



INFECTIOUS DISEASE EPIDEMIOLOGY 2008-2013 REPORT

Office of Infectious Disease Services
Bureau of Epidemiology and Disease Control
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LIST OF ABBREVIATIONS

AAC	Arizona Administrative Code
ADHS	Arizona Department of Health Services
ARS	Arizona Revised Statute
ASPHL	Arizona State Public Health Laboratory
AZ	Arizona
CDC	Centers for Disease Control and Prevention
CDR	Communicable Disease Report
CSTE	Council of State and Territorial Epidemiologists
dRIT	Direct Rapid Immunohistochemical Test
DSO	Disease-Specific Observation
EDC	Bureau of Epidemiology and Disease Control
ELR	Electronic Laboratory Reporting
HAI	Healthcare Associated Infections
HUS	Hemolytic Uremic Syndrome
MCDPH	Maricopa County Department of Public Health
MEDSIS	Medical Electronic Disease Surveillance Intelligence System
MRSA	Methicillin-Resistant <i>Staphylococcus aureus</i>
ODIS	Office of Disease Integration and Services
OIDS	Office of Infectious Disease Services
RMSF	Rocky Mountain spotted fever
RSV	Respiratory Syncytial virus
STD	Sexually Transmitted Disease
STEC	Shiga toxin-producing <i>E. coli</i>
TBRF	Tick-Borne Relapsing Fever
VISA	Vancomycin–intermediate resistance <i>Staphylococcus aureus</i>
VPD	Vaccine-Preventable Disease
VRE	Vancomycin-Resistant Enterococcus
VRSA	Vancomycin-Resistant <i>Staphylococcus aureus</i>
VRSE	Vancomycin-Resistant <i>Staphylococcus epidermidis</i>
WNV	West Nile virus

EXECUTIVE SUMMARY

The Office of Infectious Disease Services (OIDS), within the Bureau of Epidemiology and Disease Control (EDC) at the Arizona Department of Health Services (ADHS), is responsible for monitoring and controlling diseases caused by many infectious agents or toxins, as well as implementing and maintaining systems for reporting, managing, and analyzing communicable disease data. To accomplish this, OIDS staff work closely with other public health and healthcare professionals at local health departments, healthcare facilities, federal agencies, other offices at ADHS, and other agencies.

This report describes Arizona's infectious disease surveillance system and trends in disease incidence and distribution for cases reported to the Arizona public health system from 2008 through 2013. This information is intended to assist public health agencies and partners with the aim of improving disease prevention and control activities.

The report includes several sections:

- An explanation of the sources of information for Arizona's infectious disease data;
- An overview of the state's communicable disease surveillance system, including important changes to the overall surveillance system and to the statewide electronic surveillance database and management system during this period;
- A brief description of the types of morbidities tracked by OIDS, and their relative disease burden in Arizona;
- Links to extensive disease statistics for 2008–2013;
- Short summaries of selected diseases under surveillance, including statistics and descriptions of trends in the data; and
- References to additional detailed information about many of these topics, in the form of separate reports and publications authored or produced by OIDS staff.

I. INTRODUCTION AND SURVEILLANCE SYSTEM OVERVIEW

A. PURPOSE AND SCOPE OF THE REPORT

The purpose of this report is to describe Arizona's infectious disease surveillance system and summarize surveillance information for cases reported to the Arizona public health system during the period of 2008 through 2013. This information is intended to assist public health agencies and our partners by providing uniform data on the disease burden in the state, describing trends in disease incidence and distribution, and giving relevant information on system details or changes.

As of the writing of this report, the ADHS Office of Infectious Disease Services (OIDS) is comprised of five programs: Infectious Disease Epidemiology; Public Health Emergency Preparedness Epidemiology; Healthcare Associated Infections; MEDSIS (Medical Electronic Disease Surveillance Intelligence System); and Electronic Disease Surveillance (including syndromic surveillance and electronic laboratory reporting activities). Collectively, OIDS is responsible for surveillance and investigation for a variety of diseases, including influenza; foodborne/waterborne diseases; invasive organisms; vaccine-preventable diseases; and vector-borne and zoonotic diseases. Surveillance for tuberculosis and sexually transmitted diseases, including HIV, is conducted by the Office of Disease Integration and Services (ODIS), and as such is not included in this report.

OIDS staff work closely with Arizona's local health departments. 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 the tribal health departments and/or Indian Health Service Units. Much of the information presented in this report has been collected through the joint efforts of local and state health department staff. Local health department staff in Arizona play an essential role not only in collecting communicable disease data, but more importantly, as the public health officials working most directly to control the spread of infection from identified cases.

OIDS staff also collaborate with colleagues in other ADHS offices and bureaus including: Environmental Health; Immunization Program Office; State Health Laboratory Services; and Public Health Emergency Preparedness, all within the Division of Public Health Services, and the Office of Border Health. OIDS would like to acknowledge and thank both external and internal partners for their contributions to this report.

B. DATA SOURCES AND LIMITATIONS

ADHS maintains registries of selected conditions that are reportable per Arizona Administrative Code (AAC) R9-6-202, 203, 204, and 205. The information is collected to assess and monitor the burden of disease, characterize 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). Additional conditions are included that are considered important for Arizona because of differences in the epidemiology of the disease in the state or for other public health reasons. The list is revised periodically to add newly emerging pathogens or remove conditions that are no longer a public health priority.

Case definitions for public health surveillance are used to increase the specificity of reporting, and to allow comparability of diseases nationwide. Only cases meeting the confirmed or probable case classifications for these standardized surveillance case definitions are included in this report. Criteria for surveillance case definitions are often different than those used by providers to diagnose and treat diseases.

State and local public health officials rely on health care providers, laboratories, hospitals, schools, and other facilities to report notifiable diseases or conditions. Public health staff, particularly at the local level, conduct investigations of many morbidities, and implement control measures, as appropriate. During that process, additional information may be obtained about basic case descriptors, symptoms, risk factors, travel or vaccination history, contacts, and other pertinent facts. Local health jurisdictions and ADHS add the information collected through public health reporting and/or investigation to case records in the communicable disease registry.

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 case definitions over time, mechanisms of reporting, patterns of health-seeking behavior, and access to or availability of health care services all may influence the likelihood of a case being reported.

The annual population estimates from the ADHS Bureau of Public Health Statistics (<http://www.azdhs.gov/plan/menu/info/pop/index.php>) were used for the rate calculations in this report. Disease rates are calculated per 100,000 population unless otherwise specified and are not age-adjusted. Rate calculations based on a small number of reported cases or for counties with populations less than 100,000 are not considered reliable since they can be dramatically influenced by small changes in the number of reported cases.

C. OVERVIEW OF ARIZONA'S COMMUNICABLE DISEASE SURVEILLANCE SYSTEM

Arizona Administrative Code (AAC) R9-6-202, 203, 204, and 205 describe the morbidities, test results, and prescriptions required to be reported by health care providers, administrators of health care facilities, clinical laboratory directors, institutions, schools, pharmacists, and others. Tables outlining the reporting requirements, effective April 1, 2008, are on the next pages (Provider-reportable morbidities, School, childcare, or shelter-reportable morbidities and Laboratory-reportable test results). Information on the current reporting requirements can be found on the Arizona Secretary of State's website at http://apps.azsos.gov/public_services/Title_09/9-06.pdf. Additional information about communicable disease reporting can be found on the OIDS website at <http://www.azdhs.gov/phs/oids/reporting/index.htm>.

Arizona requires reporting by both healthcare providers and clinical laboratories as a dual surveillance measure to increase the sensitivity of the surveillance system and improve the completeness of reporting. Since local health departments are the primary response agency, healthcare providers report notifiable conditions to the local health departments for immediate investigation and initiation of control measures, as appropriate. Laboratories report to ADHS. Both ADHS and local health departments enter the reported data into the secure, web-based Medical Electronic Disease Surveillance Intelligence System (MEDSIS), where information can be jointly viewed by both ADHS and the appropriate local health department. Information obtained during case investigations is later added to MEDSIS to supplement the initial case reporting. ADHS reports case information without personal identifiers to CDC on a weekly basis for the purposes of compiling national statistics. Figure 1 outlines the reporting structure and flow of information in Arizona.

Reports from healthcare providers are submitted using the communicable disease report (CDR) to collect basic information about the case and the disease event (see <http://azdhs.gov/documents/preparedness/epidemiology-disease-control/disease-investigation-resources/communicable-disease-report-form.pdf>), or using another format containing the same information. Reportable conditions and test results can be reported via several methods:

- Telephone, secure fax, or mail
- Direct entry into MEDSIS by enrolled infection preventionists, providers, or laboratory staff (available since 2006), or
- Electronic laboratory reporting (ELR) – electronic transmission of test information from a laboratory's information system via HL7 messaging to ADHS (available since 2009).

Case investigators usually use the standardized investigation form for each morbidity to direct the investigation and collect additional information (for the current forms see <http://www.azdhs.gov/phs/oids/investigations/forms.htm>). Much of the information collected can

be entered into the disease-specific observation (DSO) sections in MEDSIS and used for later review and data analysis.

Data shared with public health partners, the public, and CDC throughout the year are considered provisional. Data cleaning and review occurs routinely to ensure data accuracy and quality. Each spring, data for the previous reporting year are finalized after additional data cleaning and review. Data presented here represent the finalized data for each year.

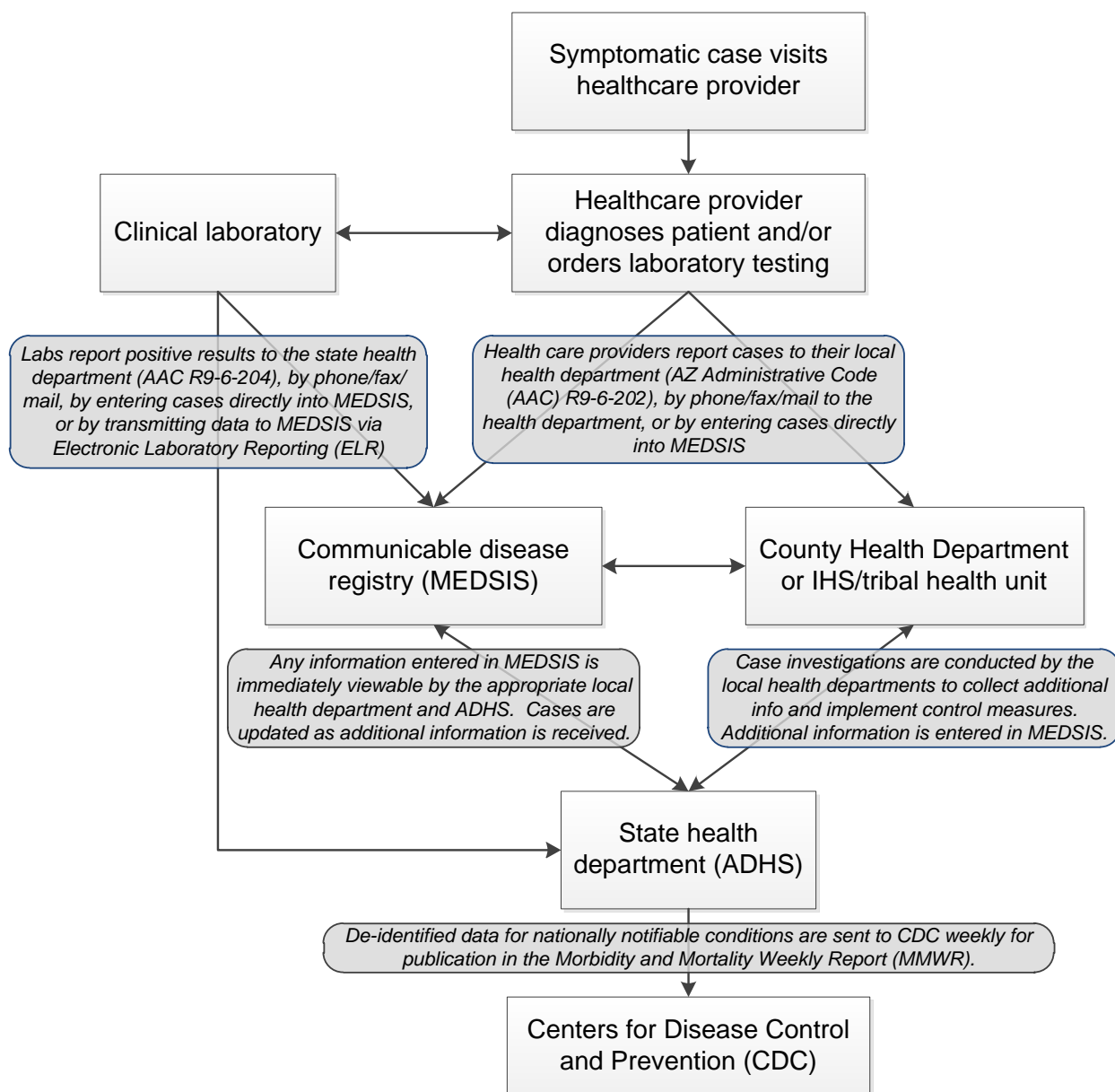


Figure 1. Arizona communicable disease reporting flow of information.

DISEASE REPORTING BY TRIBAL HEALTH DEPARTMENTS, INDIAN HEALTH SERVICES, OR OTHER FEDERAL ENTITIES

Arizona has a large population of American Indians, and is home to 22 federally-recognized tribes. Health services are provided for these populations through numerous health centers run by the tribes or by the U.S. Indian Health Services. Several other federal health facilities, including those run by the Veterans' Administration or Department of Defense, are also located in the state. While these entities are not technically required to comply with state reporting rules, they serve Arizona residents who are included in our state's census and population counts. Under AAC R9-6-207 ("Federal or Tribal Entity Reporting"), these facilities are requested to report communicable diseases and laboratory results in the same manner as non-tribal or non-federal providers, laboratories or schools; this code also provides the same privacy and confidentiality protections for these records as for reports from other entities. Reports for Arizona residents from these facilities are thus included in MEDSIS along with reports from any other entity, and the statistics provided here include the populations served at these health facilities.

SYNDROMIC SURVEILLANCE

In addition to the surveillance system described above, syndromic surveillance supplements our awareness of health-related activities and trends in the state. The principal component of syndromic surveillance in Arizona is BioSense, which primarily collects and provides visualization of emergency department visits at selected acute care hospitals. CDC manages the BioSense database and data transmission, while ADHS works with facilities to encourage new enrollees and establish and validate initial data transmission. Participating hospitals send data electronically to BioSense for all visits to their emergency departments. Data are sent on a daily basis, typically before a formal diagnosis can be made and before results of any laboratory testing may be available. Public health officials can analyze these data to look for particular syndromes in the patients' "chief complaint" (reason why the patient came to the emergency department) in order to identify trends or sudden increases in syndromes such as influenza-like illness (fever and cough or sore throat) or gastrointestinal illness (diarrhea, nausea and vomiting) to get early warnings about outbreaks, or data that may better reflect the community level.

D. CHANGES TO SURVEILLANCE AND INVESTIGATION RESOURCES DURING 2008–2013

The communicable disease surveillance system, as well as investigation procedures and forms, change over time. Changes within the Arizona system may be a result of national-level changes to case definitions or the notifiable conditions list; information system enhancements; technological changes within public health or healthcare; changes in policies or procedures at state or local levels; variations in public health priorities or resource levels; the changing epidemiology of certain morbidities; or changes in what we know about particular diseases, among other factors. Changes may be intended to improve the information available to public health officials or the public, or may be a consequence of the changing context in which public health departments operate. Many of these changes may also have an effect on surveillance data and the comparability of those data year-to-year, however, to greater or lesser extents. These changes should therefore be considered when interpreting trends over time.

Below we summarize many of the changes to surveillance and investigation resources for the period of 2008 through 2013.

RULES

Changes to AAC R9-6 became effective April 1, 2008. These changes included making Chagas disease and influenza-associated pediatric mortality reportable by providers, removing vancomycin-resistant enterococcus (VRE) from the reporting rules, requiring specimen submission to the state laboratory for positive tests for several additional organisms (including measles and rubella), and clarifying time frames and responsibilities.

A state-wide moratorium on rule-making has been in effect through much of the remainder of the period covered by this report; the April 1, 2008, reporting requirements therefore apply to all six years. On April 30, 2013, the Sections requiring investigation of the following morbidities expired, although this did not change the reporting requirements: enterotoxigenic *Escherichia coli*, Kawasaki syndrome, Reye syndrome, and unexplained death with a history of fever.

CASE DEFINITIONS

The current Arizona case definitions are posted at <http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/disease-investigation-resources/case-definitions.pdf>. Arizona case definitions for several morbidities changed during 2008 through 2013. The list, by year, of the definitions that changed is included

as Appendix B, with brief notes about those changes.

Possible surveillance impact: Changes to the confirmed and probable case definitions and to the clinical and laboratory criteria might result in an increased or decreased number of cases reported to ADHS and/or classified as confirmed or probable. Therefore, it is important to interpret the changes in incidence for a disease in the context of the possible modifications made to the case definition for that morbidity. Changes to the suspect case definition do not impact the numbers present in this report (as only confirmed and probable cases are shown) but are likely to impact disease investigation.

REPORTING AND INVESTIGATION FORMS

The communicable disease report form (CDR), the basic form for provider-reporting, is now available as a form-fillable PDF file, but otherwise remained unchanged throughout this period (see <http://azdhs.gov/documents/preparedness/epidemiology-disease-control/disease-investigation-resources/communicable-disease-report-form.pdf>). The investigation forms for several morbidities changed during this period. These are listed in Table 1, below; note that some of the changes may have been much more extensive than others.

Possible surveillance impact: Trends of risk factors or other fields present in the investigation form might be discontinuous through the years. These changes have little impact on the data presented in this report as the demographic fields shown have not been modified in the investigation forms.

Table 1. Morbidities with changes to investigation forms, by year.

Year	Morbidity
2013	Influenza-associated pediatric mortality (updated each year)
2012	Free-living ameba, varicella (chickenpox)
2011	Ehrlichiosis, malaria, meningococcal invasive disease, Rocky Mountain spotted fever, typhoid fever, West Nile virus
2010	Anthrax, botulism, botulism - infant, brucellosis, chagas, <i>E. coli</i> enterohemorrhagic (shiga toxin), <i>E. coli</i> enterotoxigenic, <i>Haemophilus influenzae</i> invasive disease, Hansen's disease (leprosy), hemolytic uremic syndrome, kawasaki syndrome, legionellosis, pertussis, salmonellosis, vancomycin-resistant and -intermediate <i>Staphylococcus aureus</i> , vancomycin-resistant <i>Staphylococcus epidermidis</i>
2009	Basidiobolomycosis, Lyme disease, rubella
2008	Creutzfeldt-Jakob disease, gastroenteritis - viral, mumps, unexplained death with a history of fever

SURVEILLANCE SYSTEM CHANGES

Significant events, system changes, or modification of processes that may have affected surveillance data for this six-year time period are noted here:

- Electronic laboratory reporting (ELR) implemented:
 - ELR allows laboratories to transmit data from their information system directly to ADHS, replacing reporting via fax or mail. Received information can then be triaged by the ADHS electronic database; laboratory reports for diseases included in MEDSIS are used to create new MEDSIS cases or add information to existing cases. Data from the electronic laboratory report are auto-populated into the appropriate fields in the MEDSIS case. Once implemented for a given laboratory, ELR reduces the time needed by ADHS staff to enter cases, and should also reduce the amount of time that laboratory staff spend on public health reporting. Most importantly, timeliness of reporting of all diseases is improved.
 - In 2009, two commercial laboratories started reporting via ELR (reporting burden: approximately 10-15% of reported cases)
 - In June 2012, an additional commercial laboratory started reporting via ELR. Together, these three laboratories account for a large proportion of the reports received by ADHS (approximately 50%).
 - In December 2012, the first hospital system started reporting via ELR.
 - *Possible surveillance impact:* Data accuracy should be improved through the elimination of manual data entry, and possibly the elimination of transcription errors by the laboratory. Other jurisdictions have found that the implementation of ELR is often accompanied by increases in case reports through more complete reporting of cases that may have been missed by manual processes.
- Three tribal public health organizations started using MEDSIS:
 - Tribal health organizations have a unique role in the surveillance and investigation of cases residing on tribal lands. Through creation of a specialized role in MEDSIS that allows sharing of case information between the tribal organizations, the county health department for the county in which the case is counted, and ADHS, increased cooperative efforts concerning communicable disease surveillance for this population are enhanced.
 - *Possible surveillance impact:* More comprehensive and accurate information about cases occurring on tribal lands in Arizona.
- Use of MEDSIS as the primary communicable disease surveillance database for Maricopa County Department of Public Health (MCDPH)
 - In January 2013, with the release of major MEDSIS enhancements, MCDPH joined MEDSIS fully. Previously, county health department staff had maintained a separate surveillance database while ADHS staff entered and updated Maricopa County data on MEDSIS.

- *Possible surveillance impact:* The MCDPH transition to MEDSIS meant greater accuracy in Maricopa County MEDSIS data, and more comprehensive investigation data in MEDSIS. Although ADHS and MCDPH data were reconciled periodically before this point, the utilization of the same database ensures much better agreement and a reduction of information missed during reconciliation. It also resulted in staff time saved, with the elimination of the duplicate case entry into both systems.
- Initiation of MEDSIS use for additional morbidities:
 - Although surveillance for most communicable diseases tracked by OIDS moved to MEDSIS in January 2006, separate databases were maintained for several morbidities, with the idea that data entry for these morbidities might be easier in a smaller database with fewer fields. With time, however, the value of tracking all diseases in the same system became clear, in particular because of the possibility of entry by external laboratory and healthcare provider users, and shared access between local and state public health users.
 - Influenza and respiratory syncytial virus (RSV) surveillance transitioned to MEDSIS in October 2008 (for the 2008-2009 influenza season).
 - Varicella case surveillance transitioned from a local database to MEDSIS in 2009. Before the complete adoption of MEDSIS for varicella surveillance, cases entered in MEDSIS by local health department users were identified and also entered into the separate database.
 - *Possible surveillance impact:* The transition to MEDSIS allowed county and state health department users to access and review the same data, reducing the potential errors inherent to reconciling different systems, whether through transcription errors or by not identifying all cases from one system that needed to be entered in the other. When assessing trends for these morbidities across years that used different data systems, it is possible that data entered outside of MEDSIS are less comprehensive because of fewer partners contributing reports to those systems; the older systems may have also had different variables than MEDSIS.
- Influenza H1N1 pandemic:
 - During the 2009 influenza A (H1N1) outbreak, many public health resources were devoted to pandemic response.
 - *Possible surveillance impact:* In addition to the clear impact of the pandemic on influenza surveillance and investigations, the pandemic response also involved many of the same human resources normally devoted to other aspects of communicable disease surveillance and investigations. Laboratories and healthcare providers were likely affected in similar ways. Investigations of cases of other morbidities, comprehensive data accuracy checks, and timeliness of public health activities may have been affected, particularly during May 2009 and September-October 2009: the first wave, then second wave and period of vaccine distribution.
- Morbidity-specific changes to the surveillance system:

- Significant changes are noted here for two morbidities.
- Coccidioidomycosis: In June 2009, a major commercial laboratory changed its reporting practices for coccidioidomycosis, resulting in a large increase in reported positive tests that were classified as confirmed coccidioidomycosis cases. In December 2012, a change in testing methods occurred at this laboratory, accounting at least in part for a subsequent decline in reports.
 - *Possible surveillance impact*: The changes in reporting and testing practices align closely with an increase in coccidioidomycosis cases in Arizona in 2009, followed by a decrease starting in December 2012. The effect on the numbers of reported cases due to changes in practices cannot be disentangled from changes in the incidence or diagnosis of coccidioidomycosis in the community in this period. It is also unclear to what extent coccidioidomycosis is underreported in the state, and whether that varied during the changes to reporting and testing.
- Influenza: During the 2009 influenza pandemic, MEDSIS, OIDS, and Information Technology staff worked together to implement a mechanism by which influenza data from the Arizona State Public Health Laboratory (ASPHL) could be added to MEDSIS via the upload of a case line list that was then processed to appear in MEDSIS with the functionality of an ELR report. Until 2012, the system also auto-populated parts of the MEDSIS influenza disease-specific observations (DSO) and classified cases based on the test results.
 - *Possible surveillance impact*: The entry of influenza data from ASPHL may not be as consistent before this process was implemented. Algorithms for automatic classification and DSO completion should reduce the potential for user error.
- Centralized outbreak tracking:
 - During this period, ADHS created a centralized database to track outbreaks across the state. Although local health departments generally conduct outbreak investigations, the centralized outbreak database allowed public health officials to better understand the number, size, location, and types of outbreaks reported and investigated throughout the state.
 - The ADHS database would later be replaced in 2014 by the implementation of the MEDSIS Outbreak Module.
 - *Possible surveillance impact*: Possibly minimal impact for case-based surveillance, although centralized tracking may encourage more comprehensive inclusion in MEDSIS of outbreak-associated cases.
- Syndromic surveillance and BioSense:
 - The original version of BioSense, which started collecting data in 2003, was shut off on March 16th, 2012, by CDC, in preparation for a new version of the system. Up until this time, Arizona users had access to data from approximately 12 acute care hospitals, as well as data from the Veterans' Administration and Department of Defense facilities.
 - Starting in 2012, ADHS began working with local health departments and acute

care hospitals around the state to establish data use agreements between all appropriate agencies and help prepare facilities to meet the data format and transmission requirements for the new BioSense 2.0 feed.

E. IMPLEMENTATION OF MEDSIS CHANGES DURING 2008–2013

Several MEDSIS changes during this period are noted in the previous section, with possible implications for the interpretation of surveillance data. Additional modifications implemented in MEDSIS are discussed below. While important for numerous reasons, the enhancements below are considered to have less impact on data interpretation.

After its initial implementation in January 2006, MEDSIS has undergone several versions and iterations in order to comply with changes to national standards as well as the needs of the system's users. Many of these enhancements and added modules have increased Arizona's capacity to manage cases of communicable disease as well as improved the state's ability to quickly respond to outbreak situations and implement control measures.

A major system update was released in January 2013. This release included brand new case management functionality; case and contact linking; an overhaul of the user interface; the inclusion of tuberculosis surveillance resources for the first time; the ability for state and local users to assign different classifications to a case; and the ability to capture time in many of the date fields. In preparation for the release, ADHS developed numerous user materials, including a comprehensive user guide, updated policies and procedures, and data dictionaries to accompany the new system. User materials were distributed at state-wide in-person trainings to all MEDSIS county and tribal health department liaisons.

MEDSIS is currently used by over 500 provider/healthcare facility users. Since MEDSIS is the only system that allows providers direct entry of disease reports, the MEDSIS and Electronic Disease Surveillance Programs have worked with other offices at ADHS to integrate the reporting process for all communicable diseases, so that providers would not need to report different diseases through different systems or methods. Reports entered for communicable diseases tracked by other ADHS offices are automatically extracted and sent to the appropriate program. In order to further streamline this effort, in 2013, ELR was integrated with the STD surveillance system, PRISM, for all three large commercial labs in Arizona, greatly decreasing the amount of manual data entry needed.

MEDSIS continues to be a stable application for users to report new cases of communicable disease as well as enter and share additional information amongst public health jurisdictions. Additional projects of the MEDSIS and Electronic Disease Surveillance Programs, with system implementation occurring after the end of 2013, include:

- Implementation of the MEDSIS Outbreak Module, to track outbreaks and outbreak-associated cases, with significant functionality between the Outbreak Module and other parts of MEDSIS, released in 2014.
- Translation of MEDSIS into Spanish to continue the binational partnership with Sonora, Mexico, counterparts, released in 2014.

- Ongoing implementation of ELR for additional hospital laboratories around the state.
- Implementation of ELR for the Arizona State Public Health Laboratory.
- Working to link MEDSIS with the STD surveillance system, PRISM, to allow provider reports to be directly incorporated into PRISM much like ELR.
- Working with acute care hospitals to establish data use agreements and syndromic surveillance feeds for BioSense 2.0.
- Continuing work towards the implementation of electronic data exchange, such as Nationally Notifiable Disease Messaging, and increased interoperability with multiple surveillance systems used within the agency.

F. TABLES OF REPORTABLE DISEASES

Table 2. Provider-reportable morbidities

Arizona Administrative Code[†] Requires Providers To:
Report Communicable Diseases
 to the Local Health Department

☒*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
☒ Chagas disease (American trypanosomiasis)	☒ HIV infection and related disease	☒ <i>Streptococcus pneumoniae</i> (pneumococcal invasive disease)
☒ Chancroid	① Influenza-associated mortality in a child	☒ Syphilis
☒ Chlamydia infection, sexually transmitted	☒ Kawasaki syndrome	☒*O Taeniasis
①* Cholera	☒ Legionellosis (Legionnaires' disease)	☒ Tetanus
☒ Coccidioidomycosis (valley fever)	☒ Leptospirosis	☒ Toxic shock syndrome
☒ Colorado tick fever	☎ Listeriosis	☒ Trichinosis
O Conjunctivitis: acute	☒ Lyme disease	① Tuberculosis, active disease
☒ Creutzfeldt-Jakob disease	☒ Lymphocytic choriomeningitis	① Tuberculosis latent infection in a child 5 years of age or younger (positive screening test result)
☒*O Cryptosporidiosis	☒ Malaria	☎ Tularemia
☒ <i>Cyclospora</i> infection	☎ Measles (rubeola)	☎ Typhoid fever
☒ Cysticercosis	☎ Meningococcal invasive disease	① Typhus fever
☒ Dengue	① Mumps	☎ Unexplained death with a history of fever
O Diarrhea, nausea, or vomiting	☎ Pertussis (whooping cough)	① Vaccinia-related adverse event
☎ Diphtheria	☎ Plague	☎ Vancomycin-resistant or Vancomycin-intermediate <i>Staphylococcus aureus</i>
☒ Ehrlichiosis and Anaplasmosis	☎ Poliomyelitis	☎ Vancomycin-resistant <i>Staphylococcus epidermidis</i>
☎ Emerging or exotic disease	☒ Psittacosis (ornithosis)	☒ Varicella (chickenpox)
① Encephalitis, viral or parasitic	① Q fever	☒*O <i>Vibrio</i> infection
☎ Enterohemorrhagic <i>Escherichia coli</i>	☎ Rabies in a human	☎ Viral hemorrhagic fever
☎ Enterotoxigenic <i>Escherichia coli</i>	☒ Relapsing fever (borreliosis)	☒ West Nile virus infection
☒*O Giardiasis	☒ Reye syndrome	☎ Yellow fever
☒ Gonorrhea	☒ Rocky Mountain spotted fever	☒*O Yersiniosis
☒ <i>Haemophilus influenzae</i> : invasive disease	①* Rubella (German measles)	
☒ Hansen's disease (Leprosy)	① Rubella syndrome, congenital	

☎ 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.

<http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/communicable-disease-reporting/reportable-diseases-list.pdf>

















†A.A.C. R9-6-202 Effective 04/01/2008




Table 3. School, childcare, or shelter-reportable morbidities

Arizona Administrative Code[†] Requires an Administrator of a School,
Child Care Establishment, or Shelter To:

REPORT COMMUNICABLE DISEASES

to the Local Health Department

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

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

<http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/communicable-disease-reporting/school-childcare-reporting-requirements.pdf>

†A.A.C. R9-6-203 Effective 04/01/2008

Table 4. Laboratory-reportable test results

Reports should be sent to:

Arizona Department of Health Services
 Infectious Disease Epidemiology
 150 North 18th Avenue, Suite 140
 Phoenix, AZ 85007
 602-364-3676 or 602-364-3199 (fax)

ARIZONA LABORATORY REPORTING REQUIREMENTS

Isolates should be sent to:

Arizona State Laboratory
 250 North 17th Avenue
 Phoenix, AZ 85007

①	Arboviruses	☒*	<i>Haemophilus influenzae</i> , other, isolated from a normally sterile site	☒	<i>Plasmodium</i> spp.
☒☒*	<i>Bacillus anthracis</i>	☒	Hantavirus	☒	Respiratory syncytial virus
☒*	<i>Bordetella pertussis</i>	☒ ¹	Hepatitis A virus (anti-HAV-IgM serologies)	☒+	Rubella virus and anti-rubella-IgM serologies
①*	<i>Brucella</i> spp.	☒ ¹	Hepatitis B virus (anti-Hepatitis B core-IgM serologies, Hepatitis B surface or envelope antigen serologies, or detection of viral nucleic acid)	①*	<i>Salmonella</i> spp.
①*	<i>Burkholderia mallei</i> and <i>B. pseudomallei</i>	☒ ¹	Hepatitis C virus	☒	SARS-associated corona virus
☒	<i>Campylobacter</i> spp.	☒ ¹	Hepatitis D virus	①*	<i>Shigella</i> spp.
☒	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%	☒ ¹ +	Hepatitis E virus (anti-HEV-IgM serologies)	*	<i>Streptococcus</i> Group A, isolated from a normally sterile site
☒	<i>Chlamydia trachomatis</i>	☒	HIV (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	☒	<i>Streptococcus</i> Group B, isolated from a normally sterile site in an infant younger than 90 days of age
☒☒	<i>Clostridium botulinum</i> toxin (botulism)	☒	HIV—any test result for an infant (by culture, antigen, antibodies to the virus, or detection of viral nucleic acid)	☒*	<i>Streptococcus pneumoniae</i> and its drug sensitivity pattern, isolated from a normally sterile site
☒	<i>Coccidioides</i> spp., by culture or serologies	☒	Influenza virus	☒	<i>Treponema pallidum</i> (syphilis)
①	<i>Coxiella burnetii</i>	☒*	<i>Legionella</i> spp. (culture or DFA)	☒	<i>Trypanosoma cruzi</i> (Chagas disease)
☒	<i>Cryptosporidium</i> spp.	①*	<i>Listeria</i> spp., isolated from a normally sterile site	①*	Vancomycin-resistant or Vancomycin-intermediate <i>Staphylococcus aureus</i>
①	<i>Cyclospora</i> spp.	☒+	Measles virus and anti-measles-IgM serologies	①*	Vancomycin resistant <i>Staphylococcus epidermidis</i>
☒	Dengue virus	☒ ²	Methicillin-resistant <i>Staphylococcus aureus</i> , isolated from a normally sterile site	☒☒	Variola virus (smallpox)
☒☒	Emerging or exotic disease agent	①+	Mumps virus and anti-mumps-IgM serologies	①*	<i>Vibrio</i> spp.
☒	<i>Entamoeba histolytica</i>	☒*	<i>Mycobacterium tuberculosis</i> complex and its drug sensitivity pattern	☒☒	Viral hemorrhagic fever agent
①	<i>Escherichia coli</i> O157:H7	☒	<i>Neisseria gonorrhoeae</i>	☒	West Nile virus
①*	<i>Escherichia coli</i> , Shiga-toxin producing	☒*	<i>Neisseria meningitidis</i> , isolated from a normally sterile site	①*	<i>Yersinia</i> spp. (other than <i>Y. pestis</i>)
☒☒*	<i>Francisella tularensis</i>	☒	Norovirus	☒☒*	<i>Yersinia pestis</i> (plague)
☒*	<i>Haemophilus influenzae</i> , type b, isolated from a normally sterile site				

☒ 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 on this page.

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

+ For each positive test result, submit a specimen to the Arizona State Laboratory within 24 hours after obtaining the positive test result.

¹ When reporting a positive result for any of the specified tests, report the results of all other tests performed for the subject as part of the disease panel.

