccinations and cost).

RESULTS

Respondent Characteristics and Vaccination Coverage Rates

Hospital A – 2005

Of the 1,600 employees, 500 (31%) HCW responded to the KAB survey. Of the 500 respondents, 44% were non-patient care staff; 41% were nurses; 9% were ancillary staff, and 4.2% physicians. Eight (1.6%) of the respondents did not provide an occupation. Of the 500 respondents, 94% were hospital employees; 4% were contract employees and nearly 1% listed themselves as volunteers. Four individuals did not provide their specific work status. The majority of the participants were female (78%) and over 41 years of age (52%). Sixty-three percent of the respondents reported that they "currently interact on a daily basis within 5 feet of a patient's respiratory droplets". Seventeen respondents (3%) did not answer this question. Lastly, 47% of respondents self-reported receiving the influenza vaccination in the prior year. According to Director of Employee Health, the influenza vaccination coverage rate increased from 36% at baseline to 40% post NAIAW campaign activities.

Hospital B – 2006

Of the 7,800 employees, 2,724 (35%) HCWs responded to the KAB survey. Of the 2,724 respondents, 41% were non-patient care staff; 27% were nurses; 20% were physicians; and 9% were ancillary staff members. Eighty (3%) respondents did not answer the occupation question. One hundred twenty-seven (5%) individuals did not provide their specific work status. The majority of the participants were female over the age of 41 (61%). Eighty respondents (3%) did not answer the occupation question. Lastly, 45% of respondents self-reported receiving the influenza vaccination in the prior year. Sixty-three individuals (2%) did not report their prior year's vaccination status. According to the Infection Control Practitioner, baseline coverage rates for Hospital B improved from 32% to 38% between September 2006 and March 2007. However, from the period September 2007 and March 2008, influenza immunization coverage rates declined from 38% to 30%. The decline may have been for reasons not entirely clear.

Hospital B – 2007

As previously described, the KAB survey was distributed only to "high risk" departments. Of the 7,800 employees, 580 (13%) HCW responded to the survey. Of the 580 respondents, 52% were nurses; 21% were non-patient care staff; 11% were ancillary staff members and 10% were physicians. Thirty

(5%) respondents did not answer the occupation question. Lastly, 38% of respondents self-reported receiving the influenza vaccination in the prior year. Six individuals (1%) did not report their prior year's vaccination status.

KAB Survey Results

In Table 1, the data profile illustrates by year and by occupation the HCW vaccinators (those who receive influenza vaccine-YES) ranged from 35% to 71% and for non-vaccinators (those who did not receive influenza vaccine – NO) ranged from 28% to 65%.

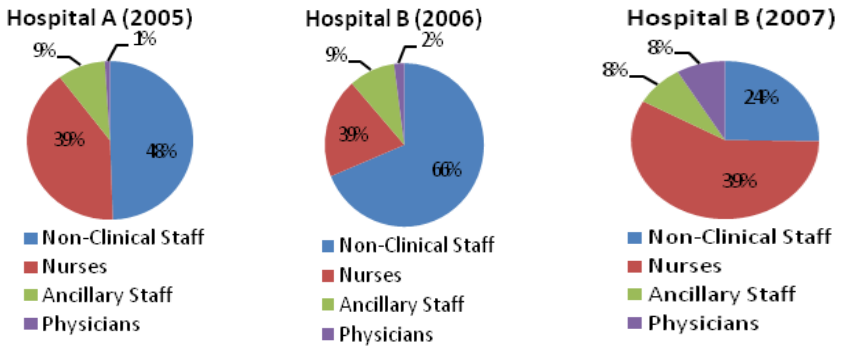
Table 1.Vaccinators and Non-vaccinators by Occupation

