Infectious Disease Epidemiology
2004 Annual Report

Office of Infectious Disease Services
Bureau of Epidemiology and Disease Control
Division of Public Health Services

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Arizona Department of Health Services

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Executive Summary

The Infectious Disease Epidemiology Section (IDES) is one of five sections in the Office of Infectious Disease Services (OIDS) in the Bureau of Epidemiology and Disease Control. The Office of Infectious Disease Services in the Arizona Department of Health Services (ADHS) is responsible for monitoring and controlling diseases caused by infectious agents and toxins. The Office is also responsible for promulgating rules related to infectious disease surveillance, prevention, and control. The Office has five programs, Infectious Disease Epidemiology, Tuberculosis Control, Hepatitis C Surveillance and Prevention, Sexually Transmitted Disease Control and Vector-Borne and Zoonotic Diseases. HIV/AIDS surveillance and prevention activities are conducted by the Office of HIV/AIDS.

The IDES Program is responsible for detecting, preventing, and controlling communicable diseases in several areas: foodborne diseases, vaccine preventable diseases, nosocomial infections, antibiotic resistant organisms, and other infectious diseases.

The Program maintains a registry of over 70 notifiable communicable diseases; provides data and statistics on selected reportable infectious diseases by monitoring disease trends through surveillance and epidemiologic investigations; supplies technical assistance to local and tribal health departments regarding prevention and control of disease; and provides information for health care providers and disease information for the public.

Some of the highlights for the period of January 1, 2004 through December 31, 2004 include:

- Changes to the reporting requirements and lists of notifiable diseases became effective in October 2004, which resulted in changes to protocols and timelines for reporting selected infectious agents. In addition, several diseases and syndromes were added to the list of reportable conditions including influenza, methicillin resistant *Staphylococcus aureus* (MRSA), emerging infections, smallpox, severe acute respiratory syndrome (SARS), West Nile virus (WNV), and unexplained deaths with fever.

- Increased incidence of several communicable diseases including chronic hepatitis B, coccidioidomycosis, and norovirus.

- Improved influenza surveillance activities as a result of mandated laboratory reporting, enhanced communication with local and tribal health departments, new and improved laboratory testing, and better reporting by sentinel physicians.

- 55% decrease in reported cases of invasive *Streptococcus pneumoniae* in children under 5 years associated with increased use of pneumococal conjugate vaccine.

I. Introduction

Data Sources and Limitations

The Arizona Department of Health Services (ADHS) maintains registries of selected conditions that are reportable per the Arizona Administrative Code R-9-202. The information is collected to assess and monitor the burden of disease, characterize the affected populations, assess trends in disease occurrence, guide control efforts and evaluate prevention initiatives. The list of reportable conditions is based upon the list of Nationally Notifiable Infectious Diseases jointly developed by the Council of State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention (CDC). The list is revised periodically to add newly emerging pathogens or delete conditions that are no longer justified.

Specific case definitions are used to increase the specificity of reporting, and to allow comparability of diseases nationwide. Only cases meeting this standardized surveillance case definition are included in the report. Criteria for surveillance case definitions are usually more stringent than those used by providers to diagnose and treat diseases.

The state and local public health officials rely on health care providers, laboratories, hospitals and other facilities to report notifiable diseases or conditions. Local health jurisdictions submit case information to ADHS, which in turn reports case information without personal identifiers to CDC for purposes of developing the national statistics. Incomplete reporting is inherent to any passive surveillance system. Knowledge and awareness of current reporting rules, willingness to comply, severity of the disease, available diagnostic tests, age of the patient, confidentiality issues surrounding the disease, changes in the case definitions over time, and access to or availability of health care services all may influence the likelihood of reporting.

The 2004 population estimates (http://www.azdhs.gov/plan/menu/info/pd.htm) were used for rate calculations. In general, disease rates were calculated per 100,000 population and are not age-adjusted. Rate calculations based on a small number of reported cases and for counties with populations less than 100,000 are not reliable since they can be dramatically influenced by small changes in the number of reported cases.

Purpose of the Report

The purpose of this report is to provide disease surveillance information to health care providers, health care organizations, governmental agencies, and other local health partners. This information is intended to assist agencies by providing uniform data on the disease burden in the state, trends in disease incidence and distribution and the evaluation of disease interventions.

Office staff collaborate with colleagues in the local and tribal health departments, as well as other ADHS Offices and Bureaus including: Environmental Health, Immunizations, HIV/AIDS, State Health Laboratory Services, and Emergency Preparedness and Response within the Division of Public Health Services. Direct public health services, as they relate to surveillance, investigation, and response to infectious diseases of public health importance, are the responsibility of the 15 county health departments and tribal health departments and/or Indian Health Service Units. This report is designed to be utilized by external stakeholders in identifying trends, targeting prevention efforts, and determining resource needs. The program would like to acknowledge both external and internal partners for their contributions to this report.

Reporting

Arizona Administrative Code (AAC) R9-6-202, 203, 204, and 205 list the diseases required to be reported by physicians, administrators of health care facilities, clinical laboratory directors, institutions, schools, pharmacists, and others.

On October 2, 2004, the department implemented new requirements for the reporting of infectious diseases. Changes to the requirements included adding reportable conditions for emerging diseases and bioterrorism agents; requiring certain organisms to be reported more rapidly (i.e., upon submission or within 24 hours of diagnosis and/or identification); expanding the reporting definitions to include more sites; requiring pharmacists to report certain prescriptions; and standardizing the investigation and reporting process for local health departments to include department investigation forms. Tables outlining the reporting requirements are listed below. Additional information on the reporting requirements can be found on the Secretary of State's website at http://www.azsos.gov/public_services/Title_09/9-06.pdf.

Table 1. Reporting Requirements for a Health Care Provider or an Administrator of a Health Care Institution or Correctional Facility

⊡*,O	Amebiasis	⊡	Hantavirus infection	⊡*,O	Salmonellosis
☎	Anthrax	☎	Hemolytic uremic syndrome	O	Scabies
⊡	Aseptic meningitis: viral	⊡*,O	Hepatitis A	☎	Severe acute respiratory syndrome
⊡	Basidiobolomycosis	⊡	Hepatitis B and D	⊡*,O	Shigellosis
☎	Botulism	⊡	Hepatitis C	☎	Smallpox
①	Brucellosis	⊡*,O	Hepatitis E	⊡	Streptococcal Group A: Invasive disease
⊡*,O	Campylobacteriosis	⊡	Herpes genitalis	⊡	Streptococcal Group B: Invasive disease in infants younger than 90 days of age
⊡	Chancroid	⊡	HIV infection and related disease	⊡	*Streptococcus pneumoniae* (pneumococcal invasive disease)
⊡	*Chlamydia* infection, genital	⊡	Kawasaki syndrome	⊡	Syphilis
①*	Cholera	⊡	Legionellosis (Legionnaires' disease)	⊡*,O	Taeniasis
⊡	Coccidioidomycosis (valley fever)	⊡	Leptospirosis	⊡	Tetanus
⊡	Colorado tick fever	☎	Listeriosis	⊡	Toxic shock syndrome
O	Conjunctivitis: acute	⊡	Lyme disease	⊡	Trichinosis
⊡	Creutzfeldt-Jakob disease	⊡	Lymphocytic choriomeningitis	①	Tuberculosis
⊡*,O	Cryptosporidiosis	⊡	Malaria	①	Tuberculosis infection in a child younger than 6 (positive test result)
⊡	*Cyclospora* infection	☎	Measles (rubeola)	☎	Tularemia
⊡	Cysticercosis	☎	Meningococcal invasive disease	☎	Typhoid fever
⊡	Dengue	①	Mumps	①	Typhus fever
O	Diarrhea, nausea, or vomiting	☎	Pertussis (whooping cough)	☎	Unexplained death with a history of fever
☎	Diphtheria	☎	Plague	①	Vaccinia-related adverse event
⊡	Ehrlichiosis	☎	Poliomyelitis	⊡	Vancomycin-resistant *Enterococcus* spp.
☎	Emerging or exotic disease	⊡	Psittacosis (ornithosis)	☎	Vancomycin-resistant or Vancomycin-intermediate *Staphylococcus aureus*
①	Encephalitis, viral or parasitic	①	Q fever	☎	Vancomycin-resistant *Staphylococcus epidermidis*
☎	Enterohemorrhagic *Escherichia coli*	☎	Rabies in a human	⊡	Varicella (chickenpox)
☎	Enterotoxigenic *Escherichia coli*	⊡	Relapsing fever (borreliosis)	⊡*,O	*Vibrio* infection
⊡*,O	Giardiasis	⊡	Reye syndrome	☎	Viral hemorrhagic fever
⊡	Gonorrhea	⊡	Rocky Mountain spotted fever	☎	West Nile virus infection
⊡	*Haemophilus influenzae*: invasive disease	①*	Rubella (German measles)	☎	Yellow fever
⊡	Hansen's disease (Leprosy)	①	Rubella syndrome, congenital	⊡*,O	Yersiniosis

Key:

☎ Submit a report by telephone or through an electronic reporting system authorized by the Department within 24 hours after a case or suspect case is diagnosed, treated, or detected or an occurrence is detected.

* If a case or suspect case is a food handler or works in a child care establishment or a health care institution, instead of reporting within the general reporting deadline, submit a report within 24 hours after the case or suspect case is diagnosed, treated, or detected.

① Submit a report within one working day after a case or suspect case is diagnosed, treated, or detected.

⊡ Submit a report within five working days after a case or suspect case is diagnosed, treated, or detected.

O Submit a report within 24 hours after detecting an outbreak.

Table 2. Reporting Requirements for an Administrator of a School, Child Care Establishment, or Shelter

✉	Campylobacteriosis	☎	Mumps
O	Conjunctivitis: acute	☎	Pertussis (whooping cough)
☎	Cryptosporidiosis	☎	Rubella (German measles)
O	Diarrhea, nausea, or vomiting	☎	Salmonellosis
☎	Enterohemorrhagic *Escherichia coli*	O	Scabies
☎	*Haemophilus influenzae*: invasive disease	☎	Shigellosis
☎	Hepatitis A	O	Streptococcal Group A infection
☎	Measles	✉	Varicella (chicken pox)
☎	Meningococcal invasive disease		

Key:

☎ Submit a report within 24 hours after detecting a case or suspect case.
✉ Submit a report within five working days after detecting a case or suspect case.
O Submit a report within 24 hours after detecting an outbreak.

Table 3. Clinical Laboratory Director Reporting Requirements

①	Arboviruses	☎,⊕	*Haemophilus influenzae*, type B, isolated from a normally sterile site	☑+	Respiratory syncytial virus
🕶°,☎,⊕	*Bacillus anthracis*	☑,⊕	*Haemophilus influenzae*, other, isolated from a normally sterile site	①,⊕	*Salmonella* spp.
☎,⊕	*Bordetella pertussis*	☑	Hantavirus	☎	SARS-associated corona virus
①,⊕	*Brucella* spp.	☑	Hepatitis A virus (anti-HAV-IgM serologies)	①,⊕	*Shigella* spp.
☑	*Campylobacter* spp.	☑	Hepatitis B virus (anti-Hepatitis B core-IgM serologies, Hepatitis B surface antigen serologies, and detection of viral nucleic acid)	☑,⊕	*Streptococcus* Group A, isolated from a normally sterile site
☑	CD_4-T-lymphocyte count of fewer than 200 per microliter of whole blood or CD_4-T-lymphocyte percentage of total lymphocytes of less than 14%	☑	Hepatitis C virus	☑	*Streptococcus* Group B, isolated from a normally sterile site in an infant younger than 90 days of age
☑	*Chlamydia trachomatis*	☑	Hepatitis D virus	☑,⊕	*Streptococcus pneumoniae* and its drug sensitivity pattern, isolated from a normally sterile site
🕶°,☎	*Clostridium botulinum* toxin (botulism)	☑	Hepatitis E virus	☑	*Treponema pallidum* (syphilis)
☑	*Coccidioides* spp., by culture or serologies	☑	HIV (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	☑	Vancomycin-resistant *Enterococcus* spp.
①	*Coxiella burnetii*	☑	HIV—any test result for an infant (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	①,⊕	Vancomycin-resistant or Vancomycin-intermediate *Staphylococcus aureus*
☑	*Cryptosporidium* spp.	☑+	Influenza virus	①,⊕	Vancomycin-resistant *Staphylococcus epidermidis*
①	*Cyclospora* spp.	☑,⊕	*Legionella* spp. (culture or DFA)	🕶°,☎	Variola virus (smallpox)
🕶°,☎	Dengue virus	①,⊕	*Listeria* spp., isolated from a normally sterile site	①,⊕	*Vibrio* spp.
🕶°,☎	Emerging or exotic disease agent	☑[1]	Methicillin-resistant *Staphylococcus aureus*, isolated from a normally sterile site	🕶°,☎	Viral hemorrhagic fever agent
☑	*Entamoeba histolytica*	☑,⊕[2]	*Mycobacterium tuberculosis* complex and its drug sensitivity pattern	①	West Nile virus
①	*Escherichia coli* O157:H7	☑	*Neisseria gonorrhoeae*	①,⊕	*Yersinia* spp. (other than *Y. pestis*)
①,⊕	*Escherichia coli*, *Shiga*-toxin producing	☎,⊕	*Neisseria meningitidis*, isolated from a normally sterile site	🕶°,☎,⊕	*Yersinia pestis* (plague)
🕶°,☎,⊕	*Francisella tularensis*	☑	*Plasmodium* spp.		

Key:

🕶° Submit a report immediately after receiving one specimen for detection of the agent. Report receipt of subsequent specimens within five working days after receipt.

☎ Submit a report within 24 hours after obtaining a positive test result.

① Submit a report within one working day after obtaining a positive test result.

☑ Submit a report within five working days after obtaining a positive test result or a test result specified in Table 3.

⊕ Submit an isolate of the organism for each positive culture to the Arizona State Laboratory at least once each week, as applicable.

\+ A clinical laboratory director may report aggregate numbers of positive test results every five working days rather than submitting individual reports as required in R9-6-204(B).

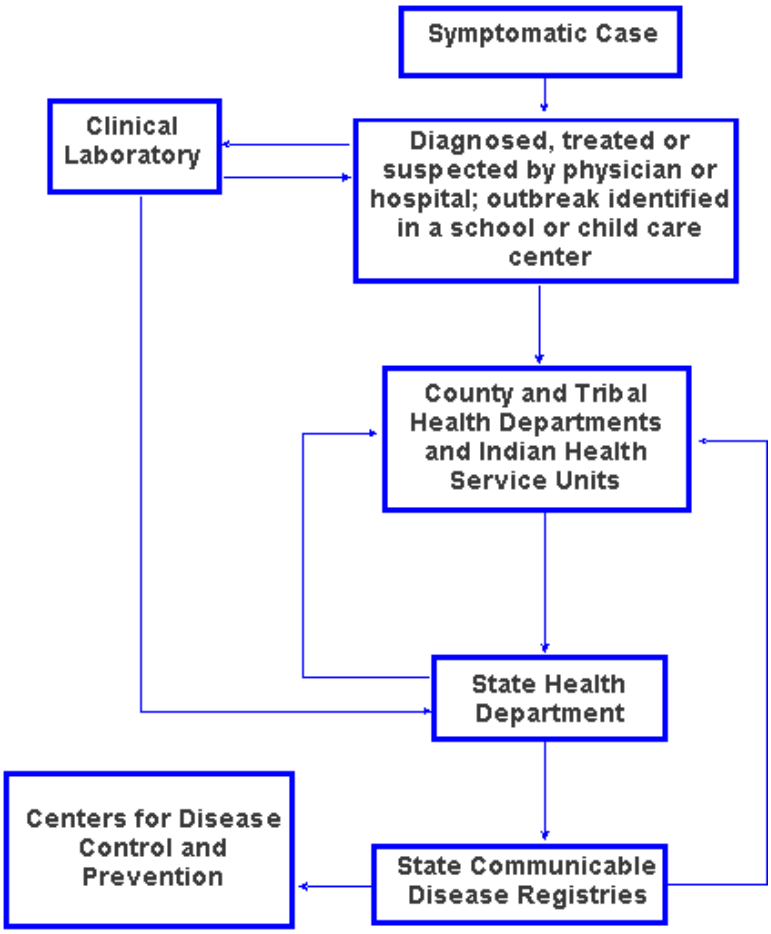
1 Submit a report only when an initial positive result is obtained for an individual.