² Submit a report only when an initial positive result is obtained for an individual.

³ 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 \geq 12 months

<http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/communicable-disease-reporting/lab-reporting-requirements.pdf>

↗ A.A.C. R9-6-204 Effective 04/01/2008

II. OVERVIEW OF REPORTED INFECTIOUS DISEASE BURDEN IN ARIZONA

A total of 181,787 confirmed or probable cases of infectious diseases, excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV, have been reported from 2008 to 2013. Of these, 41% (74,916 cases) were influenza or RSV cases, 34% (62,142 cases) were coccidioidomycosis cases and 9% (17,114 cases) were cases of enteric diseases (Figure 2). The remaining 16% of the cases (27,615 cases) are divided among invasive diseases, hepatitides, other diseases, vaccine-preventable diseases and vector-borne and zoonotic diseases. The morbidities included in each category are summarized in Table 5.

Proportion of reported cases per category for 2008–2013

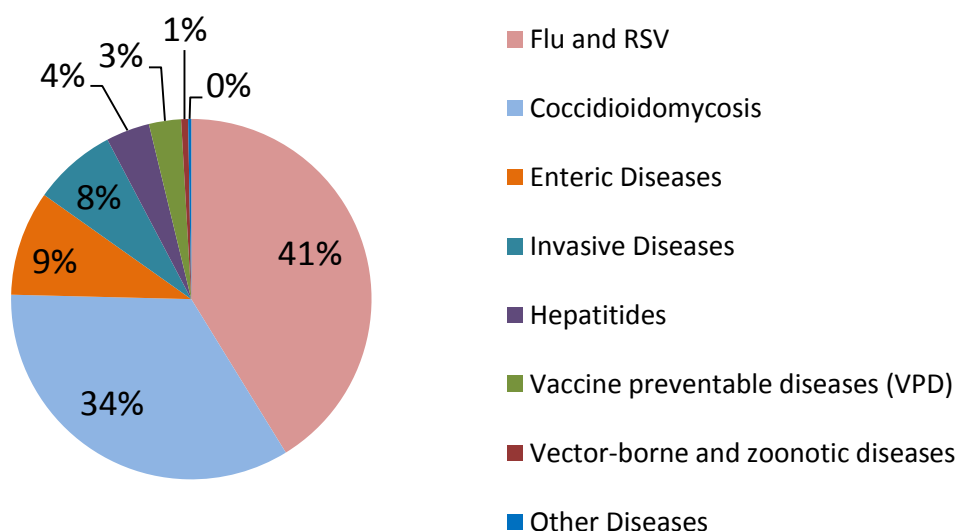


Figure 2. Proportion of reported cases by disease category for 2008–2013.

- Reported cases include confirmed and probable cases reported to state or local public health departments from 2008 to 2013 (N=181,787). Non-resident cases have been excluded. Only incident cases are reported.
- Although we usually analyze flu and RSV by surveillance season (October through September), the data here are by calendar year to match with the rest of the report.
- Influenza and RSV data from January through September 2008 were maintained in a separate database from the rest of the morbidities, but reporting methodology should be identical to the rest of the time period.

Table 5. Disease categories and corresponding reportable morbidities.

Disease Category	Reportable Morbidities
Coccidioidomycosis	Coccidioidomycosis
Enteric Diseases	Amebiasis, botulism, infant botulism, campylobacteriosis, cryptosporidiosis, cyclospora infection, cysticercosis, <i>E. coli</i> enterohemorrhagic, giardiasis, hemolytic uremic syndrome, listeriosis, salmonellosis, shigellosis, typhoid fever, <i>Vibrio</i> infection, yersiniosis
Flu and RSV	Influenza virus, influenza with mortality in a child, respiratory syncytial virus (RSV)
Invasive Diseases	Invasive methicillin-resistant <i>Staphylococcus aureus</i> (MRSA), invasive streptococcal group A, invasive streptococcal group B (in children <90 days of age), invasive <i>Streptococcus pneumoniae</i> , vancomycin-intermediate <i>Staphylococcus aureus</i> (VISA), vancomycin-resistant <i>Staphylococcus aureus</i> (VRSA), vancomycin-resistant <i>Staphylococcus epidermidis</i> (VRSE)
Hepatitides	Hepatitis A, hepatitis B acute, hepatitis B chronic, hepatitis B perinatal, hepatitis D
Other	Basidiobolomycosis, blastomycosis, Creutzfeldt-Jakob disease, emerging or exotic disease, parasitic encephalitis, Hansen's disease, Kawasaki syndrome, legionellosis, Reye syndrome, toxic shock syndrome, viral encephalitis
Vaccine preventable diseases (VPD)	Invasive <i>Haemophilus influenzae</i> , measles, invasive meningococcal disease, mumps, pertussis, poliomyelitis, rubella, smallpox, tetanus, vaccinia-related event, yellow fever
Vector-borne and zoonotic diseases	
Mosquito-borne Diseases	Dengue, Eastern Equine encephalitis virus, Japanese encephalitis virus, malaria, St. Louis encephalitis virus, Venezuelan equine encephalitis virus, West Nile virus and Western equine encephalitis virus
Tick-borne Diseases	Babesiosis, Colorado tick fever, ehrlichiosis or anaplasmosis, Lyme disease, relapsing fever, Rocky Mountain spotted fever and typhus fever
Flea-borne Diseases	Plague
Zoonotic Diseases	Brucellosis, hantavirus infection, hemorrhagic fever, leptospirosis, melioidosis or glanders, psittacosis, rabies (human cases), taeniasis, trichinosis, and tularemia

An average of 30,000 confirmed and probable cases of infectious diseases, across all

categories included in Table 5, have been reported each year from 2008 to 2013, with a maximum of 42,387 cases in 2009 and a minimum of 19,968 cases in 2008 (Figure 3). This corresponds to an average rate of 377 cases per 100,000 population per year. Flu, RSV and coccidioidomycosis are the categories mainly responsible for the yearly fluctuations observed. The influenza pandemic in 2009 largely accounts for this surge in total cases, and more specifically influenza cases, in 2009. Significant changes in the burden of reported coccidioidomycosis are described further in the Coccidioidomycosis section of this document. Vaccine-preventable diseases is the only category which shows a steady increase in the number of reported cases, going from 358 in 2008 to 1,568 in 2013 (with an average increase of 242 cases per year). The number of reported cases for the remaining categories shows little variation between 2008 and 2013. Details on the epidemiology of selected morbidities within each category can be found in the Disease Summaries section of this report.

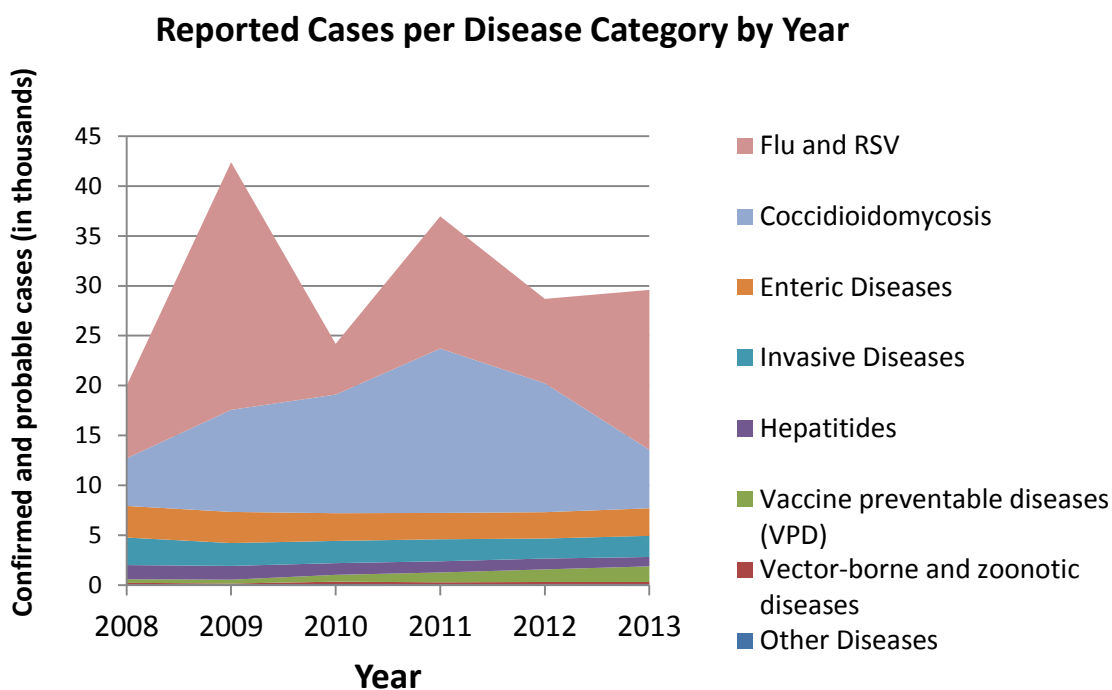


Figure 3. Number of reported cases by disease category for 2008—2013.

- a) Reported cases= sum of probable and confirmed cases from 2008 to 2013 (N=181,787). Non-resident cases have been excluded. Only incident cases are reported.
- b) Although we usually analyze flu and RSV by surveillance season (October through September), the data here are by calendar year to match with the rest of the report.
- c) Influenza and RSV data from January through September 2008 were maintained in a separate database from the rest of the morbidities, but reporting methodology should be identical to the rest of the time period.

III. DISEASE STATISTICS

The disease statistics below are all located at <http://www.azdhs.gov/phs/oids/data/stats-archive.htm>. The referenced tables are hyperlinked from the electronic version of this report.

A. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2013

- [Communicable Disease Summary by County, 2013](#)
- [Selected Disease Morbidities by Month](#)
- [Year-to-Date Communicable Disease Summary](#)
- [Reported Cases of Notifiable Diseases by County, 2013](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2013](#)
- [Reported Cases of Notifiable Diseases by Year, 2013](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 2013](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2013](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2013](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2013](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2013](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2013](#)

B. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2012

- [Communicable Disease Summary by County, 2012](#)
- [Selected Communicable Diseases by Month, 2011 & 2012](#)
- [Yearly Communicable Disease Summary](#)
- [Reported Cases of Notifiable Diseases by County, 2012](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2012](#)
- [Reported Cases of Notifiable Diseases by Year, 2002-2012](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 2002-2012](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2012](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2012](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2012](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2012](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2012](#)

C. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2011

- [Communicable Disease Summary, 2011](#)
- [Communicable Disease Summary by County, 2011](#)
- [Selected Communicable Diseases by Month, 2010 and 2011](#)
- [Reported Cases of Notifiable Diseases by County, 2011](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2011](#)
- [Reported Cases of Notifiable Diseases by Year, 2001-2011](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 2001-2011](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2011](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2011](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2011](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2011](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2011](#)

D. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2010

- [Communicable Disease Summary, 2010](#)
- [Communicable Disease Summary, by County, 2010](#)
- [Selected Communicable Diseases, by Month, 2009 and 2010](#)
- [Reported Cases of Notifiable Diseases by County, 2010](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2010](#)
- [Reported Cases of Notifiable Diseases by Year, 2000 - 2010](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 2000 - 2010](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2010](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2010](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2010](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2010](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2010](#)

E. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2009

- [Communicable Disease Summary, 2009](#)
- [Communicable Disease Summary, by County, 2009](#)
- [Selected Communicable Diseases, by Month, 2008 and 2009](#)
- [Reported Cases of Notifiable Diseases by County, 2009](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2009](#)
- [Reported Cases of Notifiable Diseases by Year, 1999 - 2009](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 1999 - 2009](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2009](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2009](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2009](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2009](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2009](#)

F. TABLES OF CASES AND RATES OF REPORTABLE DISEASES, 2008

- [Communicable Disease Summary, 2008](#)
- [Communicable Disease Summary, by County, 2008](#)
- [Selected Communicable Diseases, by Month, 2007 & 2008](#)
- [Reported Cases of Notifiable Diseases by County, 2008](#)
- [Rates of Reported Cases of Notifiable Diseases by County, 2008](#)
- [Reported Cases of Notifiable Diseases by Year, 1998 - 2008](#)
- [Rates of Reported Cases of Notifiable Diseases by Year, 1998 - 2008](#)
- [Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2008](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by 5 Year Age Groupings and Gender, 2008](#)
- [Reported Cases and Rates of Selected Notifiable Diseases by Race/Ethnicity, 2008](#)
- [Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2008](#)
- [Rates of Reported Cases of Selected Notifiable Diseases by County, 5 Year Age Groupings, and Gender, 2008](#)

IV. DISEASE SUMMARIES

A. INFLUENZA AND RSV

Influenza (flu) and respiratory syncytial virus (RSV) are respiratory viral infections causing mild to severe illness, particularly during fall and winter, and are both transmitted via respiratory droplets. Children are at higher risk of contracting RSV, whereas flu can affect the general population. In Arizona, flu and RSV made up the biggest fraction (41%) of the communicable diseases¹ reported between 2008 and 2013, for a total of more than 68,000 cases, of which 71% (52,981 cases) were flu cases.

Weekly reports detailing influenza and RSV surveillance trends are prepared and disseminated throughout the influenza season. At the end of each season, a summary of that year's data is also produced. We refer you to those reports, posted on the ADHS website (see links below).

In April, 2009, Arizona, like the rest of the world, began responding to human transmission of a novel influenza A (H1N1) virus. Arizona cases were confirmed by the end of April. Over the next few months, public health departments around the country worked to monitor the spread of human cases of the pandemic strain, assess the severity of the disease caused by the novel virus, validate and make available laboratory testing, and ensure effective distribution of the vaccine once available in the fall of 2009. Figure 4 shows the epidemiologic curve for influenza cases reported January 2009 through May 2010, with some key dates for Arizona. Additional highlights for the Arizona public health response are described at <http://www.azdhs.gov/pandemic-flu/az-response-h1n1.htm>, and the epidemiology and surveillance of the pandemic in Arizona is further described in the 2009-2010 Influenza Season Summary at the link below.

¹ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

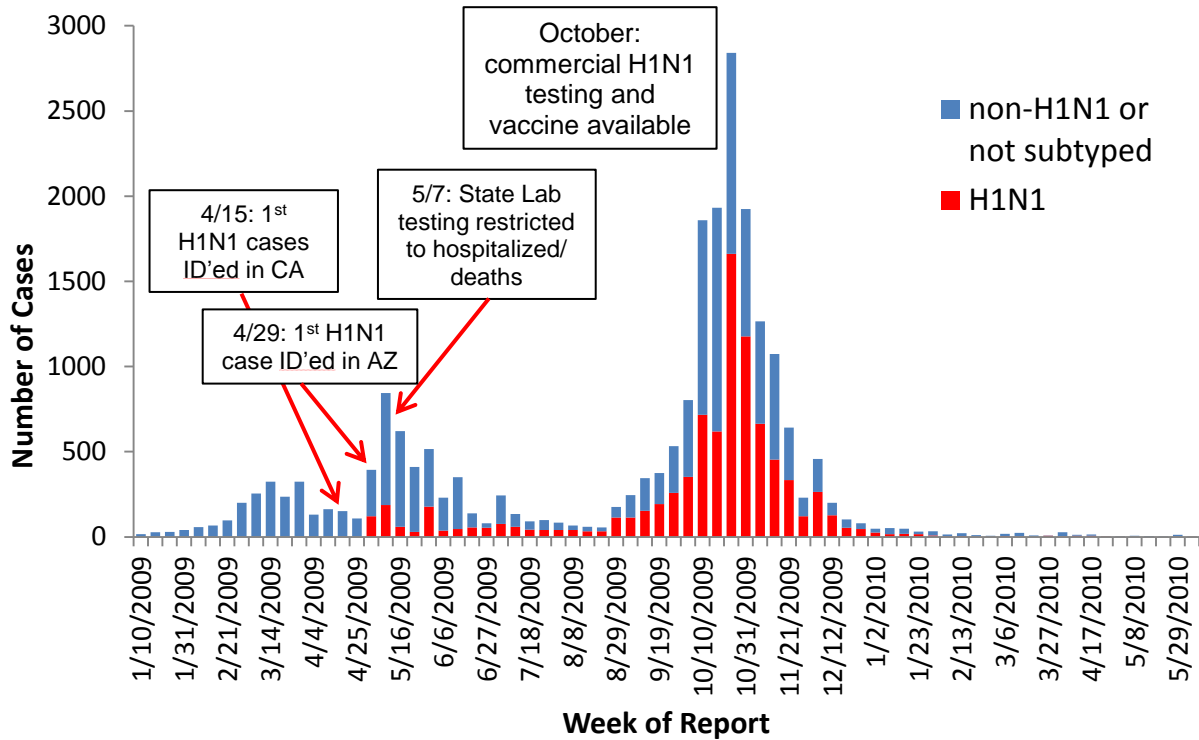


Figure 4. Epidemiologic curve for influenza cases reported January 2009 through May 2010, including the period of the H1N1 pandemic.

Link to Influenza and RSV reports:

Reports can be found on the ADHS Flu page (<http://www.azdhs.gov/phs/oids/epi/flu/index.htm>) by clicking on “Influenza Season Weekly Activity Reports” for the season of interest, and then opening the Influenza or RSV Season Summaries on the following page.

- [Influenza Report 2012-2013](#)
- [RSV Report 2012-2013](#)
- [Influenza Report 2011-2012](#)
- [RSV Report 2011-2012](#)
- [Influenza Report 2010-2011](#)
- [RSV Report 2010-2011](#)
- [2009-2010 Influenza Summary, including the 2009 H1N1 Pandemic](#)
- [2009-2010 Respiratory Syncytial Virus \(RSV\) Summary](#)
- [2008-2009 RSV Summary](#)
- [2007-2008 Influenza Season Summary \(9/30/07 - 7/26/08\)](#)
- [RSV Hospitalizations 2004-2008](#)

B. COCCIDIOIDOMYCOSIS

Coccidioidomycosis (valley fever) is an infection found in the southwestern United States, caused by inhaling spores of the fungus *Coccidioides*. It is not contagious person-to-person and cannot be transmitted from animals to humans. Sixty percent of infected persons experience no or mild symptoms. The remaining 40% experience a self-limited respiratory disease with symptoms such as fever, cough, fatigue, chest pain, shortness of breath, and rash. In less than 5% of people with symptoms, the infection can progress to severe respiratory disease or disease outside of the lungs.

Reported cases of coccidioidomycosis in Arizona have greatly increased over the last two decades. In 1993, rates were 14.6 per 100,000 persons, rising to 20.5 per 100,000 in 1997 when coccidioidomycosis became laboratory-reportable, and then to 47.9 per 100,000 in 2003;² in 2008, the rate of reported cases was 73.0 per 100,000 (Figure 5). In Arizona, coccidioidomycosis made up a large fraction (34%) of the communicable diseases³ reported during 2008–2013, for a total of more than 62,000 cases. Because of the large burden of coccidioidomycosis in Arizona, and its uniqueness compared to other morbidities under surveillance, this morbidity is listed as its own category in this report.

² ADHS Valley Fever 2013 Annual Report. <http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/valley-fever/reports/valley-fever-2013.pdf>

³ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases and Rates per year for Coccidioidomycosis

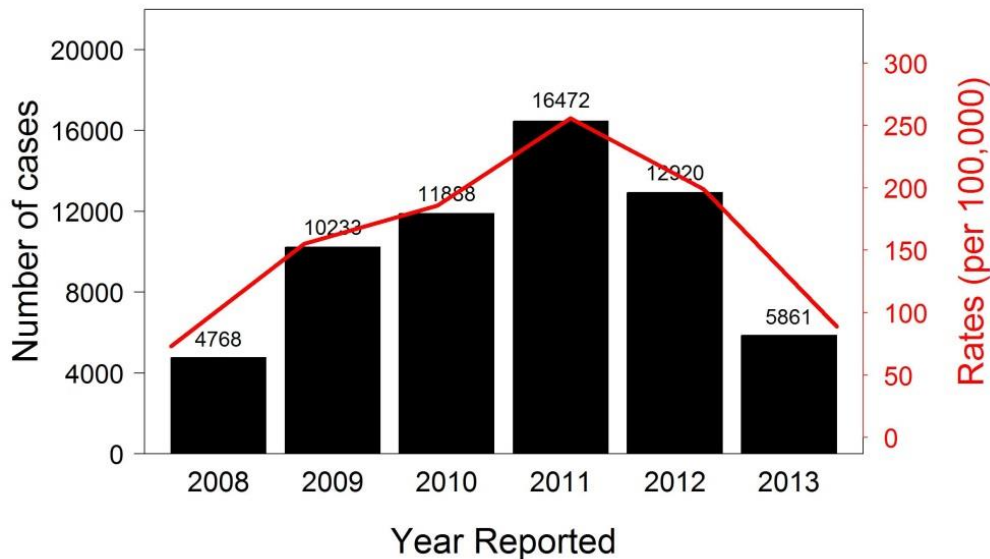


Figure 5. Cases and rates (per 100,000) for coccidioidomycosis for 2008–2013.

Since laboratory reporting of coccidioidomycosis was mandated in 1997, case reports have increased dramatically. In 2009, a major commercial laboratory altered its reporting practices for coccidioidomycosis after consultation with ADHS, to include reporting of enzyme immunoassay (EIA) results. Following this change, the total number of reported Arizona cases doubled compared to previous years (Figure 5), with case counts peaking in 2011. In late 2012, the same laboratory changed the testing platform used for EIAs, and in 2013 the number of cases reported statewide declined 55% compared to 2012. The effects of these changes are shown in more detail in the Valley Fever annual reports (see <http://www.azdhs.gov/phs/oids/epi/valley-fever/reports-publications.htm>). Although these laboratory testing and reporting changes may explain much of the observed increase and decrease in numbers of reported cases over this period, the causes of year-to-year variation in case counts remain poorly understood.

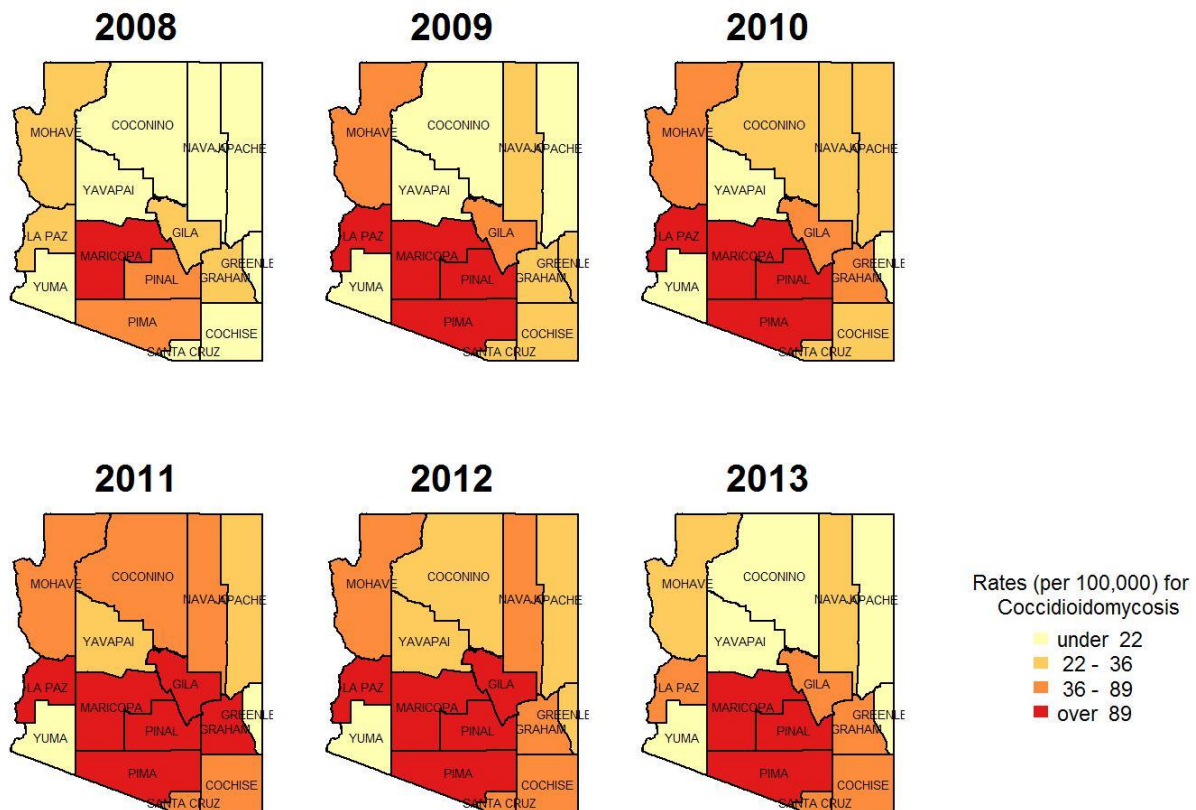


Figure 6. Rates (per 100,000) for coccidioidomycosis by county for 2008–2013.

Maricopa, Pima, and Pinal Counties consistently have the highest rates of coccidioidomycosis in Arizona (Figure 6). Cases reported from these counties constitute a majority of the national disease burden. Fewer than 100 cases are reported annually from all other counties. Rates of reported disease are lowest in Greenlee and Yuma Counties. This geographic distribution may reflect areas that are highly endemic, migration of susceptible persons to these areas, climate-related phenomena, and/or increased human or natural disturbance of desert soils where the fungus is present.

**Rates per age group per year for Coccidioidomycosis
(% cases with unknown age= 0.54)**

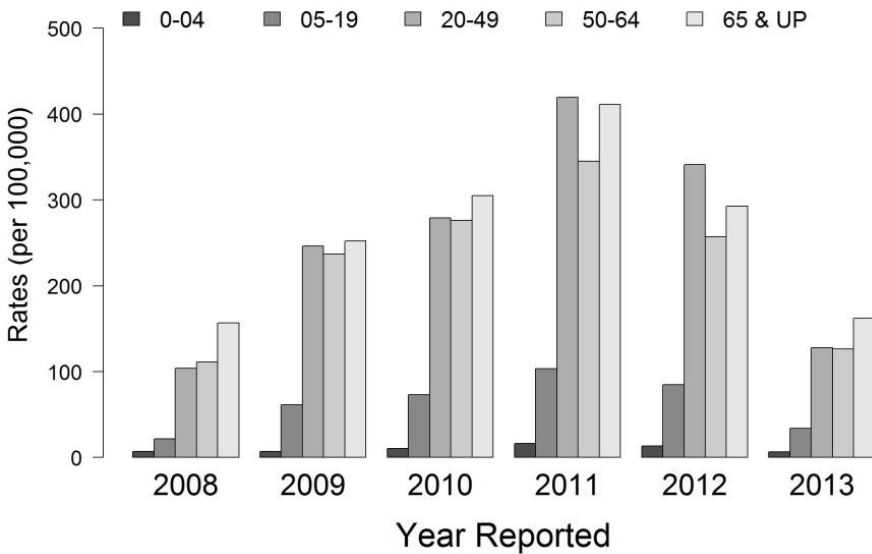


Figure 7. Rates (per 100,000) for coccidioidomycosis by age group for 2008–2013.

Rates of coccidioidomycosis are highest in older adults (Figure 7). Few cases are reported among children. This may reflect increased healthcare-seeking, greater severity of symptoms, physician awareness, and/or increased exposure to fungal spores. It is unclear why rates in adults aged 20 – 49 years were elevated from 2009 to 2012. The median age of reported cases decreased significantly after the 2009 reporting change by the major laboratory mentioned above, suggesting that the change disproportionately increased the numbers of cases reported among younger people, but the reasons that reporting of EIA test results would affect the age distribution of cases are not understood.

C. ENTERIC DISEASE OVERVIEW

Enteric (intestinal) diseases comprise several infections characterized by diarrhea, abdominal discomfort, nausea and vomiting. The causative agents of most enteric infections under public health surveillance are bacteria, such as enterohemorrhagic *E. coli* (also referred to as Shiga toxin-producing *E. coli*), *Campylobacter*, *Salmonella*, *Shigella*, *Vibrio* and *Yersinia* (excluding *Y. pestis*), as well as intestinal parasites, such as *E. histolytica* causing amebiasis, *Cryptosporidium*, *Taenia solium* causing taeniasis, and *Giardia*. Noroviruses account for a significant burden of gastrointestinal illness in the U.S., but are not tracked through case-based surveillance and testing is generally only conducted in the event of a reported outbreak. We have included in this category morbidities such as cysticercosis and botulism which may manifest as non-enteric illnesses but may be transmitted through consumption of contaminated products.

Enteric infections are usually acquired through contaminated food and water or by contact with vomit or feces. In Arizona, enteric diseases accounted for 9% of communicable diseases⁴ reported between 2008 and 2013, for a total of more than 17,000 cases. The most commonly reported enteric infections (together comprising more than 85% of the cases) are salmonellosis (35%), campylobacteriosis (32%) and shigellosis (18%) (Figure 8). Overall, reported enteric morbidities have shown a slight decline from 2008 to 2012.

⁴ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases of Selected Enteric Diseases

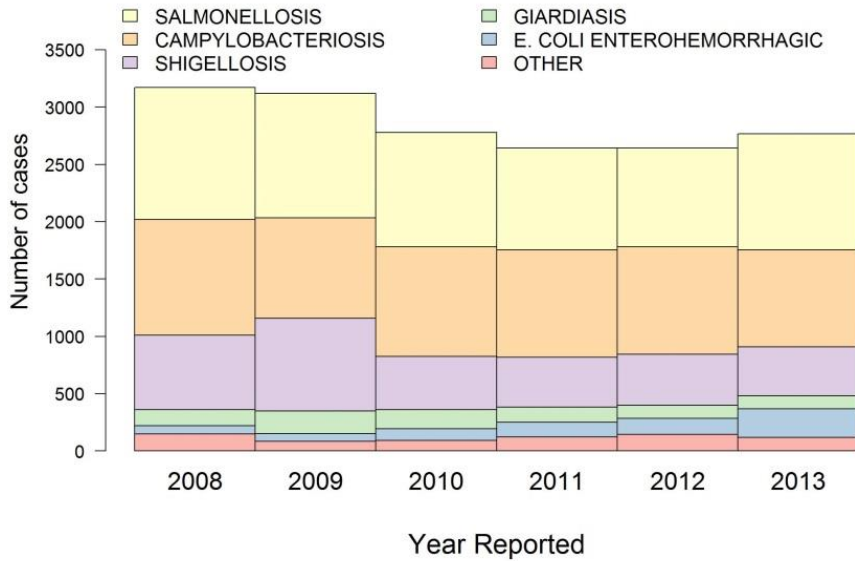


Figure 8. Cases of confirmed and probable reported enteric disease for 2008–2013.
 The category OTHER includes: amebiasis, botulism, infant botulism, cryptosporidiosis, cysticercosis, listeriosis, hemolytic uremic syndrome, typhoid fever, *Vibrio* infection and yersiniosis.

CAMPYLOBACTERIOSIS

Campylobacter infection is one of the most common causes of diarrheal illness in the U.S. Symptoms typically include diarrhea, abdominal cramps, and fever. The bacteria are often found among poultry flocks and in raw or undercooked poultry products. Other important sources of infection are untreated drinking water and unpasteurized dairy products. It is estimated that for every *Campylobacter* case reported to public health, there are 30 that go undiagnosed.

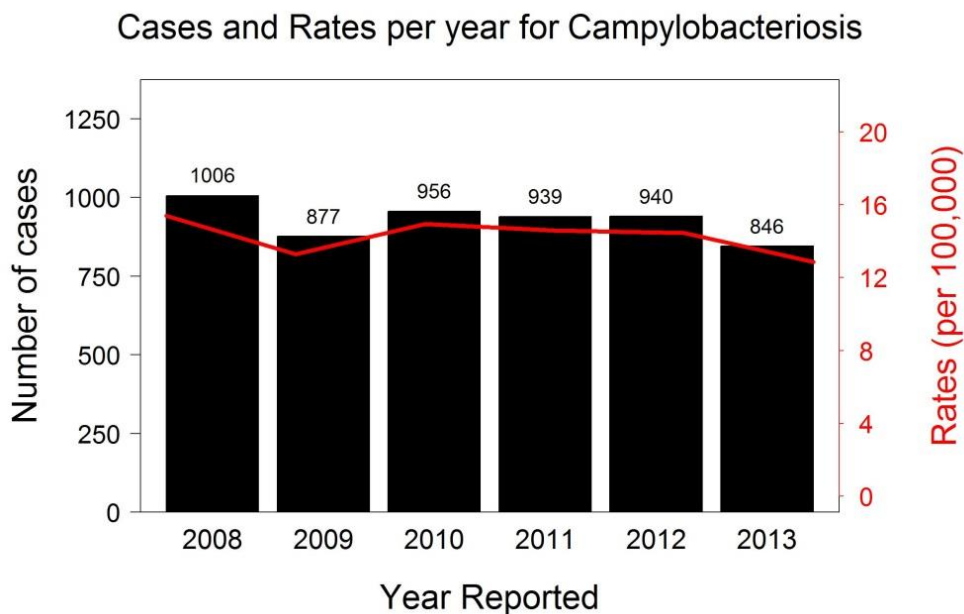


Figure 9. Cases and rates (per 100,000) for campylobacteriosis for 2008–2013.

Rates of *Campylobacter* remained relatively stable across all years and started decreasing in 2010 (Figure 9).

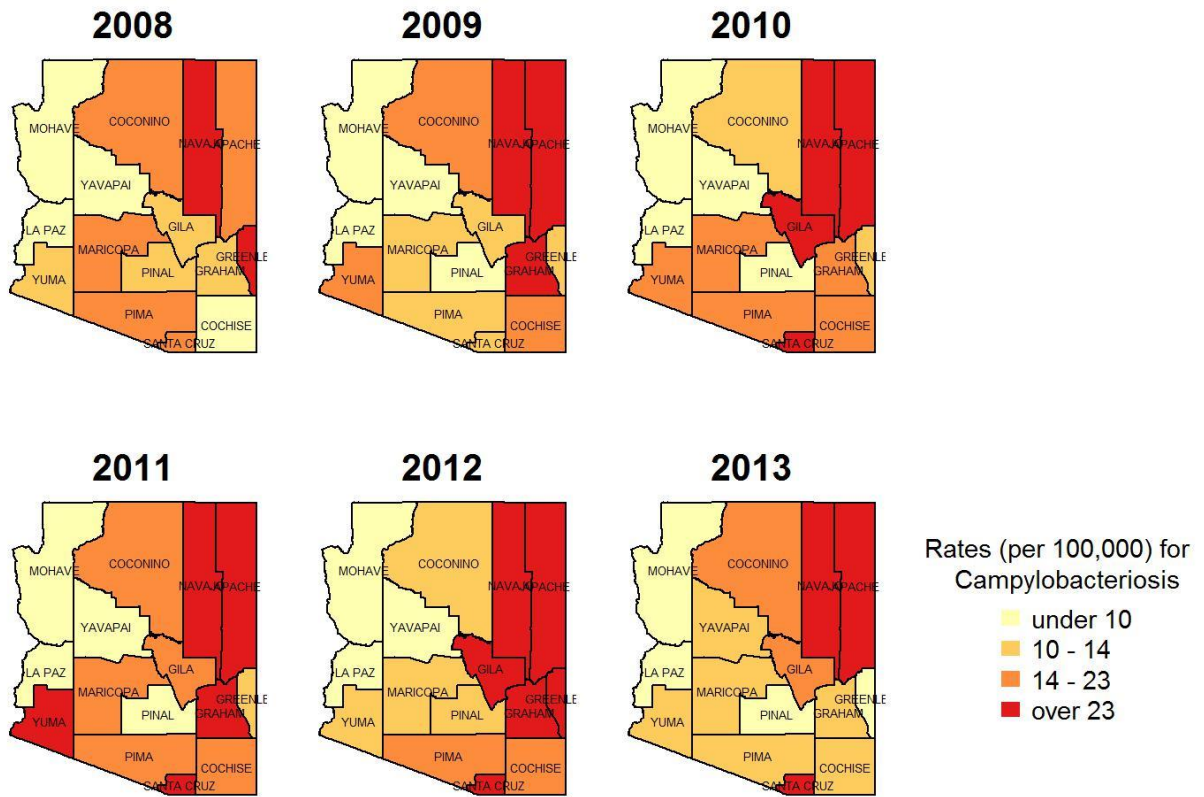


Figure 10. Rates (per 100,000) by county for campylobacteriosis for 2008–2013.