	Hospital A (2005)		Hospital B (2006)		Hospital B (2007)	
	Yes	No	Yes	No	Yes	No
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Non-Patient Care Staff*	96 (46)	111 (54)	473 (51)	461 (49)	39 (35)	73 (65)
Ancillary Staff**	23 (53)	20 (47)	123 (60)	81 (40)	24 (44)	30 (54)
Nurses	97 (44)	102 (56)	309 (50)	306 (50)	118 (42)	73 (58)
Physicians	15 (71)	6 (29)	292 (62)	177 (28)	25 (44)	32 (56)

*Non-patient care staff is defined as dietary, administration, building & safety, and security
**Ancillary staff is defined as radiology technician, phlebotomist, respiratory and occupational therapy

In Figure 1, the data highlights the percentage of HCW (by occupation) who were not vaccinated in the prior year and responded that they did not intend to vaccinate in the coming year.

Figure 1. Percentages of HCW Who Did Not Vaccinate in the Past Year
And Did Not Plan to Vaccinate In Coming Year



Personal vs. System Barriers among Non-Vaccinators

Several factors were assessed that have been shown to influence HCW influenza immunization coverage rates. LACIP identified and categorized perceptions about disease risk; vaccine side effects; vaccine efficacy; and fear of needles as personal barriers, whereas accessibility to vaccinations and cost were categorized as system-related barriers.

Among non-vaccinators who did not intend to be vaccinated in the future, personal barriers were cited more frequently than system barriers at Hospital A (2005) and Hospital B (2007). In Hospital A (2005), personal barriers were cited by all of the physicians (100%); followed by 89% for non-patient care staff; 86% for ancillary staff and 85% for nurses. In Hospital B (2007), personal barriers were cited by 90% of the nurses; followed by 81% of non-patient care staff; 80% of ancillary and 61% of physicians (see below in Table 2).

Table 2. Non Vaccinators by Occupation and No Intention of Vaccinating in the Future Personal versus System Barriers						
	Hospital A (2005)			Hospital B (2007)		
	Personal N (%)	System N (%)	Other* N (%)	Personal N (%)	System N (%)	Other N (%)
Non-Patient Care Staff	94 (90)	3 (3.0)	8 (7)	54 (81)	12 (18)	1 (2)
Ancillary	19 (86)	1 (5.0)	2 (9)	20 (80)	5 (20)	0 (0)
Nurses	62 (85)	2 (3.0)	9(12)	147 (90)	13 (8)	1 (2)
Physicians	3 (100)	0 (0)	0 (0)	17 (61)	9 (32)	2 (8)
*Refers to miscellaneous strategies						

Logistic Regression Model – Predictors Associated with Future Intention to be vaccinated

A logistic regression model was created to identify the predictors associated with the dependent variable, "future intention to receive an influenza vaccination in the upcoming season". The logistic regression model controlled for covariates, age, gender, occupation and consisted of three independent variables, previous year's vaccination status; type of barrier cited for not getting the influenza vaccine and preferred strategies to promote vaccination. Due to limited variability in the dependent variable in 2006, the model was initiated for only 2005 and 2007.

For 2005, the strongest predictors of future intention to vaccinate were the prior year's vaccination status (OR=34.0; 95% CI=15.0-77.0) and the identification of personal and system barriers (OR=2.33; 95% CI=1.23-4.43). Specifically, individuals who had received the influenza vaccine in the prior year were more likely to report a future intention to be vaccinated in the current year. In addition, individuals who reported a "combination of personal and system barriers" were more likely to report future intentions to be vaccinated in comparison to those who identified only "personal barriers".

For 2007, the strongest predictors of future intention to vaccinate were the prior year's vaccination status (OR=30.0; 95% CI=14.4-65.3); being an ancillary staff member (OR=3.0; 95% CI=1.12-7.79); and the identification of personal and system barriers (OR=1.87; 95% CI=1.06-3.29). Specifically, ancillary staff members were more likely to report future vaccination intent compared to nurses. Individuals who had received the influenza vaccine in the prior year were more likely to report a future intention to be vaccinated in the current year. In addition, individuals who reported a "combination of personal and system barriers" were more likely to report future intentions to be vaccinated in comparison to those who identified only "personal barriers".