2 Submit an isolate of the organism only when an initial positive result is obtained for an individual, when a change in resistance pattern is detected, or when a positive result is obtained ≥ 12 months after the initial positive result is obtained for an individual.

Arizona requires reporting by both health care providers and clinical laboratories as a dual surveillance measure to increase the sensitivity of the surveillance system and improve the completeness of reporting. Diseases are reported via fax, mail, and telephone using the communicable disease report (CDR) form. Additional information on communicable disease reporting and reporting and investigation forms can be found on the departmental website at: http://www.azdhs.gov/phs/oids/provider_info.htm#Reporting.

Since local heath departments are the primary response agency, notifiable conditions are reported to the county health departments for immediate investigation and initiation of control measures, as needed. Figure 1 outlines the reporting structure and flow of information in Arizona.

Figure 1. Flow of communicable disease reports



All information supplied to state or county public health agencies is maintained in strict confidentiality in conformance to state statutes.

State and County Health Department Contact Information

Arizona Department of Health Services

Infectious Disease Epidemiology Section
150 N. 18th Avenue Suite 140
Phoenix, AZ 85007-3237
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Fax: (602) 364-3119

Emergency Answering Service
Phone: (480) 303-1919

State Laboratory Services
250 N. 17th Avenue
Phoenix, AZ 85007-3231
Phone: (602) 542-1188
Fax: (602) 542-1169

County Health Departments

Apache County Health Department
395 South 1st Street West
PO Box 697
St. Johns, AZ 85936
Phone: (928) 337-4364
Fax: (928) 337-2062

Cochise County Health Department
1415 W. Melody Lane, Bldg A.
Bisbee, AZ 85603-3090
Phone: (520) 432-9400
Fax: (520) 432-9480

Coconino County Department of Health Services
2625 N. King Street
Flagstaff, AZ 86004
Phone: (928) 522-7800
Fax: (928) 522-7808

Gila County Health Department
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Globe, AZ 85501
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Fax: (928) 425-0794

Graham County Health Department
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Safford, AZ 85546
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Fax: (928) 428-8074

Greenlee County Health Department
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Phone: (928) 865-2601
Fax: (928) 865-1929

La Paz County Health Department
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Parker, AZ 85344
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Fax: (928) 669-6703

Maricopa County Health Department
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Phoenix, AZ 85006
Phone: (602) 506-6900
Fax: (602) 506-0272

Mohave County Health Department
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Phone: (928) 753-0743
Fax: (928) 718-5547

Navajo County Health Services District
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Holbrook, AZ 86025
Phone: (928) 524-4750
Fax: (928) 524-4759

Pima County Health Department
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Fax: (520) 791-0366

Pinal County Health Department
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Phone: (520) 866-7319
Fax: (520) 866-7310

Santa Cruz County Health Department
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Phone: (520) 375-7900
Fax: (520) 761-4813

Yavapai County Health Department
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Prescott, AZ 86305
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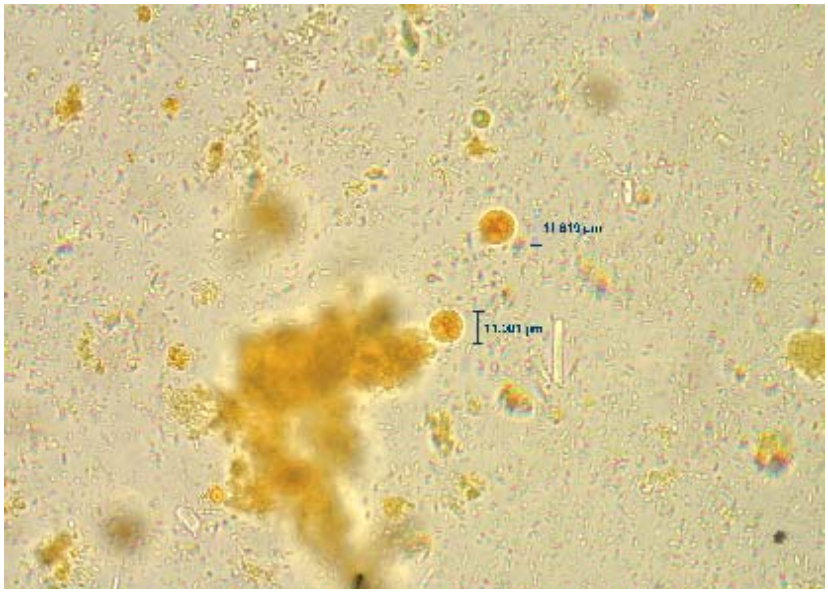
Fax: (928) 771-3369

Yuma County Health Department
2200 W. 28th Street Suite #137
Yuma, AZ 85364
Phone: (928) 317-4550
Fax: (928) 317-4591

II. Disease Statistics



Entamoeba coli

III. Disease Summaries

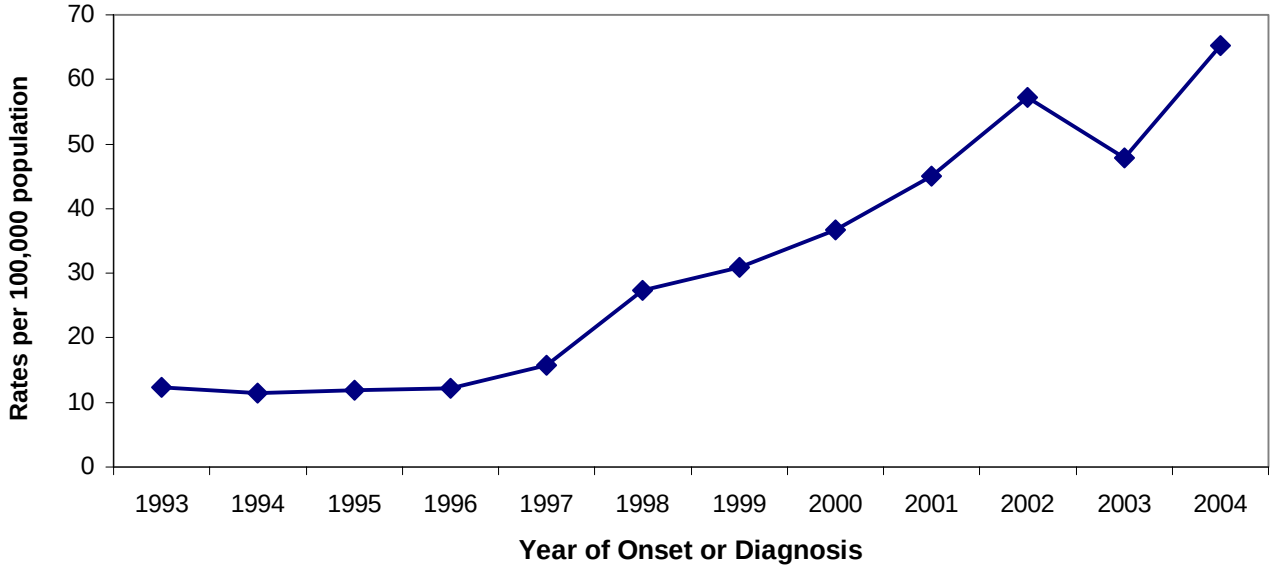
A. Coccidioidomycocis

Discussion of Surveillance Data

Coccidioidomycosis at the southwest regional level has been a nationally notifiable disease since 1995, which included a requirement for laboratory confirmation. In 1997, Arizona instituted mandatory laboratory reporting, which contributed to an increase in the number of reported cases, in addition to improving the timeliness and completeness of reporting. It is important to note that the increase in the incidence of coccidioidomycosis has continued to rise and therefore does not appear to be simply associated with increased reporting (Figure 2).

Reported cases of coccidioidomycosis have been increasing since 1997. To date, the highest number of cases reported in Arizona was in 2004 when a total of 3,654 cases of coccidioidomycosis were reported in Arizona (62.7 cases per 100,000 population), which represents a 281% increase since 1997.

Figure 2. Rates of reported coccidioidomycosis, Arizona, 1993-2004.



Most infections are sub-clinical or self-limited, and clinical manifestations range from influenza-like illness to severe pneumonia and, more rarely, extra-pulmonary disseminated disease. It is important to note, however, that hospitalizations associated with a diagnosis of coccidioidomycosis have substantially increased from 1998, indicating an increase in the number of cases that present with severe disease. Healthcare providers in Arizona may want to consider coccidioidomycosis in the differential diagnosis of patients with influenza-like illness given that the peak activity of influenza and coccidioidomycosis coincides.[1]

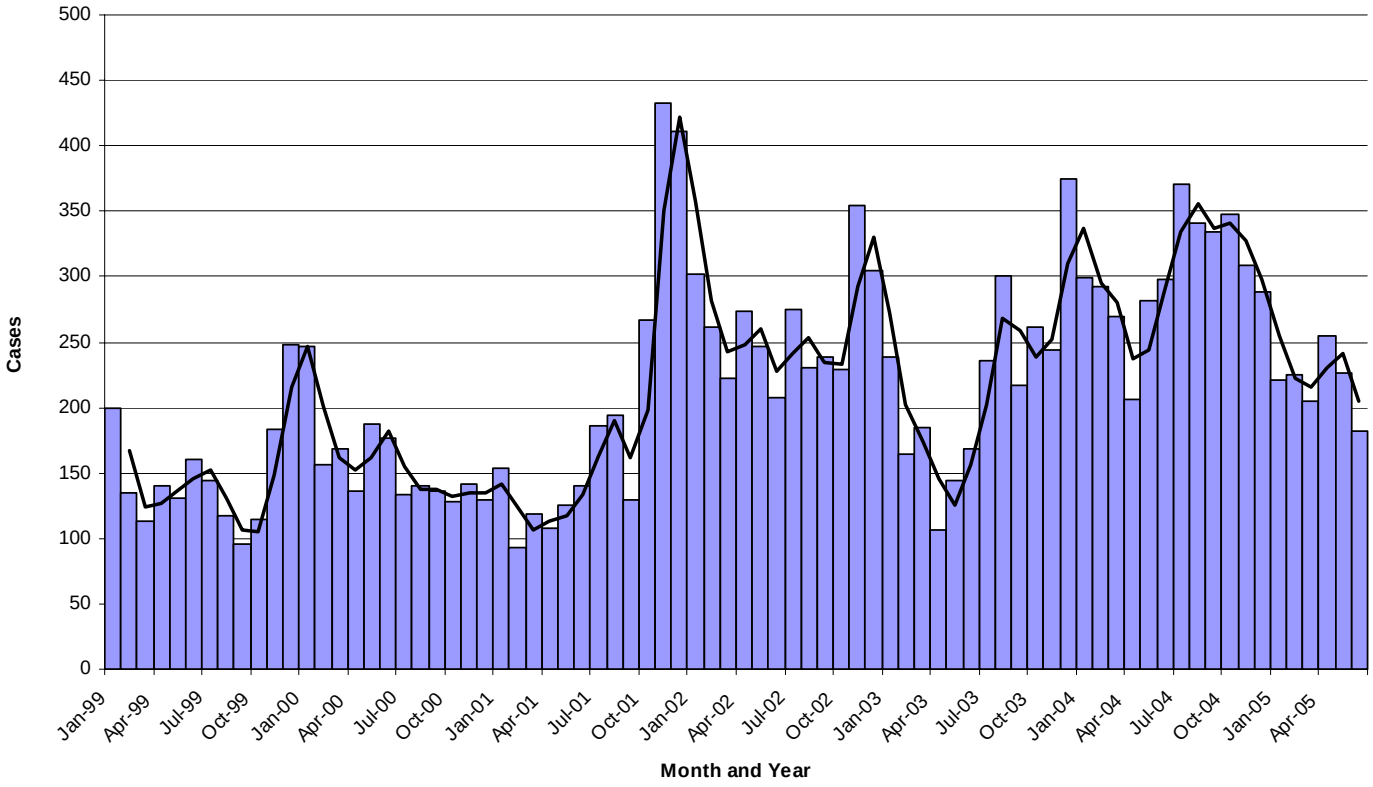
Disease incidence in Arizona appears to peak in the winter from November to February and it is during these months that the increase in disease has risen consistently each year. This winter peak in Arizona varies from Southern California, where, in an earlier study, infection rates from

[1] CDC. Increase in Coccidioidomycosis – Arizona, 1998-2001. MMWR 2003; 52:109-112.

coccidioidomycosis were higher in late summer/early fall.[2] However, in 2004, coccidioidomycosis cases appeared to peak earlier than usual with the highest number of cases reported in August. It is unknown whether this early season was due to unusual weather conditions, including increased amounts of rainfall, or awareness campaigns initiated in August.

A 2002 study of valley fever in Arizona indicated that the increase in coccidioidomycosis infections in the winter were associated with environmental factors and conditions, including the cumulative amount of rain in the preceding 7 months, the average temperature in the last 3 months, presence of dust in the last month, and the amount of rain in the last 2 months in proportion to the last 7 months. An increased likelihood of a seasonal outbreak occurring in the winter of a particular year seems to be preceded by a long period of drought, especially if it was in conjunction with hot and dusty conditions. Notably, this model accurately explained the absence of a peak in the winter of 2000-2001[3] (Figure 3).

Figure 3. Coccidioidomycosis cases by month and year, Arizona, 1999-2004.



Interestingly, the incidence rate in 2004 was slightly higher among 10-14 year olds than in previous years. In addition, the incidence rate among 55-59 year olds in 2004 was the highest observed in Arizona since coccidioidomycosis became reportable (Figure 4). However, the reasons for this increase are unknown. Overall incidence rates continue to be highest in

[2] Smith CE, Beard RR, Whiting EG, Rosenberg HG. Effect of season and dust control on coccidioidomycosis. JAMA 1946; 132:833-8.
[3] CDC. Increase in Coccidioidomycosis – Arizona, 1998-2001. MMWR 2003; 52:109-112.

persons aged ≥55 years, who are at highest risk of developing symptoms and therefore most likely to be diagnosed. Overall, males have a higher incidence rate than females, possibly due to occupational exposure and duration of outdoor activities. Incidence rates by county demonstrated the highest rate in Maricopa (76.6 per 100,000), followed by Pima (71.0 per 100,0000), then Pinal (69.6 per 100,000); these same counties also had the highest number of cases in 2004: Maricopa with 2,701, Pima with 661, and Pinal with 152 (Figure 5).

Figure 4. Rates of reported coccidioidomycosis by age and year, Arizona, 1999-2004.