Across 2008–2013, Navajo County had high rates of *Campylobacter* infection. Since 2010, Apache, Gila, and Santa Cruz Counties have also seen consistently high rates of infection (Figure 10).

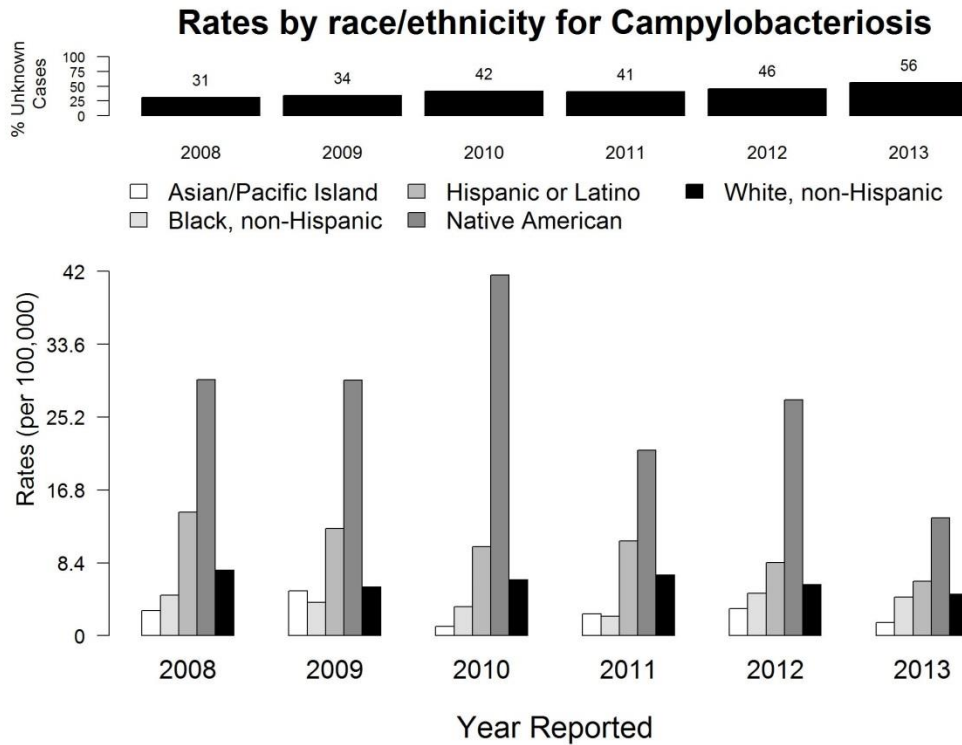


Figure 11. Rates (per 100,000) by race/ethnicity for campylobacteriosis for 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicates more informative rates for that year (lower panel).

Native Americans had the highest rate of *Campylobacter* infection across all years, with a peak in 2010. Rates among Hispanics were also consistently higher than for persons who identified as Asian/Pacific Islander, Black, and White, non-Hispanic (Figure 11). However, race/ethnicity was unknown among a large proportion of cases each year (31-56%).

SALMONELLOSIS

Salmonellosis is a bacterial illness that causes diarrhea, fever, and abdominal cramps. *Salmonella* germs spread through contaminated food and water as well as contact with animals. *Salmonella* infections are responsible for approximately 42,000 cases of illness in the United States each year. It is estimated that for every *Salmonella* case reported to public health, there are 29 cases that go undiagnosed.

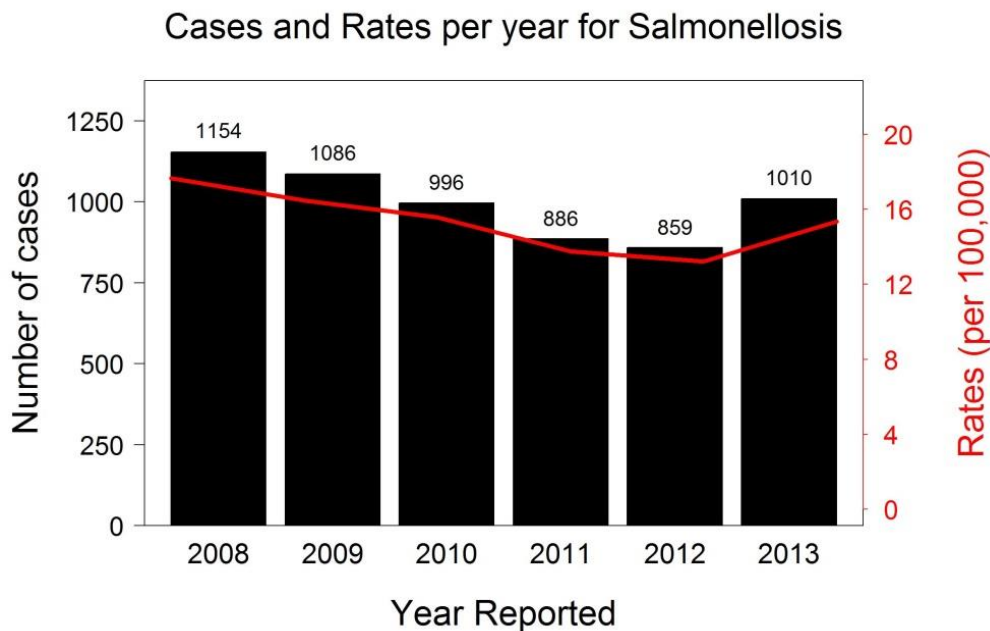


Figure 12. Cases and rates (per 100,000) for salmonellosis for 2008–2013.

Salmonellosis rates for 2008–2013 showed a steady decline until increasing in 2013 (Figure 12).

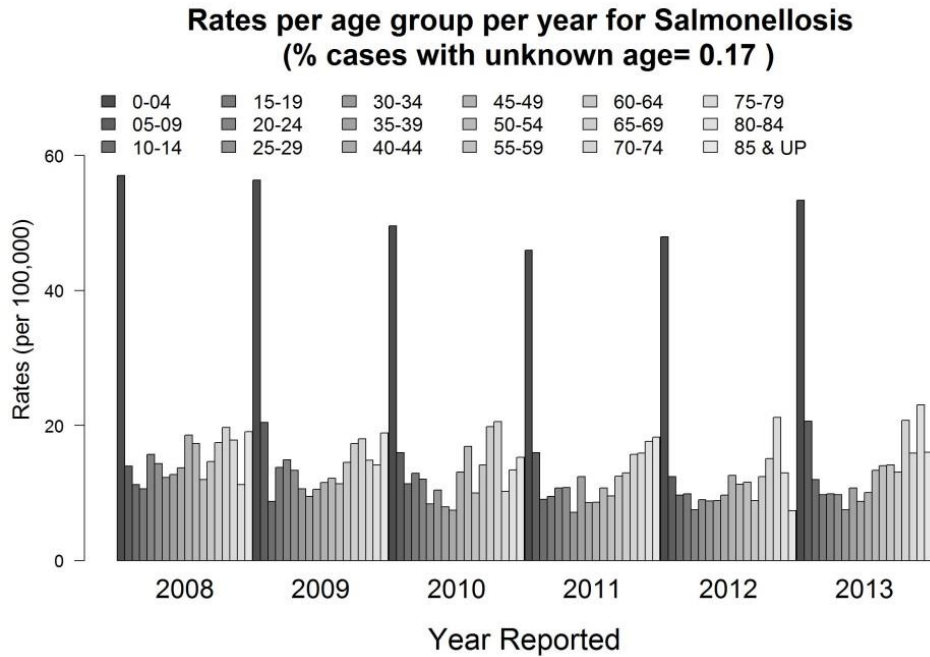


Figure 13. Rates (per 100,000) by age for salmonellosis for 2008–2013.

Children aged less than five years experienced much higher rates of salmonellosis than other age groups, with at least double the rate of any other age group during 2008–2013 (Figure 13).

Rates per gender per year for Salmonellosis

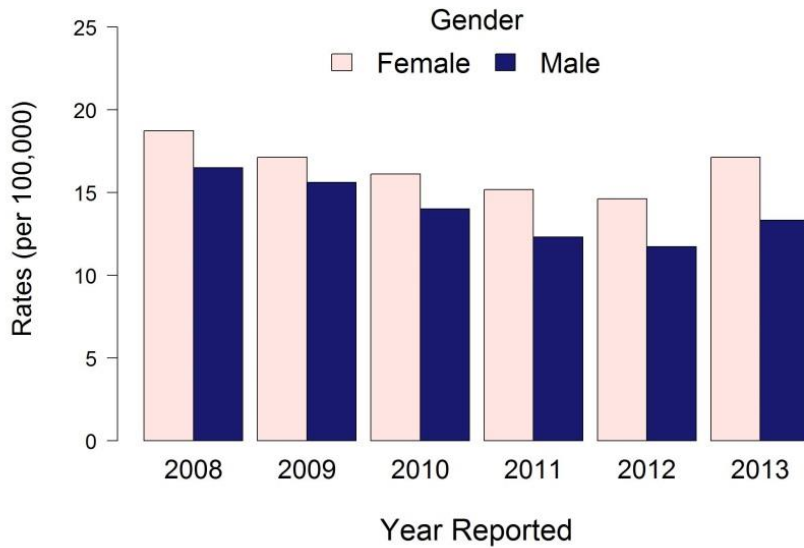


Figure 14. Rates (per 100,000) by gender for salmonellosis for 2008–2013.

Rates each year were slightly higher among women (Figure 14), and mirror the overall trends in salmonellosis.

ENTEROHEMORRHAGIC *ESCHERICHIA COLI*

Escherichia coli (*E. coli*) are a large group of bacteria. Although most strains do not pose a health threat, there are some types that cause illness. Enterohemorrhagic *E. coli*, or Shiga toxin-producing *E. coli* (STEC) can cause severe disease that includes abdominal cramps, bloody diarrhea, and vomiting. The illness occasionally leads to hemolytic uremic syndrome (HUS), a type of kidney failure. If a patient meets the case definition for both STEC and HUS, the case is reported for each of the conditions. STEC are found in the intestines of animals including cattle, deer, and sheep. It is estimated that for every STEC case reported to public health, there are 26 cases that go undiagnosed.

Cases and Rates per year for Enterohemorrhagic *E. coli*

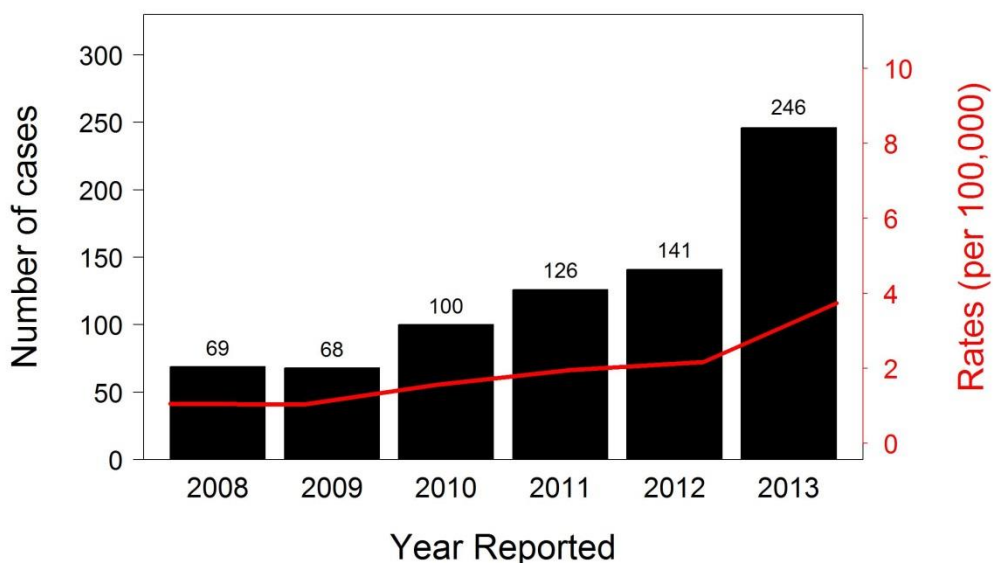


Figure 15. Cases and rates (per 100,000) for enterohemorrhagic *E. coli* for 2008–2013.

Cases and rates for STEC increased across 2008–2013 with a peak in 2013 related to a point source outbreak at a restaurant in Maricopa County (Figure 15).

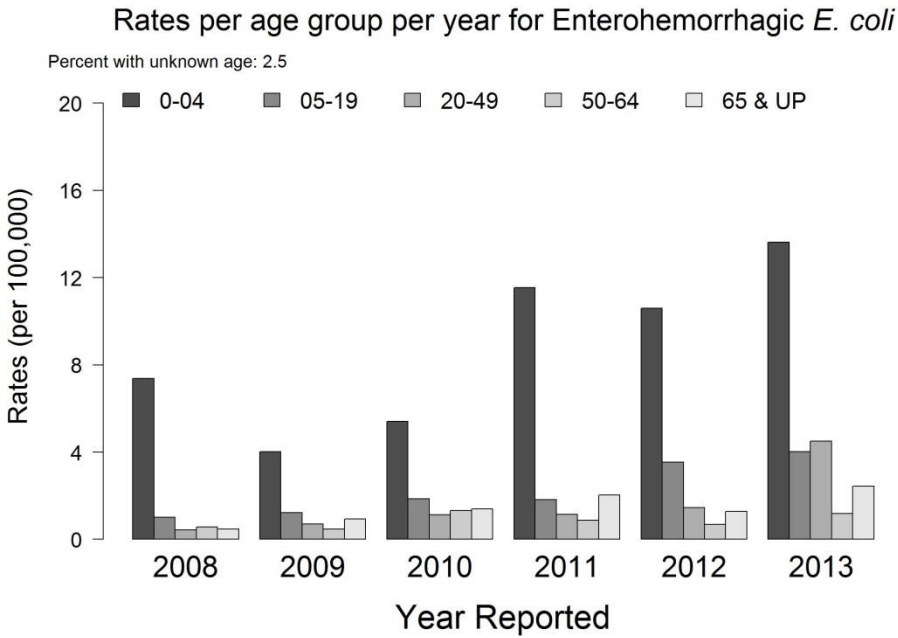


Figure 16. Rates (per 100,000) by age group for enterohemorrhagic *E. coli* for 2008–2013.

STEC infections in Arizona disproportionately affect infants and children less than five years old (Figure 16).

SHIGELLOSIS

Shigella bacteria can cause bloody diarrhea, fever, and abdominal cramps. The germs spread through direct contact with someone who is sick or by eating or drinking something that is contaminated with *Shigella*. About 14,000 cases of illness are reported in the United States each year. The infection tends to be more common in the summer than winter. It is estimated that for every *Shigella* case reported to public health, there are eight cases that go undiagnosed.

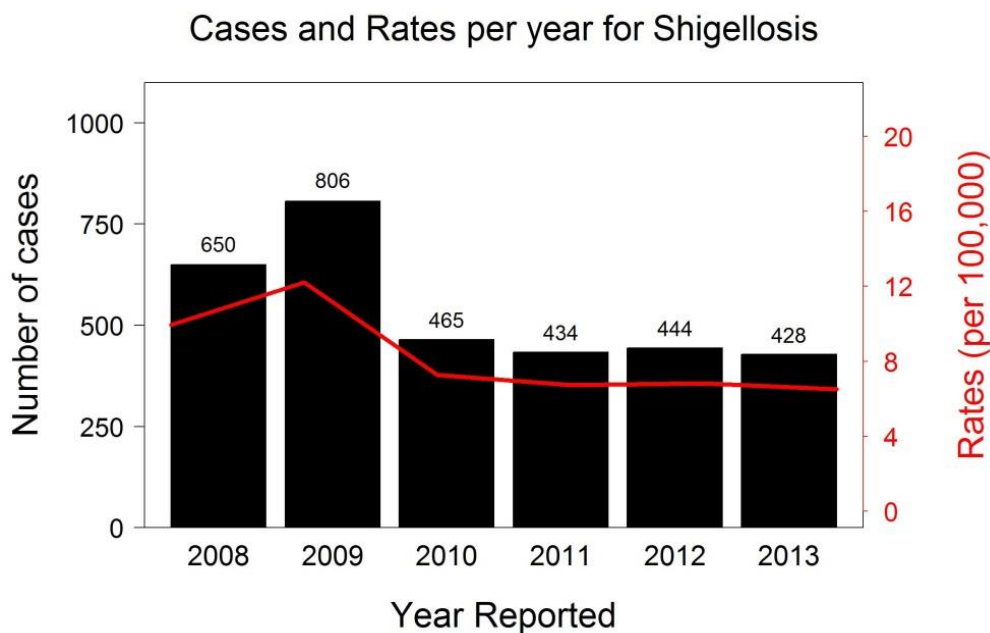


Figure 17. Cases and rates (per 100,000) for shigellosis for 2008–2013.

Cases and rates for shigellosis peaked in 2009 before decreasing and remaining relatively stable from 2010–2013 (Figure 17).

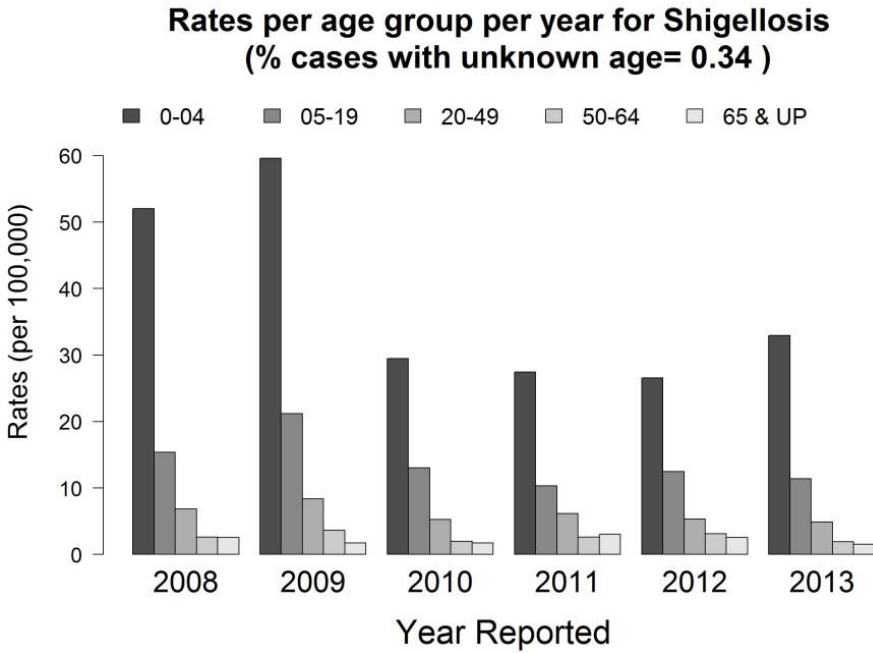


Figure 18. Rates (per 100,000) by age group for shigellosis for 2008–2013.

Shigellosis rates were highest among infants and children less than five years old (Figure 18). This follows the national trend, with toddlers between the ages of two and four years old most likely to contract shigellosis.

CRYPTOSPORIDIOSIS

Cryptosporidium is a parasite that infects human and animals and is one of the most frequent causes of waterborne disease in the United States. People acquire disease by eating or drinking something contaminated with *Cryptosporidium* (which includes swallowing recreational water such as from a swimming pool, lake, or river) and through close contact with someone who is ill with the infection. Common symptoms include watery diarrhea, abdominal cramps, vomiting, and fever. Persons at high risk of infection include diaper-age children, international travelers, anyone who drinks unfiltered/untreated water, and people who work closely with livestock. It is estimated that there are approximately 748,000 cases of cryptosporidiosis in the United States each year.

Reported cases decreased significantly from 2008 to 2009. Between 2010 and 2013, the case rate remained relatively stable (Figure 19). The high rate in 2008 was attributed to multiple outbreaks associated with recreational water exposures in Arizona and neighboring states.

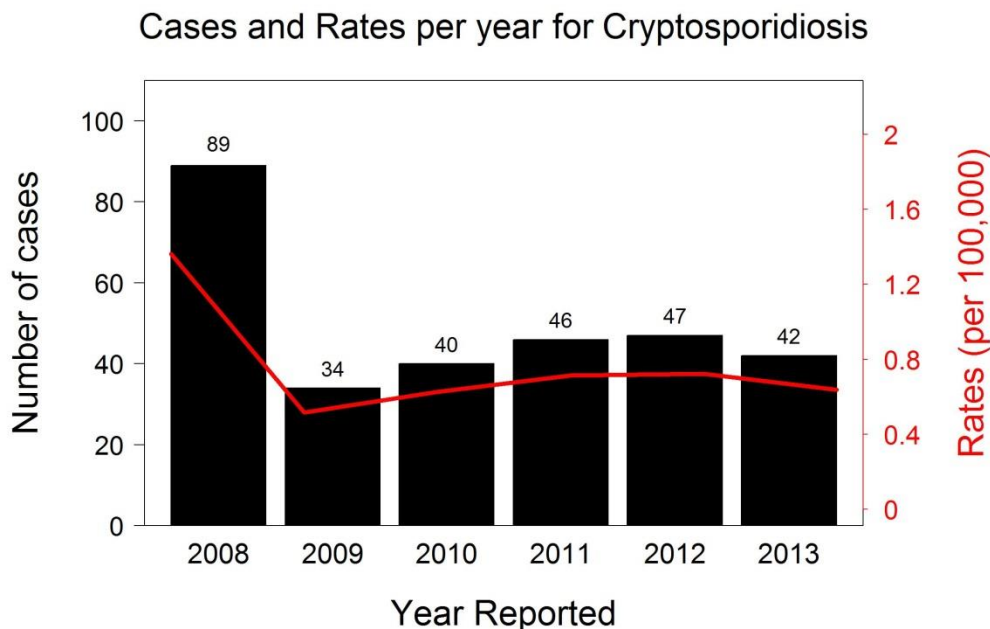


Figure 19. Cases and rates (per 100,000) for cryptosporidiosis for 2008–2013.

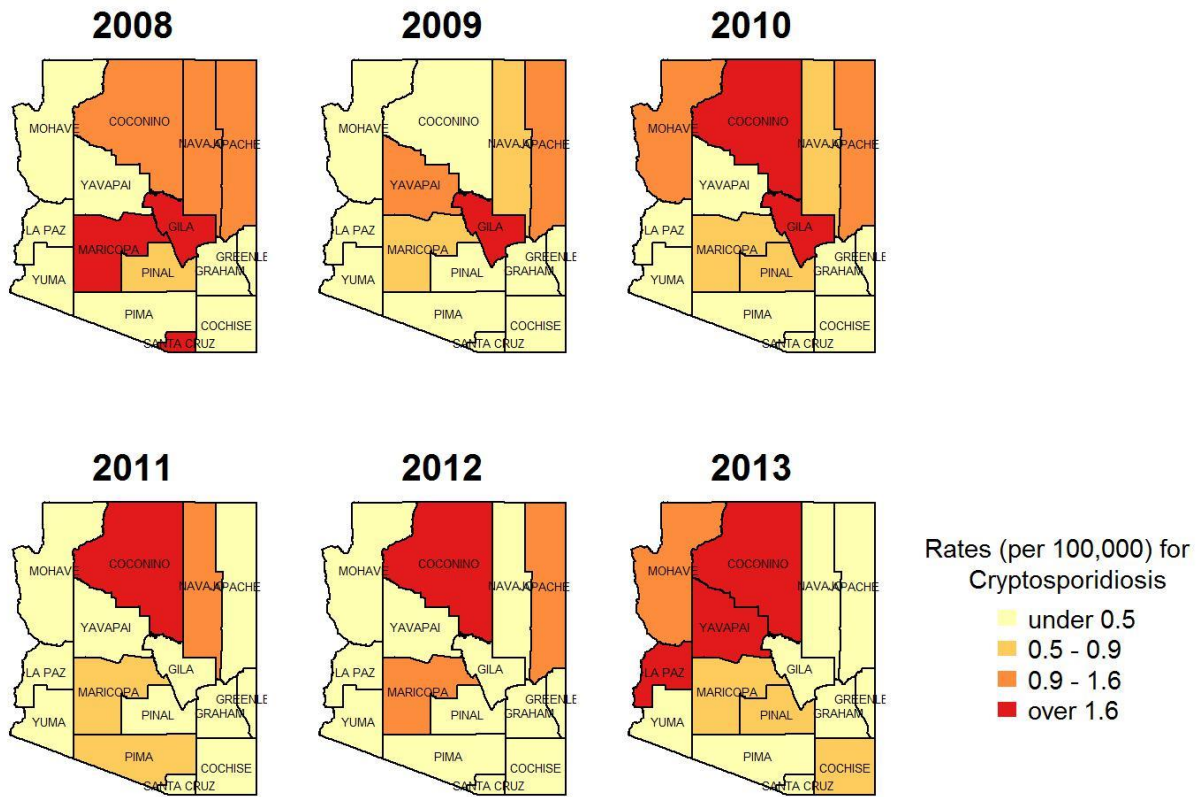


Figure 20. Rates (per 100,000) by county for cryptosporidiosis for 2008–2013.

Case rates were consistently high in Coconino County from 2010-2013 (Figure 20). The high case rates in Maricopa County in 2008 reflect the outbreaks in that year.

HEPATITIS A

Hepatitis A is an acute viral illness that spreads between people through the fecal-oral route. Symptoms often include yellowing of the skin and eyes (jaundice), fever, fatigue, vomiting, and loss of appetite. Persons most at risk include travelers to areas where hepatitis A is common and men who have sex with men. Vaccination with the two-dose series of hepatitis A vaccine in persons 12 months of age and older is the best way to prevent infection. In the 1990s, Arizona had the highest rate of hepatitis A infection in the country; the implementation of childhood vaccination programs in Arizona in the late 1990's, and the subsequent lowering of the minimum age at vaccination from 24 months to 12 months in 2006, likely contribute to the low case rate among children now.

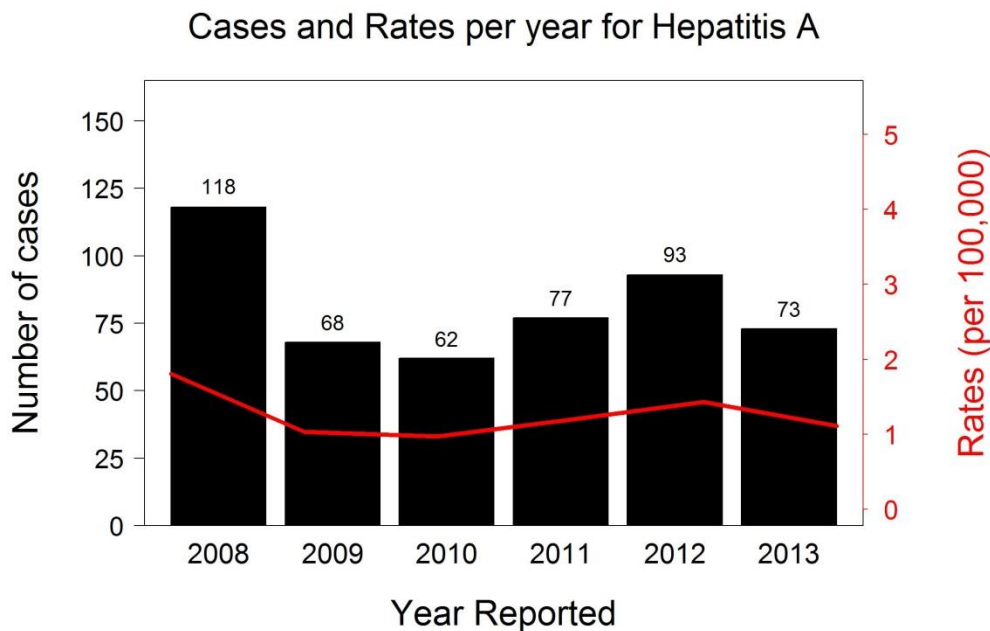


Figure 21. Cases and rates (per 100,000) for hepatitis A for 2008–2013.

Rates of hepatitis A in Arizona decreased each year between 2008 and 2010 (Figure 21), consistent with the annual decline in earlier years since the hepatitis A vaccine first became available. In 2013, 24 Arizona residents were identified to be part of a multi-state outbreak of hepatitis A virus infections linked to pomegranate seeds from Turkey.

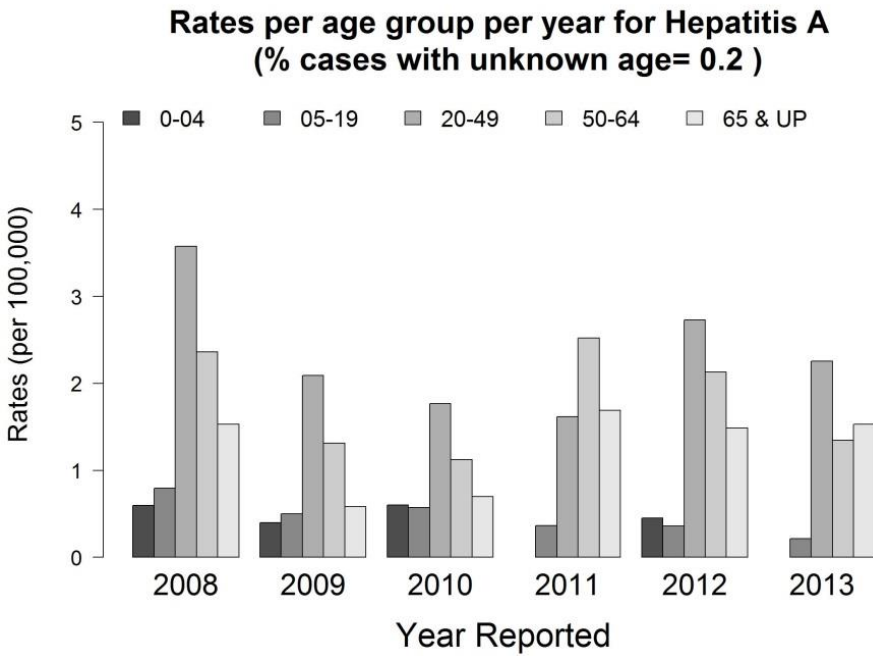


Figure 22. Rates (per 100,000) by age group for hepatitis A for 2008–2013.

Case rates during 2008 through 2013 were consistently highest for adults aged 20-49 years, and lowest among infants and young children (Figure 22).

VIBRIO INFECTION

Vibrio are bacteria that occur naturally in marine environments and can cause human illness after consumption of raw or undercooked shellfish or exposure by swimming in contaminated water with open wounds. Clinical illness can present as a diarrheal illness, an infected wound, or a severe blood infection. Nearly a dozen species of *Vibrio* bacteria are known to cause illness and are responsible for approximately 80,000 illnesses in the United States each year. It is estimated that for every *Vibrio* case reported to public health, there are 142 cases that go undiagnosed. Cholera, which is caused by *Vibrio cholerae* O1 or O139 strains that produce the cholera toxin, is much rarer than other *Vibrio* infections, and is counted separately from the cases included here.

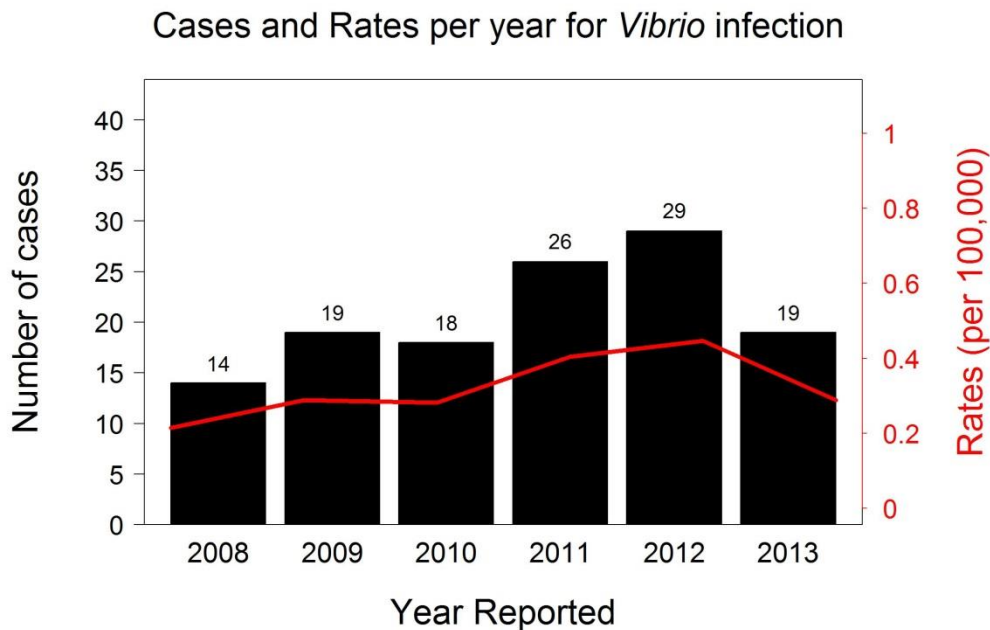


Figure 23. Cases and rates (per 100,000) for *Vibrio* infection for 2008–2013.

The number of vibriosis cases between 2008 and 2013 remained relatively stable except for slight increases during 2011 and 2012 (Figure 23).

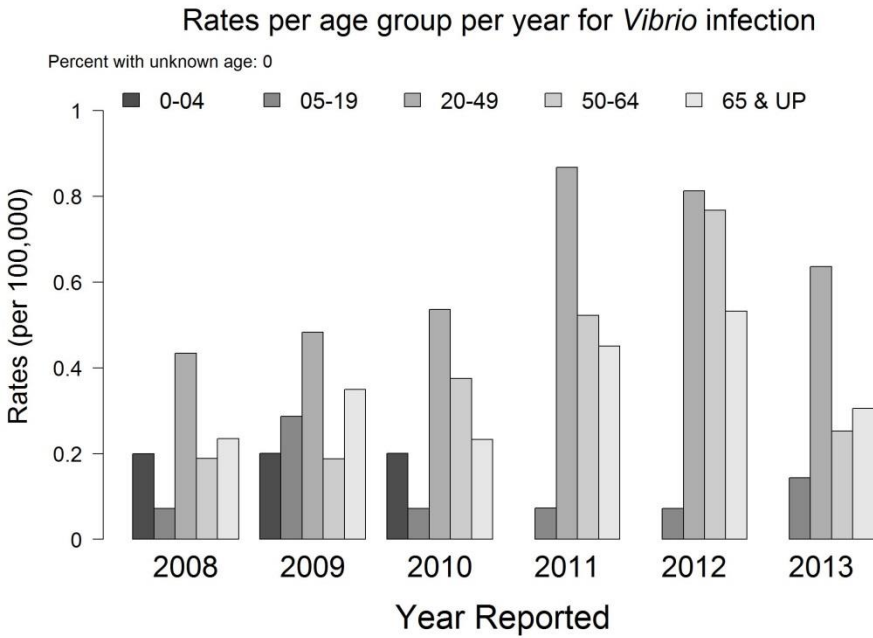


Figure 24. Rates (per 100,000) by age group for *Vibrio* infection for 2008–2013.