DISCUSSION

Immunization Coverage

Across both hospitals and years 2005-2007, very modest improvements in vaccination coverage were appreciated in spite of the NAIAW special outreach strategies (e.g. Health Care Worker educational toolkits, mobile carts, and raffle prizes, expanded clinic hours) to address system and personal barriers.

Chronic Non-Vaccinators by HCW Occupation

This study quantified the proportion of specific (HCW) at two hospitals who self-identify to have continuous and close contact with hospitalized patients, but for personal reasons (beliefs about vaccine efficacy, safety, perceptions of low disease risk) more than system factors (cost, accessibility) choose not to be vaccinated in the future. For example, in this study, 80% of nurses across both hospitals self-reported that personal barriers were reasons they chose not to receive influenza vaccinations currently or in the future. Over 35% of ancillary personnel and physicians across both hospitals self-report not being vaccinated in the previous influenza season and did not intend to be vaccinated in the current influenza season. The proportion of non-patient care staff was equally divided between getting vaccinated in the

upcoming influenza season and not intending to vaccinate in the upcoming influenza season. However, in this survey it is difficult to clearly discern which of the non-patient care staff (dietary, administration, building & safety, security) hold these personal beliefs.

Study Limitations

The results of the survey should be interpreted cautiously since the survey had several important methodological shortcomings, threatening the internal and external validity of the findings. First, administration of the survey in 2005 and 2006 was conducted at the time of vaccination which may have influenced the respondent's answers to the survey questions. Secondly, the survey was not administered to the population in a standardized fashion, disallowing for comparability of the results across hospitals and occupations. Similarly, in 2007, the survey was handed out in specific departments and the respondents merely self-selected to participate in the survey. Third, ethnicity data was not collected to identify potential trends in cultural similarities and differences, thereby compromising the ability to generalize these findings to similar settings.

CONCLUSIONS AND FUTURE DIRECTIONS

The NAIAW outreach and subsequent KAB survey provided a unique opportunity to engage immunization stakeholders from hospitals, health departments, and health plans to leverage resources and work collaboratively toward identifying their baseline employee influenza immunization coverage levels and work toward the goal of improving the coverage levels of high risk adults to at least 60% to meet the Healthy People 2010 goals [3]. The KAB survey assisted employee health directors and Infection Control Practitioners at these two hospitals to identify and therefore prioritize the health care personnel (e.g., nurses) needed for targeted educational interventions with an aim toward changing attitudes about the efficacy and safety of the vaccine to decrease influenza outbreaks in hospitals. Future research should include the implementation of evaluation studies that can rigorously test the efficacy of educational interventions with an aim toward changing personal beliefs and attitudes about vaccine safety, effectiveness, and disease risk to patients and their families, in order to effectively improve and sustain influenza immunization coverage levels among HCW.

Since 2007, legislative hearings spearheaded the introduction of specific health policy to change the entire landscape of health care worker influenza immunization coverage levels in California. Acute care hospitals are now required to adopt and implement California Health and Safety code 1288.5-1288.9 [4] standardizing hospital employee influenza policies and practices to include the provision of influenza vaccinations to all employees free of charge, and to systematically monitor the influenza immunization coverage and declination rates of all employees. To assist hospitals in compliance, the ICLAC health care worker subcommittee has implemented a baseline hospital survey amongst over 100 acute care hospitals in LAC to assess the hospital's policies and procedures used to monitor health care worker influenza coverage and declination rates and to assess the components of their employee influenza program. The results of the survey will be analyzed to determine if ICLAC members can provide any technical assistance in meeting the new health and safety code. Future plans include testing the effectiveness of educational interventions systematically in a randomized controlled design to determine the types of educational strategies that are more successful to improve influenza immunization coverage levels among HCW throughout Los Angeles County.