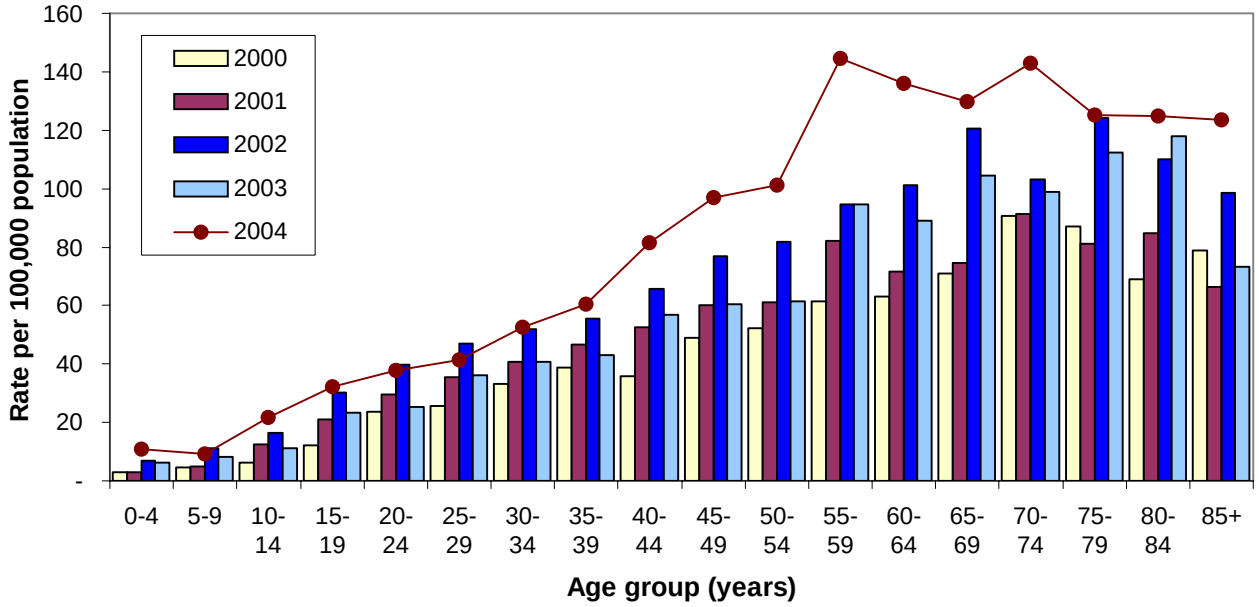
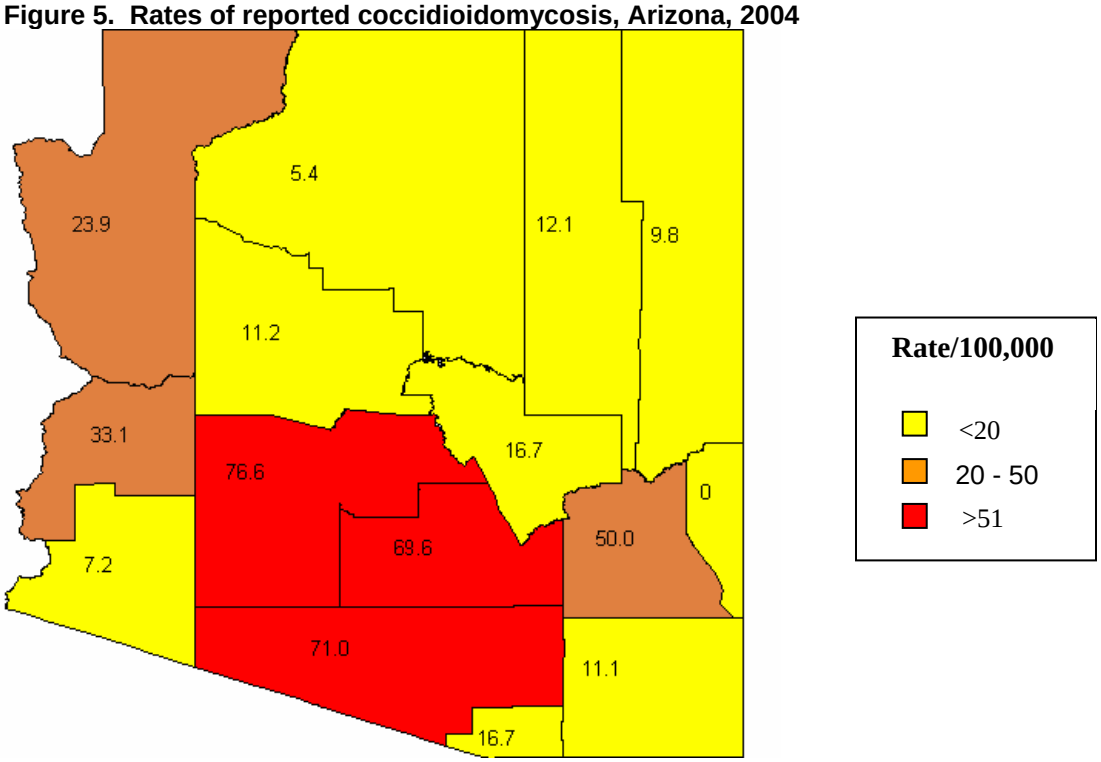


Figure 5. Rates of reported coccidioidomycosis, Arizona, 2004



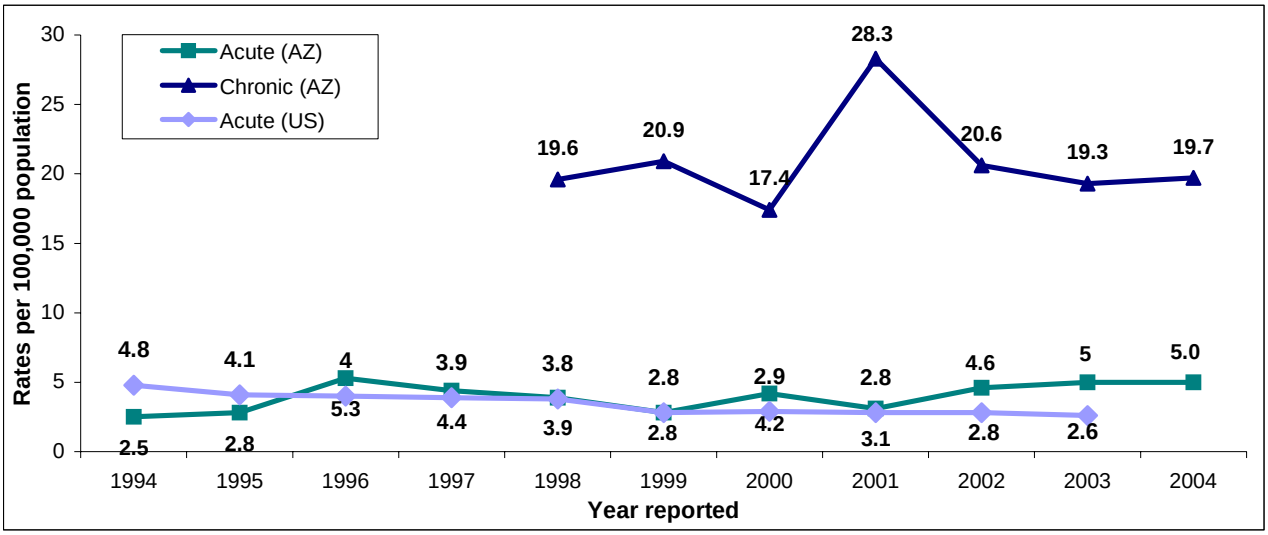
B. Hepatitis B

In 2004, 289 cases (5.0/100,000) of acute hepatitis B and 1,147 cases (19.7/100,000) of chronic hepatitis B were reported in Arizona. While acute hepatitis B has been reportable in Arizona for many years, chronic hepatitis B has been tracked in the state only since 1998. Vaccination continues to be the most effective way to prevent hepatitis B infection. While hepatitis B vaccines have been available in the U.S. since 1981, they did not come into wide use until 1991 when a more comprehensive vaccination strategy was introduced to include routine vaccination of infants, vaccination of adolescents and adults at high risk of infection, and prenatal testing of pregnant women for hepatitis B surface antigen.[4] Infection within the first year of life is a significant risk factor for chronic viral carriage, and thus much of the U.S. prevention program has focused on infants. Recent rates of perinatal infections have been low; no cases were identified in Arizona in 2004. Education to infected persons about transmission of the hepatitis B virus may also help to contain further spread.

Currently, classification of hepatitis B into acute and chronic cases in Arizona is largely based on the type of positive test reported. Many reports of hepatitis B are not investigated and classifications are usually based on reported test results. Therefore, cases with positive IgM results are recorded as acute infections, while a positive surface antigen test in the absence of a positive IgM result results in classification as a chronic infection. However, further investigation into symptoms, liver function, and past history of hepatitis B is warranted in order to more accurately classify cases.

Data for hepatitis B cases reflect the date of report to the state health department, not the date of infection or onset of symptoms. Acute hepatitis B rates in Arizona have been increasing slowly throughout the last decade, with a consistently high number of cases reported in the last three years (Figure 6). Meanwhile, the opposite trend was observed in the U.S. rates; the rate for 2003 (2.6/100,000) was approximately half of the 1994 rate (4.8/100,000). Rates of reported chronic hepatitis B in Arizona have been consistently higher than those for acute infections.

Figure 6. Rates of reported hepatitis B by year of report, Arizona, 1994-2004.



[4] Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Hamborsky J, Wolfe S, eds. 8th ed. Washington DC: Public Health Foundation, 2004.

Approximately 50% of acute cases and 30% of chronic cases reported in 2004 were between the ages of 40 and 59 years (Figures 7 & 8). Males account for 57% and 52% of acute and chronic cases, respectively. For acute hepatitis B, rates of reported cases in 2004 are higher among men for most age groups, with peak rates for both sexes in the 40 to 59 year age groups. Interestingly, peak rates of reported chronic hepatitis B by age group differ between the two sexes. Among men, rates are highest in the 45-49 year age group; peak rates for women occur in the 25 to 34 year age groups, with significant declines in older groups. Additionally, women in the 15 to 34 year age group have higher rates than men in the same age group whereas the reverse is true for all other age groups. Whether this represents more testing in women of child-bearing age or a distinct difference in infection or disease between men and women is unknown.

Figure 7. Rates of acute hepatitis B, by age and sex, Arizona, 2004.

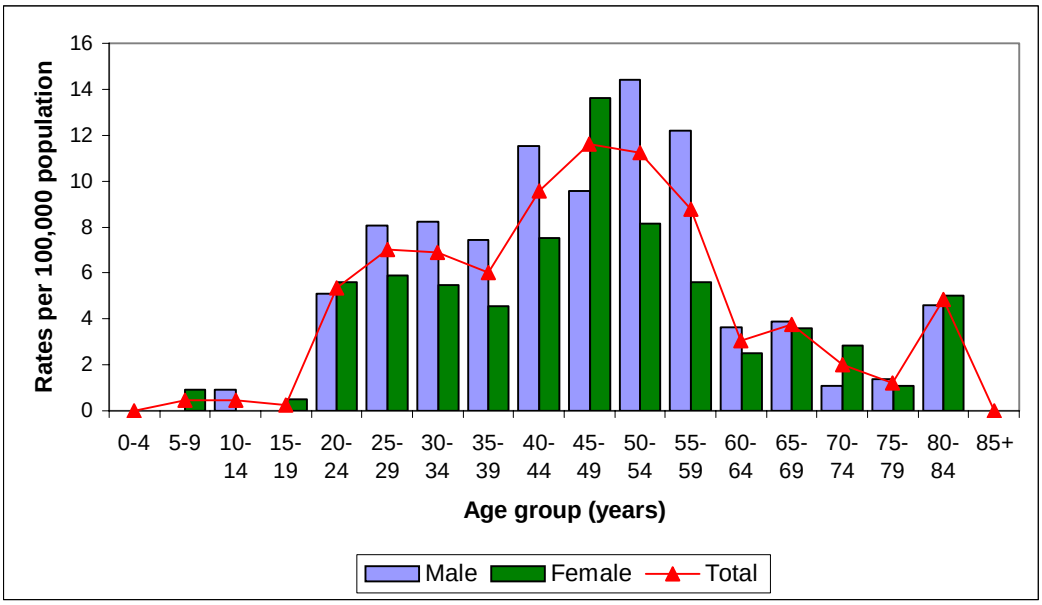
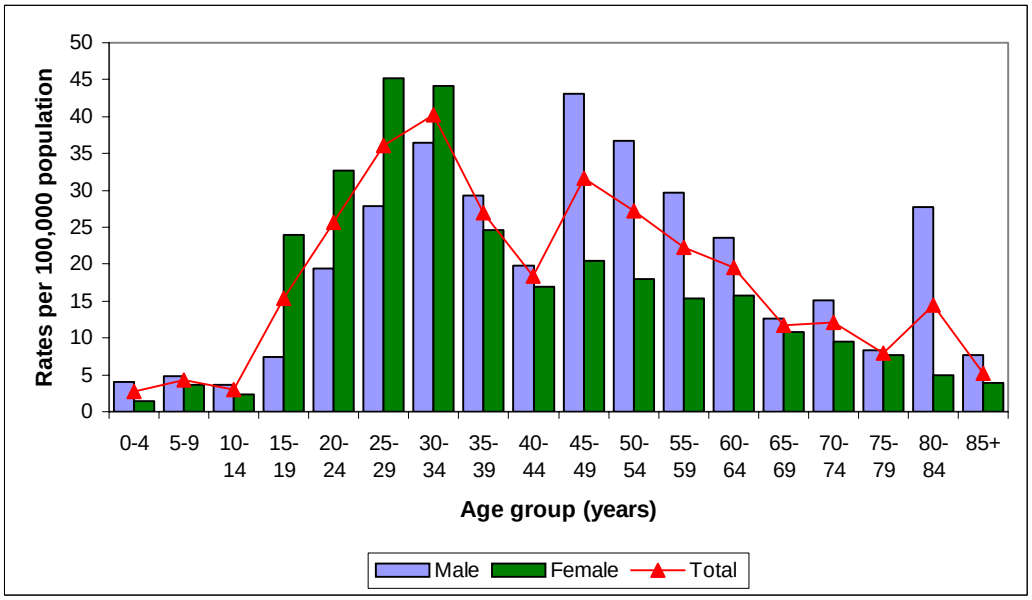


Figure 8. Rates of chronic hepatitis B, by age and sex, Arizona, 2004.



While acute hepatitis B appears to have been increasing in Arizona in recent years, more information is needed about whether this increase represents a true rise in symptomatic cases, or rather an increase in requests for testing, changes in the sensitivity of the tests, or other factors. Further investigation of hepatitis B cases regarding risk factors, transmission, and reasons for testing is needed in order to better understand the epidemiology of hepatitis B in Arizona.