Vibrio infections most significantly affected adults, with the 20-49 year old age group having the highest case rate over the period (Figure 24). No vibriosis cases were identified in children less than five years of age in 2011 through 2013, although case rates in older age groups increased during that period. With the exception of 2010, *Vibrio* infections were seen more often in men than women (Figure 25).

Rates per gender per year for *Vibrio* infection

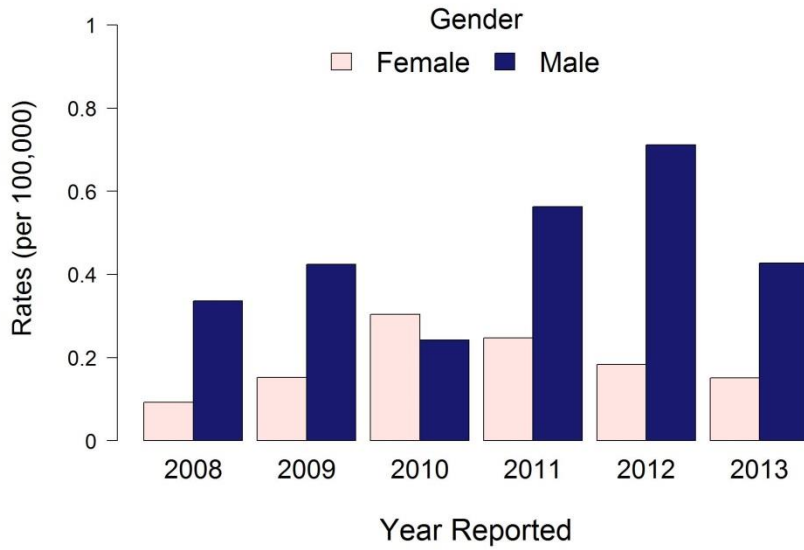


Figure 25. Rates (per 100,000) by gender for *Vibrio* infection for 2008–2013.

LISTERIOSIS

Listeria bacteria are widely distributed in nature and cause a range of clinical illness from mild influenza-like illness to meningitis and septicemia. Infection is most often caused by eating or drinking something contaminated with the bacteria. The bacteria have been found in a variety of foods including unpasteurized dairy products, ready-to-eat meats such as deli meats and hot dogs, and uncooked meats, fruits, melons and vegetables. Pregnant women, newborns, and persons with underlying medical conditions are at highest risk for disease. CDC estimates that at least 90% of people who become infected with *Listeria* are in one of these high risk groups. It is estimated that for every *Listeria* case reported to public health, there are two cases that go undiagnosed.

Case rates remained relatively stable between 2008–2011 before peaking in 2012 and dropping off markedly in 2013 (Figure 26). Case rates were highest among adults over 50 years old during the 6-year period, with one notable exception in 2012, when rates were highest among children less than five years old (Figure 27). Reasons for the differences in the 2012 numbers are not known.

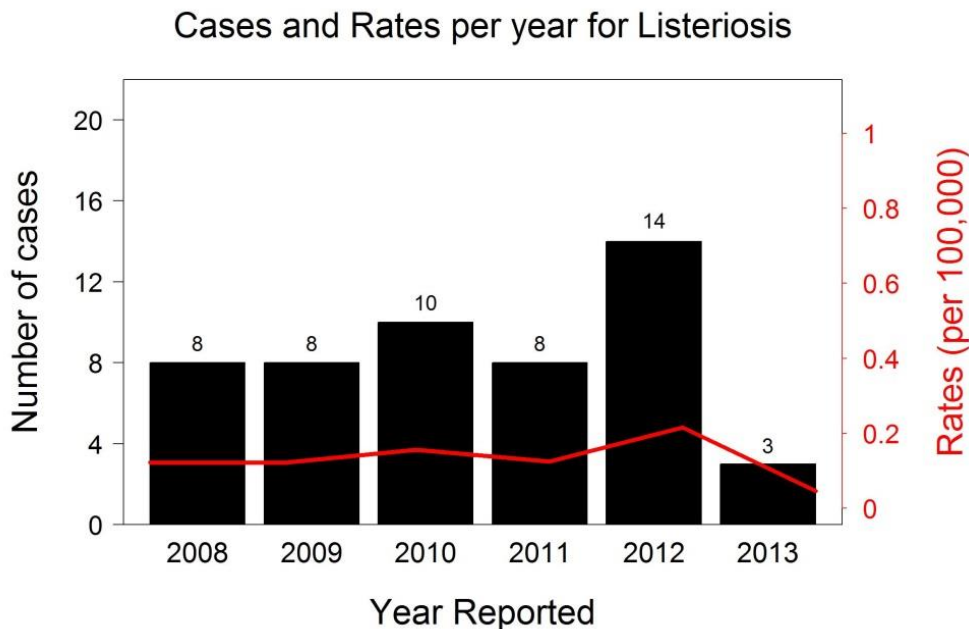


Figure 26. Cases and rates (per 100,000) for listeriosis for 2008–2013.

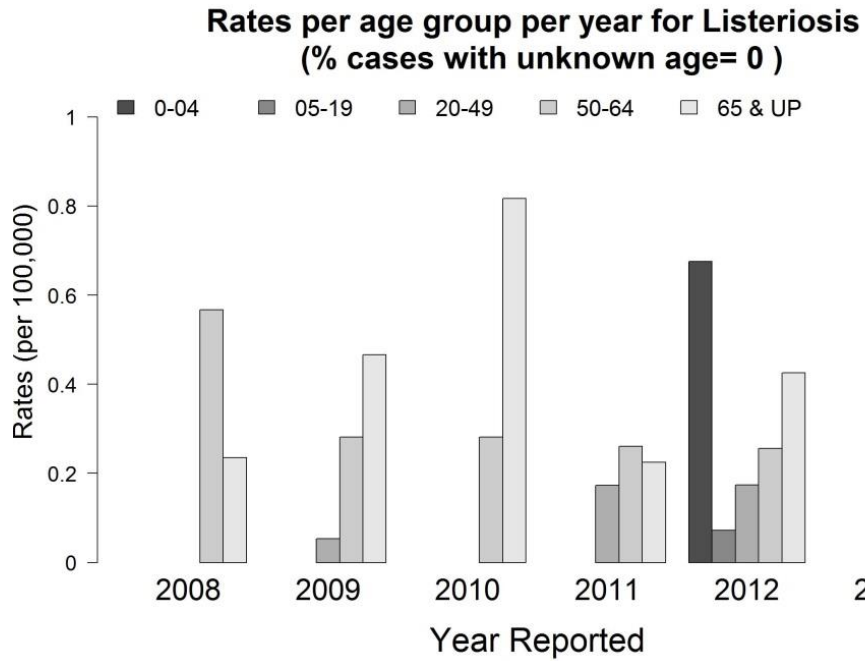


Figure 27. Rates (per 100,000) for listeriosis by age group for 2008–2013.

BOTULISM

Botulism is a serious infection caused by a toxin produced by the *Clostridium botulinum* bacteria, which are found in soil. Infection can be caused by ingesting food contaminated with the bacterial toxin, through a contaminated wound (most often associated with black-tar heroin injection), or an accidental overdose of botulinum toxin used in cosmetic procedures. Infant botulism can also occur from ingestion of *C. botulinum* bacteria.

All forms of botulism are considered a medical emergency and require immediate attention. Foods linked to botulism infection include home canned foods where sterilization processes were not followed, fermented fish, illicitly-brewed alcohol, and honey (only in infants less than one year old). In the United States, approximately 145 cases are reported each year—approximately 15% are foodborne, 65% infant botulism, and 20% wound botulism.

In Arizona, even one case of botulism is considered unusual. A peak occurred in 2012 when 12 cases were reported and linked to two separate botulism outbreaks associated with illicitly-brewed alcohol at a correctional facility.

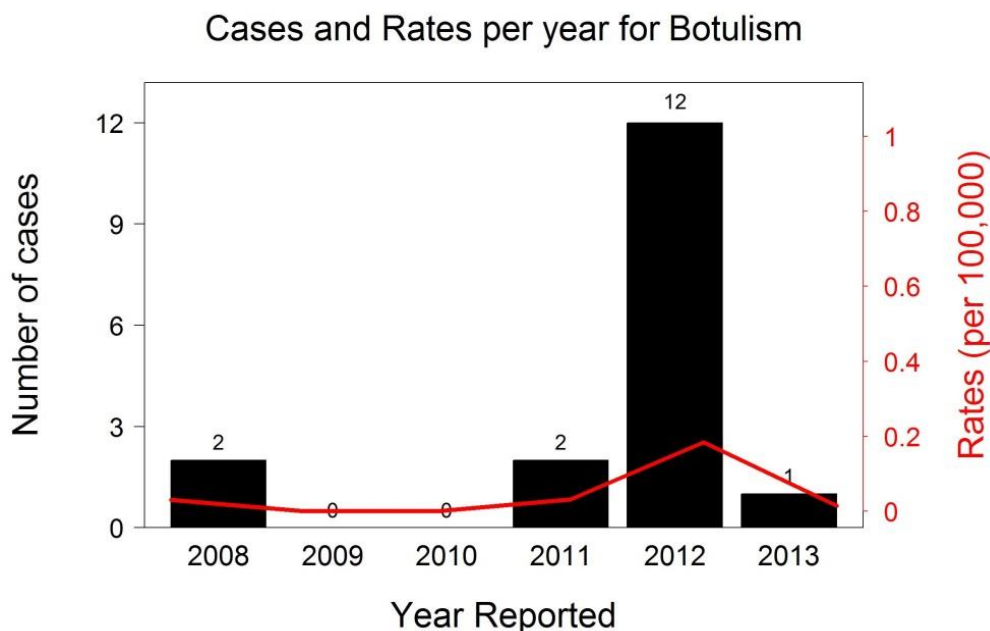


Figure 28. Cases and rates (per 100,000) for botulism for 2008–2013.

D. INVASIVE DISEASES OVERVIEW

The organisms responsible for the illnesses in the invasive disease category are bacteria that usually cause mild illnesses when infecting the skin, wounds, or throat. However, severe disease may occur when these bacteria colonize parts of the body where they are usually not found, like the bloodstream, cerebrospinal fluid, muscles, or the lungs.

The causative bacteria include *Staphylococcus aureus*, *Streptococcus* groups A and B, and *Streptococcus pneumoniae*. Invasive diseases can be spread through skin-to-skin contact (as for methicillin-resistant *Staphylococcus aureus*), contact with respiratory droplets from an infected person (as for group A *Streptococcus* and *Streptococcus pneumoniae*) or passed from the mother to the baby, most often during labor and birth (as for group B *Streptococcus*). Invasive infections caused by specific types of antimicrobial-resistant bacteria, such as methicillin-resistant, vancomycin-intermediate, or vancomycin-resistant *Staphylococcus aureus* (MRSA, VISA, and VRSA, respectively) are often associated with healthcare settings and may thus be denoted as “healthcare associated infections” (or HAI) when these cases meet certain conditions. *Streptococcus pneumoniae* (or pneumococcal disease) is the only invasive disease included here that is vaccine-preventable.

It is important to note that the data shown here represent only invasive disease (not infections of other body sites), and have not been determined to be healthcare- vs. community-acquired. Furthermore, group B streptococcal infections are only reportable for infants <90 days of age; data on infections among older persons are not collected.

Cases of Selected Invasive Diseases

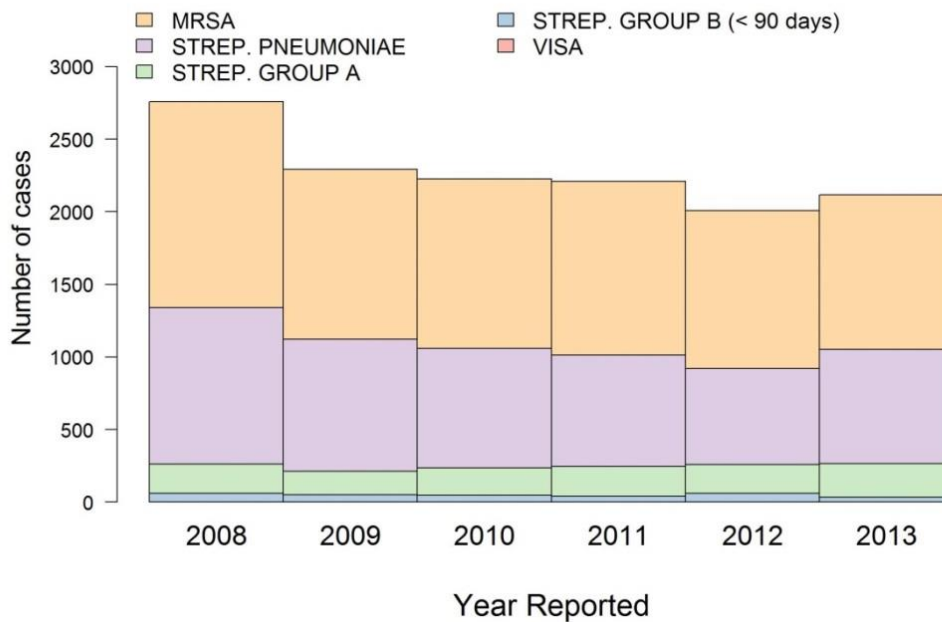


Figure 29. Cases of reported confirmed and probable invasive diseases for 2008–2013.

MRSA: invasive methicillin-resistant *Staphylococcus aureus*; Strep. pneumoniae: invasive *Streptococcus pneumoniae*; Strep. group A: invasive streptococcal group A; Strep. group B: invasive streptococcal group B (in cases less than 90 days old); VISA: vancomycin-intermediate *Staphylococcus aureus*. No cases of vancomycin-resistant *Staphylococcus aureus* (VRSA) or vancomycin-resistant *Staphylococcus epidermidis* (VRSE) have been identified in Arizona.

In Arizona, these invasive diseases made up 8% of the communicable diseases⁵ reported between 2008 and 2013, for a total of more than 13,000 cases. The most commonly reported invasive conditions (89% of the cases) were invasive methicillin-resistant *Staphylococcus aureus* and invasive *Streptococcus pneumoniae* (Figure 29). Overall, these invasive diseases in Arizona have shown a decline from 2008 to 2012.

⁵ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA), INVASIVE DISEASE

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a bacterium resistant to beta-lactam antibiotics. *Staphylococcus aureus* can cause a variety of localized and invasive infections, as well as toxic shock syndrome, and may be transmitted through direct contact with an infected wound or fomite. About a third of the population has *S. aureus* on their skin or in their noses, and approximately 2% of the population has MRSA on their skin. These individuals are colonized with *S. aureus* or MRSA and often have no symptoms; infection and the appearance of symptoms may occur when the bacterium encounters breaks in the skin. Invasive MRSA infections are usually more severe than skin or other localized infections, causing severe problems such as bloodstream infections, pneumonias, and surgical sites infections. Surveillance data are available only for invasive disease; these infections can be acquired in the community but are more commonly associated with healthcare settings. Community-associated MRSA infections can occur in crowded settings where there is frequent skin-to-skin contact and sharing of personal items, such as among athletic teams, in correctional facilities, and in military training facilities. Risk factors for healthcare-associated MRSA include prolonged hospital stay or presence of a tracheal tube, intravascular catheter, or peritoneal catheter.

In Arizona, cases and rates of invasive MRSA have been high, in comparison to other reportable morbidities, throughout 2008 to 2013, with a slow decrease in case rates over the time period (Figure 30). Several MRSA outbreaks were reported over this period, most commonly from schools. However, relatively small numbers of cases were involved in these outbreaks, which also generally involved non-invasive infections (which are not included in these surveillance numbers).

Rates of invasive MRSA disease increase with age, probably due to the higher likelihood of exposure to health care settings and increased susceptibility of older people (Figure 31). Interestingly, males have been consistently more affected by the disease than females (data not shown). Between 2008 and 2011, rates of invasive MRSA were consistently higher in a few counties, such as Maricopa, Mohave and Pima Counties (Figure 32). The decrease in number of cases and rates statewide from 2011 to 2012 is visible in most counties.

Cases and Rates per year for MRSA, invasive

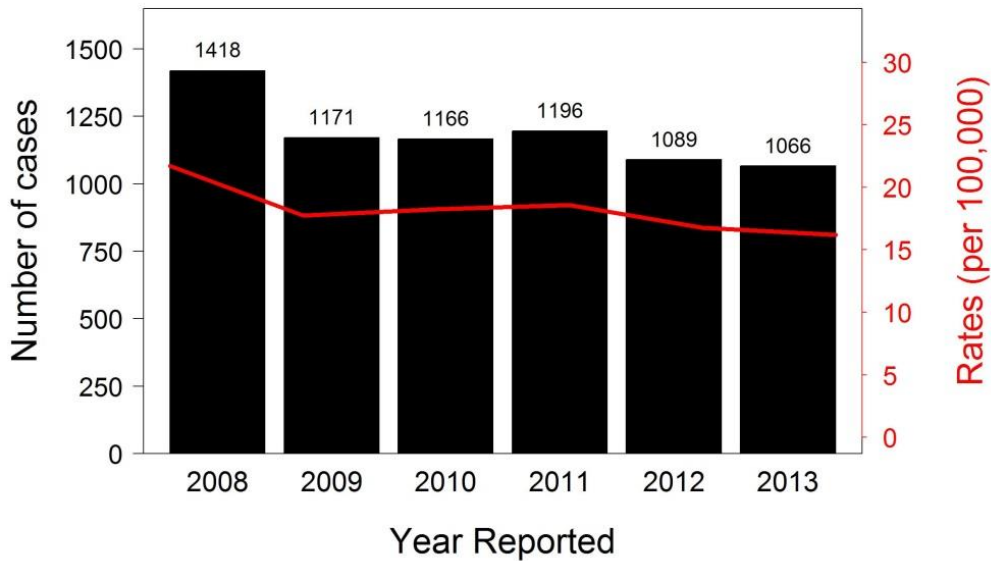


Figure 30. Cases and rates (per 100,000) for invasive MRSA for 2008–2013.

Rates per age group per year for MRSA, invasive
(% cases with unknown age= 1.4)

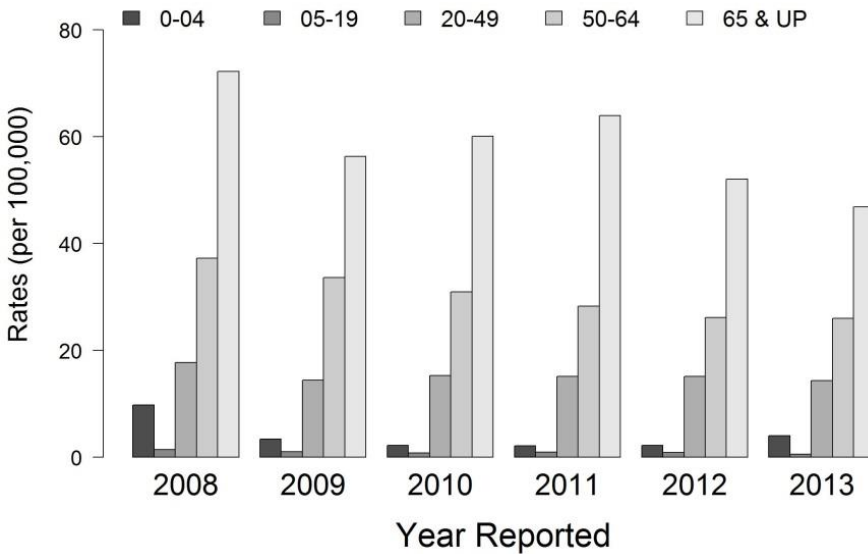


Figure 31. Rates (per 100,000) for invasive MRSA by age group for 2008–2013.

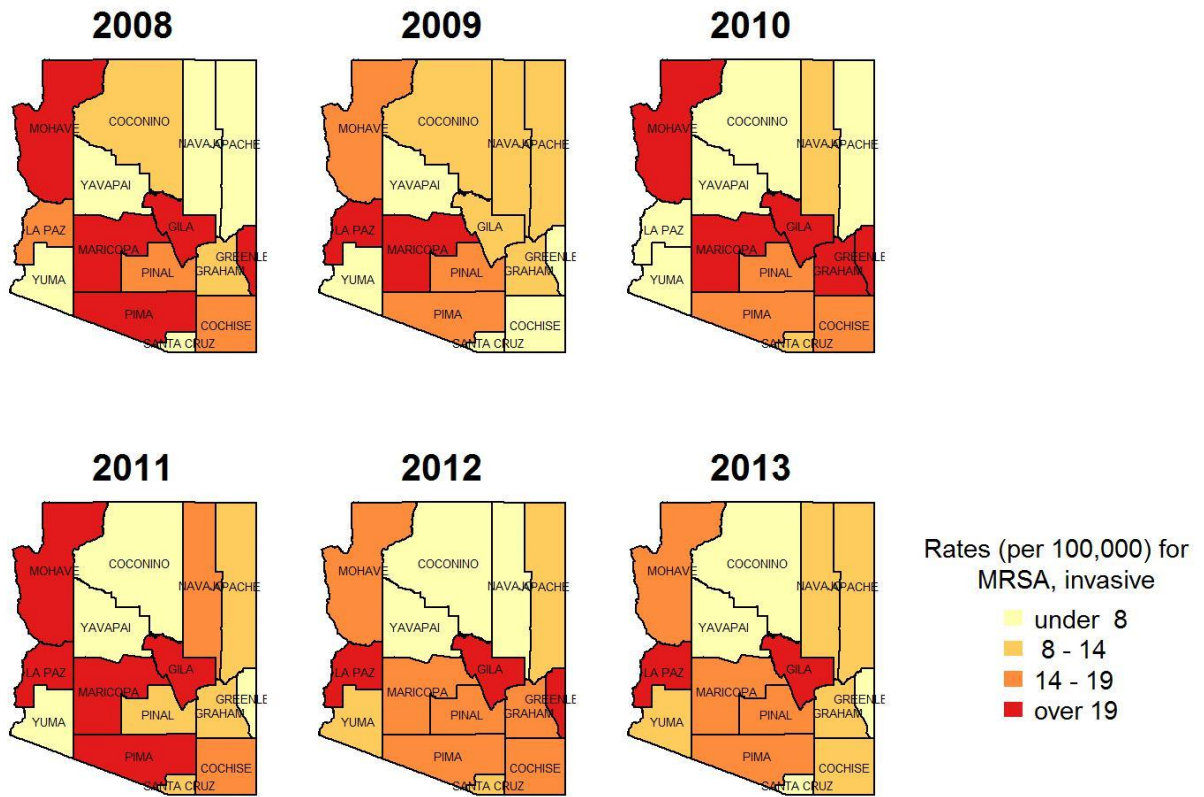


Figure 32. Rates (per 100,000) for invasive MRSA by county for 2008–2013.

STREPTOCOCCUS PNEUMONIAE, INVASIVE DISEASE

Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae*. The bacteria are commonly found in the nasopharynx but can spread to other parts of the body, causing infection in susceptible individuals. Transmission is through respiratory droplets or autoinoculation. In 1977, the United States licensed the first pneumococcal vaccine; in 2000, a conjugate vaccine was licensed and is routinely given to children.

Cases and Rates per year for *Streptococcus pneumoniae*

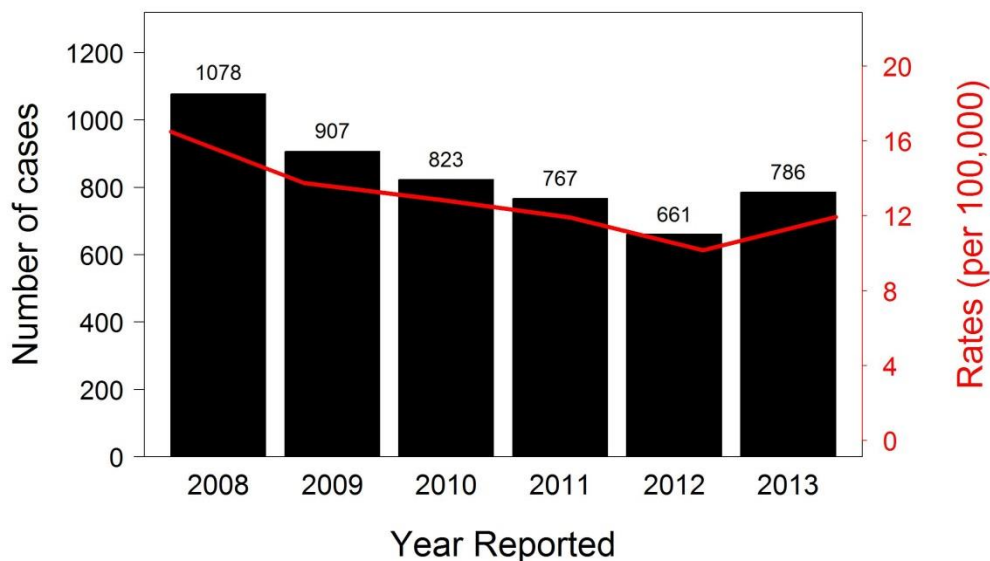


Figure 33. Cases and rates (per 100,000) for invasive *Streptococcus pneumoniae* for 2008–2013.

In Arizona, the number of confirmed cases of invasive *Streptococcus pneumoniae* declined between 2008 (1,078 cases or 16 cases per 100,000 population) and 2012 (661 cases or 10 cases per 100,000 population) and then rose slightly again in 2013 (786 cases or 12 cases per 100,000 population) (Figure 33).

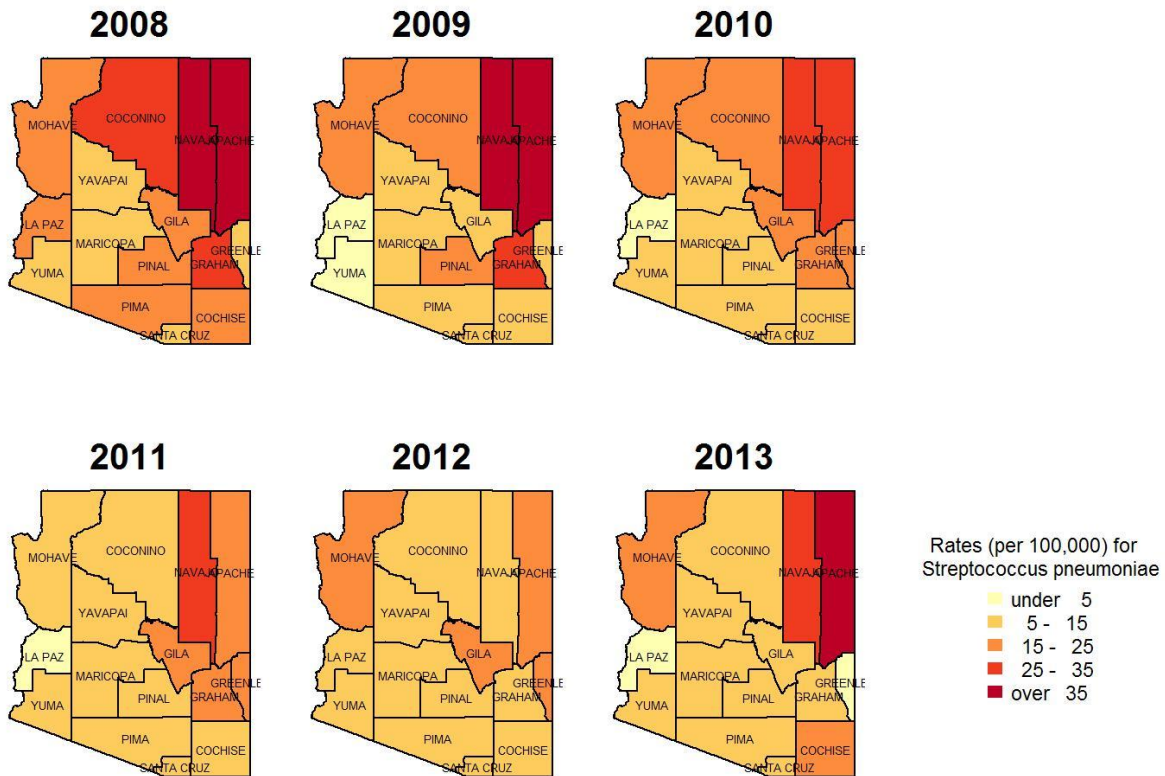


Figure 34. Rates (per 100,000) for invasive *Streptococcus pneumoniae* by county for 2008–2013.

Between 2008 and 2012, the rates of confirmed cases of *Streptococcus pneumoniae* decreased or remained constant in the majority of counties in Arizona (Figure 34). During that time period the highest rates were seen in 2008 when no county had fewer than 5-15 cases per 100,000 population. In 2008 and 2009, Navajo and Apache Counties had the highest rates in the state, each with >35 cases per 100,000 population. The rates decreased in those two counties between 2010 and 2012 but increased in 2013, with Apache again reaching >35 cases per 100,000 population. Rates increased for four counties between 2012 and 2013: Mohave, Navajo, Apache, and Cochise, while rates decreased for three counties during that same period: La Paz, Gila, and Greenlee. However, rates for counties with small populations may be somewhat unstable, as the identification of one additional case can mean a large change in the rate per population.

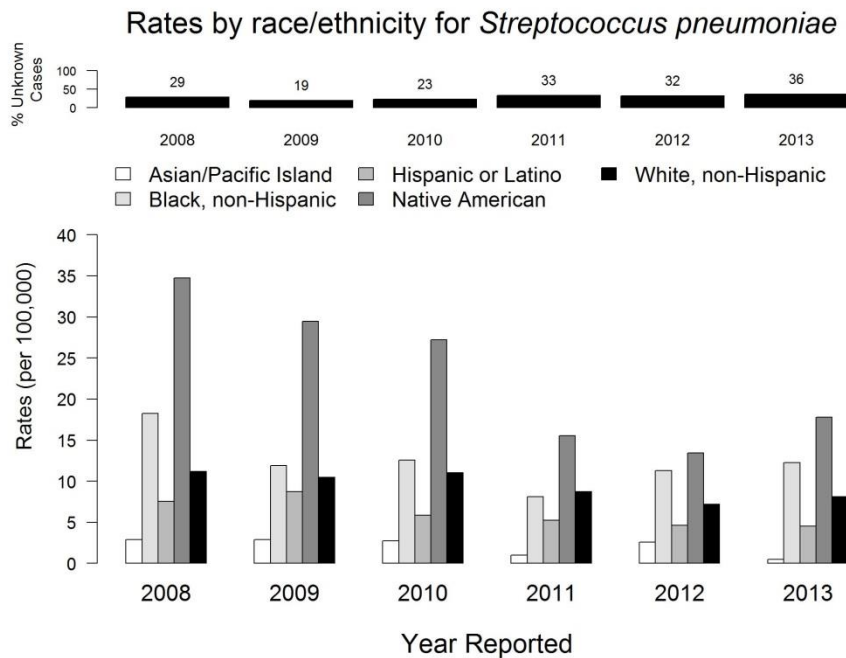


Figure 35. Rates (per 100,000) for *Streptococcus pneumoniae* by age group for 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicates more informative rates for that year (lower panel).

Between 2008 and 2013, there was an overall decrease in the rate of confirmed cases of invasive *Streptococcus pneumoniae* among all races/ethnicities in Arizona (Figure 35). For each year, the highest rate was among Native Americans and the lowest rate was among Asian/Pacific Islanders. Between 2008 and 2012, the rate among Native Americans declined steadily from approximately 34 cases per 100,000 population to approximately 13 cases per 100,000 population. This corresponds to the changes seen in county rates (Figure 34), as the counties with the highest rates of invasive pneumococcal cases also have large Native American populations. In 2013, the rate among White non-Hispanics, Native Americans, and Black non-Hispanics increased slightly again. It is important to note, however, that the percentage of cases with unknown race/ethnicity was relatively high in all years (19-36%), which could potentially affect relative rates between categories or between years.

STREPTOCOCCAL GROUP A, INVASIVE DISEASE

Group A *Streptococcus* bacteria cause mainly mild illnesses such as strep throat, scarlet fever, and impetigo (a skin infection). Occasionally these bacteria can invade the bloodstream, muscles, or lungs causing invasive streptococcal group A disease. Symptoms of invasive disease include pneumonia, necrotizing fasciitis, meningitis, and sepsis, among others. Streptococcal toxic shock syndrome is also possible, usually associated with an infection of cutaneous lesions, although these are counted separately along with other etiologies of toxic shock syndrome. Group A *Streptococcus* bacteria are spread through contact with droplets from an infected person's cough or sneeze. Groups at highest risk for invasive disease include the elderly; immunosuppressed persons; persons with chronic cardiac or respiratory disease, diabetes, or skin lesions; and African Americans and American Indians.

Between 2008 and 2012, cases and rates of streptococcal group A invasive disease in Arizona have been fairly stable, with the exception of 2009 when fewer cases were reported (Figure 36). In 2013, an increase in the number of cases is apparent.

Cases and Rates per year for Streptococcal Group A, Invasive

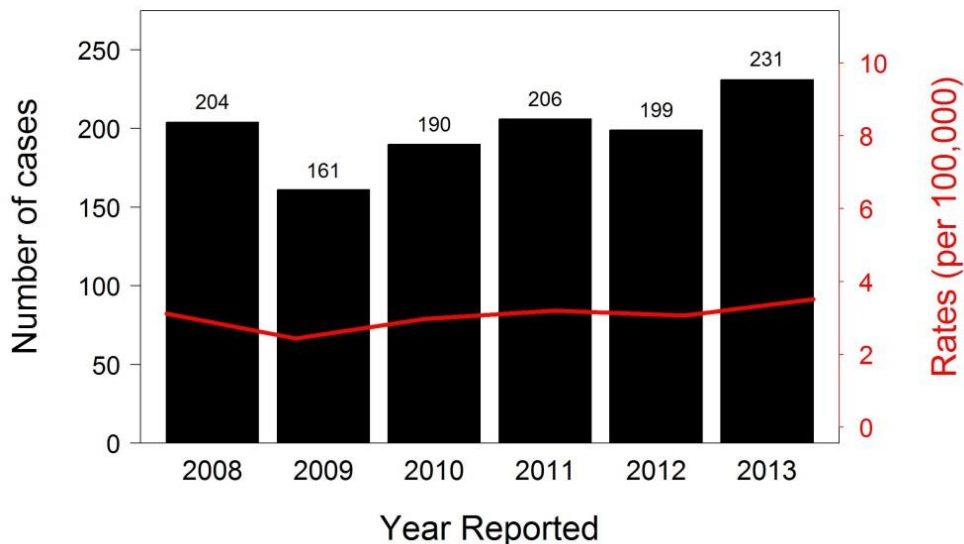


Figure 36. Cases and rates (per 100,000) of streptococcal group A, invasive diseases, for 2008–2013.

As expected, the Native American population is disproportionately affected by streptococcal group A invasive disease, with rates more than twice the rest of the population (Figure 37), although it is important to note that information on race and ethnicity is missing for 23-34% of cases each year.