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HEPATITIS A VACCINATION OUTREACH TO FOOD SERVICE WORKERS IN LOS ANGELES CENTRAL CITY EAST/SKID ROW

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BACKGROUND

Hepatitis A is an acute viral disease, transmitted by the fecal-oral route. Minute concentrations of hepatitis A can transmit the virus from contaminated food to person and from person to person. The Centers for Disease Control and Prevention (CDC) recommends routine hepatitis A vaccination for children; for adults, vaccination is recommended for those who meet the following criteria: diagnosis of a chronic liver disease, diagnosis of a clotting-factor disease; users of street drugs (injecting and non-injecting), working in a laboratory with hepatitis A research, traveling to or working in countries with endemic disease, an adult 40 years of age or younger who had a possible exposure to hepatitis A within the previous two weeks, and any adult who desires immunity. Although medical specialists have determined that one dose of hepatitis A vaccine confers strong protection against the disease, the Immunization Action Coalition recommends that adults complete a series of two doses of hepatitis A vaccine, with the second dose administered six months after the initial dose [1].

In late 2005, an increased number of hepatitis A cases in Los Angeles County (LAC) was reported to Department of Public Health (DPH), and beginning in October 2005, an outbreak of hepatitis A occurred among staff, volunteers, and residents of a homeless shelter in the Central City East/Skid Row area. In total, 45 cases (13% of the total outbreak) associated with area homeless services were confirmed, with multiple overlapping exposures of shelters, soup kitchens, and food sources. In early 2006, a series of vaccination outreach sessions were conducted by LAC DPH Service Planning Area (SPA) 4-Central Public Health Center and Acute Communicable Disease Control Program (ACDC) staff, reaching 88 food service workers (FSWs) in community-based organizations (CBOs) in Skid Row with education and a first dose of hepatitis A vaccine.

In February 2008, the DPH Immunization Program encouraged DPH providers to vaccinate individuals in high risk groups, including men who have sex with men (MSM), injection and non-injection substance users, individuals with chronic liver disease, and those who have received a previous dose of Hepatitis A vaccine at a Public Health Center.

The ACDC Planning and Evaluation Unit activities focus on building community capacity to prevent acute infectious diseases (excluding HIV/AIDS, STD, and TB). Since December 2007, unit staff members have convened and facilitated meetings with DPH colleagues (including SPA 4-Central Public Health Center and the Immunization Program), the Department of Health Services (DHS) Homeless Coordinator, and diverse stakeholders in the downtown community to work collaboratively on homeless health and infectious disease prevention planning and activities.

Central City East, commonly referred to as Skid Row, is a 52-square block area in downtown Los Angeles, which is estimated to have the highest concentration of homeless residents in the United States [2]. Since the Skid Row FSWs, if infected, would be at risk of transmitting hepatitis A to vulnerable, homeless individuals, ACDC sought out an opportunity to plan and facilitate a collaborative education and vaccination outreach with the aim of reaching a higher number (than previous outreach) of individuals volunteering and working in food service in order to participate in vaccinating individuals in high risk groups which in this case are the FSWs in the Skid Row. This opportunity would provide strengthening the past outreach efforts and opportunity to gather more data on a hard-to-reach population such as the homeless.

METHODS

Outreach

A team was established and introductory planning meetings held by March 2008 to discuss the approach and logistics of the project. The team consisted of the ACDC Health Education Unit and epidemiologist, Central Health Center clinic staff, Adult Viral Hepatitis Coordinator, and the Immunization Program. Along with vaccination, group education on hepatitis A and a voluntary survey was administered.

Building on the previous experience in SPA 4 of conducting post-outbreak hepatitis A outreach, the project team identified potential local sites for further education and vaccination activities reaching FSWs. ACDC staff researched, compiled, and verified with community stakeholders a listing of LAC Infoline (2-1-1) providers and Skid Row Health and Housing Initiative sites and identified 20 homeless services agencies with FSWs serving Central City East/Skid Row.