C. Influenza and Respiratory Syncytial Virus (RSV)

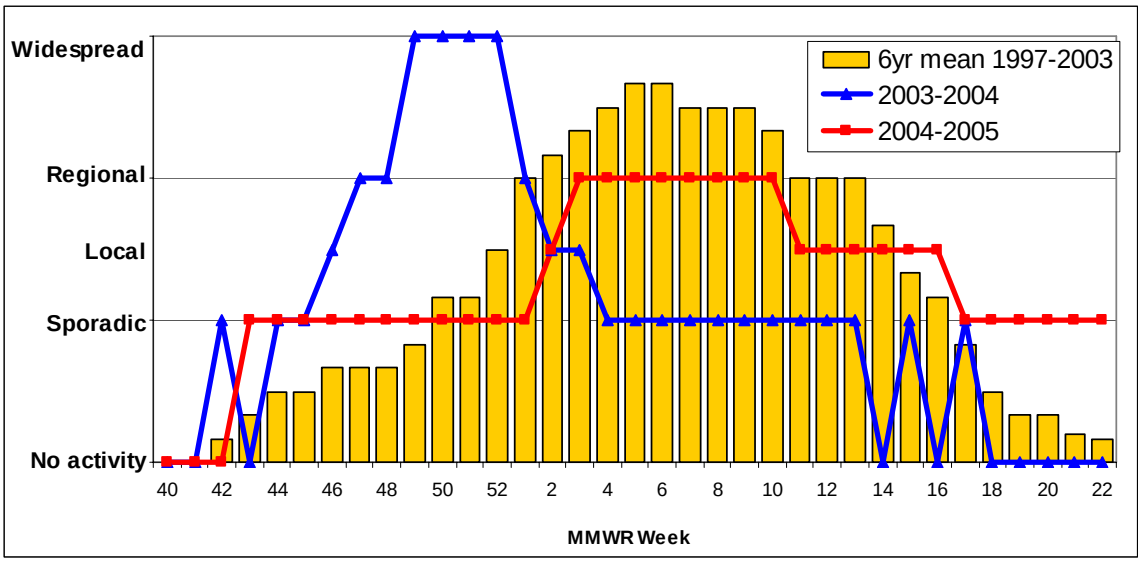
Influenza and respiratory syncytial virus (RSV) both became reportable by laboratories in October, 2004. While neither was a reportable disease before this change, influenza surveillance has been carried out for many years because of the potential public health impact of the virus. There are several purposes for influenza surveillance, which differ somewhat from those for other communicable diseases. These are to: determine where and when influenza cases are occurring; determine the predominant types and subtypes circulating in Arizona; assess the intensity and impact of activity; and detect emergence of novel influenza viruses or unusual events.

Influenza surveillance in Arizona relies on: sentinel providers, laboratory reports, subtyping of isolates, and hospital emergency department visits or school absenteeism in select counties. Sentinel physicians throughout the state submit weekly reports of influenza-like illness (ILI) to the U.S. Influenza Sentinel Provider Surveillance Network, a collaboration between health care providers, state and local health departments, and the CDC. These reports help to determine the period when influenza-like illnesses account for a larger proportion of patient visits, both statewide and nationally. Viral isolation and subtyping at the Arizona State Laboratory and other select laboratories detect the predominant circulating types and subtypes and identify any novel strains. Laboratory reports provide further indication of relative influenza activity levels. Since the 2003-2004 season, influenza-associated pediatric mortalities have been tracked and investigated.

On October 5, 2004, one of the two manufacturers of U.S. influenza vaccine announced that it would be unable to provide any doses for the 2004-2005 season. This resulted in a vaccine shortage that forced health departments and health care providers around the country to institute new strategies to protect those at highest risk of complications or severe infections. Vaccine was prioritized based on age or high-risk conditions.

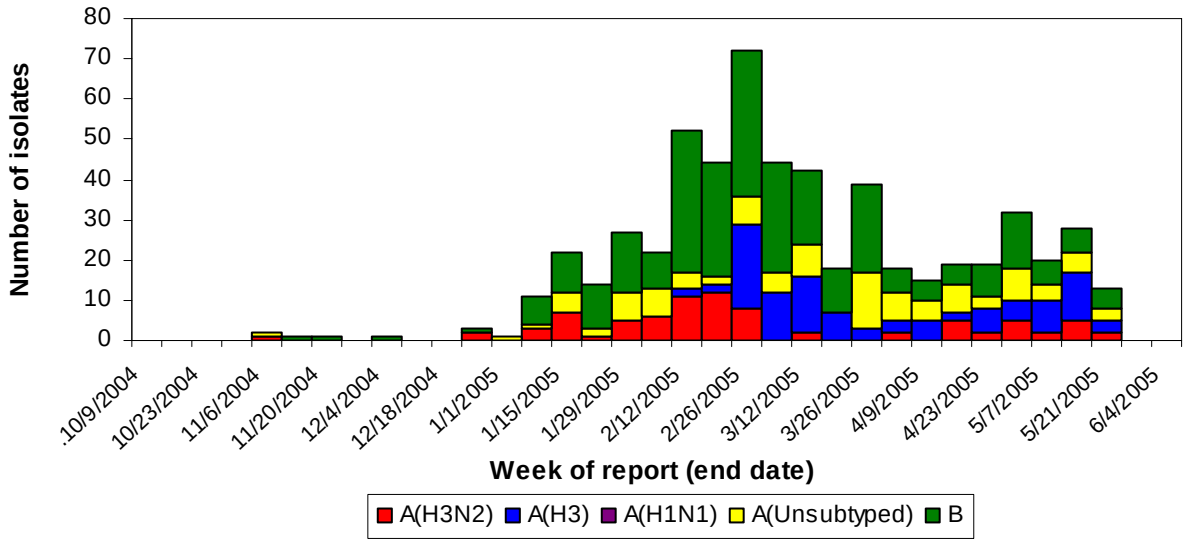
Fortunately, the 2004-2005 influenza season was mild. Widespread activity was never declared in Arizona, and activity was regional from late January until mid-March, with activity peaking in February. This pattern is temporally similar to many influenza seasons in Arizona (Figure 9).

Figure 9. Influenza activity, Arizona, 1997-2005.



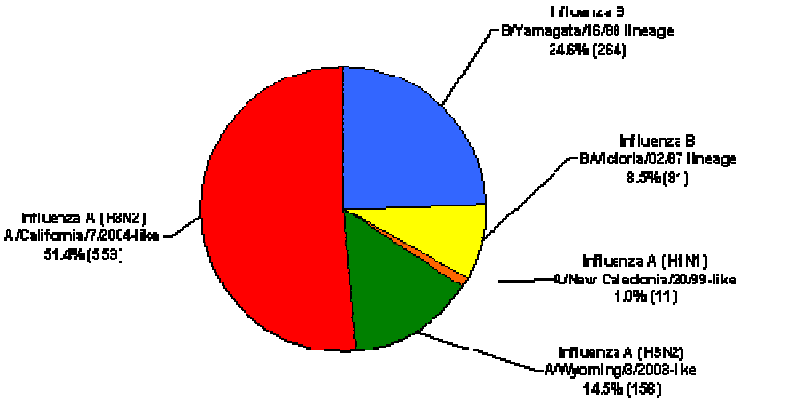
Nationally, influenza A(H3N2) predominated while influenza B circulated somewhat later in the season. In Arizona, approximately equal numbers of culture- or PCR-confirmed influenza A and influenza B were reported throughout the season (Figure 10). The Mountain Region (which includes Arizona) consistently had a higher proportion of influenza B than the rest of the country.

Figure 10. Culture- or PCR-confirmed influenza, by type or subtype, Arizona, 2004-2005.



The 2004-2005 influenza vaccine contained three components: A/Fujian or A/Wyoming(H3N2); A/New Caledonia(H1N1); and B/Shanghai of the Yamagata lineage. Early in the season, A/Fujian predominated nationally, but in November a new strain was identified, influenza A/California(H3N2), which accounted for the majority of antigenically-typed influenza by the end of the season (Figure 11). An A/California-like strain replaced the A/Fujian-like strain in the 2005-2006 vaccine. Two lineages of influenza B co-circulated in the U.S. Very little A(H1N1) circulated in the country.

Figure 11. 2004-2005 Influenza season antigenic characterization.*

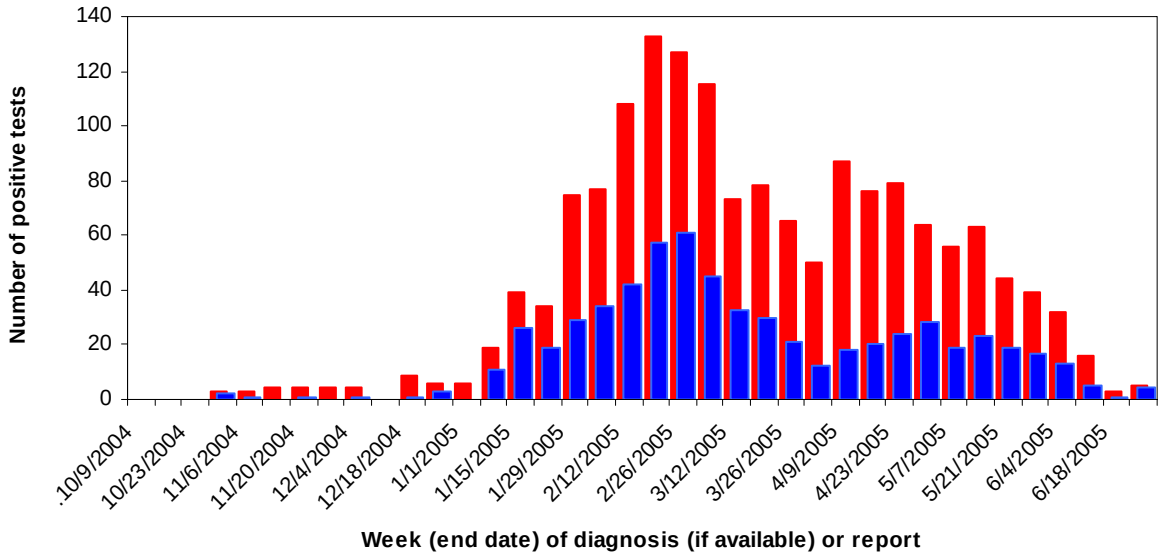


* Data as of June 24, 2005. Proportion of viruses characterized by CDC may not be representative of circulating viruses due to active solicitation for less frequently seen subtypes collected by WHO/NREVSS laboratories throughout the season.

Courtesy CDC.

Laboratory-reporting of influenza in Arizona began in 2004-2005 and thus baseline data are not available. However, this information proved valuable for monitoring the timing of activity in the state (Figure 12) and identifying counties where the virus circulated.

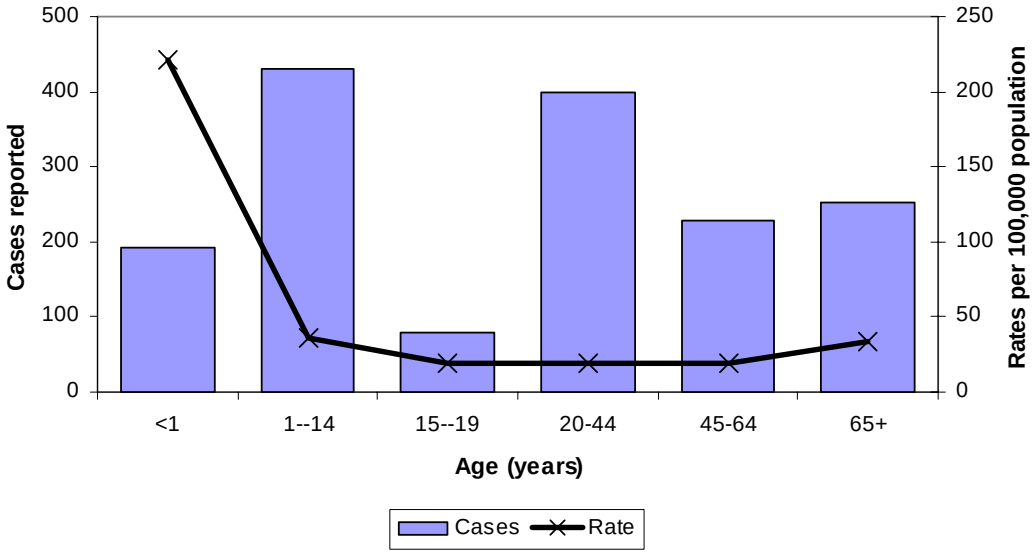
Figure 12. Laboratory-confirmed influenza, Arizona, 2004-2005.



Children less than 15 years of age accounted for 39% of reported influenza cases and the incidence rate was much higher in infants less than one year of age than in other age groups (Figure 13). This probably reflects a bias in diagnostic testing for influenza in the younger age groups. Infants and young children are susceptible to severe influenza and complications and have hospitalization rates comparable to those aged 65 years and over.[5] However, infants may be more likely to visit a health care provider and be tested to distinguish influenza from other respiratory infections.

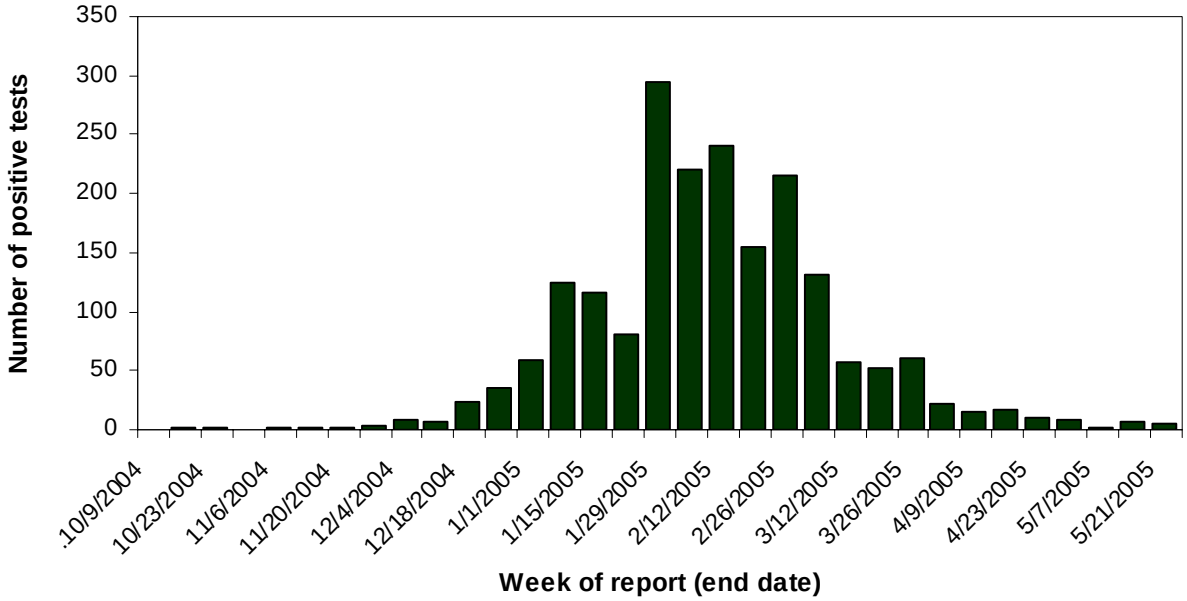
[5] Harper SA, Fukuda K, Uyeki TM, et al. Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR. 2004; 53(RR-6):1-40.

Figure 13. Age group of reported laboratory-confirmed influenza, Arizona, 2004-2005.



Respiratory syncytial virus (RSV) is a common respiratory infection, especially among infants and young children. It follows a seasonal pattern similar to influenza, though peaks in the seasons will often occur at different times. Because RSV reporting started late in 2004, there are no past data for comparison. Case-specific information on RSV is not available. The RSV reports during the 2004-2005 season peaked in late January, preceding the influenza peak (Figure 14).

Figure 14. Laboratory-confirmed respiratory syncytial virus (RSV), Arizona, 2004-2005.



D. Methicillin-resistant *Staphylococcus aureus*

Sterile site isolates of Methicillin-resistant *Staphylococcus aureus* (MRSA) became reportable by laboratories in October 2004. The purpose of this new surveillance is to determine the incidence of invasive disease due to MRSA in Arizona. Historically, MRSA has been associated with outbreaks in the hospital and long term care facility settings. In the past few years, there has been an increasing number of outbreaks identified in community settings. These have included outbreaks associated with athletes and sporting events. Community acquired-MRSA (CA-MRSA) infections are those acquired by persons who have not been hospitalized within the past year, or have not had a medical procedure (such as dialysis, surgery, catheters). These CA-MRSA infections are an emerging problem in Arizona. Patients, health care providers, and facilities are increasingly burdened with infections that do not resolve with normal first line therapy. Subsequent healthcare provider visits and testing are needed to diagnose and successfully treat these patients.