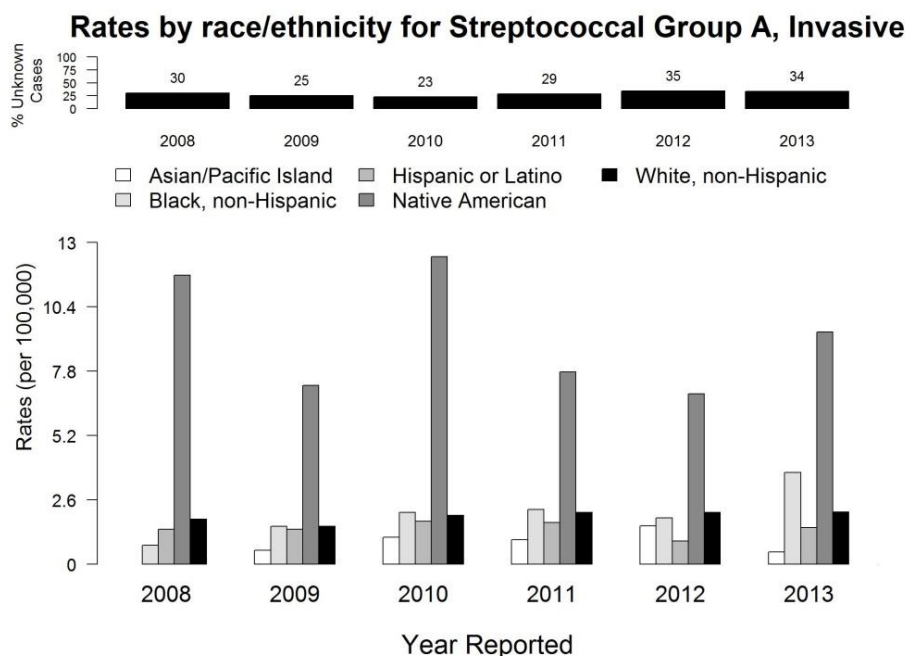


Figure 37. Rates (per 100,000) for streptococcal group A, invasive disease, by race/ethnicity for 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicates more informative rates for that year (lower panel).

Probably as a consequence of the high burden of disease in the Native American population, high rates of the disease appear to concentrate in Navajo County, which shows consistently high rates through most of 2008–2013, and Apache County, with high rates between 2011 and 2013 (Figure 38).

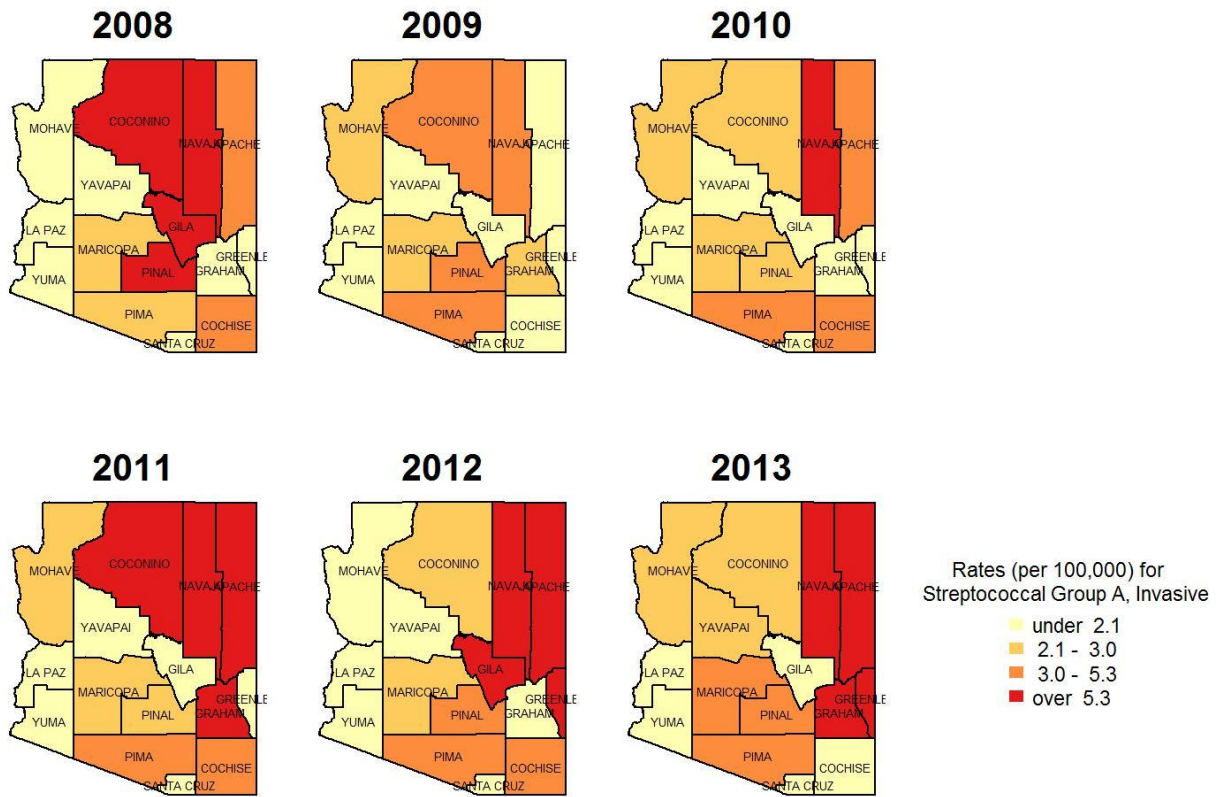


Figure 38. Rates (per 100,000) for streptococcal group A, invasive disease, by county for 2008–2013.

E. HEPATITIDES OVERVIEW

Hepatitides are a group of viral infections that include hepatitis A, B, C, D and E viruses, which are the leading causes of liver cancer. Hepatitis A and E are transmitted person-to-person through the fecal-oral route, whereas hepatitis B, C and D are transmitted through percutaneous (i.e., puncture) or mucosal contact with blood or bodily fluids. Hepatitis B infections can be divided into acute, chronic or perinatal types, based on symptoms, specific test results, and age. Hepatitis C infections can also be categorized as acute or chronic; hepatitis A does not become chronic. Vaccines are available for the prevention of hepatitis A and B.

Hepatitis C is the most common chronic bloodborne infection in the U.S. Because many of those infected do not know they are infected, newly identified cases of chronic hepatitis C could well be the most common of the hepatitides in Arizona. However, funding for hepatitis C surveillance in Arizona was eliminated during this period, and we are unable to produce reliable statistics for hepatitis C without the resources available for managing the large amount of data involved. Despite minimal surveillance resources, we estimate over 10,000 cases of hepatitis C are reported to ADHS each year.

In Arizona, cases of hepatitis A, B, D, and E made up 4% of the newly reported cases of communicable diseases⁶ reported between 2008 and 2013, for a total of more than 7,000 cases. Among the hepatitides other than C, the most common infections (93% of the cases) are chronic and acute hepatitis B (Figure 39). Overall, hepatitis A, B and D showed a decrease in number of reported cases from 2008 to 2013. Refer to the Enteric disease overview for more information on Hepatitis A.

⁶ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases of Selected Hepatitides

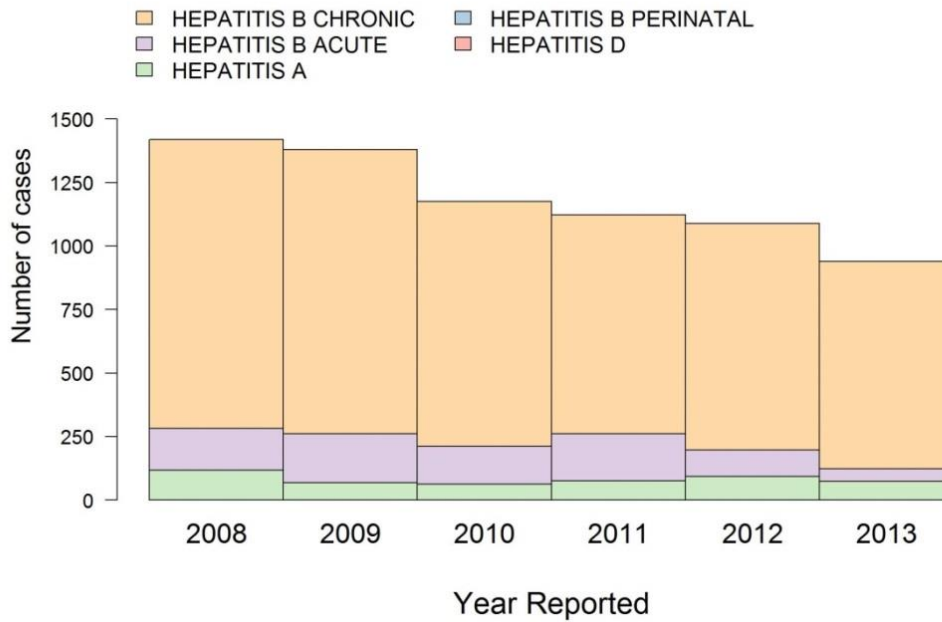


Figure 39. Cases of confirmed and probable hepatitis for 2008–2013.

No cases of confirmed or probable hepatitis E were identified. Only two case of perinatal hepatitis B were reported for 2008–2013 (one in 2009 and one in 2013). A single case of hepatitis D was reported in 2010.

HEPATITIS B

Hepatitis B is a viral illness that has infected an estimated 2 billion persons worldwide. More than 350 million persons have chronic infections that will last their lifetime and it is the cause of up to 80% of hepatocellular carcinomas. Humans are the only known host of hepatitis B. Hepatitis B virus (HBV) is a small, double-shelled virus with numerous antigenic components including hepatitis B surface antigen, hepatitis B core antigen and hepatitis B e antigen. Transmission occurs through infectious body fluids with the highest concentration of virus being present in blood and serous fluids. There is no apparent transmission of HBV via sweat, tears, urine, stool, or droplet nuclei.

Acute hepatitis B may manifest clinically as fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, abdominal pain, or other non-specific symptoms, possibly accompanied by jaundice; however, 50% of adults with acute infections experience no symptoms. Although most acute infections resolve completely, approximately 5% of infections result in a chronic infection, with the risk decreasing with age. Chronic infections are often asymptomatic, but may progress to severe illness including cirrhosis, liver failure, and liver cancer. Early identification of HBV infection is important to help interrupt ongoing transmission and provide medical intervention for chronic carriers, thereby reducing disease progression.

In the United States, the most common route of HBV transmission is through sexual contact with an infected person. Perinatal transmission from mother to infant at birth is another important mode of HBV transmission. For infants whose mothers are positive for both surface antigen and e antigen, 70-90% will develop HBV infection in the absence of post-exposure prophylaxis. Up to 90% of infected infants will develop chronic, lifelong infection. A series of three doses of hepatitis B vaccine is more than 98% effective in preventing HBV infection in infants, and more than 90% effective in teens and adults⁷.

⁷ Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, eds. 12th ed., second printing. Washington DC: Public Health Foundation, 2012. <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/hepb.pdf>

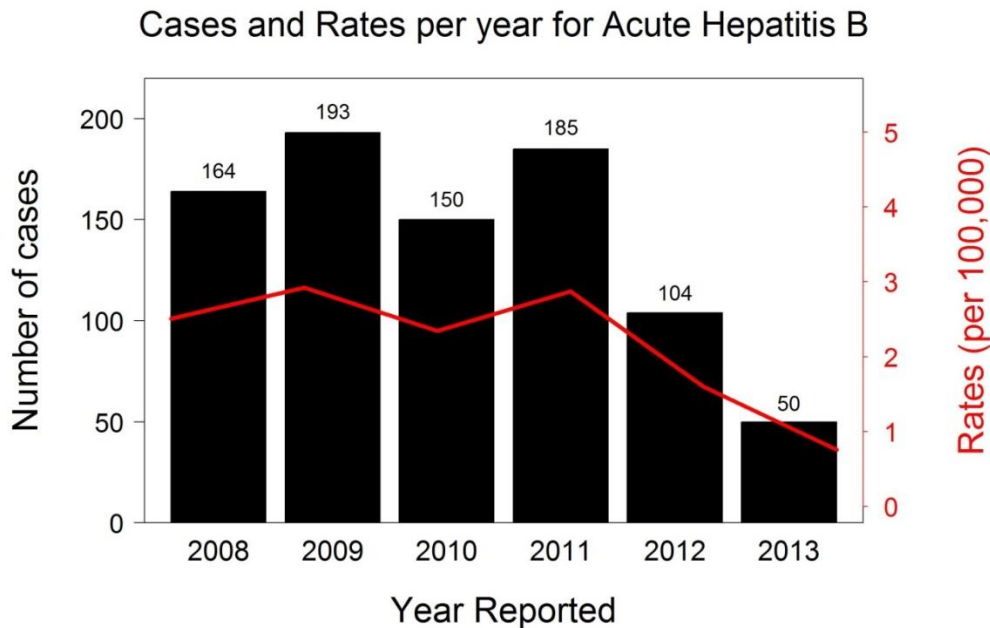


Figure 40. Cases and rates (per 100,000) for acute hepatitis B for 2008–2013.

In Arizona from 2008–2013, reported cases and rates of acute hepatitis B declined from a high of 193 cases reported in 2009 to 50 cases reported in 2013 (Figure 40). This decline in Arizona cases is consistent with a national decline in cases during this same time period. Rates could also have been affected by a change in the 2013 case definition⁸ for acute hepatitis B cases that required the presence of clinical symptoms in addition to laboratory results. The change in the case definition may play an important role in the 2013 decline in either of two ways: the inclusion of asymptomatic but laboratory-positive cases in earlier years, or exclusion of symptomatic persons in 2013 if lack of resources limited case investigations to determine whether a person had compatible symptoms.

⁸ The 2013 acute hepatitis B case definition also included a slight change in laboratory criteria, in addition to requiring clinical symptoms: the presence of hepatitis B surface antigen AND positive Immunoglobulin M (IgM) antibody to hepatitis B core antigen, if performed, for a confirmed case, or positive IgM alone for a probable case. In the earlier years, a positive test for either hepatitis B surface antigen or IgM antibody was sufficient for both confirmed and probable cases.

Cases and Rates per year for Chronic Hepatitis B

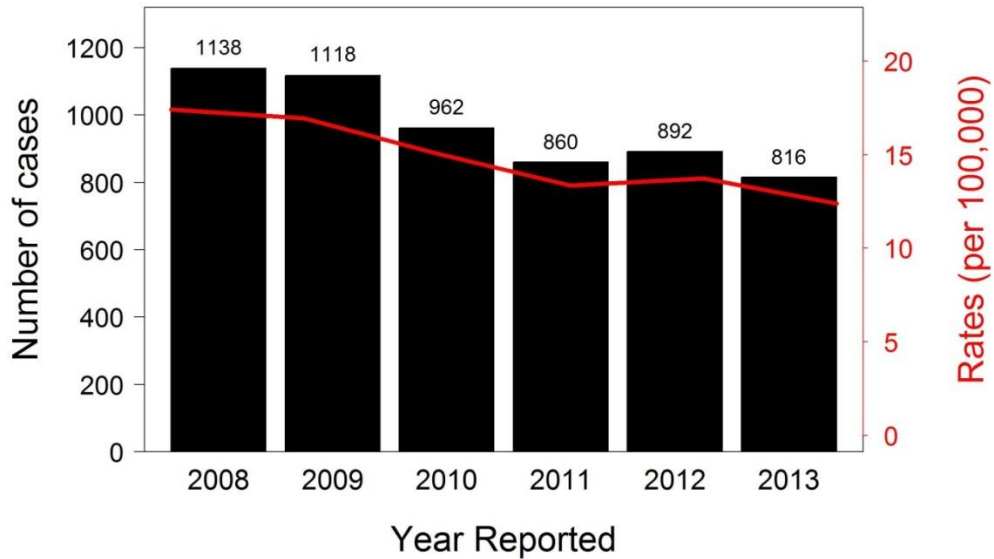


Figure 41. Cases and rates (per 100,000) for chronic hepatitis B for 2008–2013.

The number and rates of newly-reported chronic hepatitis B in Arizona declined over the period of 2008 (1,138 cases) through 2013 (816 cases) (Figure 41). Identification of chronic hepatitis B is generally based on laboratory testing and does not require confirmation of compatible symptoms.

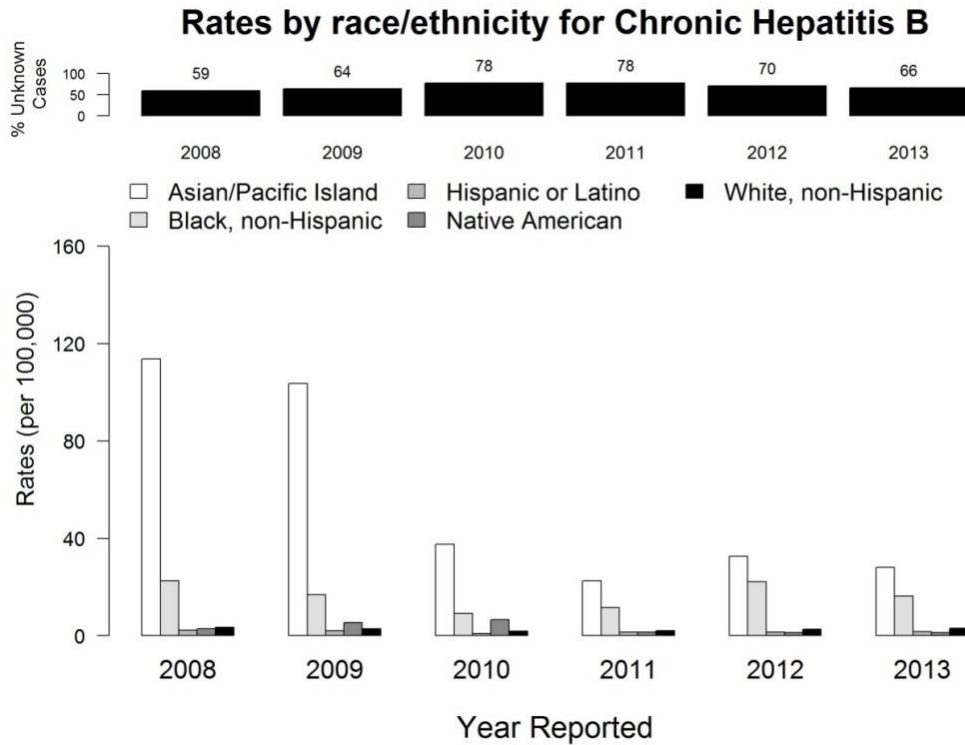


Figure 42. Rates (per 100,000) for chronic hepatitis B by race/ethnicity for 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicates more informative rates for that year (lower panel).

In Arizona from 2008–2013, rates of newly-reported chronic hepatitis B have been consistently highest in the Asian/Pacific Islander population, followed by the Black population (Figure 42). However, rates in the Asian/Pacific Islander population appear to have decreased during this time period from a high of approximately 115 cases per 100,000 population in 2008 to a low of approximately 30 cases per 100,000 population in 2011. This decrease mirrors the overall decline in newly reported chronic hepatitis B cases over this period; however, because of the high proportion of cases for which race/ethnicity data are not available (59-78% of cases each year) due to lack of resources to investigate individual cases of chronic hepatitis B, the disproportionate decrease in Asian/Pacific Islander cases may also simply reflect differences in the availability of race information.

F. VACCINE-PREVENTABLE DISEASES OVERVIEW

Our category of vaccine-preventable diseases (VPDs) includes several infectious diseases for which an effective preventive vaccine exists, specifically: chickenpox, invasive *Haemophilus influenzae*, measles, invasive meningococcal disease, mumps, pertussis, poliomyelitis, human rabies, rubella, smallpox, tetanus, vaccinia-related events, and yellow fever. Some vaccine-preventable diseases are listed in other disease categories, including *Streptococcus pneumoniae* in the Invasive diseases overview, hepatitis A and B in Hepatitides overview, and influenza in its own category (Influenza and RSV).

VPDs may be transmitted via numerous different routes, including respiratory droplets (*Haemophilus influenzae*, measles, mumps, pertussis, rubella) or contaminated wounds (tetanus). Some of the unique objectives of surveillance for VPDs are to monitor changes in the incidence and epidemiology of the diseases once a vaccine is available and routinely used; to collect information on the effectiveness of vaccinations against particular diseases; and to identify illness caused by pathogen strains not included in the vaccines.

There are several VPDs for which children are routinely vaccinated in the U.S. but which are not discussed in this report. Surveillance for varicella (chickenpox) is ongoing in Arizona, but due to inconsistencies in reporting and classification of cases over this period, we have excluded it from this report. Newer vaccines against rotavirus and human papillomavirus are now part of the routine pediatric and adolescent vaccination schedules, but Arizona does not have a surveillance program for the diseases prevented by those vaccines.

In Arizona, the VPDs included in this category accounted for 3% of the communicable diseases⁹ reported between 2008 and 2013, for a total of more than 5,000 cases. Including hepatitis A and B and invasive *Streptococcus pneumoniae* in the VPD category would increase the number to 10% of the reported communicable diseases, or more than 17,000 cases. The most commonly reported VPDs (97% of the cases) are pertussis and invasive *Haemophilus influenzae* (Figure 43). During this time period, pertussis has shown a great increase, in 2013 reaching more than six times the number of cases reported in 2008, though the incidence of pertussis has historically occurred in cycles of approximately five years. No cases of diphtheria, polio, or yellow fever were reported in this period.

⁹ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases of Selected Vaccine-Preventable Diseases

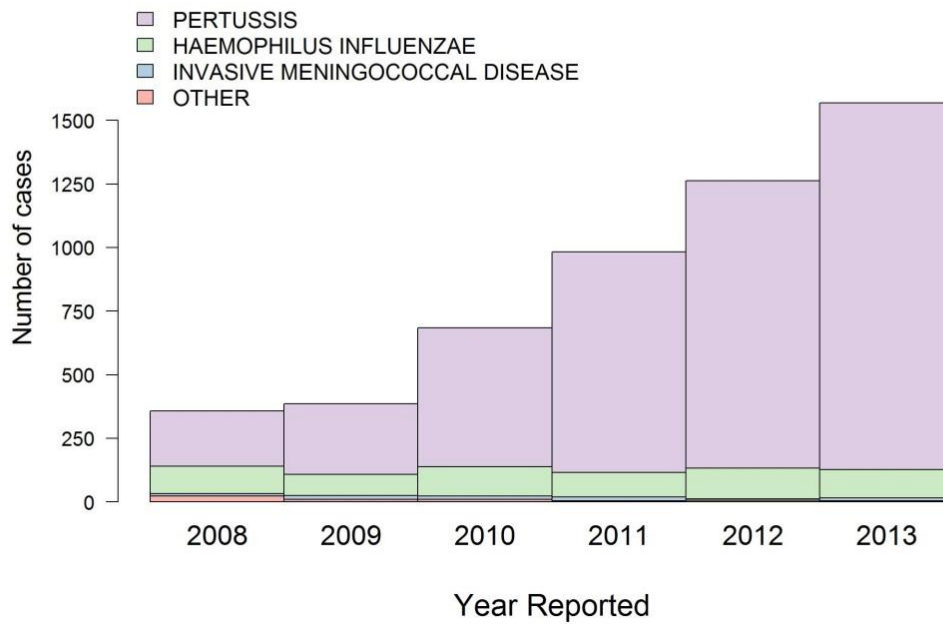


Figure 43. Cases of confirmed and probable selected vaccine-preventable diseases (VPDs) for 2008–2013.

The OTHER category includes measles, mumps, rubella, tetanus and vaccinia-related adverse events (smallpox vaccine adverse events). No cases of diphtheria, polio or yellow fever were reported in this period.

PERTUSSIS

Pertussis (“Whooping Cough”) is a highly contagious bacterial illness caused by the bacterium *Bordetella pertussis*. The illness affects all ages but is most serious in infants. Transmission occurs through contact with respiratory droplets or airborne droplets of respiratory secretions. Initial symptoms may be similar to the common cold with runny nose and mild cough. Fever, if present, is low-grade. The diagnosis of pertussis is typically made when the cough progresses to paroxysms (bursts of numerous, rapid coughs), which occur more frequently at night and may be followed by post-tussive vomiting. A person with pertussis is most contagious in the early, mild stage of illness. Symptoms may persist for months after the initial onset of pertussis. Young infants are at highest risk for developing complications, with the most common complication being bacterial pneumonia. Other complications include seizures, encephalopathy, and death. Antibiotics are somewhat effective in controlling symptoms if given early in the course of illness. Erythromycin is the gold standard for pertussis treatment, but alternatives include azithromycin and trimethoprim-sulfamethoxazole.

The first vaccine developed against *Bordetella pertussis* was the whole-cell vaccine which was introduced in the 1940s. In 1997 and 2005 two new vaccines became available to prevent pertussis and with fewer side effects than the earlier vaccine: DTaP and Tdap. DTaP (diphtheria-tetanus-acellular pertussis) is the pediatric formulation and is approved for children ages 6 months through 6 years of age. The primary series consists of four doses, with the first three doses given at 4-8 week intervals and the fourth dose given 6-12 months after the third dose. In addition, a fifth booster dose is recommended before school entry. Tdap (adolescent/adult tetanus-diphtheria-acellular pertussis, with smaller doses of diphtheria and pertussis antigens compared to DTaP) vaccine is recommended as a single dose for children 7–10 years of age who are not fully immunized against pertussis as well as adolescents 11–18 years of age, adults 19–64 years of age and adults 65 years of age or older who have contact with an infant less than 12 months of age.

Cases and Rates per year for Pertussis

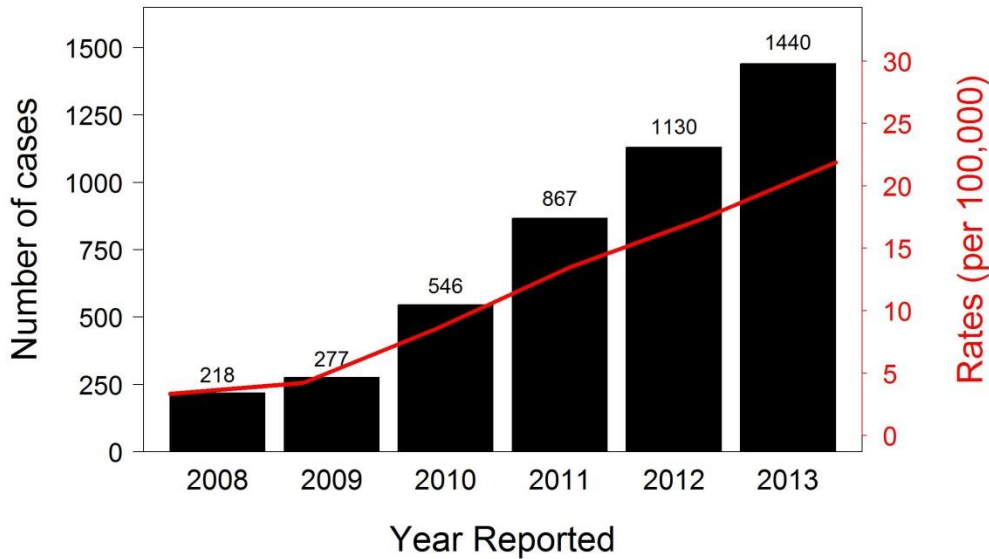


Figure 44. Cases and rates (per 100,000) for pertussis for 2008–2013.

Over the past five years, reported pertussis cases in Arizona have increased six-fold from 210 cases reported in 2008 to 1,440 cases reported in 2013 (Figure 44). This increase in reported cases was part of a national increase with the most cases reported nationally since 1955. This increase is thought to be partly due to the three- to five-year cyclic nature of pertussis incidence, as well as possible waning immunity after the fifth dose of DTaP vaccine, as compared to the more effective whole cell vaccine. Low vaccination rates may also explain the higher number of cases, particularly for 2013, when a large outbreak was reported in a small isolated community in northwest Arizona. A large number of individuals in this community are opposed to immunization; the low vaccination rates in this community make it susceptible to outbreaks of vaccine preventable disease, including pertussis. 49% of the pertussis cases reported in 2013 were associated with this outbreak.

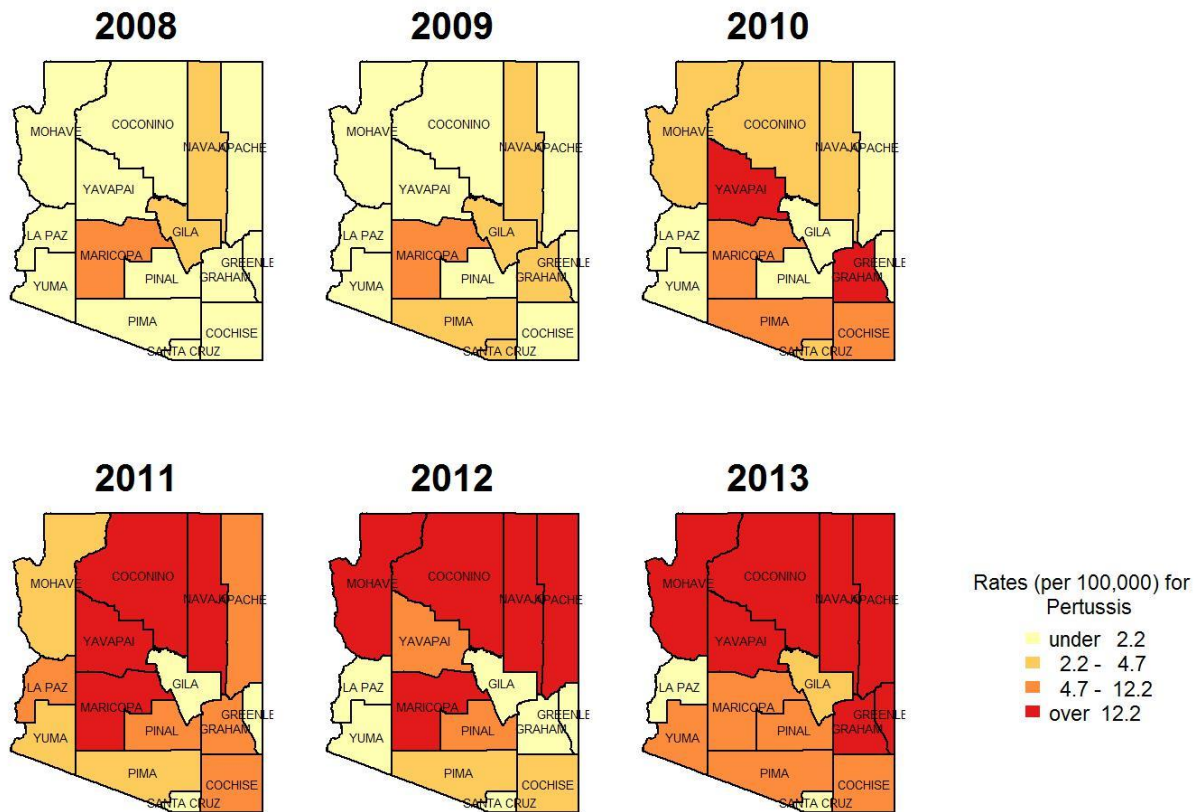


Figure 45. Rates (per 100,000) for pertussis by county for 2008–2013.

Pertussis cases are typically reported each year in Arizona’s two most populated counties, Maricopa and Pima Counties (Figure 45). However, during years of increase, pertussis spreads through travel and other contact, resulting in spread throughout the state. Communities with higher proportions of children who have not been vaccinated against pertussis are also clustered in particular parts of the state, which can result in higher case rates in some counties during outbreaks.

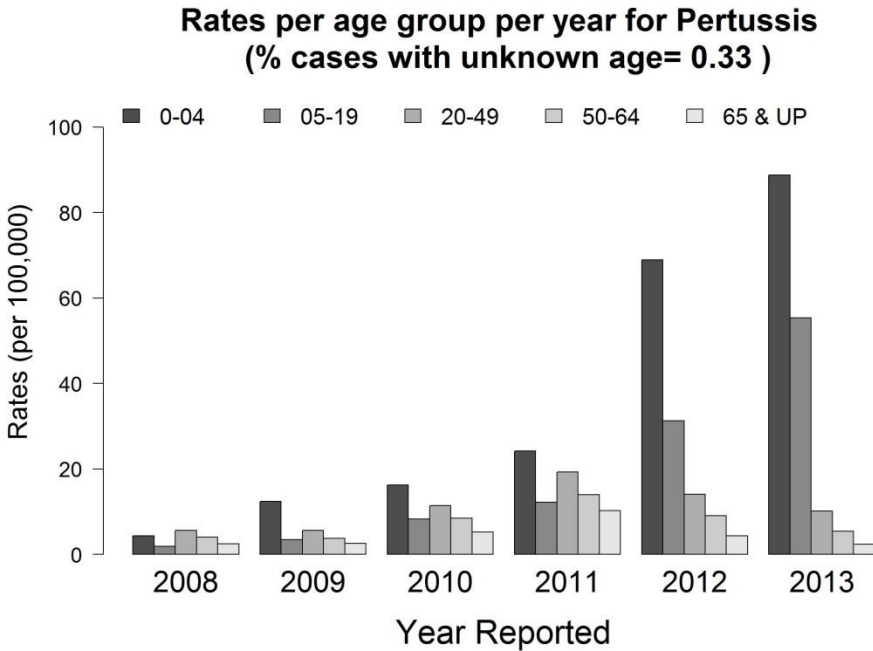


Figure 46. Rates (per 100,000) for pertussis by age group for 2008–2013.

For each year from 2009-2013, age-specific rates of reported pertussis were highest in the 0-4 year age group (Figure 46). Persons in this age group, especially infants, are too young to be fully vaccinated for pertussis and are the most susceptible to disease. This highlights the importance of vaccination in the older age groups that are able to be fully vaccinated, to prevent the spread of disease to persons in the youngest age groups that are most vulnerable to pertussis.

HAEMOPHILUS INFLUENZAE, INVASIVE DISEASE

Haemophilus influenzae, a gram-negative coccobacillus, is a cause of serious bacterial infections in humans. *H. influenzae* is transmitted through respiratory droplets, and asymptomatic carriers are thought to play a role in disease transmission. Of the six serotypes of *H. influenzae* (a, b, c, d, e, f), invasive disease caused by serotype b (Hib) was a leading cause of bacterial meningitis and other invasive bacterial diseases in children less than five years of age prior to the introduction of an effective polysaccharide vaccine in 1985. A Hib conjugate vaccine was also licensed in 1987. Hib vaccination is recommended for all infants starting at 2 months of age, and is given as a two- or three-dose primary series depending on the type of vaccine used. A booster dose is recommended at 12-15 months of age.

As a result of vaccination, the incidence of invasive Hib disease in the United States has declined more than 99% as compared with pre-vaccine disease levels. However, cases of invasive Hib disease continue to be reported in unvaccinated or undervaccinated children. Invasive Hib disease is uncommon in adults. Hib disease appears to follow a temporal pattern, peaking in September through December and March through May.

Although Hib infection is considered the most severe, infection with other *H. influenzae* serotypes also causes illness in humans. Since the introduction of vaccines against Hib, disease caused by serotype b has significantly declined and other serotypes predominate as the cause of invasive disease. Invasive disease may also be caused by non-encapsulated (non-typeable) *H. influenzae* organisms. In Arizona, surveillance is conducted for *H. influenzae* disease in all ages to assist in the detection of Hib and to monitor changes in the predominance of different serotypes.