The team met with shelter staff in Central City East/Skid Row to learn more about how large kitchens operate. It was determined that on-site outreach efforts will be an effective method for larger agencies to reach the high number of individuals rather than referring them to seek vaccination from the local public health clinic. Five well-established community-based social service organizations were selected to serve as hub outreach locations for smaller agencies.

DPH Immunization Program trained staff on how to input records into the California Immunization Registry (formerly known as Los Angeles-Orange Immunization Network—LINK) a confidential vaccination tracking system coordinated locally by the DPH Immunization Program.

Vaccine Administration

Vaccination outreach sessions took place at five sites and were modeled after traditional public health influenza clinic outreach activities. Priority during this outreach was to utilize the least amount of clinical staff to vaccinate as many FSW as possible in a timely manner. Two phases of vaccination outreach were conducted six months apart. The first phase targeted FSWs who never had a hepatitis A vaccine. The second phase targeted those FSWs who received the first dose of hepatitis A vaccine to receive their second dose. FSWs who never received the vaccine also were given their first dose during the second phase outreach. FSWs who received their first dose during the phase two outreach sessions were referred to Central Public Health Center to receive their second dose.

Survey

Participants were asked to complete a voluntary survey designed to characterize the population receiving vaccine. The survey consisted of indicators of demographics, status of homelessness and behavioral characteristics. During the phase one outreach sessions, a health educator gave a presentation on hepatitis A and then introduced the survey as voluntary and helpful for providing future outreach services. After the surveys were collected, responses were entered into a Microsoft Access database and analyzed in SAS 9.1.

Health Education

At each of the phase one sites, the health education procedure included introduction, pre-test, PowerPoint presentation, and post-test. Pre- and post-tests were not conducted at a large kitchen/food delivery organization due to time limits of explanation in Spanish with English translation. An ACDC health educator prepared and delivered an interactive presentation, “The Basics of Hepatitis A in Los Angeles County and in the Homeless,” at three of the homeless shelter sites, and variations of it at the two other community sites.

RESULTS

Outreach

Staff and volunteer FSWs from nine organizations serving Central City East/Skid Row participated, and five of the nine sites served as host agencies where education and vaccination activities were conducted. These host agencies consisted of two large faith-based shelters, a nonprofit apartment complex for low-income and formerly homeless residents, a grassroots volunteer-run soup kitchen, and a large door to door food preparation and delivery organization serving vulnerable individuals. The four additional CBOs that participated included a grassroots volunteer group, community center, community organizing nonprofit, and a subsidized housing program. All nine nonprofit CBOs serve food to homeless and very low income area residents; the organizations serve a total of over 2.94 million meals each year. Eight of the nine organizations are based in Central City East/Skid Row (Figure 1).

Figure 1. Map of outreach education and vaccination sites and participating organizations.

Vaccine Administration

One hundred seventy (170) FSWs from nine local organizations participated in the first phase of hepatitis A vaccination outreach. All 170 FSWs received their first dose of hepatitis A vaccine at the first phase outreach, held in April, May, and June 2008. One hundred fifty four (154) FSWs from six local organizations participated in the second phase; in which 88 received their first dose and 66 received their second dose, held at four of the phase one sites in October, November, and December 2008 (Figure 2). In total, 258 FSWs received vaccinations and 324 shots were administered.

Survey

The demographic and behavioral characteristics survey was conducted at four sites during the first phase only; it was not distributed at one site because of time limitations in the schedules of the FSWs. Of the four sites where the survey was conducted, 109 FSW of the 170 reached during phase one received hepatitis A vaccine between April 24, 2008 and June 4, 2008. Of these 109, 76 (69.7%) completed a survey. Overall demographics reflected a predominantly male population (88%) with median age of 47 years (range 24-66 years).

Figure 2. Number of hepatitis A vaccines distributed during outreach phases 1 and 2.