Staphyloccoccus aureus is part of the normal skin flora and is the most common cause of skin infections. It is not possible to differentiate colonization and infection with only the laboratory information; therefore, asking laboratories to send information on all MRSA isolates would not assist in classifying cases and would create a reporting burden for the labs. The majority of CA-MRSA infections are skin and/or soft tissue infections and will not be identified by the new reporting requirement unless the organism spreads to the blood.

National surveillance for MRSA is currently under development at the Centers for Disease Control and Prevention (CDC). It usually takes several months for labs to begin reporting new diseases on a consistent basis. Approximately 125 invasive MRSA isolates have been reported monthly in the first three months of reporting. Additional resources are necessary to ascertain epidemiologic characteristics and risk factors, and to categorize healthcare- versus community-associated MRSA.

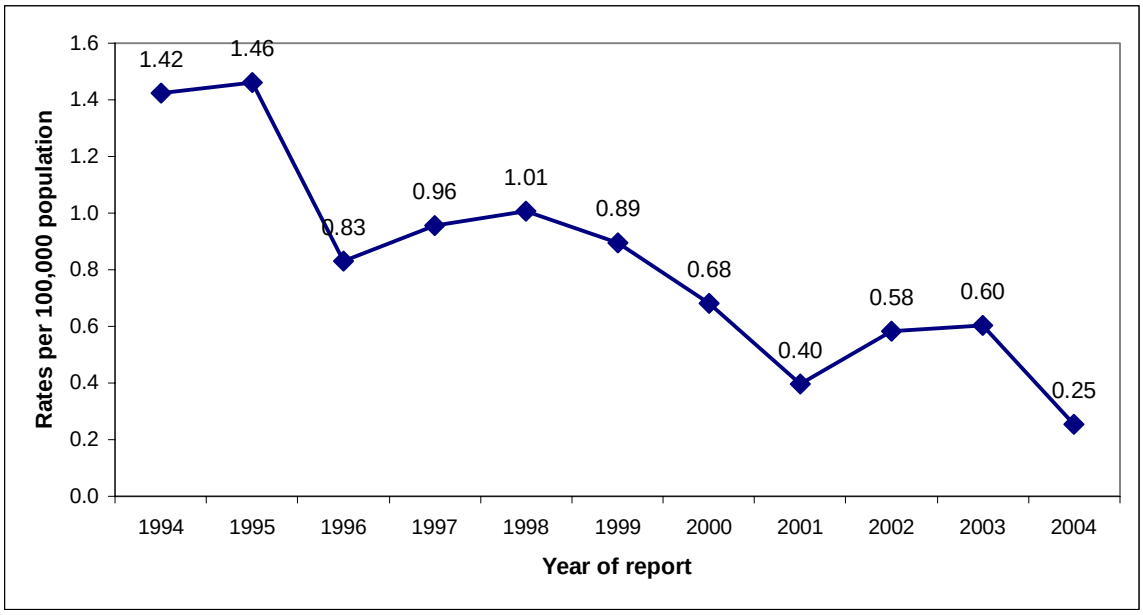
Additional information on MRSA infections is available at
http://www.cdc.gov/ncidod/hip/ARESIST/mrsa.htm.

E. Invasive Meningococcal Disease

Meningococcal disease is caused by the bacteria *Neisseria meningitidis* and is the most common cause of bacterial meningitis for toddlers, adolescents and young adults in the U.S. *N. meningitidis* is divided into numerous serogroups based on immunogenicity, but 95% of illness worldwide is caused by five serogroups: A, B, C, Y and W-135. *N. meningitidis* is spread via respiratory and nasal secretions. Case fatality has decreased with antibiotic treatment; however, it remains high at 10%. A quadrivalent polysaccharide vaccine has been available in the U. S. since 1978 and covers serogroups A, C, Y and W-135, but does not provide protection against serogroup B, which is common in the U.S. This vaccine has been used to control outbreaks and is also given to people at increased risk of acquiring meningococcal disease; however, it is not approved for use in children under the age of 2 years.

The reported rate of invasive meningococcal disease in Arizona has been decreasing over the past decade (Figure 15). In 2004, only 15 cases reported statewide, the lowest rate in 10 years. There were no deaths reported in 2004 attributed to meningococcal disease.

Figure 15. Rates of reported invasive meningococcal disease, Arizona, 1994-2004.



Rates of meningococcal disease vary by age group (Figure 16). The highest incidence rate occurs in children under one year, followed by children ages 1-4 years. Adolescents also have high rates of infection compared to other age groups. A large percentage of disease in those under one year (49% of those with known serotype in 1994-2004) is caused by serogroup B and thus is not currently vaccine-preventable (Figure 17). Analysis of meningococcal cases indicates that over 50% of infections in Arizona are caused by serogroups represented in the current vaccine. As indicated in Figure 17, a high percentage of Arizona cases, especially among adolescents and adults, are potentially vaccine-preventable.

Figure 16. Rates and cases of reported invasive meningococcal disease, Arizona, 1994-2004.

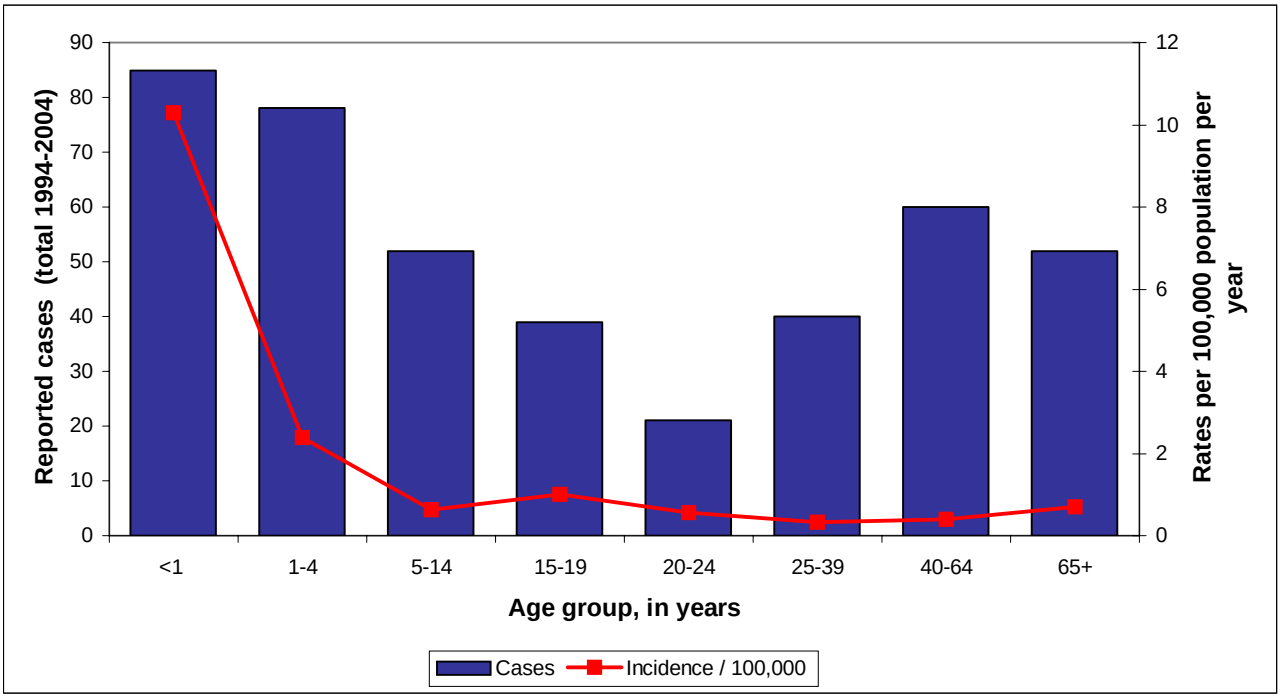
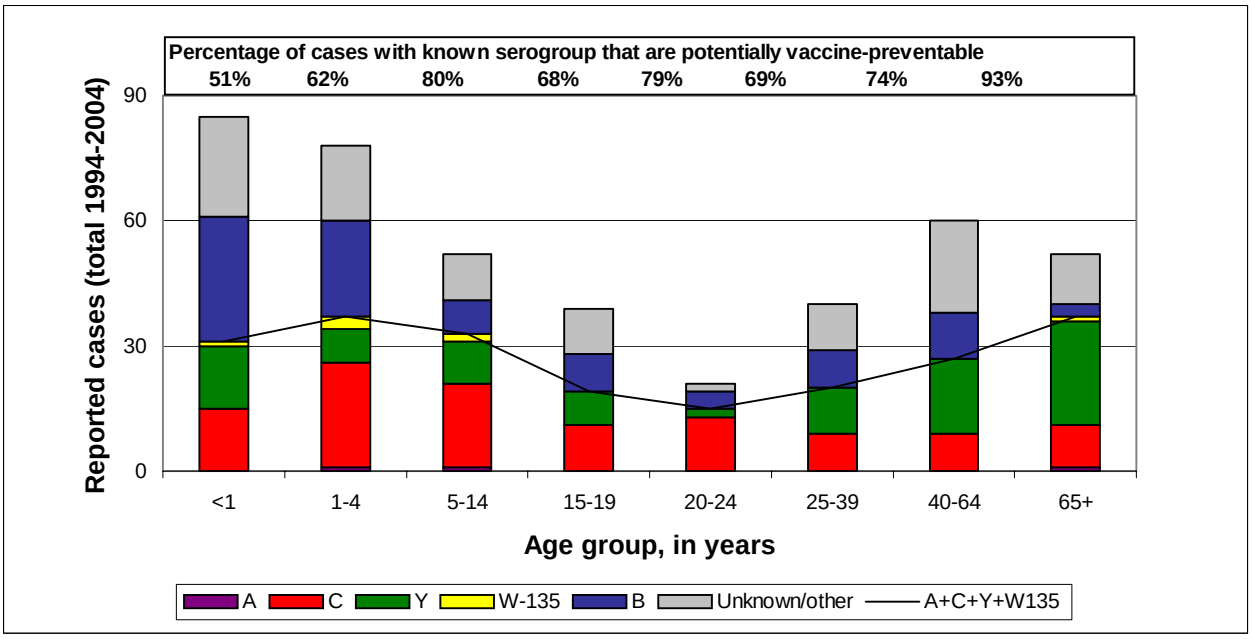


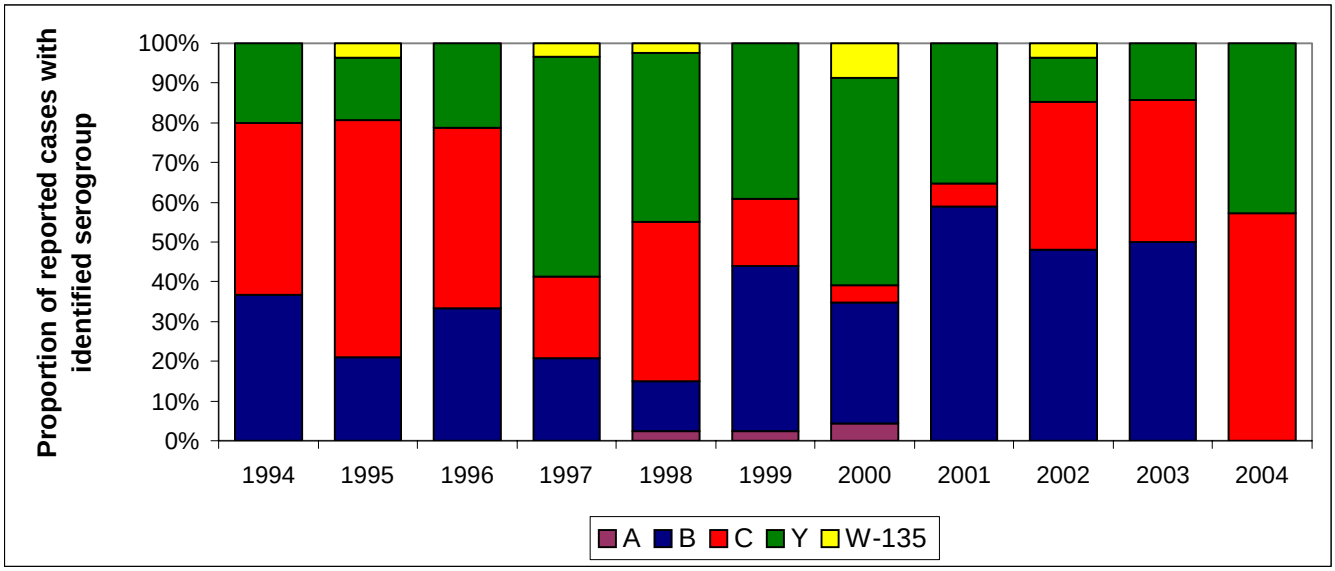
Figure 17. Serogroup distribution by age group, invasive meningococcal disease, Arizona, 1994-2004.



The serogroup distribution for the years 1994-2004 in Arizona is shown in Figure 18. Nationally, the proportion of meningococcal cases caused by serogroup Y has increased from 2% in 1989-

1991 to 37% in 1997-2002.[6] However, no clear trend in serogroup distribution has been observed in Arizona over the similar time frame shown below. In 2004, serogroups C and Y each accounted for approximately 50% of cases with known serogroup; however, 47% of the reported cases were not serogrouped.

Figure 18. Meningococcal serogroups, invasive disease, Arizona, 1994-2004.



The introduction of new immunization recommendations for adolescents and young adults will likely reduce the incidence of meningococcal disease and may result in changing the epidemiology of the disease in Arizona.

[6] Centers for Disease Control and Prevention. Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7):2.

F. Norovirus

Background

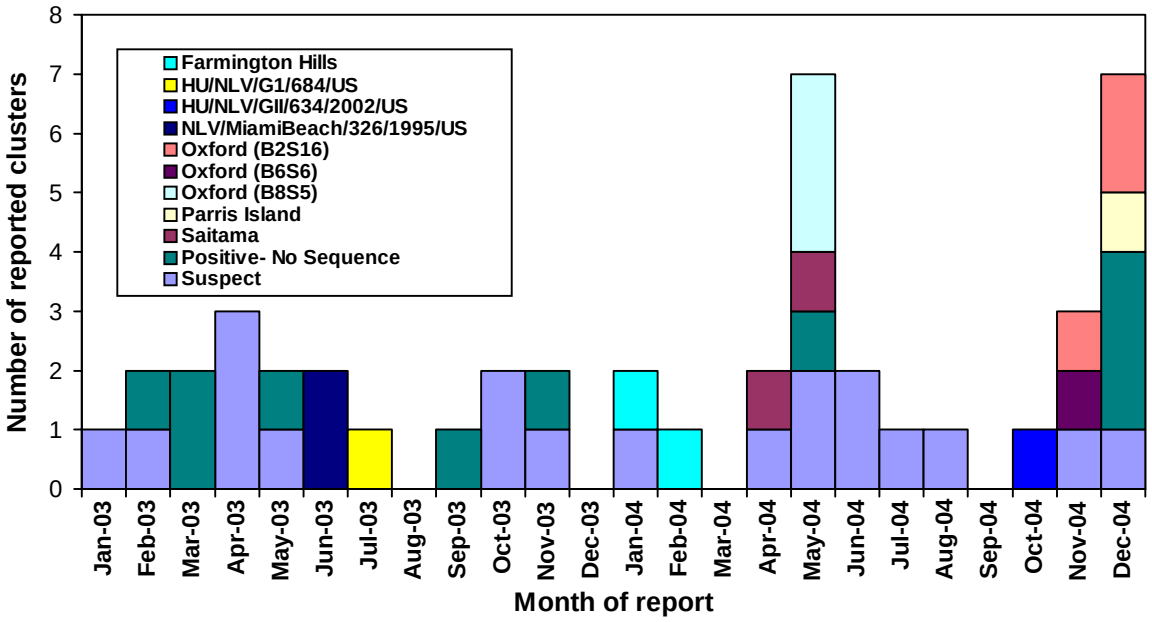
Norovirus is a common cause of gastroenteritis both nationally and in Arizona and is associated with acute illness typically of short duration. Symptoms include nausea, vomiting, abdominal pain, headache, watery diarrhea, low-grade fever or any combination of these symptoms. The virus is usually spread via the fecal-oral route; however, airborne transmission through aerosolization of emesis has been documented. Norovirus has been associated with foodborne and waterborne outbreaks, but person-to-person spread is the most common source of cluster. Attack rates of greater than 50% are common during outbreaks and the virus spreads easily in long term care facilities, schools, daycares, and other institutions in which people are in close contact.