Cases and Rates per year for *Haemophilus influenzae* type b

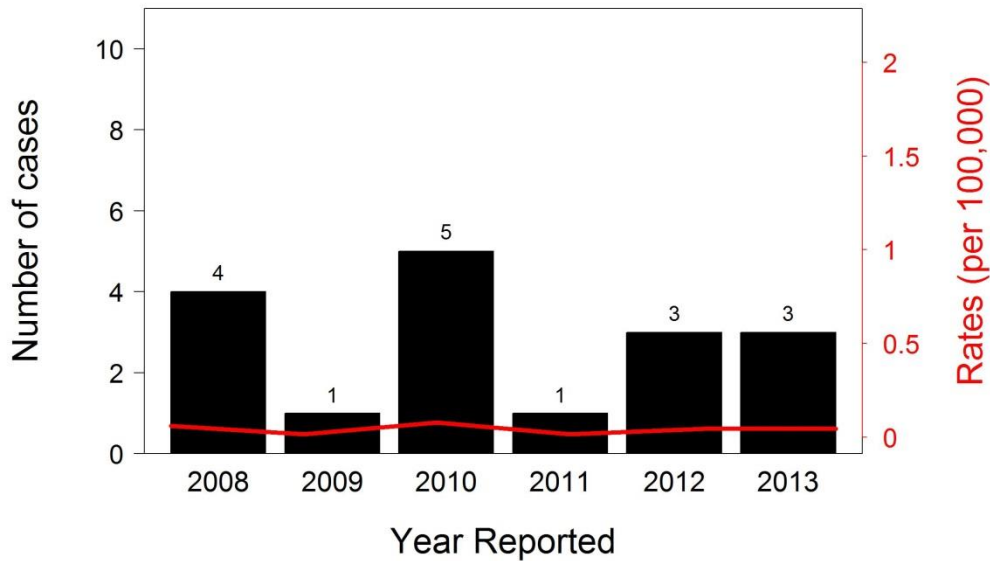


Figure 47. Cases and rates (per 100,000) for *Haemophilus influenzae* type b, for 2008–2013.

In Arizona, numbers and rates of yearly reported cases of Hib have been low from 2008–2013, ranging from one case (reported in both 2009 and 2011) to five cases (reported in 2010) (Figure 47). Reported cases are typically unvaccinated for Hib, under-vaccinated, or too young to receive Hib vaccine. Of the 17 Hib cases identified in this period, 12 (71%) were aged less than 5 years, one (6%) was in the 5-9 year group and the remaining four (24%) were among adults.

Cases and Rates per year for *Haemophilus influenzae* all types

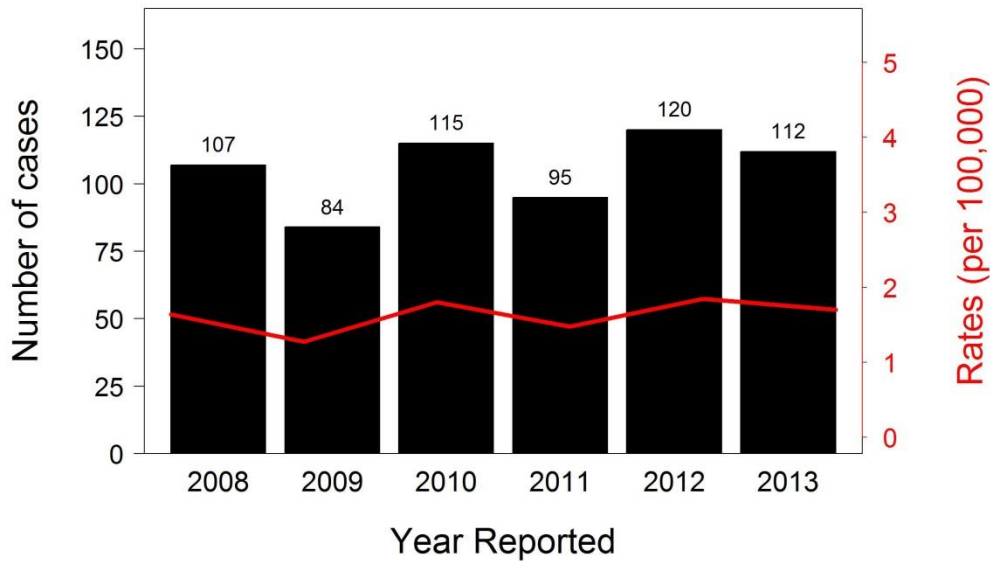


Figure 48. Cases and rates (per 100,000) for invasive *Haemophilus influenzae*, all types, for 2008–2013.

Overall rates of invasive disease due to *Haemophilus influenzae* for all ages and serotypes have remained relatively constant from 2008–2013 (Figure 48). During this period, age-specific rates have been consistently highest among children under 5 years of age and adults older than 65 years of age (Figure 49).

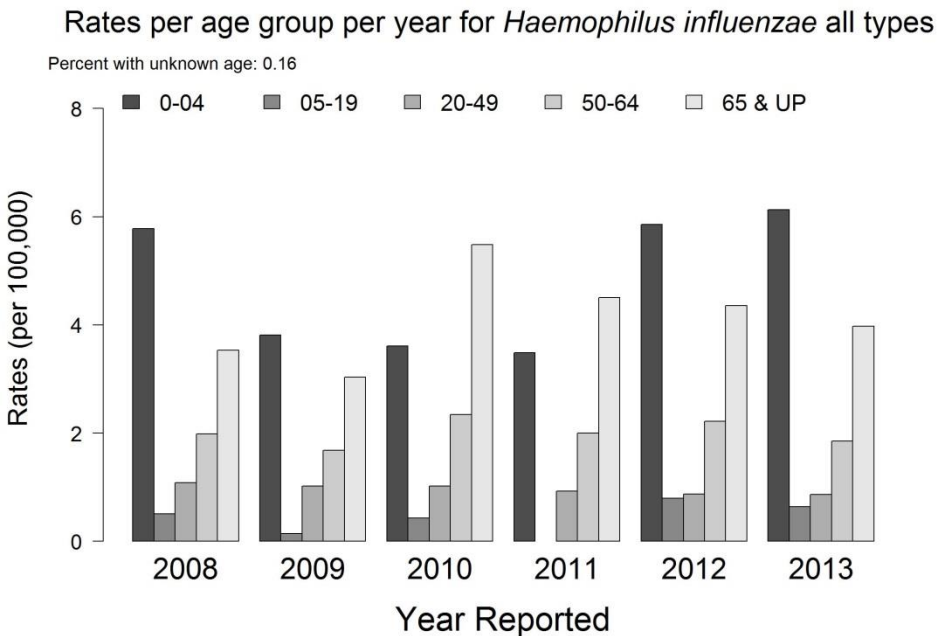


Figure 49. Rates (per 100,000) for *Haemophilus influenzae* (all types), by age group, for 2008–2013.

Laboratories are required under Arizona Administrative Code (AAC) R9-6-204 to forward isolates to the Arizona State Public Health Laboratory for serotyping and archiving. Prior to September 2011, all isolates received by the State Public Health Laboratory were serotyped. After September 2011, due to lack of resources, the State Public Health Laboratory limited serotyping to isolates received from cases younger than five years of age. Isolates from older cases continue to be archived and are available if needed for surveillance purposes.

Proportion of cases of invasive *Haemophilus influenzae* in persons under 5 years of age, by serotype for 2008-2013

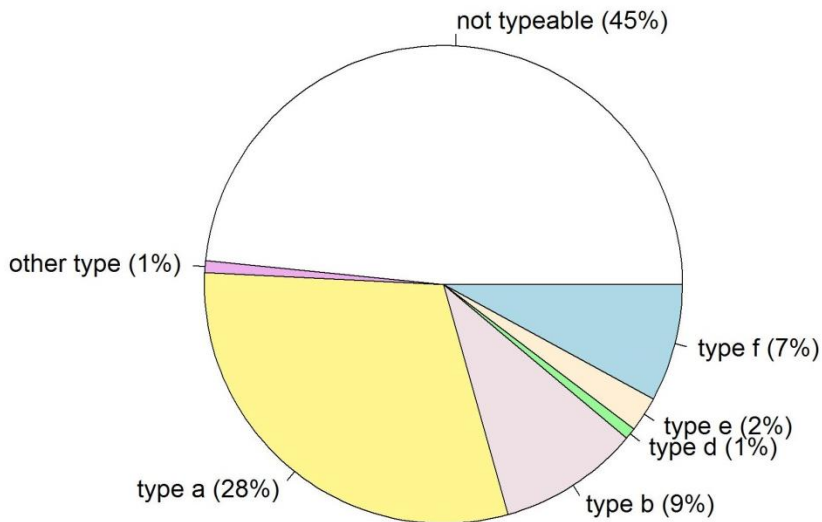


Figure 50. Proportion of cases of invasive *Haemophilus influenzae* in children under 5 years of age, by serotype, for 2008–2013 (n=135).

The serotype was unknown for 9 cases (7%).

From 2008–2013, among children less than five years of age for whom serotyping was performed, serotype a (28%) has predominated as the cause of invasive *Haemophilus influenzae* disease in Arizona (Figure 50), followed by serotype b (9%), although almost half of the isolates submitted to the State Public Health Laboratory have been non-typeable organisms. All serotypes (a through f) have been reported in Arizona from 2008–2013 among persons of any age (data not shown). Only Hib (serotype b) is considered vaccine-preventable.

MENINGOCOCCAL INVASIVE DISEASE

Meningococcal disease is an acute, severe disease caused by the bacterium *Neisseria meningitidis*, and is a leading cause of bacterial meningitis and sepsis in the United States. Most invasive disease is caused by five serogroups: A, B, C, Y and W-135. Serogroups C and Y are most commonly associated with outbreaks. Transmission occurs via droplet aerosol or nasopharyngeal secretions. The most common presentation of invasive disease is meningitis, followed by sepsis. In the past, the case fatality rate exceeded 50%, but with current antibiotics and improved supportive care, the case fatality rate is down to 15%. Up to 20% of survivors will suffer long term sequelae such as hearing loss, neurological damage, or loss of a limb. Antibiotics to treat meningococcal disease include penicillin G, ampicillin, cefotaxime and ceftriaxone.

Vaccines to prevent meningococcal disease caused by serogroups A, C, Y and W135 include a polysaccharide vaccine (MPSV4) licensed in 1978 and a newer conjugate vaccine (MCV4) licensed in 2005 and recommended for all children 11–12 years of age, with a booster dose at 16 years of age. Beginning with the 2014–2015 school year, all Arizona students in grades 6–12 are required to have one dose of MCV4 for school entry. Until recently, no vaccine against serogroup B was available, but on October 29, 2014, the first serogroup B vaccine was licensed for use in the United States (Trumenba, Wyeth)¹⁰. This vaccine is administered as a three-dose series and is licensed for use in persons 10–25 years of age.

¹⁰ <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm420998.htm>

Cases and Rates per year for Meningococcal Disease

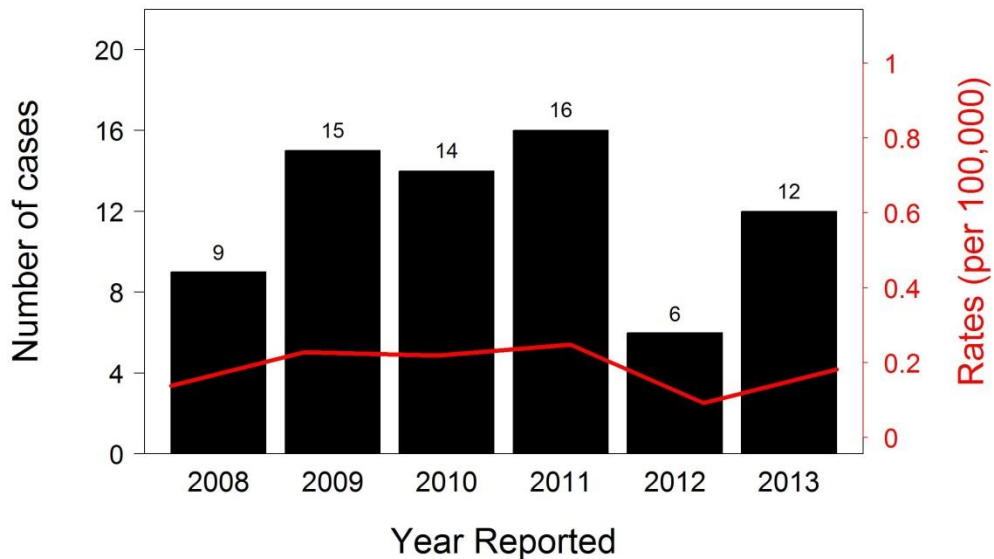


Figure 51. Cases and rates (per 100,000) for meningococcal disease for 2008–2013.

Reported meningococcal cases have remained at low levels during 2008–2013, from a low of six cases reported in 2012 to a high of 16 cases reported in 2011 (Figure 51). Nationally, meningococcal disease has decreased since 2000, and disease caused by outbreak-related serogroups C and Y has remained low. Localized outbreaks continue to be reported nationally, and in 2013 college-related serogroup B outbreaks were reported at Princeton University and University of California Santa Barbara.

**Rates per age group per year for Meningococcal Disease
(% cases with unknown age= 0)**

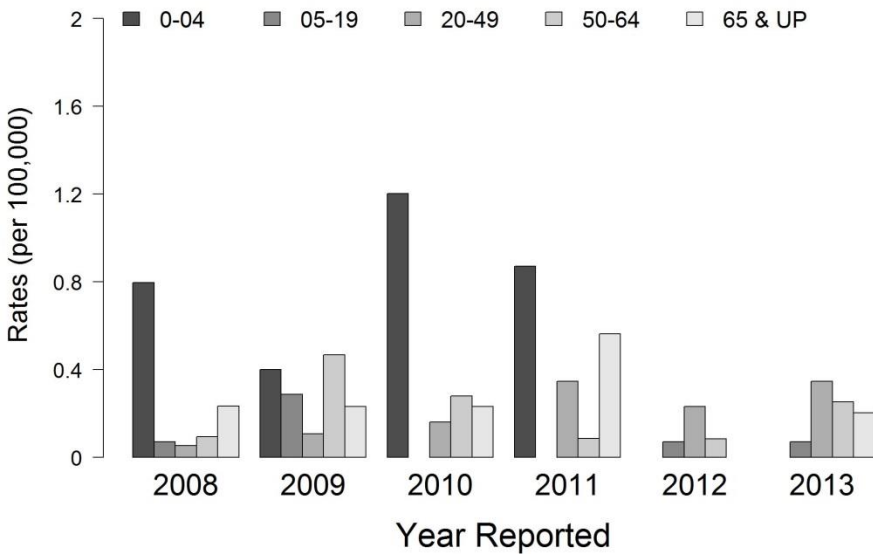


Figure 52. Rates (per 100,000) for meningococcal disease by age group for 2008–2013.

From 2008–2013, there has been variability in the ages of reported cases in Arizona (Figure 52). However, age-specific rates of infection tended to be highest in the youngest and oldest age groups for most years.

Proportion of cases of Meningococcal Disease by serogroup for 2008-2013

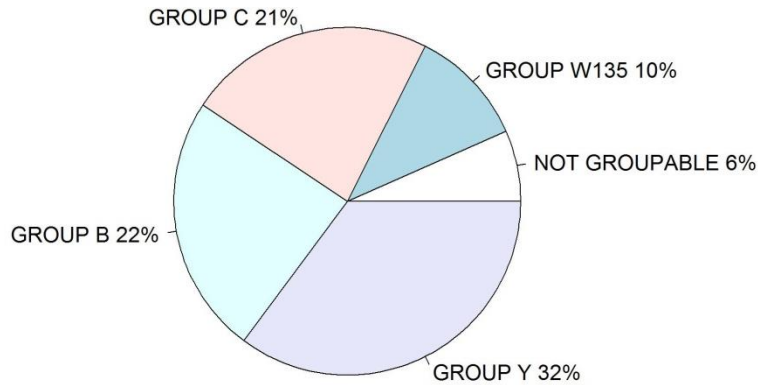


Figure 53. Proportion of cases of meningococcal disease by serogroup for 2008–2013 (n = 72).

Serogroup was not available for an additional seven cases (10%).

For Arizona cases, laboratories are required under Arizona Administrative Code (AAC) R9-6-204 to forward case isolates to the Arizona State Public Health Laboratory for serogrouping. From 2008–2013, predominant meningococcal serogroups for Arizona cases included B, C and Y (Figure 53). This is consistent with predominant meningococcal serogroups reported nationwide. Disease caused by serogroup W-135 was reported during 2008, 2011, 2012 and 2013. Disease caused by serogroup A was not identified in Arizona during 2008–2013.

G. VECTOR-BORNE AND ZOOBOTIC DISEASES OVERVIEW

Vector-borne and zoonotic diseases are two groups of pathogens transmitted to humans by invertebrate and vertebrate organisms. Specifically, zoonotic diseases are infections transmitted to humans from animals other than mosquitoes, ticks and fleas, such as rodents, rabbits and cattle. Transmission may be through direct contact with those animals; some zoonotic diseases (for example, brucellosis and taeniasis) may be transmitted through consumption of contaminated animal products.

Vector-borne diseases are pathogens transmitted by mosquitoes, ticks and fleas. Examples of vector-borne diseases identified among Arizona residents include California serogroup virus, dengue, malaria and West Nile virus (mosquito-borne); babesiosis, Colorado tick fever, ehrlichiosis, anaplasmosis, Lyme disease, relapsing fever, Rocky Mountain spotted fever, typhus fever (tick-borne); and plague (flea-borne).

In Arizona, vector-borne diseases made about 0.05% of the communicable diseases¹¹ reported between 2008 and 2013, for a total of more than 1,000 cases (Figure 54). Of these, mosquito-borne diseases accounted for 68% (733 cases) and tick-borne diseases for 32% (346 cases) of the cases of vector-borne disease. Overall, trends of vector-borne diseases have been quite stable between 2010 and 2013, with tick-borne morbidities showing a somewhat increasing amount of cases from 2008 to 2013 and mosquito-borne morbidities showing fluctuating numbers over this time period.

¹¹ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases of Selected Vector-Borne Diseases

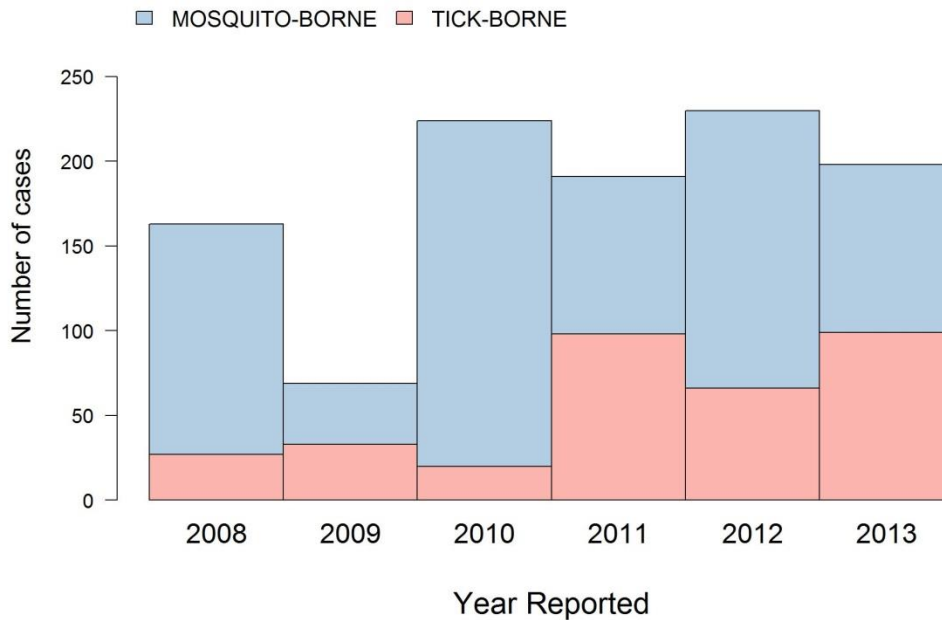


Figure 54. Cases of selected mosquito-borne diseases (California serogroup virus, dengue, malaria and West Nile virus) and tick-borne diseases (Colorado tick fever, ehrlichiosis or anaplasmosis, Lyme disease, relapsing fever, Rocky Mountain spotted fever, typhus fever), for 2008–2013.

Flea-borne diseases were not included because of the low incidence (only one case of plague in 2008). No cases of babesiosis, Powassan virus or typhus fever were reported in this period.

In Arizona, zoonotic diseases made up a very small fraction of the communicable diseases¹² reported between 2008 and 2013, for a total of 40 cases. In these years, the most commonly reported zoonotic diseases (more than 87% of the cases) were brucellosis and hantavirus infection (Figure 55).

¹² Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

Cases of Selected Zoonotic Diseases

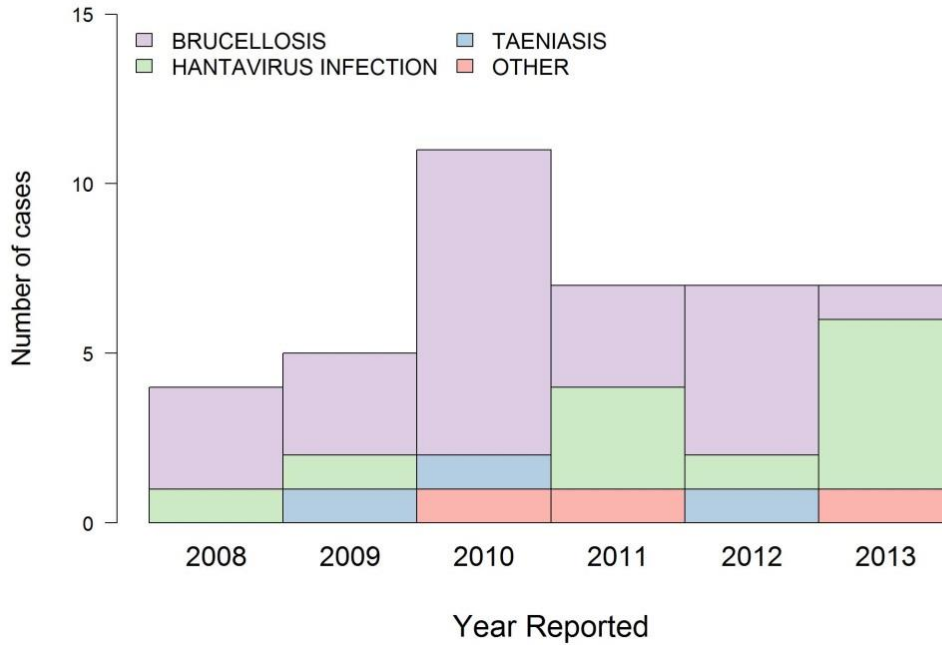


Figure 55. Cases of confirmed and probable selected zoonotic diseases (brucellosis, hantavirus infection, taeniasis and other) for 2008–2013.

The category “OTHER” includes one case each of psittacosis, trichinosis, and tularemia. No cases of leptospirosis or viral hemorrhagic fever were identified during this period.

HANTAVIRUS PULMONARY SYNDROME

Hantavirus pulmonary syndrome is a syndrome caused by a virus in the hantavirus genus. In Arizona, this is most commonly the Sin Nombre strain of hantavirus. The virus is found in the bodily fluids of infected rodents, which are often asymptomatic. Although not a common disease, the case fatality rate in humans can be quite high, at around 30%. Arizona has had more identified hantavirus infections than any other state in the country, based on the cumulative recorded case count. Infections are most often seen in late spring and early summer and are correlated with times when people start cleaning out garages, sheds, basements or other areas that may have had rodents during the fall and winter months. Infection occurs when humans inhale the aerosolized viral particles in rodent bodily fluids, most often from urine or feces.

Cases and Rates per year for Hantavirus Pulmonary Syndrome

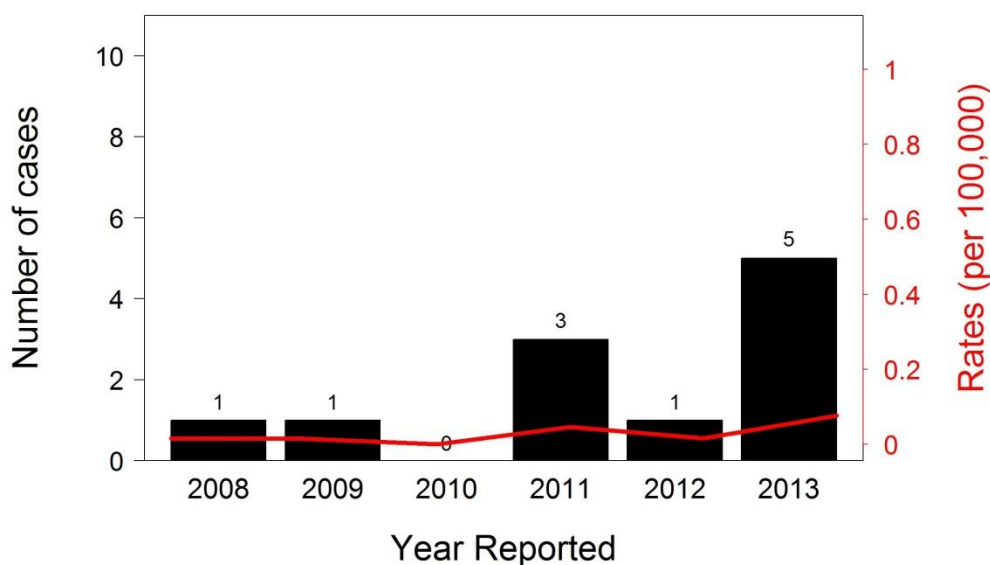


Figure 56. Cases and rates (per 100,000) for hantavirus pulmonary syndrome for 2008–2013.

As seen in Figure 56, there was a slight increase in cases in 2011 and in 2013. Case numbers may increase due to environmental changes that allow for more favorable conditions for rodents, and a subsequent increase in the rodent population.

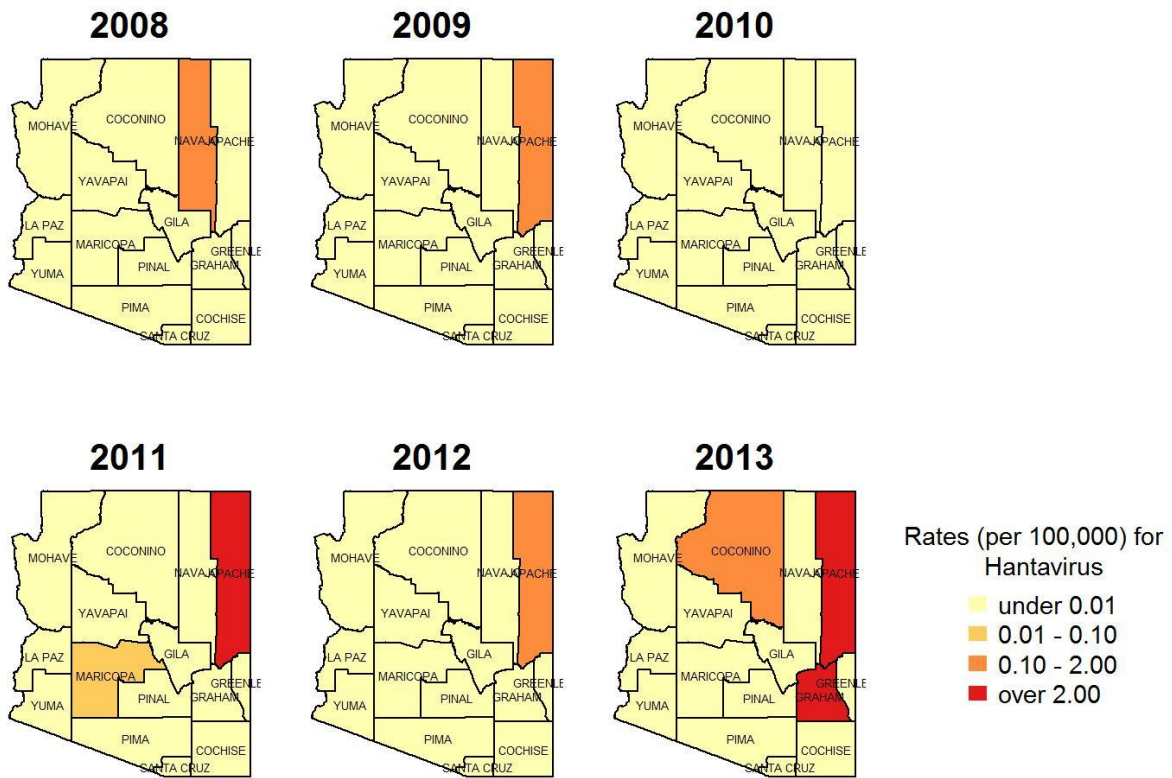


Figure 57. Rates (per 100,000) for hantavirus pulmonary syndrome by county for 2008–2013.

As reflected in Figure 56, Figure 57 also shows that 2013 had the highest incidence of hantavirus pulmonary syndrome during this time period. The majority of cases were found in the rural northeastern region of the state.

H. MOSQUITO-BORNE DISEASES OVERVIEW

Mosquito-borne diseases are vector-borne diseases transmitted by mosquitoes. Mosquito-borne diseases reported in Arizona between 2008 and 2013 are California serogroup virus, dengue, malaria, St. Louis encephalitis virus and West Nile virus. Of these, West Nile virus and California serogroup virus are the only mosquito-borne diseases locally acquired in Arizona. These are arboviral diseases transmitted primarily by *Culex* mosquitoes, and can cause neuroinvasive symptoms such as meningitis and paralysis. Dengue is also a viral disease, but is transmitted by *Aedes* mosquitoes. Malaria is caused by a parasite of the *Plasmodium* spp. and is transmitted by *Anopheles* mosquitoes. While cases of dengue and malaria have been reported among Arizona residents throughout this period, these infections were all imported, or acquired among persons travelling to areas where dengue and malaria circulate, rather than by transmission within Arizona.

In Arizona, mosquito-borne diseases reported between 2008 and 2013 accounted for 733 cases, of which 77% (566 cases) were West Nile virus cases (Figure 58). The number of cases appeared to fluctuate over the years between 2008 and 2013, with no clear increasing or decreasing trend.

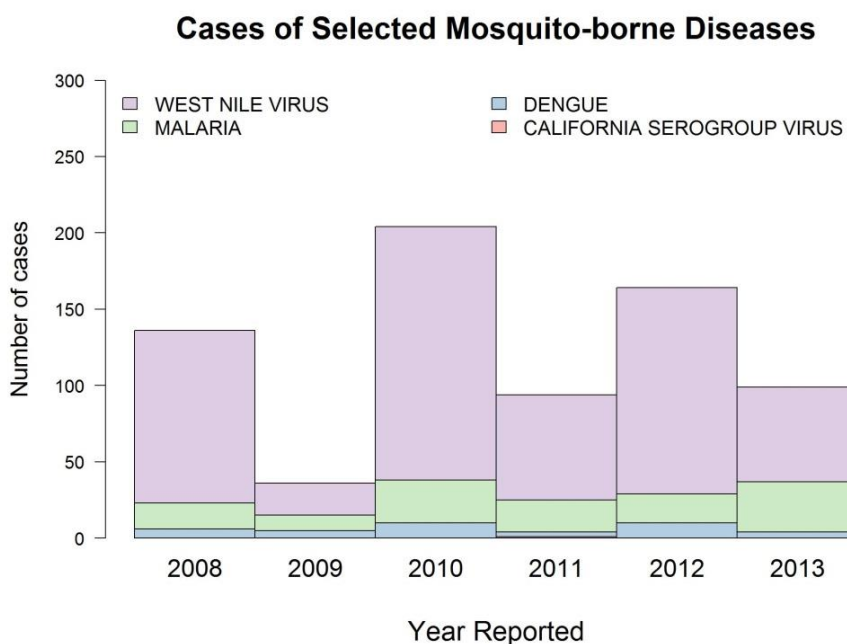


Figure 58. Cases of selected confirmed and probable mosquito-borne diseases (California serogroup virus, dengue, malaria and West Nile virus) for 2008–2013.

No cases of Cache Valley virus, Eastern Equine encephalitis virus, Japanese encephalitis virus, St. Louis encephalitis virus, Venezuelan equine encephalitis virus and Western equine encephalitis virus were reported in this period.

WEST NILE VIRUS

West Nile virus (WNV) is a flavivirus transmitted by mosquitoes. It is found all over the world, but is diagnosed most frequently in the United States and Canada. Arizona has a particularly high number of West Nile virus cases reported, and a high case fatality rate. Most infections (80–90%) are sub-clinical, but the rest (10–20%) can be quite severe. Populations at risk for more severe disease include elderly populations and those with comorbid medical conditions. Arizona's at-risk populations are relatively high in number, which may account for the large number of cases identified and diagnosed in the state. More severe disease manifestations can include encephalitis and meningitis. WNV cases and deaths have been identified every year in Arizona since 2003. Because most infections are mild or subclinical, the numbers reported are considered an underestimate of the number of infections in the state.

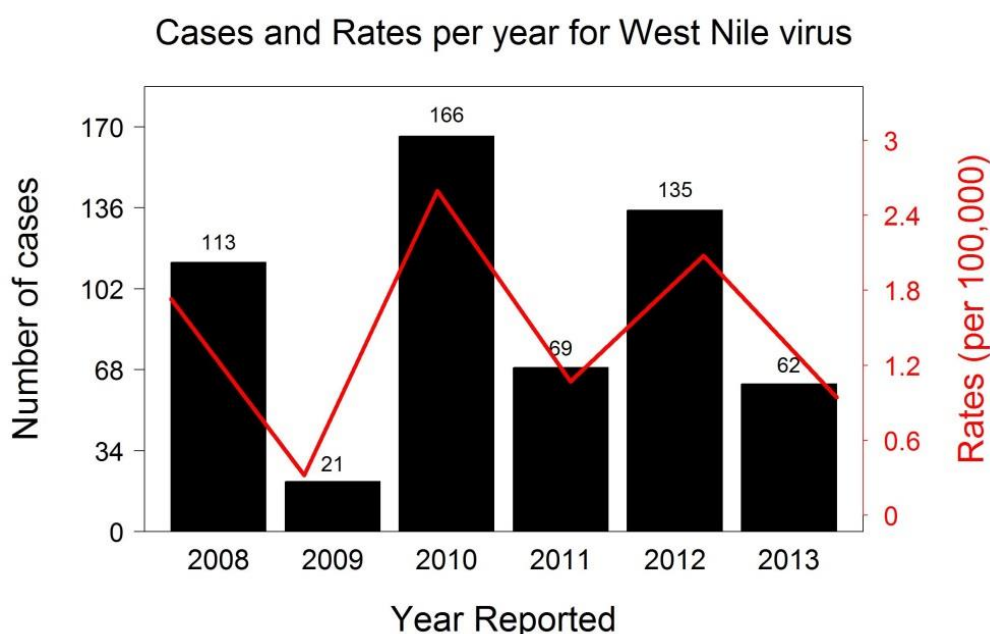


Figure 59. Cases and rates (per 100,000) per year for West Nile virus for 2008–2013.

Figure 59 shows the six-year trend for WNV cases in Arizona by both number of cases and incidence rate per 100,000. This graph reflects the trend of alternating years between an outbreak and low case counts. Specifically, outbreaks occurred in 2008, 2010 and 2012, with the highest number of cases during this period (166) reported in 2010.