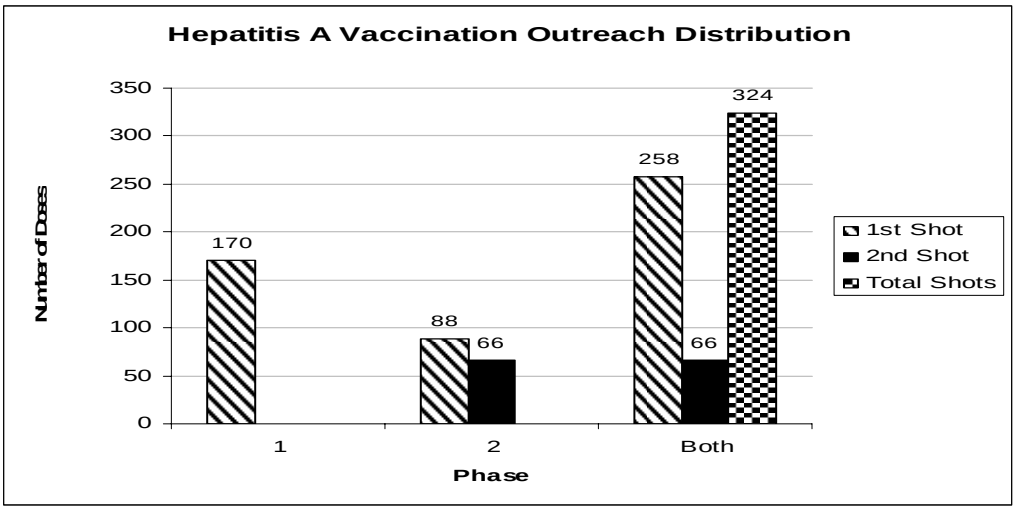
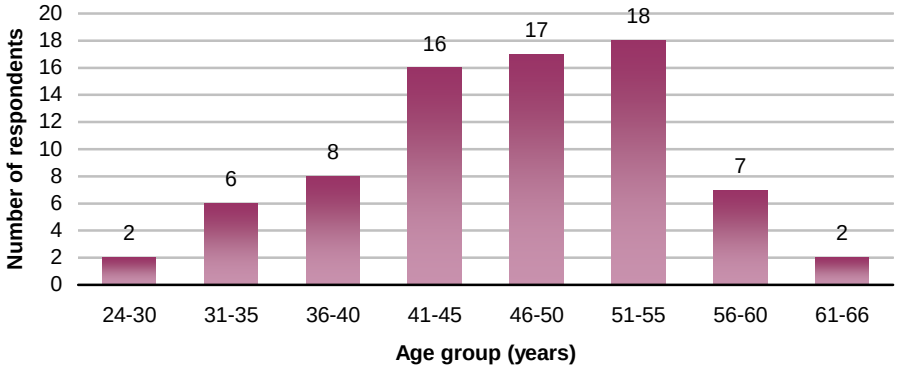


Figure 3. Age distribution of survey respondents (N=76) receiving hepatitis A vaccine during outreach in April – June 2008.



A plurality of FSW completing the survey (48.7%) identified as Black; 25% identified as white. while 22.4% self-reported a Hispanic-Latino ethnicity. Of those providing sexual orientation information, 72.4% (n=55) indicated heterosexual practice.

Regarding homelessness and shelter living, 52.6% (n=40) of survey participants considered themselves homeless and 65.3% (n=49) reported living in a homeless shelter (Table 1). Some survey participants were sensitive to the word “homeless” and less than five surveys had alternative terms such as “transitional” or

explanations that they did not think that their program or place of work was a homeless shelter. Responses were not altered in the analysis and reflected the perspectives of the survey participants. Thirty-six respondents (47.4%) reported being homeless and living in a homeless shelter. Thirteen respondents (17.1%) indicated that they were not homeless but were living in a homeless shelter. Three respondents (3.9%) indicated that they were homeless and were not living in a homeless shelter. Twenty-two respondents (28.9%) indicated that they were neither homeless nor living in a homeless shelter. Of the 30 respondents who answered how long they had been homeless, the median time of homelessness was one year (range 30 days to 37 years).