While individual cases of norovirus are not reportable in Arizona, outbreaks of gastrointestinal illness are required to be reported and investigated. Since 2002, norovirus surveillance in Arizona has increased with the addition of testing capabilities at the Arizona State Public Health Laboratory (ASPHL). This has enhanced our capacity to respond to gastrointestinal outbreaks and has allowed for confirmation of suspected outbreaks of viral gastroenteritis within two days of specimen collection.

Surveillance Data

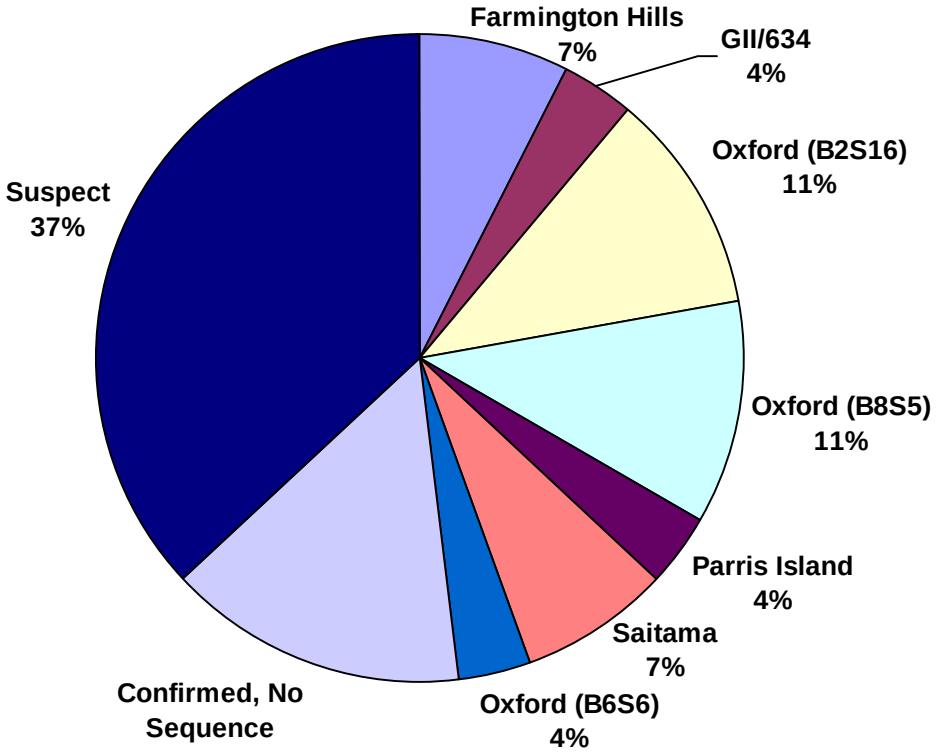
Norovirus was suspected or confirmed as the causative organism in over half of the documented outbreaks of gastrointestinal illness in Arizona in 2004. Seventeen outbreaks of norovirus were confirmed in 2004, compared with six in 2003 and none in 2002. Ten gastrointestinal clusters were of unknown etiology; some of these may have been due to norovirus, but no clinical specimens were obtained. Peaks of activity in Arizona in 2004 occurred in late spring and winter (Figure 19).

Figure 19. Norovirus activity by genetic subtype, Arizona, 2003–2004.



Through genetic sequencing done at the State Laboratory, a wide variety of norovirus clones have been identified since this technique was implemented in 2003 (Figures 19 & 20). The percentage of sequenced outbreaks continues to increase over time, enhancing our capacity to identifying trends associated with the spread of norovirus clones. Although data are not available for individual cases, sequencing information can be useful in monitoring the epidemiology of infection and suggesting sources of infection. In Arizona, several different clones were identified throughout 2004 and varied depending on the location and source of the cluster. While the majority of norovirus clones seen nationally are of the GII.4 or "Farmington Hills" strain, Arizona data have not indicated a trend towards this clone. However, data represent reported outbreaks only and sequencing data are unavailable for over 50% of outbreaks, limiting our ability to interpret data and identify trends.

Figure 20. Identified norovirus clones, Arizona, 2004.



Summary of Norovirus Outbreaks in Arizona, 2004

Norovirus contributed to more foodborne outbreaks in Arizona during 2004 than any other pathogen. It is believed that three factors contribute to this observation, including the low infective dose, large human reservoir of infection, and the ability to be transmitted by a variety of routes. Norovirus outbreaks in Arizona during 2004 have been documented in long-term care and assisted-living facilities, hospitals, schools, restaurants, cruises, and among members of sports teams.

The largest outbreak of norovirus documented in Arizona during 2004 occurred among students and employees at a Maricopa County elementary school. When the school reported the cluster, it was estimated that over 150 children had been absent due to illness. This outbreak reinforced the need to exclude actively ill students, practice careful and prompt disposal of vomit, and appropriately disinfect all surfaces during norovirus outbreaks in school settings.

There have been several documented cases of norovirus clusters among athletic teams, both nationally and statewide. Members of sports teams have close contact and typically share personal items, allowing for enhanced person-to-person transmission. An investigation of a norovirus outbreak among a football team in Pima County found environmental and person-to-person transmission among players; however, a specific exposure was not identified.

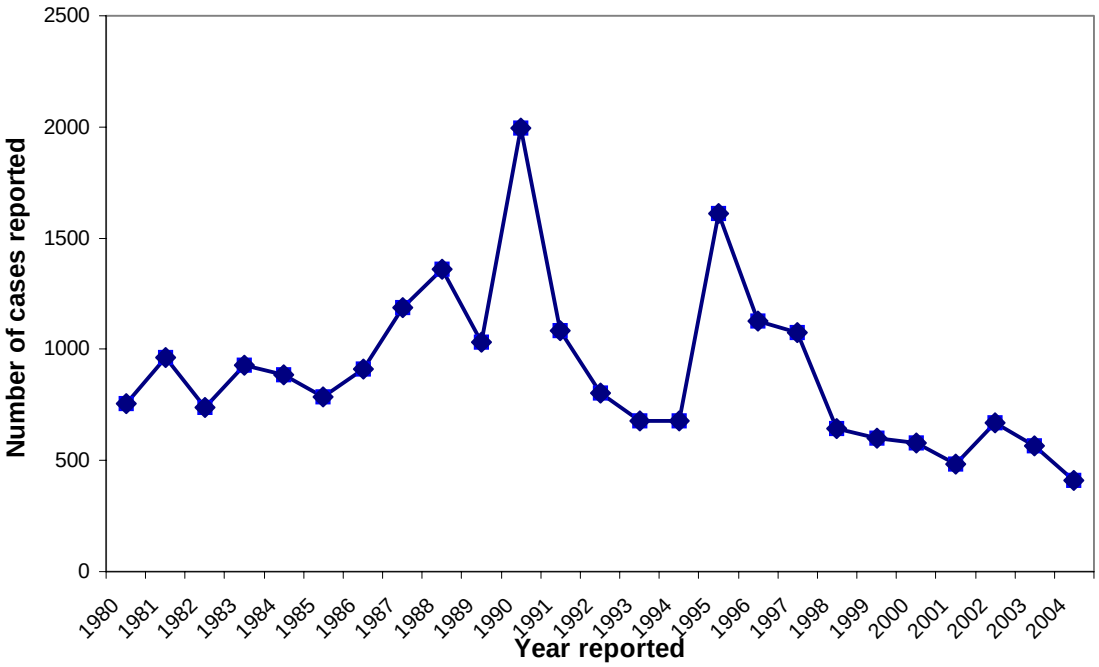
G. Shigellosis

Although *Shigella* was first identified over 100 years ago, it continues to infect millions of people every year. Shigellosis is endemic throughout the world and there are approximately 164.7 million cases worldwide, of which 163.2 million are in developing countries and 1.5 million in industrialized countries. In 2004, Arizona reported 409 cases of shigellosis, which represents the lowest annual number of cases reported since 1980.

Shigella is a highly contagious bacterium that infects the intestinal tract of humans. The genus *Shigella* consists of four species: Group A, *Shigella dysenteriae*; Group B, *S. flexneri*; Group C, *S. boydii*; and Group D, *S. sonnei*. In general, *S. dysenteriae*, *S. flexneri*, and *S. boydii* account for most isolates in developing countries. In industrialized countries, *S. sonnei* is most common followed by *S. flexneri*. This trend is consistent within Arizona, where each year the number of cases of *S. sonnei* outnumbers those for *S. flexneri*.

Shigellosis has shown a cyclical trend, ranging from 6 to 30 years. Some researchers believe that this cyclical pattern may reflect the development of population-based serotype specific immunity. The cyclical trend of shigellosis is evident when analyzing the number of cases in Arizona by year, as shown in Figure 21. Shigellosis outbreaks were common with a peak of over a thousand cases of shigellosis reported in 1990 (1,995). Although statewide numbers of shigellosis were at decreased levels during 2004, localized clusters were identified in Arizona; however, they involved a small number of people.

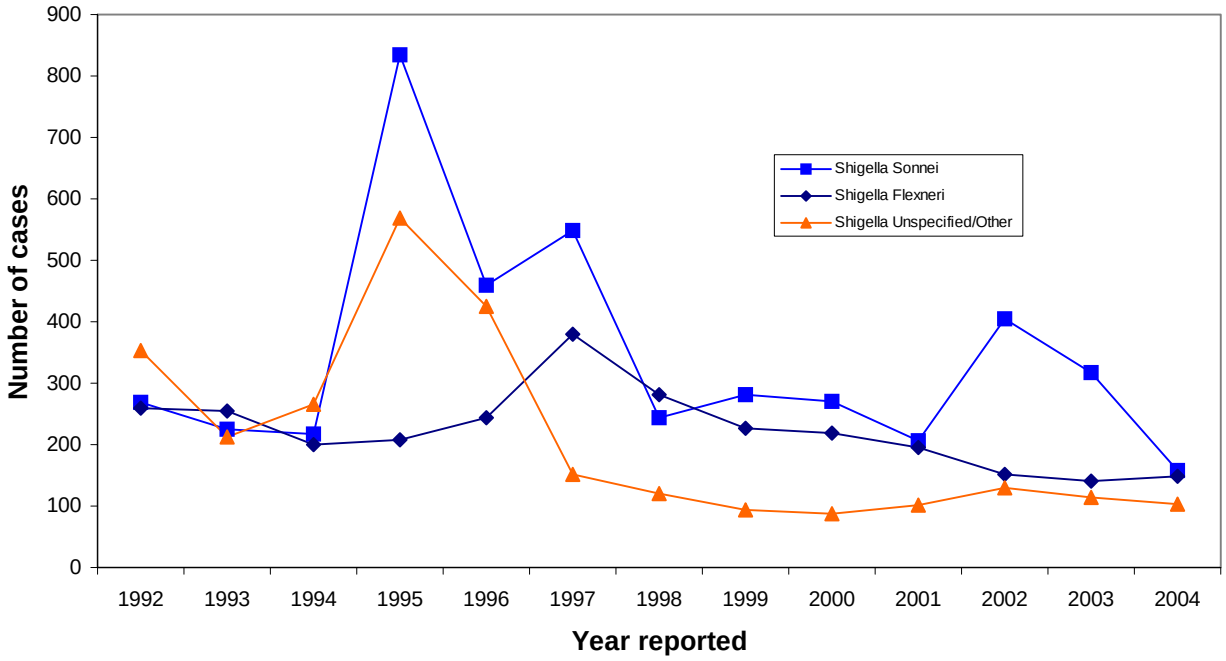
Figure 21. Reported *Shigella* cases, Arizona, 1980–2004.



Additional trends are identified when analyzing *Shigella* according to serotype. Figure 22 presents the number of shigellosis cases reported in Arizona over the last 12 years by total cases and by the two most commonly reported species, *S. sonnei* and *S. flexneri*. As shown, the number of *S. flexneri* cases has remained relatively constant over the last six years, while

the number of *S. sonnei* cases has fluctuated. In general, *S. sonnei* species are the most common type found in large outbreaks in the United States. Therefore, it appears that recently the number of *S. sonnei* cases is most often responsible for the fluctuating trends in the number of shigellosis cases reported in Arizona.

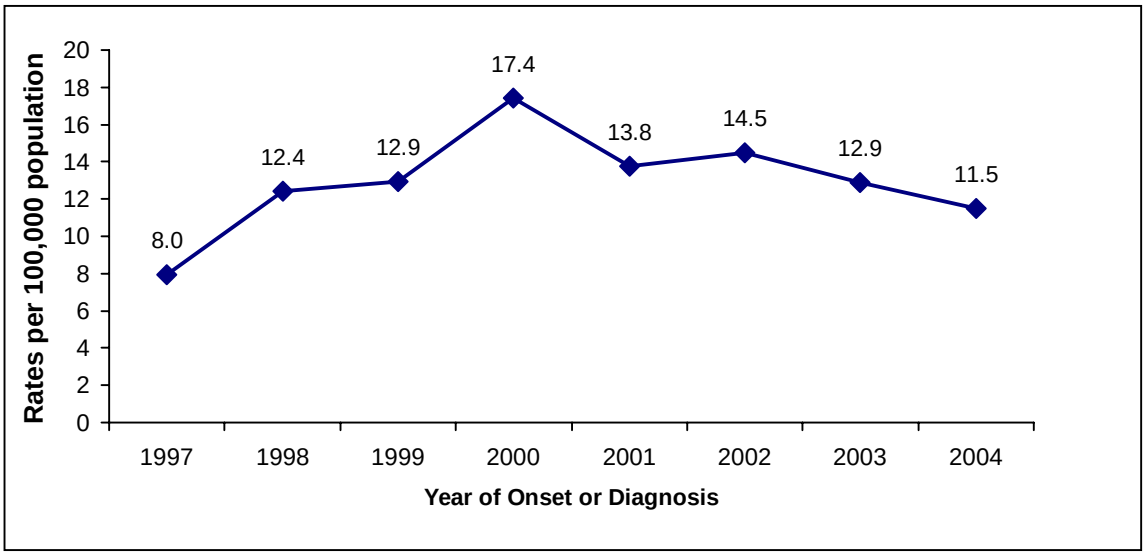
Figure 22. Reported Shigella cases by serotype, Arizona, 1992–2004.