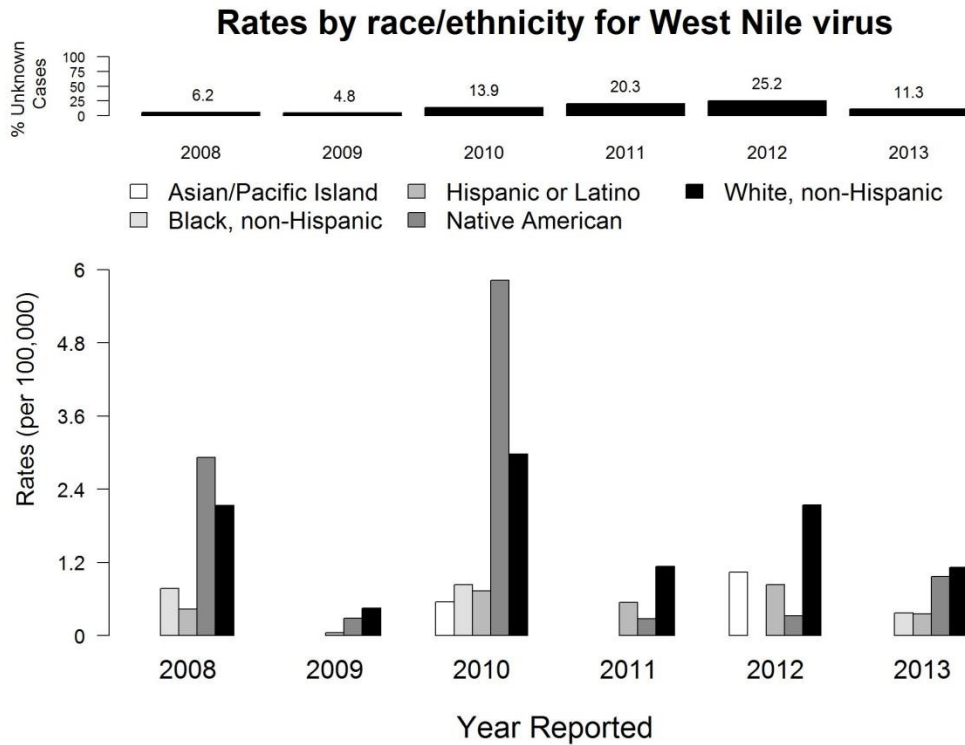


Figure 60. Rates (per 100,000) by race/ethnicity for West Nile virus for 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicate more informative rates for that year (lower panel).

Native American and White, non-Hispanic populations were most affected by West Nile virus during 2008–2013. The rates of disease among Native Americans were particularly high during the outbreak in 2010, although rates were also elevated among other races/ethnicities.

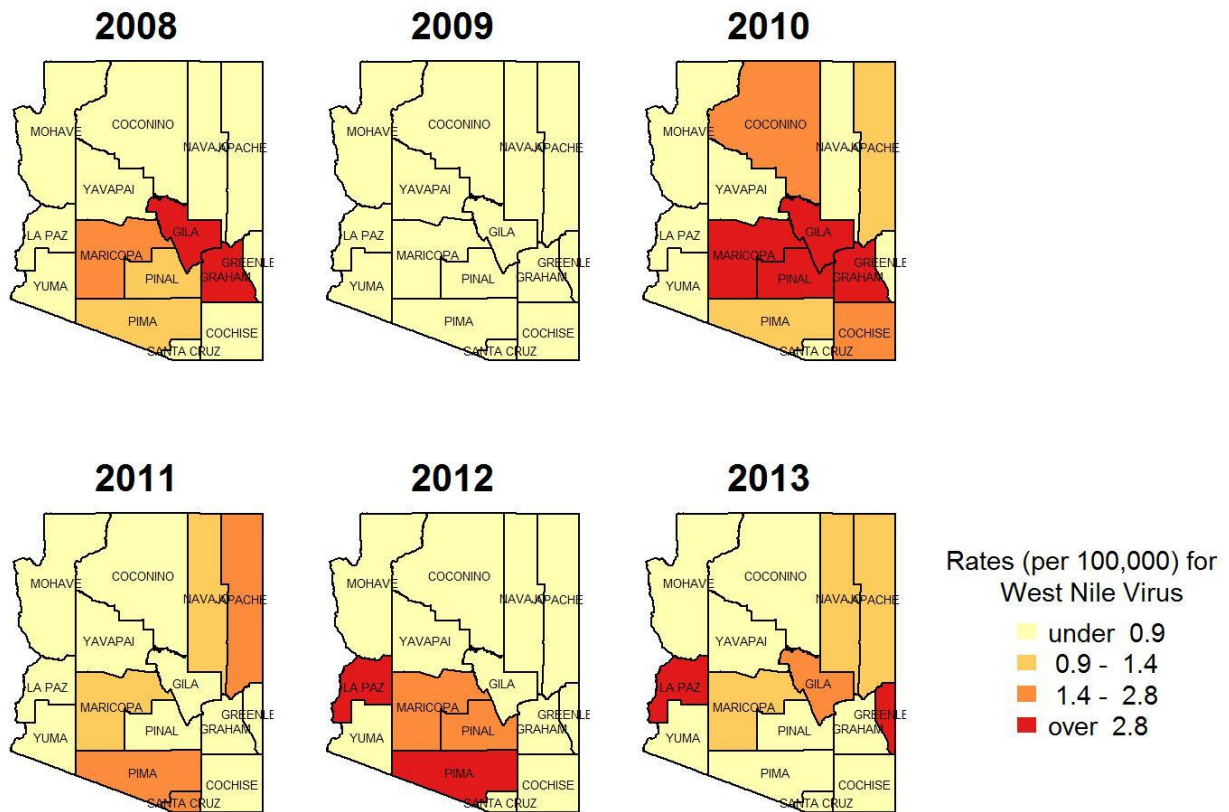


Figure 61. Rates (per 100,000) of West Nile virus by county for 2008–2013.

Overall, Maricopa and Pinal Counties experienced the highest rates of reported WNV, followed by Pima and Gila County between 2008 and 2013 (Figure 61). Higher rates were observed throughout the state in 2010, which corresponded with the large WNV outbreak in Arizona. Some of the affected counties in the northeastern and eastern parts of the state (Coconino, Apache, Navajo, Gila and Graham) also contain a large proportion of Arizona’s Native American population. Referencing Figure 60, 2010 also had the highest rates among Native American populations when compared to any other year.

MALARIA

Malaria is a mosquito-borne disease endemic to most of sub-Saharan Africa, South America, Southeast Asia and the Pacific Islands, as well as India, parts of the Middle East, and parts of Central America. Malaria is not endemic in the U.S., and no locally-acquired malaria cases have occurred in Arizona. Arizona does, however, have travel-associated cases reported every year. These cases are typically found in populations who previously lived abroad and have since immigrated to Arizona, or can also occur in persons living in Arizona who travel to malaria-endemic countries and return to Arizona. Because cases are counted based on their location of residence at the time they are diagnosed, rather than where the disease was acquired, people living in Arizona who are diagnosed with travel-associated malaria are counted as Arizona cases.

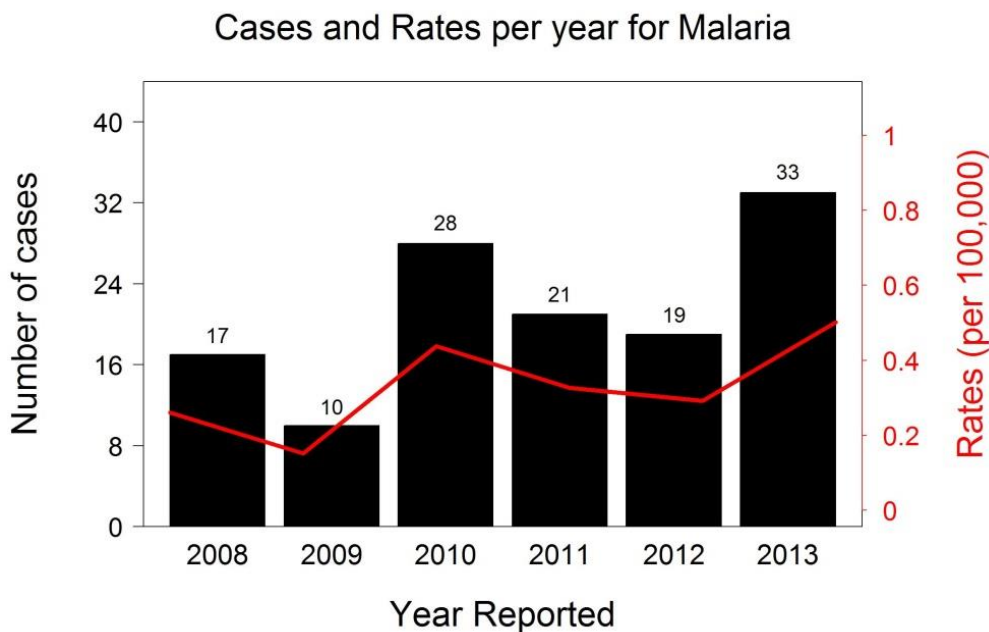


Figure 62. Cases and rates (per 100,000) per year for malaria 2008–2013.

Figure 62 shows the number of cases of malaria diagnosed in Arizona in the years 2008 to 2013, as well as the incidence rate per 100,000. Malaria rates increased slightly over the time period; reasons for this increase are unclear.

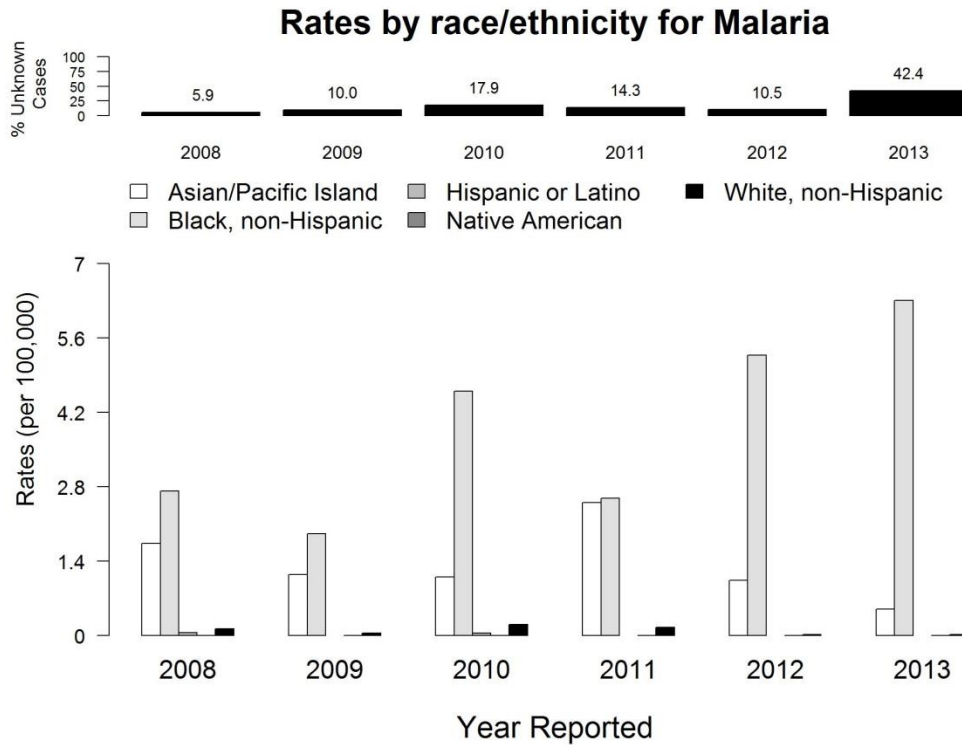


Figure 63. Rates (per 100,000) by race/ethnicity for malaria 2008–2013.

The figures above show the percent of cases with unknown race/ethnicity (upper panel) and rates (per 100,000) by race/ethnicity for 2008-2013 (lower panel). A lower proportion of cases with unknown race/ethnicity (upper panel) indicates more informative rates for that year (lower panel).

Of cases with known race/ethnicity, higher rates of malaria were observed among the Black, non-Hispanic population, followed by the Asian/Pacific Islander population. This is probably a reflection of where diagnosed patients emigrated from before arriving in Arizona, as Africa, Southeast Asia and the Pacific Islands are all highly endemic for malaria. Malaria cannot be locally acquired in Arizona, so all cases were associated with travel or residence in malaria-endemic countries.

I. TICK-BORNE DISEASES

There are approximately one dozen tick-borne diseases found throughout the United States. These diseases can be passed to animals and humans by the bite of a tick infected with bacteria, viruses, or parasites. Different species of ticks carry different infectious agents and are often found in different areas of the United States.

Tick-borne diseases seen in Arizona residents include Rocky Mountain spotted fever, Lyme disease (associated with travel to endemic states), tick-borne relapsing fever, ehrlichiosis/anaplasmosis, typhus fever, and Colorado tick fever. Figure 64 summarizes the number of probable and confirmed human cases of selected tick-borne diseases in Arizona over the 6-year period. Rocky Mountain spotted fever accounts for the large majority of tick-borne diseases seen across the state.

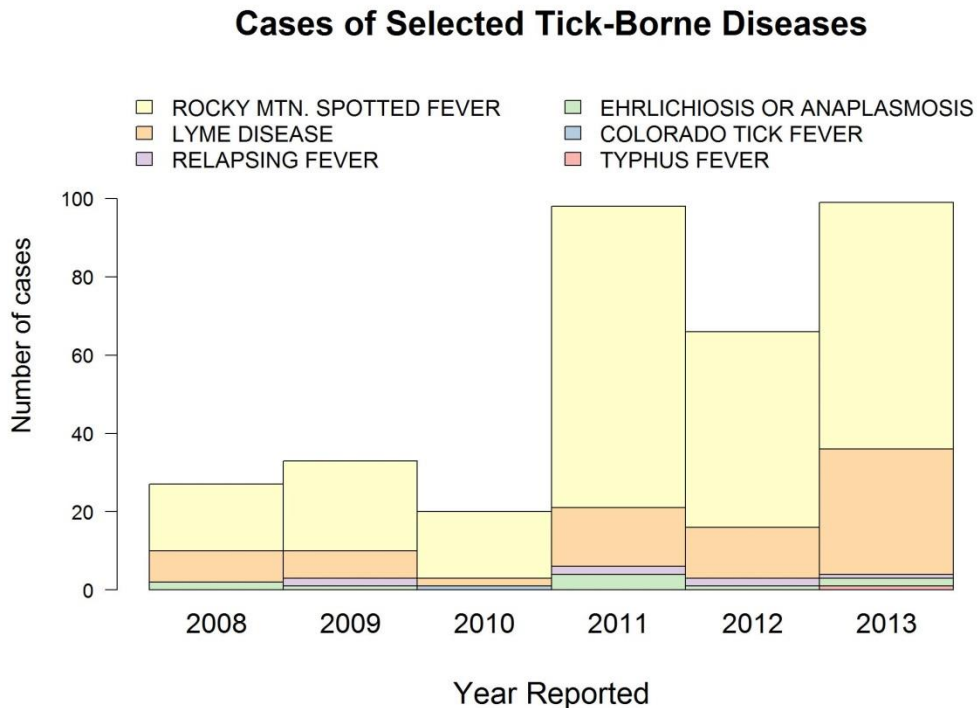


Figure 64. Number of cases reported for selected tick-borne diseases for 2008–2013. Lyme disease cases seen in Arizona are all imported from endemic areas in the United States.

ROCKY MOUNTAIN SPOTTED FEVER (RMSF)

Since its emergence in Arizona in 2003, Rocky Mountain spotted fever (RMSF), caused by the bacteria *Rickettsia rickettsii*, has caused over 300 cases and 20 deaths on six different American Indian reservations. Although *Dermacentor* species ticks are the primary vector for the disease in most of U.S., *Rhipicephalus sanguineus*, or the brown dog tick, is responsible for disease transmission in Arizona. Due to this novel tick vector, the epidemiology of RMSF in Arizona differs from what is seen in the rest of the United States. The majority of RMSF cases in Arizona have occurred in children under the age of 10 years, and case counts peak in the early fall. Dogs also play an important role in the ecology of the disease, as they are the primary hosts for the tick vector and can transport infected ticks to new areas.

Because RMSF has only recently emerged in Arizona, we describe relevant events in the history of the disease below, before further examining the descriptive epidemiology of Arizona cases from 2008 to 2013.

Timeline of RMSF in Arizona (Figure 65):

- 1993-2002: Historically, six cases of RMSF were reported among Arizona residents; most of these were associated with out-of-state travel.
- In 2003, the first human case of locally-acquired RMSF, a pediatric fatality, was identified on Reservation #1 (Figure 66) in the eastern part of Arizona. An investigation to establish the source of exposure resulted in the discovery of *Rhipicephalus sanguineus* (brown dog) ticks in the environment and on free-roaming dogs throughout the reservation. These findings provided evidence that *R. sanguineus* was a new vector for RMSF in the United States and the source of the human case.
- In 2005, the first human case was reported on Reservation #2, which shares a large border with Reservation #1.
- Cases continued to be reported from these two areas each year, and response efforts (e.g., community education, pesticide spraying, tick-collaring dogs) were initiated by the tribal governments in coordination with other partners.
- Over the next few years, the first reports of human cases were identified in four additional areas:
 - 2009: Reservation #3 in south-central Arizona;
 - 2011: Reservation #4 in southern Arizona;
 - 2012: Reservation #5 and Reservation #6, both located in north-central Arizona
- During 2004-2012, at least one canine serosurvey was conducted on each of the affected tribal lands to predict the human risk level for RMSF. Tribal lands with canine RMSF seropositivity of >50% were considered high risk areas.
- Prevention efforts have occurred throughout the decade since the emergence of RMSF across the different affected tribal lands. However, limited resources, environmental

persistence of *R. sanguineus* ticks, large populations of free-roaming dogs, and lack of well-established animal control programs continue to pose challenges to the control and eradication of RMSF.

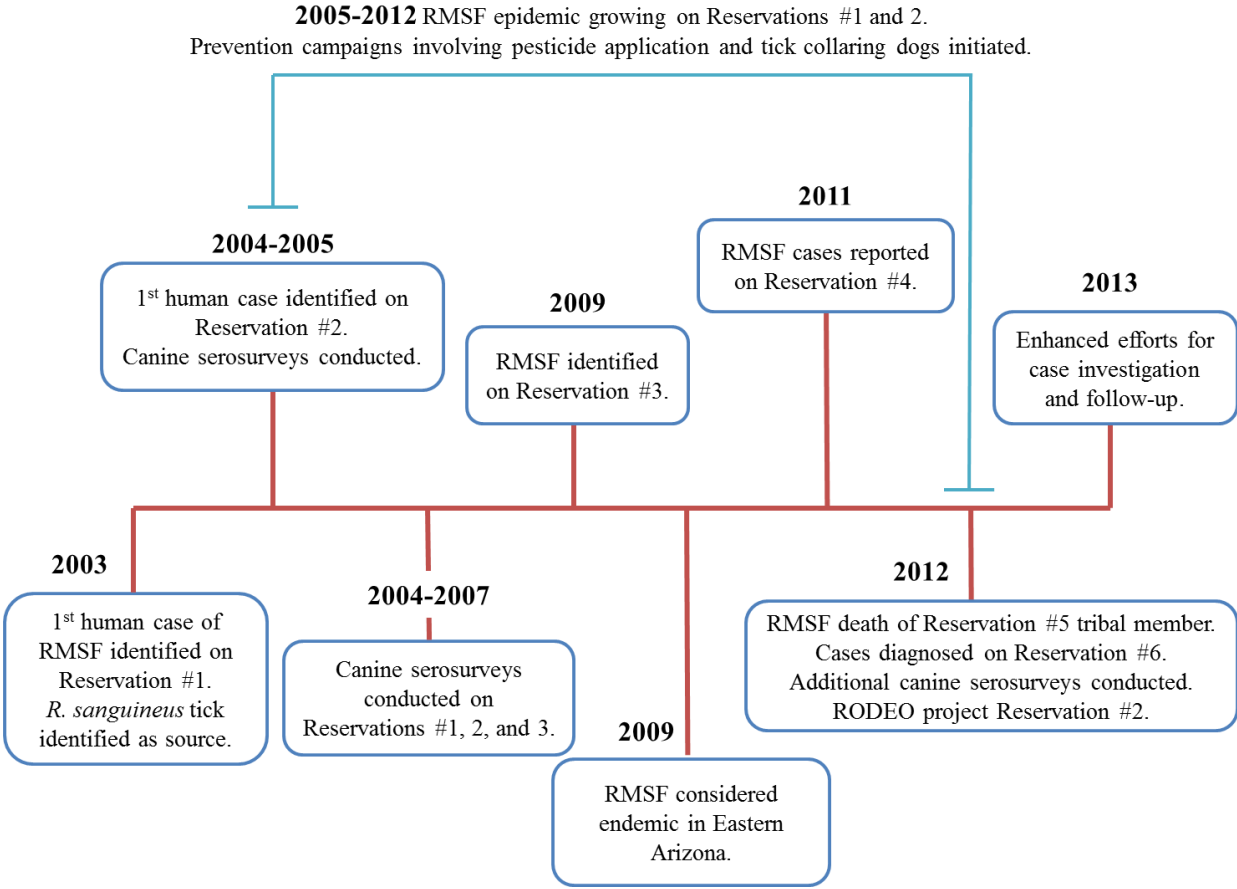


Figure 65. Timeline of RMSF identification and control efforts in Arizona.

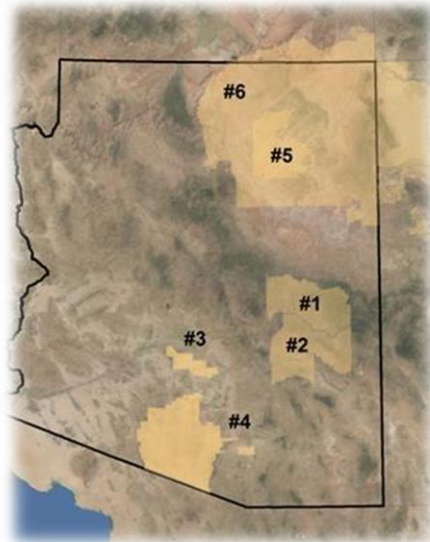


Figure 66. Map of RMSF-affected areas in Arizona, 2003–2013.

RMSF is currently the most commonly identified tick-borne disease in Arizona, with cases having been almost exclusively detected among individuals living in six tribal reservations. Figure 67 depicts the number and rate of confirmed and probable cases of RMSF reported during 2008–2013 in Arizona.

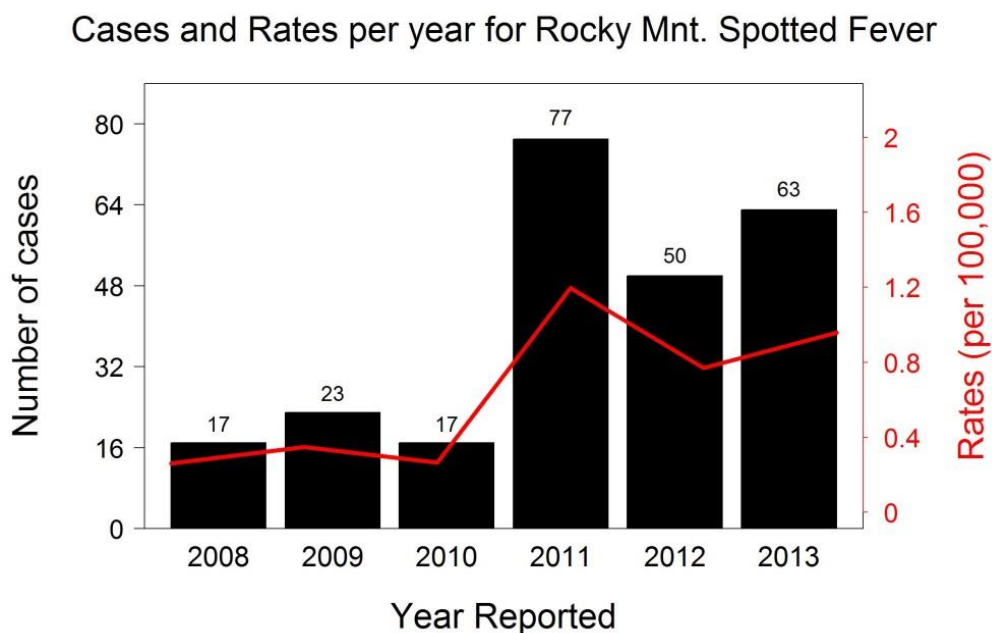


Figure 67. Cases and rates (per 100,000) for Rocky Mountain spotted fever by year reported for 2008–2013.

From 2008–2010, rates of reported RMSF were fairly steady, followed by a large rise in cases in 2011. Figure 68 represents the number and rate of confirmed and probable cases of RMSF by year of onset in 2008–2013 in Arizona. These case counts differ slightly from Figure 67 (representing year reported) and are more reflective of when individuals were infected and became ill.

Cases and Rates per onset year for Rocky Mnt. Spotted Fever

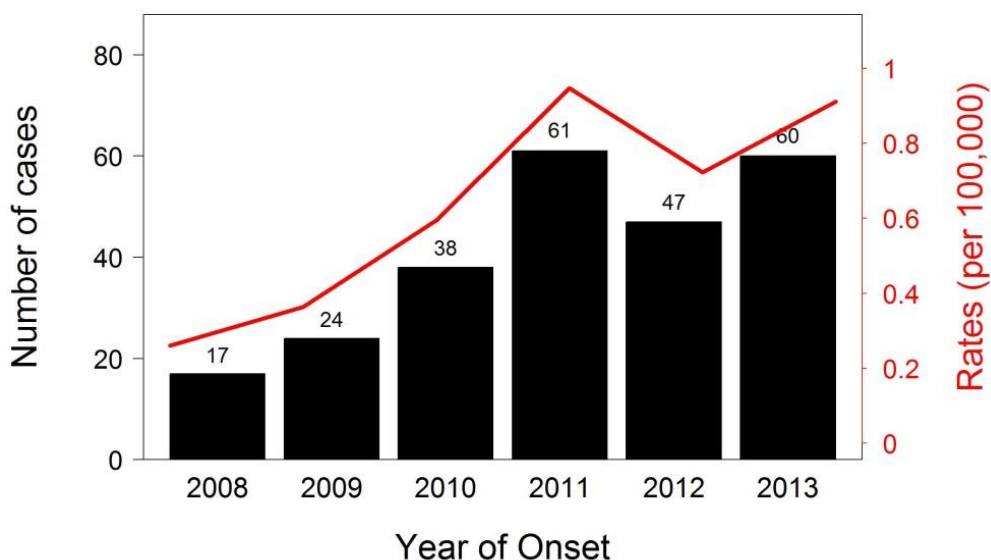


Figure 68. Cases and rates (per 100,000) for Rocky Mountain spotted fever by year of onset¹³ for 2008–2013.

The increase in cases over this time period, shown in both figures, can be explained by several factors. These include implementation of an RMSF clinical algorithm and educational trainings to heighten awareness of RMSF by clinicians, leading to increased RMSF testing and more accurate diagnosis of cases, as well as extensive case-finding activities which identified numerous previously undetected cases. Additionally, there was an increase in reporting of RMSF results by laboratories and changes in disease classification criteria. With the shift towards electronic laboratory reporting over this period, some laboratories were able to more easily report all RMSF results in order to improve disease surveillance. The large increase in reported cases starting in 2011 is likely related to enhanced surveillance procedures and the

¹³ Onset date was available for 153 RMSF cases. For the remaining 94 RMSF cases, the year of onset is the year of the earliest among the following: date of specimen collection, diagnosis date, date reported to county health department, date entered in MEDSIS, date reported to ADHS or date submitted to State.

associated follow-up by tribal jurisdictions and other public health partners. The time burden and level of resources required for thorough case follow-up and investigations may also be reflected in the fluctuations in the numbers of RMSF cases shown here for 2012 and 2013, as cases are only counted if compatible symptoms can be identified among persons with laboratory evidence of infection.

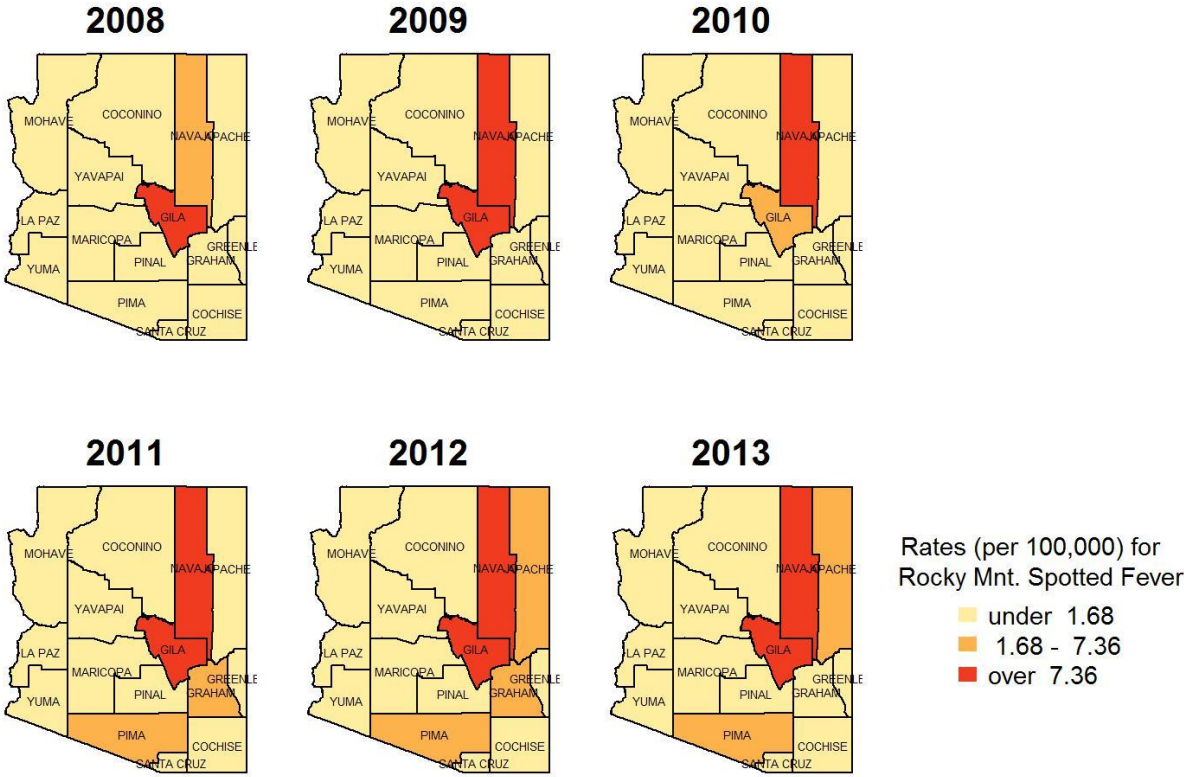


Figure 69. Rates (per 100,000) for Rocky Mountain spotted fever by county by year reported for 2008–2013.

Figure 69 depicts the rates of RMSF cases in Arizona across the counties. The tribal lands where RMSF cases have been identified cross the boundaries of several counties, which explains the widespread distribution. Over the six-year time period, the tribal reservations in southern Arizona (e.g., Pima County) have experienced a lower prevalence of RMSF, while tribal reservations in eastern Arizona (e.g., Gila County and southern Navajo County) have consistently reported cases and are seen as high-risk areas.

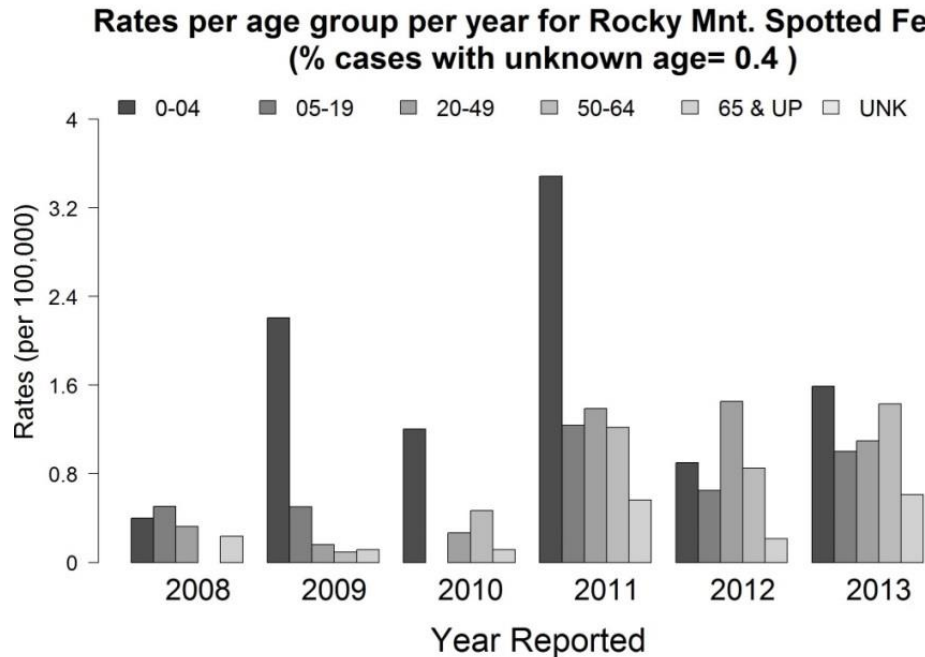


Figure 70. Rates (per 100,000) by age group for Rocky Mountain spotted fever by year reported for 2008–2013.

Children under the age of five years experience the highest rates of RMSF in Arizona (Figure 70), with over 60% of cases identified in persons under the age of 19 years.

RMSF control efforts have developed in response to increasing case numbers. When RMSF was first identified in Arizona, control efforts were centered around the detected cases. Starting in 2007, enhanced community-wide control strategies were initiated, including reservation-wide dog collaring, pesticide application, and household surveys to query about RMSF knowledge in the community. In 2010, dedicated RMSF staff began to coordinate and provide assistance with these programs. However, due to the evidence of increasing disease burden of RMSF in Arizona, in 2011 the high-risk tribes implemented enhanced community education and prevention efforts with the assistance of ADHS and CDC. Activities included pesticide spraying of homes throughout the year and tick collaring of free-roaming dogs, which may have helped contribute to the decrease in cases in 2012. Additionally, in 2012, and as depicted in Figure 65, Reservation #2 began the reservation-wide “RODEO” project, involving collaborative environmental control efforts at the home and dog level.

The change in the level of disease threat in the tribal communities is likely the result of a multifaceted approach. Expansion of education efforts to clinicians in medium-risk (as well as high-risk) areas was a driving factor of RMSF case reporting and detection in 2013. Thus, the rise in RMSF cases during that year can also be explained by the enhanced detection of cases by two additional tribal reservations. In summary, the epidemiology of confirmed and probable cases of RMSF in Arizona reflects a complex set of changing factors, including variations in the

numbers of people infected each year; the distribution of the disease in the state; the impact of control efforts against the disease; and public health surveillance, reporting, and investigation practices.

LYME DISEASE

Lyme disease is caused by the bacteria *Borrelia burgdorferi* and spread by the blacklegged tick or western blacklegged tick. These species of ticks are found only in very limited regions of Arizona, although several cases of Lyme disease are reported each year from residents who have traveled to Lyme-endemic areas of the United States. Lyme disease is most frequently reported from the northeast and upper midwestern states, as well as along the northern part of the west coast. This disease is well-known for the development of the hallmark bulls-eye rash.