Fifty-eight respondents (76.3%) said they resided in downtown Los Angeles, while 16 (21.1%) said they did not. The median time of residency downtown was 0.5 years (3 days to 29 years) among 45 respondents. Fifty-

one respondents (67.1%) reported working in a homeless shelter while 24 (31.6%) reported that they did not work in a homeless shelter (Table 1).

The survey respondents shared three common behavioral characteristics; the most frequent of which is distributing or serving food to others at least once a week (69.7%). Among the 56 respondents completing the second (reverse) side of the survey, 60.7% (n=34) reported an indication of a history of alcoholism. In addition, 46.4% (n=26) of 56 respondents reported using non-injection street drugs, excluding marijuana, in the past year (Table 1).

Table 1. Behavioral characteristics of volunteer survey participants (N=76).

Risk factor	n	%
Males who have sex with males	3	3.95
Frequency of cooking or making meals for others		
4-7 days/week	31	40.8
1-3days/week	10	13.2
<1 days/week	8	10.5
Never	26	34.2
Distribute or serve food to others at least once a week	53	69.7
Chronic liver disease	2	2.6
More than one sex partner in past six months		
Yes	5	8.9*
No	50	89.3*
Don't know	1	1.8*
Frequency of sex without condoms		
Always	3	5.4*
Most of the time	2	3.6*
Sometimes	11	19.6*
Rarely ever	9	16.1*
Never	22	39.3*
I don't have sex with other people	8	14.3*
Use injection street drugs		
Yes	3	5.4*
No	52	92.9*
Use injection street drugs in past year		
Yes	5	8.9*
No	48	85.7*
Excluding marijuana, use non-injection street drugs		
Yes	16	28.6*
No	40	71.4*
Excluding marijuana, use non-injection street drugs in past year		
Yes	26	46.4*
No	30	53.6*
Indication of alcoholism		
Yes**	34	60.7*
No	22	39.3*

* Percent of respondents completing second side of survey (n=56).

** Answering "yes" to any one of four standard questions (1. Have you ever felt that you should cut down on your drinking? 2. Have people annoyed you by criticizing your drinking? 3. Have you ever felt bad or guilty about your drinking? 4. Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover?)

Health Education

Two hundred and fifty eight (258) FSWs received Hepatitis A education. During first phase activities, bilingual (English and Spanish) pre-/post-tests were administered before and after interactive group sessions with PowerPoint presentations. Pre-/post-test questions were revised or eliminated as needed. The results of pre-/post-tests demonstrated the percentage differences in the increase in knowledge based on matched-name-sets (only), ranging from 11% to 32% (average 22.5%) increase. Knowledge increases were most significant in the areas of mode of transmission, source of infection, and risk factors of hepatitis A. During the second phase of outreach vaccination and education activities, ACDC staff provided FSWs with health education individually and in small groups; throughout both phases, printed Hepatitis A information was distributed to all participating FSWs.

DISCUSSION

The project team received consistent high scores and positive feedback from outreach site representatives. Project team members stated that the collaboration within DPH was very effective. ACDC, Central Health Center, the Immunization Program, and the Hepatitis Coordinator worked together on a common goal, maintaining communication and high energy. The team benefited from Central Public Health Center's coordination of two groups of nursing students and SPA 4-Central Public Health Center PHNs, who assisted in administering vaccinations at two outreach sites.

The project team members involved in health education, vaccine administration, and LINK devoted numerous hours each week to coordinating logistics for this project. The project team identified a ratio of staff or volunteers to vaccines that may be useful in public health-emergency preparedness and/or point-of-distribution (POD) planning and implementation. At one outreach site, a large homeless shelter, the project team members worked with the site's contact person, to recruit two security staff and three well respected residents to assist in traffic flow and client screening. This increased the team roster to 13 from the DPH staff total of eight on that occasion. Involving the targeted population, FSWs, with their organization staff proved effective in increasing the sense of shared responsibility, the credibility, and the efficiency of the intervention.