H. Invasive *Streptococcus pneumoniae*

Surveillance of invasive *Streptococcus pneumoniae* (pneumococcal disease) through laboratory reporting has been ongoing in Arizona since April 1997. In 2004, 670 cases were reported (11.5 cases per 100,000 population), compared to 718 cases reported in 2003 (12.9 cases per 100,000 population) representing a 7% decrease in cases (Figure 23). This decrease in incidence is thought to be due to the continuing use of the pneumococcal conjugate vaccine for children. Other states have reported a greater decrease in disease than is seen in Arizona.

Figure 23. Rates of reported invasive *Streptococcus pneumoniae* infection, Arizona, 1997-2004.



Eighty seven children less than five years old were reported with invasive pneumococcal disease in Arizona in 2004 compared to 200 cases in 2000. The significant drop in cases is likely due to the use of the pneumococcal conjugate vaccine in this age group. Forty six (53%) of cases were male. Of the 46 children with known disease outcome, four died.

Resistance to penicillin decreased from a high of 46% in 2000 to 25% in 2004. Thirty-two of the isolates were available at the Arizona State Public Health Laboratory for serotyping. Twenty six (81%) were typable. Only two of the isolates from children were serotypes found in the vaccine, 19F and 6B. Pneumococcal types typically found in Arizona children include: 1, 3, 6, 7F, 9, 10, 10A, 12, 15, 15B, 19, 19A, 22, 23, and 33. The most common isolate identified was 19A in four patients.

Antibiotic resistance and treatment of *Streptococcus pneumoniae* invasive disease has become an emerging world, national and state problem. In the United States, drug-resistance *Streptococcus pneumoniae* (DRSP) has increased substantially in the past fifteen years; DRSP varies regionally and has been reported to be over 30% in some areas of the U.S. In 1999, ADHS began posting antibiograms of ISP on the Infectious Disease Epidemiology Program's website on a quarterly basis (Figures 24 & 25). Children less than five years of age have higher rates of penicillin non-susceptibility (Figures 26 & 27). In addition, children under age 5 showed an increase in high level resistance in 2000.

Figure 24. Antibiotic susceptibility among reported invasive *Streptococcus pneumoniae* isolates, Arizona, 2004.

Antibiotic	Number of Isolates Tested	Susceptible [n (%)]	Intermediate [n (%)]	Resistant [n (%)]
Penicillin	356	286 (80)	47 (13)	17 (5)
Ceftriaxone	294	282 (96)	8(3)	2(1)
Vancomycin	285	283(100)	0	0
Erythromycin	309	276 (89)	5 (1)	27(9)
Clindamycin	66	65 (98)	0(0)	1(2)
Levofloxacin	180	175 (97)	5 (3)	0

Figure 25. Antibiotic susceptibility among reported invasive *Streptococcus pneumoniae* isolates in children less than 5 years, Arizona, 2004.

Antibiotic	Number of Isolates Tested	Susceptible [n (%)]	Intermediate [n (%)]	Resistant [n (%)]
Penicillin	34	23 (67)	6 (17)	5 (14)
Ceftriaxone	23	22(95)	0	1(5)
Vancomycin	30	30 (100)	0	0
Erythromycin	37	29 (78)	1(.02)	7(18)
Clindamycin	7	7 (100)	0	0
Levofloxacin	12	11 (91)	1(9)	0

Figure 26. Penicillin non-susceptibility among reported invasive *Streptococcus pneumoniae* isolates, Arizona, 1998-2004.

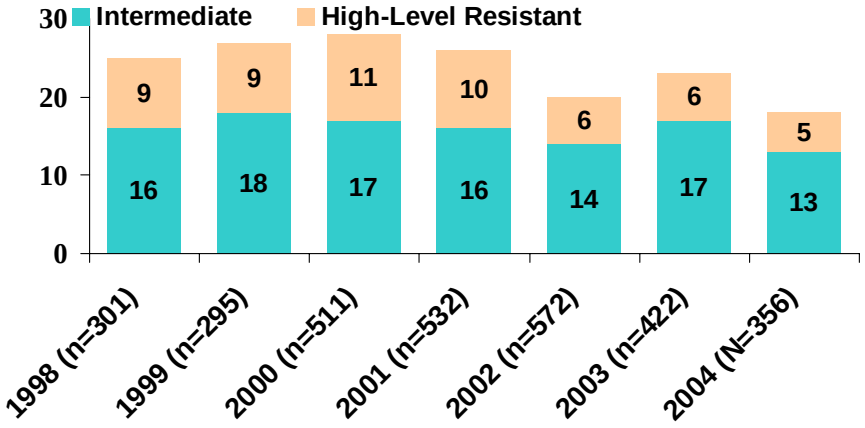
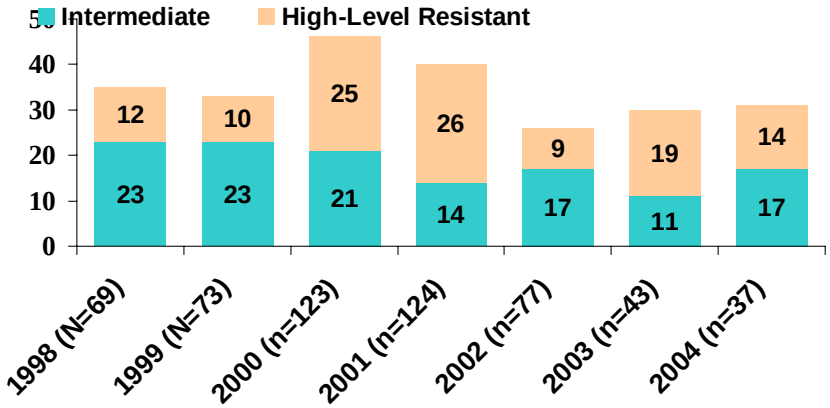
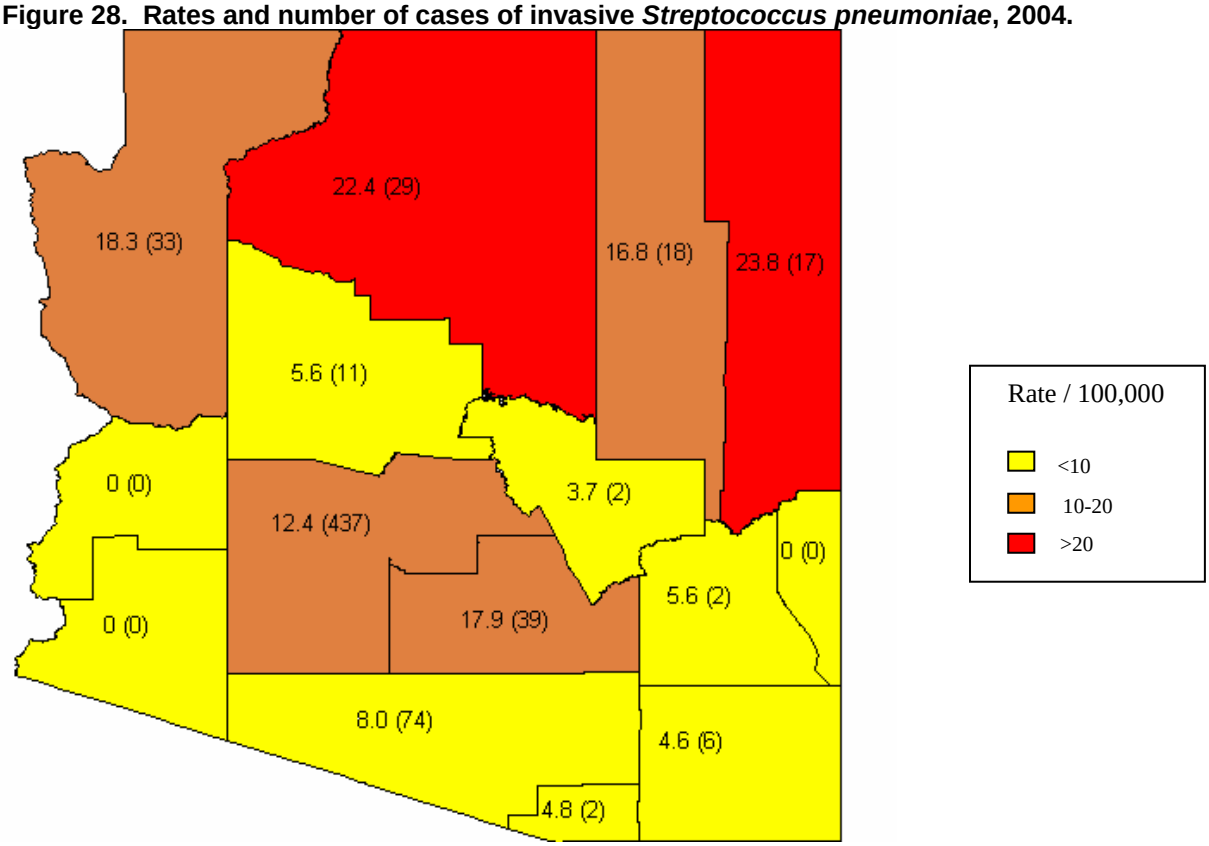


Figure 27. Penicillin non-susceptibility among reported invasive *Streptococcus pneumoniae* isolates in children <5 years, Arizona, 1998-2004.

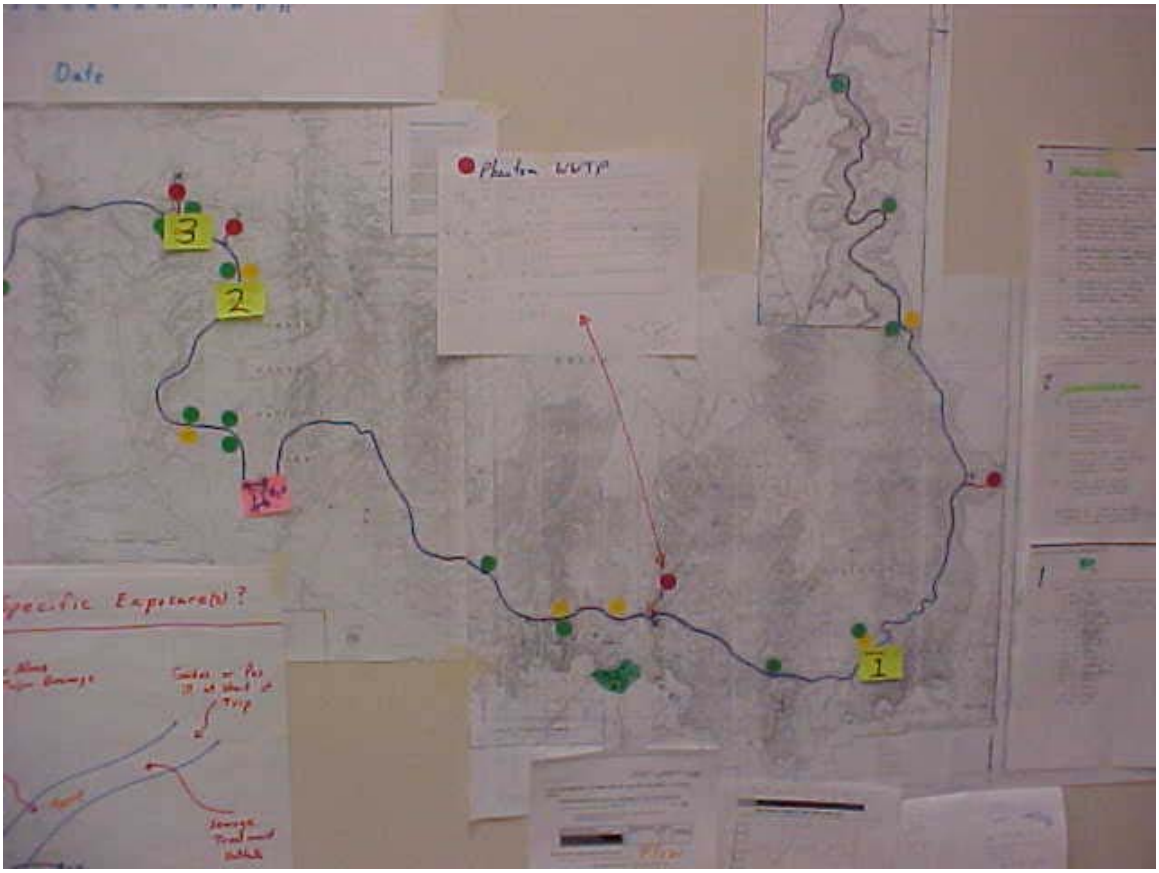


The distribution of cases by county in 2004 is shown in Figure 28.

Figure 28. Rates and number of cases of invasive *Streptococcus pneumoniae*, 2004.



IV. Outbreaks



Foodborne Illness Outbreaks in Arizona, 2004

Background

Foodborne illnesses are a widespread public health problem with an estimated 76 million cases and 5,000 deaths occurring each year in the United States. Health officials in Arizona have several different mechanisms for identifying outbreaks: routine surveillance of reportable diseases and investigations of these cases to identify common exposures and clinical symptoms; routine testing, subtyping, and comparison of enteric isolates including using advanced molecular identification techniques such as pulsed field gel electrophoresis (PFGE) to detect matching or possibly linked cases; and public reports of suspected foodborne illness to their local health department using foodborne illness hotlines.

Definitions:

Confirmed Foodborne/Waterborne Outbreak:
A confirmed foodborne illness outbreak is an incident or exposure in which two or more persons experience a similar illness after ingestion of a common food, water source, or meal and epidemiologic evaluation implicates the item was the source of illness. Outbreaks may or may not be laboratory-confirmed. Waterborne outbreaks may be associated with drinking water or recreational water. Confirmed outbreaks may be classified into the following categories:

1. Laboratory-confirmed: Outbreaks in which laboratory evidence of a specific etiologic agent is obtained.
2. Epidemiologically-defined: Outbreaks in which clinical and epidemiological evidence define a likely agent, but laboratory confirmation is not obtained.
3. Outbreak of undetermined etiology: Outbreaks in which laboratory confirmation is not obtained and epidemiologic evidence cannot clearly define an agent.

Probable Foodborne/Waterborne Outbreak:
A probable foodborne illness outbreak is defined as an incident or exposure in which two or more persons experience a similar illness after ingestion of a common food item or water source, and a specific item is suspected, but person-to-person transmission or other exposures cannot be ruled out.

ADHS is working to develop an Arizona foodborne illness hotline to improve identification of enteric illness in individuals who may not be clinically diagnosed. Healthcare providers also report suspected foodborne illness outbreaks when they see an unexpected number of patients with gastrointestinal illness. Restaurants, daycare providers, schools, and healthcare facilities (i.e., hospitals, long-term care facilities) may also report outbreaks to Arizona's local and state health departments.

Norovirus continues to be major cause of gastrointestinal outbreaks in Arizona with 17 confirmed outbreaks during 2004. A study by the CDC found that norovirus was detected in 93% of outbreaks of nonbacterial gastroenteritis. The majority of norovirus outbreaks in Arizona are thought to be spread via person-to-person transmission. Additionally, ill food workers handling ready-to-eat items such as sandwiches, drinks, and salads can also cause outbreaks of norovirus. Prevention of further disease transmission occurs by encouraging proper hand-washing techniques, minimizing bare-hand contact with ready-to-eat items, removing environmental contamination, and excluding ill employees from work until 72 hours after recovery.

Salmonella was the second-most common cause of gastroenteritis clusters in Arizona during 2004, causing three documented foodborne outbreaks. One outbreak was associated with food served to patrons at a restaurant, while the other two were linked to food that was catered for events. The cause of restaurant and catered outbreaks can be difficult to ascertain since several factors may be involved, including infected food handlers, cross-contamination of raw and ready-to-eat food items, environmental contamination, consumption of undercooked foods of animal origin, or inadequate cooking, hot holding, cooling, and reheating of multiple food items.

Bacterial intoxication caused by such pathogens as *Clostridium perfringens*, *Bacillus cereus*, and *Staphlyococcus aureus* was also an important cause of foodborne clusters in 2004 . These outbreaks often lack laboratory confirmation since laboratory tests are unable to detect the bacteria and toxin as they are short-lived in the stool of ill individuals. Commonly-identified factors leading to bacterial intoxications are improper time and temperature control of potentially hazardous food items such as meat, rice and sauces.

Confirmed Foodborne Illness Outbreaks

A. Possible Bacterial Intoxication Outbreak Among Students at Day School, April – Pima County

On April 30, 2004 the Pima County Environmental Health Department received a call from an elementary school in Pima County after several students became ill with nausea, vomiting, diarrhea, cramps, and headache on April 28th and 29th. The Pima County Health Department initiated an investigation to identify the source of infection and compiled a questionnaire regarding symptoms and menu items consumed during the week of April 26th.

Questionnaires were administered to classrooms; each child and faculty member responded to the questions. Of the 140 individuals interviewed, 28 met the case definition of vomiting or diarrhea and one or more of the following: nausea, cramps, fever, and headache. The average age of respondents was 14, with a range of 8 years to 45 years of age. An analysis of the food data revealed two lunch items as a possible source of illness. Both the bean and cheese “burro” and the tortilla chips were shown to be significantly associated with illness ($p<0.05$). However, after controlling for persons that also ate the bean and cheese burro, the tortilla chips lost their statistical significance ($p=0.28$). The average incubation period of those that became ill after lunch on the 27th was 12 hours, with a range of 6 to 35 hours. The average duration of illness for the cases was 24 hours.

Since no food samples or clinical specimens were available for laboratory testing, a causative agent was not identified. *Clostridium perfringens* intoxication was the suspected cause of illness given the short incubation period (6-24 hours) and short duration of illness (24 hours or less). Although this bacterium is often associated with improper time and temperature control of food items, inspections of the lunch vendor by Environmental Health found that the beans in the burros had been cooked and cooled appropriately. However, the burros were prepared offsite and delivered to the school, presenting the possibility for inappropriate handling during delivery.

B. Norovirus Outbreak Among Diners at Buffet Restaurant, May – Maricopa County

On Friday, May 21, 2004, Maricopa County Environmental Health Services (MCEHS) received three separate complaints regarding a local buffet restaurant. All three complainants reported

eating at the restaurant on May 18th, 2004. One of the complaints was from an attendee of a school fundraiser held at the restaurant. Subsequently, the school reported that approximately 53 of the individuals who attended this event developed gastrointestinal symptoms. School officials did not provide a list of attendees, but ill individuals were instructed to call the health department. Cases who phoned the health department were interviewed regarding their symptoms and exposures.

According to these interviews, the ice cream and/or yogurt dispensed from the soft serve machine at the restaurant appeared to be associated with infection. This association was identified epidemiologically prior to MCEHS inspection at the restaurant, allowing for the collection of food samples from the soft serve machine and ice cream/yogurt containers. Testing of these samples at the ASPHL depicted evidence of bacterial contamination, notably in samples collected from previously unopened containers. MCEHS inspectors also noted that six employees called in sick between May 2nd and May 21st. Three of those employees worked on May 18th. Of the employees experiencing gastrointestinal symptoms, onset was suspected to be after May 18th.

In addition to food testing, stool specimens were collected by the county health department to determine the etiologic agent. One of the stool specimens collected tested positive for norovirus at ASPHL. While bacterial contamination identified in the food sample may be indicative of improper handling or disinfection procedures, the cluster of illnesses may also have been caused by one or both pathogens. There is some variation in incubation times suggesting that bacterial intoxication may have occurred in addition to the identified norovirus infections. Bacterial intoxication is extremely difficult to determine from testing of stool specimens. In addition, two more complaints of illness concerning this restaurant were received on May 24th and June 9th by the county health department. The facility was re-inspected by MCEHS and additional food samples from the soft serve machine were obtained. This second batch of samples also showed high levels of bacterial contamination. After visually inspecting detailed cleaning of the machine, tests from later samples were within normal limits.

C. Salmonella Outbreak Associated With Consumption of Shrimp Cocktail at Restaurant in Mexico, June – Mexico

On July 22, 2004, ASPHL notified ADHS of eight *Salmonella enteritidis* isolates, collected between June 24, 2004 and July 10, 2004, which matched by PFGE, suggesting a common exposure. Shortly after this discovery, the foodborne branch of CDC notified ADHS that the Salmonella Outbreak Detection Algorithm (SODA) maintained by the CDC detected an increase in the number of positive cases of *S. enteritidis*. A total of 20 *S. enteritidis* isolates, collected between June 24 and July 12 were found to have the same PFGE pattern.

These cases were distributed among several counties: 12 in Maricopa, 1 in Pinal, 3 in Pima, 1 in Coconino, 1 in Yavapai, and 1 in Navajo County. County health department interviews revealed that many of the cases traveled to Mexico during the 1-7 days prior to their onset of illness, the incubation period for *Salmonella*. ADHS incorporated this information into more focused questionnaire including information on hotels and meals consumed in Mexico, and re-interviewed cases.

These interviews revealed that 18 of the 20 identified cases had traveled to Rocky Point, Mexico, between June 1 and July 5. In addition, 10 of these 18 cases consumed shrimp at various restaurants, with the majority (70%) specifically recalling consumption of shrimp

cocktail. Since the suspected food was served at restaurants outside of the United States, further investigation into the exact source of the infection could not take place.

D. Salmonella Outbreak Among Conference Attendees, August – Maricopa County

Reports were received from the Wisconsin and Oregon state health departments regarding two cases of *Salmonella oranienburg* that attended a conference in Maricopa County during the first week of August. The Maricopa County Department of Public Health (MCDPH) conducted an inspection of the facility and obtained information about the conference. Meanwhile, the California State Health Department called to report a third case of *S. oranienburg* in a California resident who also attended the conference in Arizona.

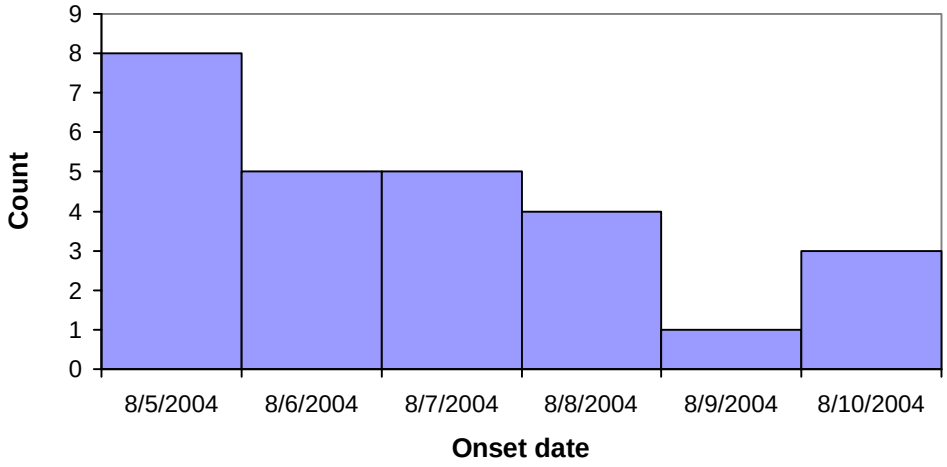
Upon further investigation by the MCDPH and Maricopa County Environmental Health Services (MCEHS), additional cases of illness were reported among conference attendees. According to the company holding the conference, an informal e-mail group of people reporting illnesses identified approximately 18 conference attendees with gastrointestinal symptoms. Approximately 500 people nationwide attended the conference in Arizona and additional case-finding measures were initiated. An inspection completed by MCEHS did not find any food code violations at the conference center facilities and no ill employees documented. MCEHS also obtained a menu of the foods served by the facility throughout the entire conference.

Since the outbreak involved people from multiple states, the investigation was completed by ADHS. The PFGE patterns on the three *Salmonella* specimens from Wisconsin, Oregon, and California revealed that all three matched. These results supported the theory that a common-source outbreak of *Salmonella* had occurred. Interestingly, a review of the PFGE database at the Arizona State Public Health Laboratory (ASPHL) did not find any results matching the patterns seen in the three conference attendees from other states. ADHS verified foods consumed during the conference and obtained a list of attendees from the conference organizers. This information was used to develop a questionnaire and a case-control study was initiated.

Telephone interviews were conducted on all individuals reporting illness. In addition, controls were randomly selected and interviewed from the list of 500 attendees. Additional cases were identified during control interviews; any controls matching the case definition were classified as cases and additional controls were enrolled. A total of 30 cases and 50 controls were identified during interviews.

Survey data were analyzed to identify common patterns in onset dates and food consumption. The majority of those cases reported onset dates the second day of the conference (Figure 29). Since the incubation period for *Salmonella* generally ranges from 18 to 72 hours, this finding indicates that the exposure probably occurred during the single meal served the first day of the conference. However, statistical analysis of the foods consumed at this meal did not reveal any item as significantly associated with illness. Since the identification and investigation of this cluster occurred over a month after the onset, recall and interviewer bias may have impacted the results.

Figure 29. Cases of Salmonella by onset date, Arizona 2004.



E. Salmonella Outbreak Associated With Wedding Reception, October – Yuma County

During the last week of October 2004, a Yuma County resident called the local county health department to report illness after attending a wedding reception on Friday, October 22, 2004. The resident's 16-year-old daughter had presented to a local healthcare facility on October 23, 2004, with diarrhea, vomiting, nausea, fever, chills, and abdominal cramps. The caller reported that other individuals who had also attended the reception had similar symptoms.

No stools were collected for testing; however, the healthcare provider stated that 14 or 15 others at the reception had been seen between October 24th and 25th with similar symptoms. In addition, the local health department noted an increase in gastrointestinal cases (10 cases) during this period in the daily list of emergency room visits maintained by the local hospital. On October 28, laboratory results revealed that three out of the ten suspected gastroenteritis cases at the local hospital were positive for *Salmonella*. Two of these individuals attended the wedding reception on October 22nd, while the third positive case reported attending a birthday party (quinceañera) on Saturday, October 23. Two other individuals also reported developing gastrointestinal symptoms after this party. Investigations revealed that this party was held within 24 hours of the wedding reception, at the same location and catered by the same company as the wedding reception.

Attendees of the wedding reception were interviewed to identify a possible source for the *Salmonella* infections. Unfortunately, information on the birthday party could not be obtained. The county health department acquired a menu for the wedding, which included shredded beef (barbacoa), Spanish rice, beans, lettuce salad, salsa, ranch dressing, and corn tortillas. Of the 162 people who attended the wedding reception, the health department identified 57 that met the case definition for salmonellosis. Based upon interviews with 35 of the 57 ill, onset of illness was 7-72 hours after the wedding reception, suggesting a point source infection. Interviews were not able to pinpoint a specific contaminated food item, since ill attendees consumed various combinations of dishes.

The Yuma County Environmental Health Department completed an inspection with the catering company for both events and did not find any reports of ill food handlers. Environmental health inspectors found that food preparation occurred in a non-commercial, unlicensed kitchen in the home of a catering company employee. In addition, the caterer did not have proper knowledge on food handling practices. Although no food was available for bacterial testing, the epidemiologic and environmental investigations suggest a high possibility of cross-contamination among all of the food prepared for the wedding reception.

F. Norovirus Outbreak Among Conference Attendees, October – Maricopa County

On Tuesday, October 26, 2004, the Maricopa County Department of Public Health (MCDPH) received a phone call from emergency department staff at a local hospital stating that several persons with nausea, vomiting, diarrhea, and fever had sought treatment at their facility the prior evening; all patients were guests at a local resort/conference center. MCDPH staff initiated an outbreak investigation and began working closely with conference center staff. The facility reported approximately 500 national and international attendees to the conference, with 82 individuals reporting symptoms—80 attendees and two employees. MCDPH was able to obtain 2 stool specimens for testing, which tested positive for norovirus at ASPHL.

Since attendees had returned home to various states and countries before interviews could be conducted, MCDPH chose to administer questionnaires via e-mail. This method yielded a fairly high return rate for cases; however, no controls completed the questionnaire. The major symptoms reported by attendees were nausea, vomiting, weakness, diarrhea, and anorexia. Since all of the resort meals were served buffet style with a large number of choices, an implicated food item could not be determined.

An inspection completed by MCEHS revealed that the facility had been compliant with recommendations to restrict ill food handlers until symptoms resolved. However, during the MCEHS inspection, it was noted that several food workers were absent in the days prior to the onset of illness among guests and that at least two of the absent food workers had symptoms suggestive of norovirus.

G. Norovirus Outbreak Among Diners at Popular Restaurant, December – Cochise County

On Monday, December 13, 2004, the Cochise County Environmental Health Division (CCEHD) received a call from the public stating that several people who had eaten at a popular, local restaurant on Thursday, December 9, developed gastrointestinal symptoms. A second group of individuals also dining the same night called with similar complaints. County epidemiologists obtained a list of group members and initiated interviews.

Of the 81 diners contacted by CCEHD, 35 had symptoms suggestive of norovirus infection. The health department was able to collect six stool specimens on patrons on December 15th; two were positively identified as norovirus at the ASPHL. Analysis of interviews showed a significant association between consuming salad at the restaurant and developing gastrointestinal symptoms ($p<0.05$). In addition, CCEHD inspections found several violations in the kitchen of the restaurants. There were several discrepancies noted in the food handling processes of the salad. Salad greens had been washed in the hand sink, lettuce shipping boxes were reused to store washed lettuce, and salad bowls (which were wet stacked) filled with lettuce were stacked on top of each other, with the above bowl nested in the lettuce of the

bowl below. Although the origin of norovirus in the salad is under question, analysis of interviews and inspection results firmly point to the salad as the source of the outbreak.

Probable Foodborne Illness Outbreaks

H. Norovirus Outbreak Among Inmates at Correctional Facility, November – Maricopa County

On November 12, 2004, the Office of Environmental Health (OEH) at ADHS received an incident report of several inmates ill with gastrointestinal symptoms at a correctional facility in Maricopa County. The report from a correctional officer described prisoners presenting with vomiting and diarrhea beginning about 11:55 pm on Wednesday, November 10, 2004. Shortly after receiving the report, staff from EHS traveled to the facility to interview prisoners and inspect the establishment.

Of the 20 inmates interviewed, 16 reported gastrointestinal symptoms including vomiting and diarrhea. OEH requested stool specimens and submitted specimens to ASPHL for testing. In addition, frozen samples of the foods served at each dining period in the last 72 hours were obtained for bacterial testing at the ASPHL. Numerous deficiencies were noted during the inspection, including the use of dirty, greasy wash water and no rinse water in the 3-compartment sink.

Test results, follow-up interviews, and data analysis revealed the possibility of an infected food handler contaminating food served on Tuesday, November 9th. Stool cultures from inmates tested positive for norovirus at ASPHL. The ill kitchen worker had onset of stomach cramps and vomiting at 11:00 am on November 9th, approximately 36 hours prior to the onset of the majority of inmates. The food worker continued to work in the kitchen during the time he felt ill. No stool samples or tests were taken on this food worker.

Interviews revealed that the sausage served for the lunch meal on Wednesday, November 10th was associated with illness ($p\text{-value}<0.05$). In addition, OEH staff noted that temperature control sheets obtained from the food service contractor indicated that the sausage had not been heated to the appropriate temperature.