ACDC staff conducted a brief survey seeking feedback from representatives of participating outreach sites during the month of July. Feedback included:

- "We were extremely satisfied. Participation was beyond my expectations. Everything went as planned. We were well informed and there were no surprises. The staff response was good and I heard no complaint which in itself is positive feedback. Everyone felt special on receiving their vaccination card."
- "They were very efficient, very organized. Continue your good work. You were very organized, professional, and responsive to the needs of our employees. They enjoyed the experience. They found it very social and effective. The team was so pleasant to each other as well as the people they were serving. It was a great opportunity. We all worked well together. They [staff receiving vaccinations] were very thankful and asked for more opportunities such as the Hep A. We loved it; it was wonderful. We took it in stride. We liked the demeanor and the information you gave. The participants were glad-it was good for everybody."
- "I was glad to see the health department in the role of preventative medicine. I didn't know they still did it; it reminded me of my childhood with vaccination and booster shots a regular event. The cooperation between DPH, the Mission, and me was great. They were wonderful at answering all questions. They had friendly attitudes. Everyone involved worked well together. "; "These guys [FSWs] are afraid of

  getting the disease from the shot. They need to know about the different kinds of hepatitis. People are walking around with misinformation about having Hep C and working in the kitchen."

The project team found that staff at both faith-based and non-faith based CBOs were open to and interested in receiving training and technical assistance on infectious and/or communicable disease prevention and control from DPH. Furthermore, project team members felt that these hepatitis A vaccination outreach efforts helped to strengthen relationships with participating CBOs, relationships vital for future capacity-building interventions that project staff members envision. These CBOs are important partners for not only disease prevention, but

also for emergency preparedness and response planning efforts. The project team recommends hepatitis A vaccination to be accessible, integrated and sustained in existing health care delivery systems, in partnership with community stakeholders, for FSWs in Skid Row.

Like the demographics of the larger resident population in Central City East Skid Row, this population of FSWs had very few females. Not all the participants were residents of downtown Los Angeles, and some came from other areas of Los Angeles to work in the community. Prevalent behavioral characteristics were a history of alcoholism and use of non-injections street drugs. Given the large hepatitis A outbreak associated with downtown homeless services in the past, the FSW population working in downtown Los Angeles may be a good prevention target for ongoing hepatitis A and B vaccination and education.

As for the health education component, methods needed to be tailored to each site, considering that these community agencies have varying staff capacity, amenities, and audio/visual equipment.

CONCLUSION

Reaching more FSWs in downtown Los Angeles with hepatitis A education and vaccination will require coordination between CBOs, healthcare providers, and public sector organizations. The outreach conducted in 2008 is an example of an effective strategy to combat adult viral hepatitis. As a result of lessons learned in this experience, DPH integrated hepatitis A education and vaccination into the activities of Project Homeless Connect in downtown Los Angeles, held in December 2008 and 2009. Further, CBOs in the downtown Los Angeles area that did not participate in this project have, since the project's conclusion, requested hepatitis A vaccination for their staff. No further hepatitis A outbreaks in downtown Los Angeles or in Central City East/Skid Row have been reported to date since this outreach. Although future outbreaks are not proofed due to high turnover characteristics of this population, this outreach has established firm foundation of working relationships with these homeless service agencies for future efforts of vaccinations and infection control.

In order to prevent hepatitis A as well as other infectious diseases, it is critical for all FSWs to practice frequent and careful hand washing, wear gloves when handling food, and stay home from work when sick. Collaboration was critical in promoting and facilitating access to adult vaccination. This effort included DPH programs, community health services, CBOs, and a student nurse program. The outcomes of these efforts led to the establishment of a DPH adult viral hepatitis vaccination outreach task force.

The ACDC Planning and Evaluation Unit aims to continue to develop and initiate future collaborative projects to strengthen the capacity of community based homeless services organizations to prevent the transmission of infectious disease and improve community health.

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