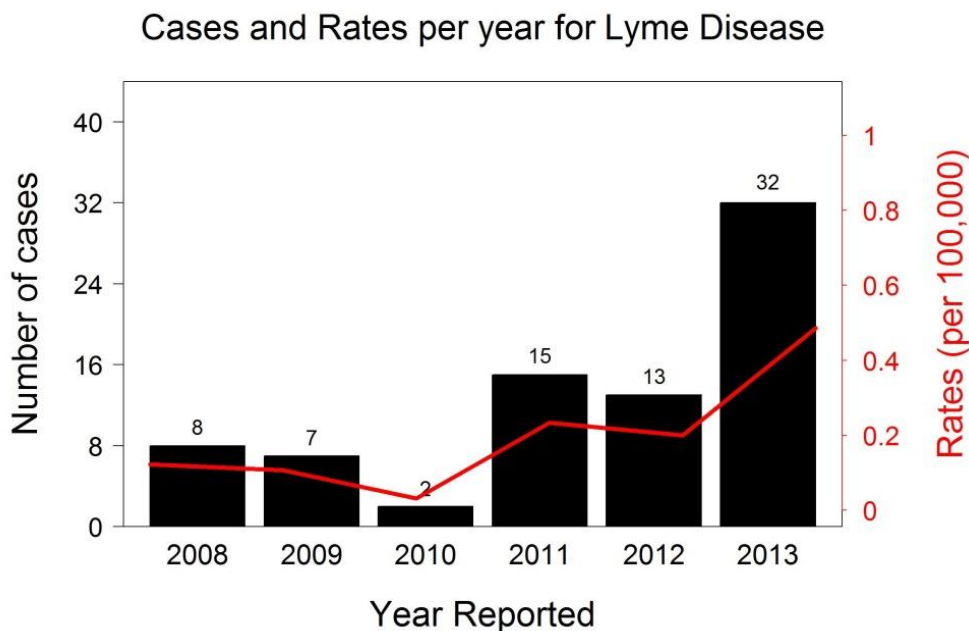


Figure 71. Cases and rates (per 100,000) for Lyme disease for 2008–2013.

Lyme disease cases seen in Arizona are all imported from endemic areas in the United States.

As seen in Figure 71, the number of cases of Lyme disease imported to Arizona from residents travelling to endemic areas of the United States has fluctuated over the past six years. This cannot be interpreted as an Arizona trend because all cases were associated with travel to endemic areas. In 2010 there was a decrease in Lyme disease cases among Arizona residents to a low of two cases. In contrast, in 2013 there was an increase to 32 cases (or 0.5 cases per 100,000 people). The low number of cases in 2010 and rise in cases in 2013 has also been seen in non-endemic states bordering Arizona (Figure 72, Source CDC). The disproportionate rise in cases in Arizona may be in part due to the 2013 change in the state's case definition

criteria for confirmed and probable Lyme disease cases; however, other unknown factors may have also contributed to the increase in that year.

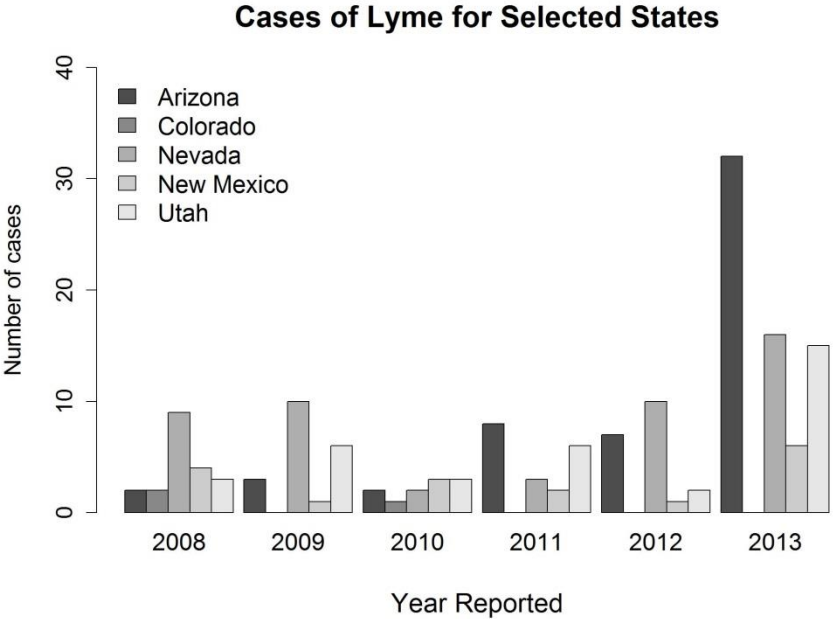


Figure 72. Cases of Lyme disease by state for 2008–2013.

Source CDC http://www.cdc.gov/lyme/stats/chartstables/reportedcases_statelocality.html.

For surveillance of Lyme disease in Arizona, travel and exposure history, as well as laboratory and clinical evidence, are taken into consideration for case investigation and classification. Overall, the imported cases of Lyme disease in Arizona were more frequently reported among white, non-Hispanic persons; rates were slightly higher among males than females (Figure 73).

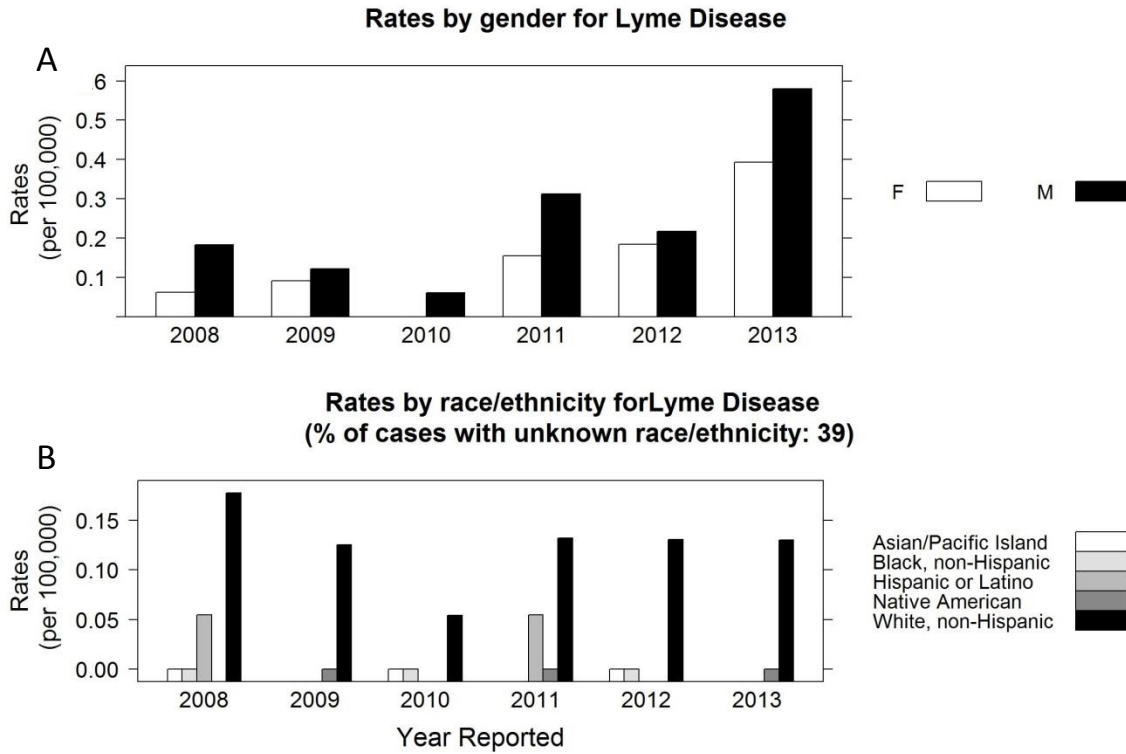


Figure 73. Rates (per 100,000) by gender (A) and by race/ethnicity (B) for Lyme disease for 2008–2013.

TICK-BORNE RELAPSING FEVER (TBRF)

In contrast to other tick-borne diseases, which are spread by hard ticks, tick-borne relapsing fever (TBRF) is spread by soft ticks of the *Ornithodoros* genus. Several different *Borrelia* species bacteria can cause TBRF, and are usually associated with specific species of ticks. Common *Borrelia* species include *B. hermsii*, *B. parkerii*, and *B. turicata*. These bacteria can be seen as spirochetes on blood smears of infected individuals. The soft ticks live in rodent nests and burrows, frequently of chipmunks and squirrels. TBRF has been identified only a few times in Arizona in the last six years and causes recurring episodes of fever, body aches, and nausea.

Cases and Rates per year for Tick-borne Relapsing Fever

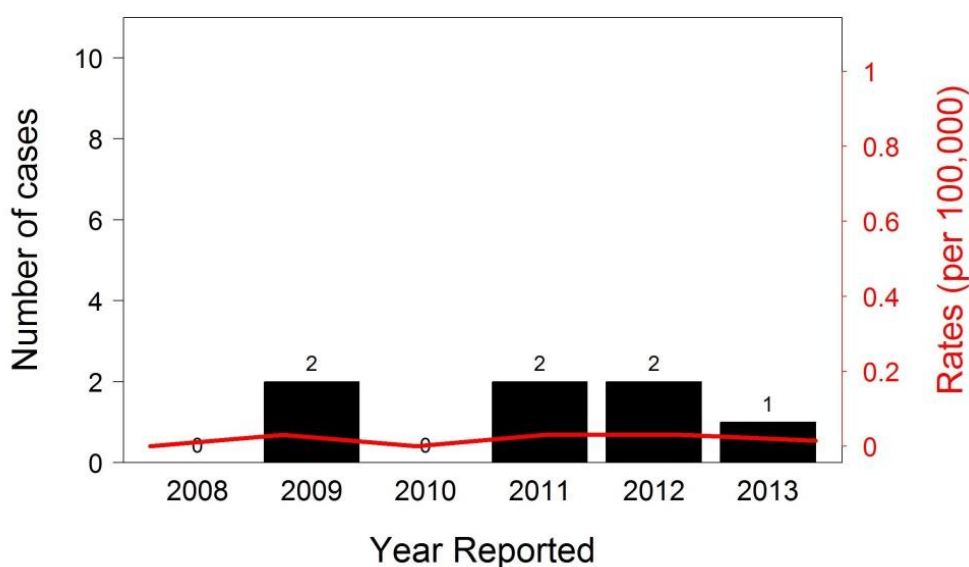


Figure 74. Cases and rates (per 100,000) for tick-borne relapsing fever for 2008–2013.

Figure 74 shows the case count and rate per 100,000 population of TBRF in Arizona from 2008–2013. TBRF is a fairly rare disease in Arizona, with only sporadic cases identified in the northern areas of the state. TBRF is most commonly associated with rodent-infested environments, specifically cabins in mountainous areas.

J. ANIMAL RABIES

Rabies is a preventable viral disease of mammals most often transmitted through the bite of a rabid animal. The vast majority of animal rabies cases reported to the Arizona Department of Health Services each year occur in wild, rather than domestic, animals. While all mammals are susceptible to infection, only a few different animals actually serve as reservoirs of the disease. This means they are capable of maintaining the virus in an endemic or enzootic cycle as well as experiencing occasional outbreaks or epizootics. Bats, foxes, and skunks are the reservoirs for the virus in Arizona and are the most commonly reported rabid animals each year. Two non-reservoir animals that also frequently test positive for rabies are bobcats and coyotes.

Human rabies is reportable in Arizona, but cases in the U.S. are extremely rare. The last documented human rabies death in Arizona was in 1981. The goal of animal rabies surveillance, which includes both wild and domestic animals, is to monitor circulation of rabies virus among animal species; provide information for strategically implementing rabies control measures among wildlife species to reduce the threat of human exposure, when warranted; and test animals with known human exposures to indicate whether post-exposure prophylaxis of the individual is recommended for the prevention of human rabies.

Animal rabies surveillance is based on diagnostic laboratory results from the Arizona State Public Health Laboratory (ASPHL) and the USDA Wildlife Services. ASPHL performs the direct fluorescent antibody test to establish a rabies diagnosis, while the USDA Wildlife Services laboratory performs the direct rapid immunohistochemical test (dRIT). Animals are submitted through an approval protocol by various state, county, municipal, tribal, federal, and private animal control and veterinary agencies.

Number of Rabid Animals per year

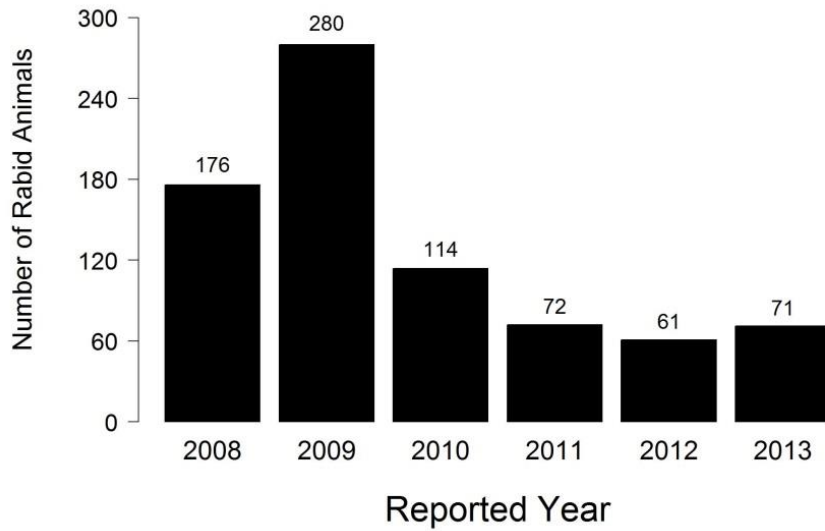


Figure 75. Number of rabid animals identified in Arizona for 2008–2013.

Figure 75 depicts the total number of animals that tested positive for rabies from 2008 to 2013. Many more animals are assessed and submitted for rabies testing but did not test positive.

Number of Rabid Animals by Type (top 5 types)

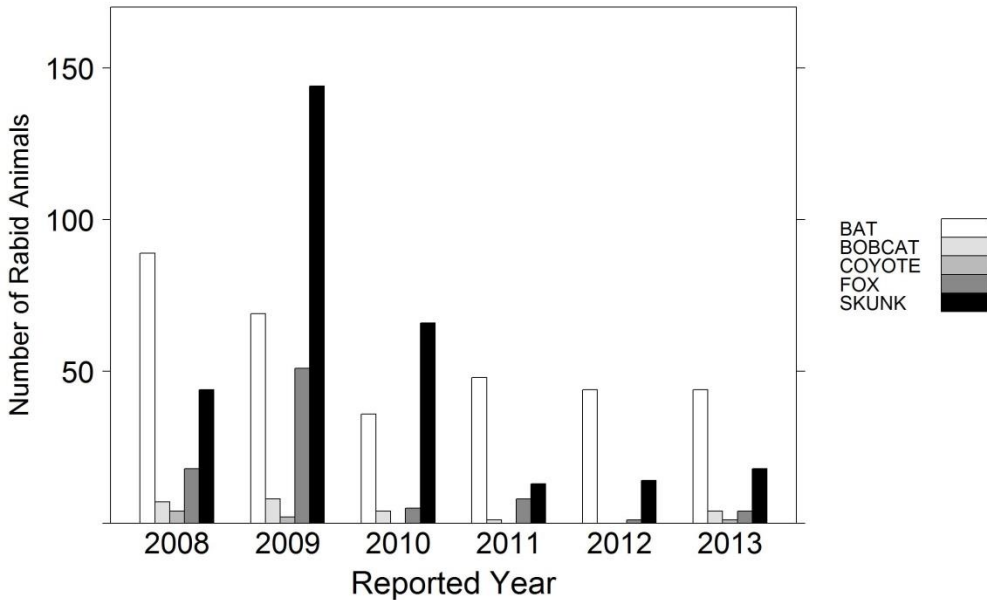


Figure 76. Number of rabid animals by type (top five animal types: bat, bobcat, coyote, fox and skunk) for 2008–2013.

The vast majority (98%) of wild animals that tested positive for rabies in Arizona during 2008 through 2013 represent just five types of animals: bats, bobcats, coyotes, foxes, and skunks. Figure 76 and Figure 77 illustrate the number of cases of animal rabies and the distribution of positive animals for these five animal types during this period. Bats and skunks are the most commonly reported rabid animals in Arizona (43% and 39%, respectively, for 2008-2013). In 2008 and 2009, identified rabid animals were more widely distributed across the state, but in 2012 and 2013 were focalized more in the southern counties in Arizona. In 2009, there was an epizootic of rabies in the skunk populations in Pima County and in the fox populations in Coconino County, which account for the high case counts of positive animals in Arizona in that year.

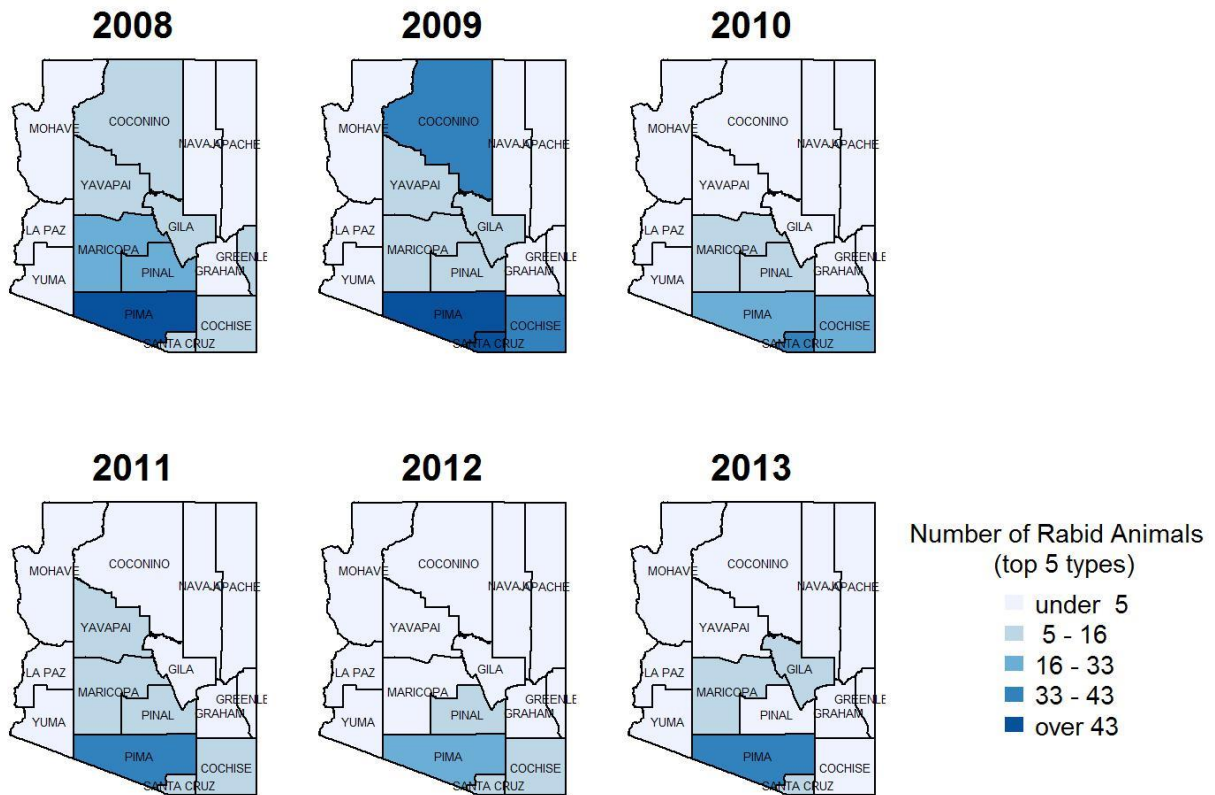


Figure 77. Cases of rabid animals by county for the top five animal types (bat, bobcat, coyote, fox and skunk) for 2008–2013.

K. OTHER DISEASES OVERVIEW

The “other” disease category includes a heterogeneous group of reportable morbidities which are not included in the previously described categories (coccidioidomycosis, enteric diseases, influenza and RSV, hepatitises, invasive diseases, vaccine-preventable diseases or vector-borne and zoonotic diseases). Diseases in the “other” category are basidiobolomycosis, blastomycosis, Creutzfeldt-Jakob disease, emerging or exotic disease, parasitic encephalitis, Hansen's disease, Kawasaki syndrome, legionellosis, Reye syndrome, toxic shock syndrome and viral encephalitis. In Arizona, these “other” diseases made up a small fraction of the communicable diseases¹⁴ reported between 2008 and 2013, for a total of about 500 cases, of which 58% (299 cases) were legionellosis cases. Only legionellosis will be discussed in detail in this report.

¹⁴ Excluding sexually-transmitted diseases, tuberculosis, hepatitis C, and HIV.

LEGIONELLOSIS

Legionellosis refers to any disease caused by *Legionella* bacteria, most commonly *Legionella pneumophila*. Two clinically and epidemiologically distinct illnesses are associated with legionellosis: Legionnaires' disease and Pontiac fever. The former condition is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia. The latter is a milder illness without pneumonia. Legionellosis is acquired through inhalation of aerosolized water contaminated with the *Legionella* bacteria. Sources of infection can be cooling towers, potable water systems, whirlpool spas, humidifiers, decorative fountains and respiratory therapy equipment. Warm water is particularly prone to *Legionella* infection since bacteria grow best at higher temperatures. Risk factors include recent travel with an overnight stay outside of home, exposure to whirlpool spas, age more than 50 years, smoking, underlying lung diseases and immune system disorders.

In Arizona, the number of cases and rates for legionellosis between 2008 and 2013 have fluctuated, showing peaks in 2010 and 2013 (Figure 78). The age group most affected by the disease has been those 65 years old and older for all years, except during 2008 when the 50 to 64 year old age group had the highest rate. A few cases in children less than five years were reported in 2009, 2010 and 2013 (Figure 79). Legionellosis cases have been detected in multiple counties between 2008 and 2013, with no evident pattern identifiable as cases are generally sporadic (Figure 80).

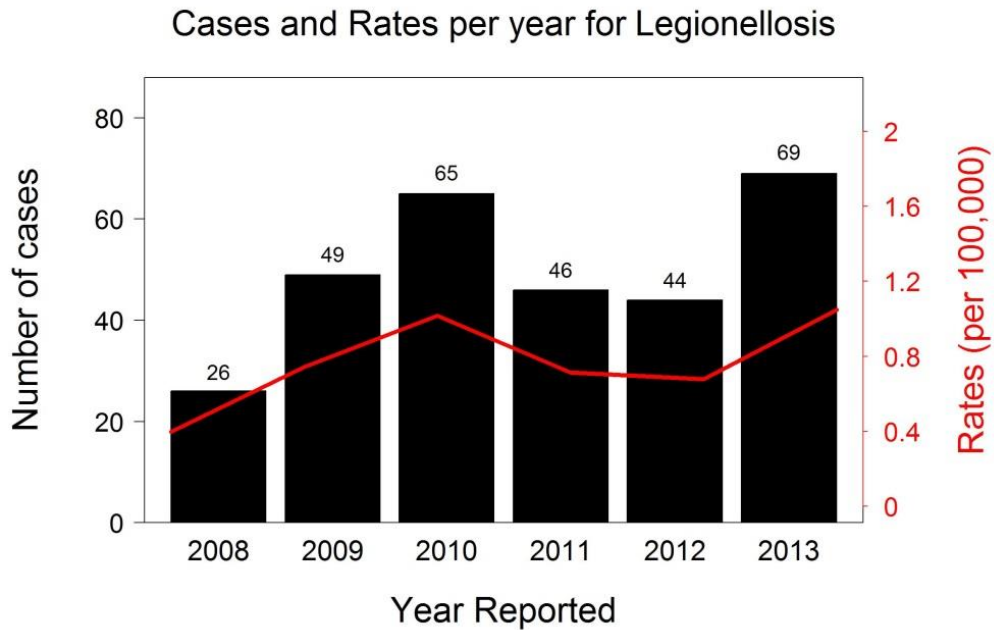


Figure 78. Cases and rates (per 100,000) for legionellosis for 2008–2013.

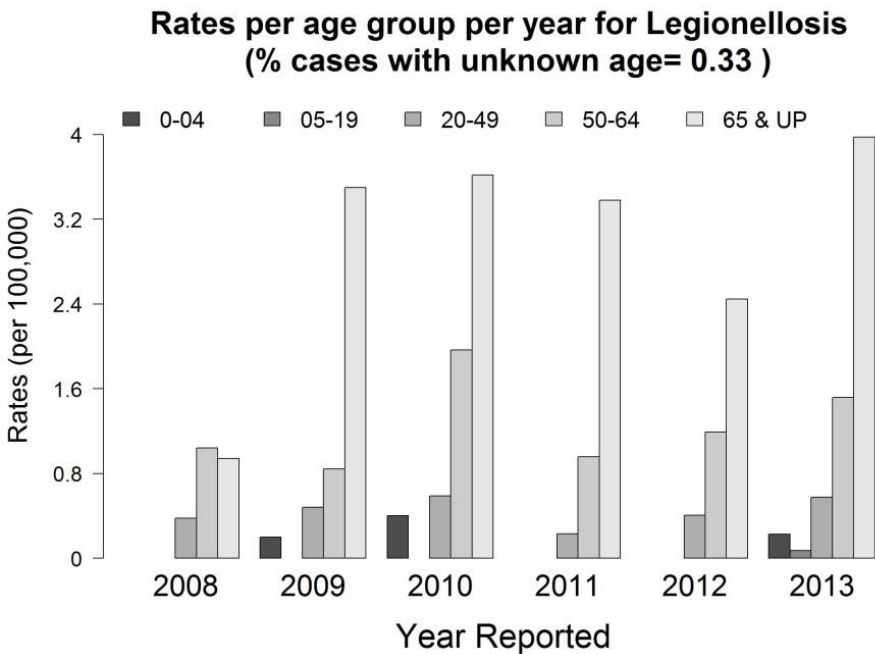


Figure 79. Rates (per 100,000) of legionellosis by age group for 2008–2013.

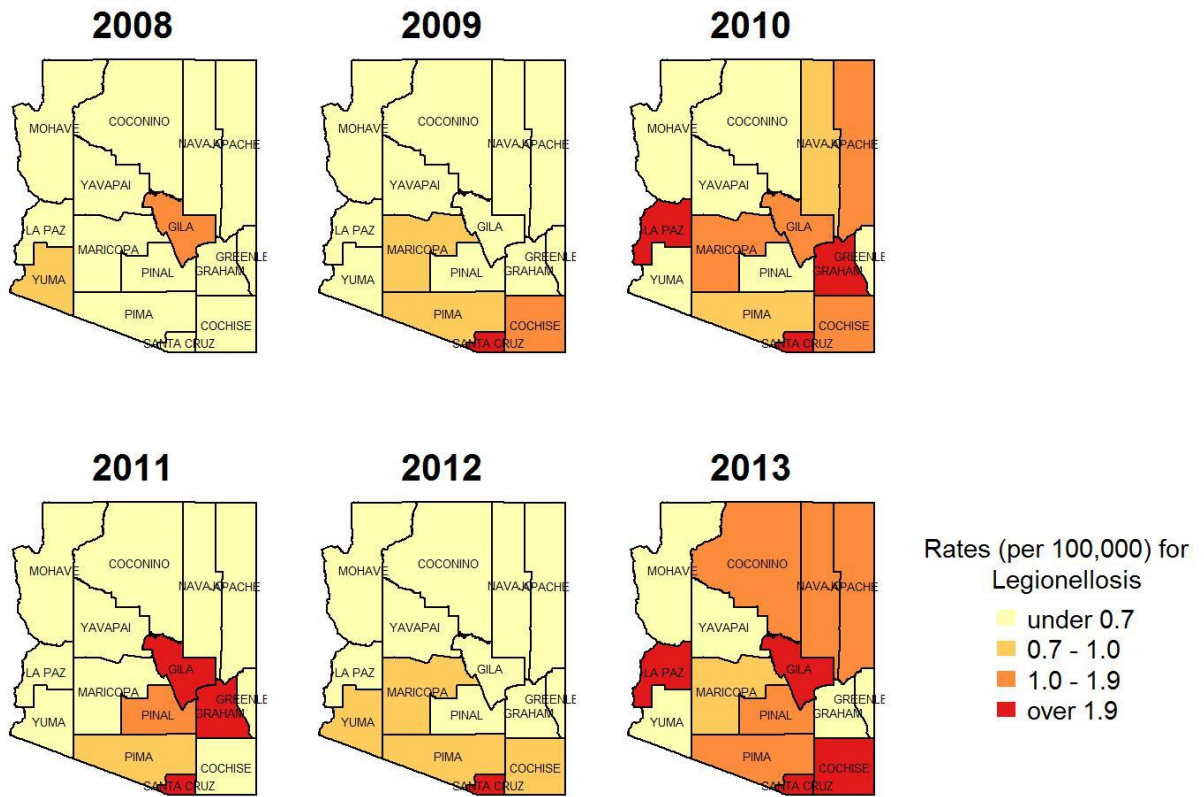


Figure 80. Rates (per 100,000) for legionellosis by county for 2008–2013.

V. OUTBREAKS

In the previous sections of this report, we have mostly discussed statistics and trends from case-based surveillance – the reporting and investigation of single cases of disease. However, outbreak detection and response are other key components of a state’s public health capacity and are essential for prevention and control of illness in a population. Outbreaks may be identified by finding clusters, trends, or similarities among cases that have been reported to the health departments. Or, they may be identified when healthcare facilities, schools, or any members of the community notify a public health agency about a group of ill persons who seem to have something in common. Identified outbreaks may or may not involve diseases that are reportable as single cases, or the cause of the illness may be unknown at the time the outbreak is identified. Outbreak-associated cases for reportable conditions such as salmonellosis are included in the case counts for the appropriate morbidity in this report.

An outbreak is defined as an unexpected increase in occurrence of a disease, infestation, or sign or symptom of illness. In Arizona, healthcare providers, healthcare institutions, correctional facilities, and administrators of schools and shelters are required to report outbreaks of infectious diseases to their local health department under Arizona Administrative Code (A.A.C.) R9-6-202 and 203 and Arizona Revised Statutes (A.R.S.) Title 36. Hotels, motels and resorts are also required to report contagious or epidemic diseases occurring in their establishments within 24 hours under A.R.S. §36-622.

Local health departments play the primary role in investigating outbreaks and implementing control measures, as for single cases. ADHS staff provide support by coordinating clinical and environmental specimen testing with the Arizona State Public Health Laboratory and leading investigations that involve cases from multiple jurisdictions. ADHS also works closely with other state and federal agencies, including the CDC, Arizona Department of Agriculture, U.S. Food and Drug Administration, and the U.S. Department of Agriculture, for support and collaboration on multistate investigations.

During 2008—2013, information about each reported outbreak was collected in a centralized database, which included outbreak characteristics such as: date of outbreak report, number of ill persons, county where the suspected exposure occurred, suspected infectious disease or organism involved, outbreak location/setting (e.g., restaurant, healthcare facility, school), and mode of transmission (e.g., foodborne, waterborne, environmental, person-to-person). These data are collected in order to provide a profile of the infectious disease outbreaks that occur in Arizona, so that we can better implement appropriate outbreak control measures to mitigate the spread of disease and prevent future outbreaks from occurring.

Each year, more outbreaks of gastrointestinal illnesses are reported to public health officials than other types of outbreaks. Reported outbreaks are more likely to have been spread by person-to-person transmission and to have occurred in healthcare, school or childcare

facilities. Reports for each year describing the characteristics of the detected and investigated outbreaks in Arizona can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/phs/oids/data/reports-archive.htm>) under the corresponding year tab.

- [Infectious Disease Annual Outbreak Summary Report 2013](#)
- [Infectious Disease Annual Outbreak Summary Report 2012](#)
- [Infectious Disease Annual Outbreak Summary Report 2011](#)
- [Infectious Disease Annual Outbreak Summary Report 2010](#)
- [Infectious Disease Annual Outbreak Summary Report 2009](#)
- [Infectious Disease Annual Outbreak Summary Report 2008](#)

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We also wish to acknowledge the many staff at local health departments and ADHS who contributed to communicable disease surveillance and investigation efforts over this period, as well as all the laboratories and healthcare providers who have reported the case information discussed.

VII. APPENDICES

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928-338-1514 (fax)

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B. CHANGES TO CASE DEFINITIONS 2008–2013

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CHANGES TO CASE DEFINITIONS 2008–2013

Year	Morbidity	Changes
2008	Basidiobolomycosis	Changes to the laboratory criteria.
	Creutzfeldt-Jakob disease	Changes to all the case definitions.
	Ehrlichiosis	Reclassified to include anaplasmosis. Changes to the clinical description, laboratory criteria and case definitions. Addition of the suspect case classification.
	Lyme disease	Changes to the laboratory criteria and to the confirmed case definition; addition of probable and suspect case classifications.
	Mumps	Changes to the laboratory criteria, to the confirmed and probable case definitions and addition of the suspect case classification
	Polio (nonparalytic)	Added to the list of reportable conditions.
	Q fever	Changes to the case classifications.
	Rocky Mountain spotted fever	Changes to the confirmed and probable case definitions and addition of the suspect case classification.
	VISA or VRSA	Changes to the laboratory criteria.
	Vibrio	Changes to the laboratory criteria.
2009	Cryptosporidiosis	Changes to the laboratory criteria, addition of the probable case classification and elimination of symptomatic/asymptomatic classifications for confirmed cases.
	Lyme disease	Changes to the clinical presentation; changes to confirmed and probable case definitions.
2010	Anthrax	Changes in laboratory criteria for diagnosis, in the confirmed case definition; addition of probable and suspect case classifications.
	Brucellosis	Addition of presumptive laboratory criteria, changes in the probable case definition.

	Cryptosporidiosis	Changes to the confirmed and probable case definitions and laboratory criteria.
	Cyclosporiasis	Addition of probable case classification and changes in the confirmed case definition.
	Dengue	Changes in the clinical description and laboratory criteria, addition of suspect case classification and of dengue shock syndrome clinical description
	Malaria	Changes to the laboratory criteria for diagnosis and to the confirmed case definition, addition of the suspect case classification.
	Psittacosis	Changes to the laboratory criteria and addition of the probable case classification.
	Tetanus	Deletion of confirmed case classification and addition of probable case classification.
	Toxic shock syndrome	Addition of the differentiation between non-Streptococcal and Streptococcal toxic-shock syndrome.
	Viral hemorrhagic fevers	Addition of exposure/epidemiological criteria.
2011	Arboviruses	Addition of arboviruses under the non-reportable communicable morbidities of public health significance. [Entire category later moved under Reportable conditions in 2013.]
	Babesiosis	Addition of babesiosis under the non-reportable communicable morbidities of public health significance.
	Botulism, foodborne	Addition of probable case classification
	Botulism, wound	Addition of probable case classification and changes to the confirmed case definition
	Giardiasis	Changes to the laboratory criteria, addition of probable case classification
	West Nile virus infection	Addition of differentiation between neuroinvasive and non-neuroinvasive, by applying the national arbovirus case definition to West Nile virus infection.
2012	Campylobacteriosis	Addition of suspect laboratory criteria and suspect case classification

	Hepatitis B acute	Deletion of the probable case classification
	Influenza-associated hospitalizations	Addition of influenza-associated hospitalizations under the non-reportable communicable morbidities of public health significance.
	Infections caused by free-living amebae	Addition of infections caused by free-living amebae under the non-reportable communicable morbidities of public health significance. [Later moved to the reportable category of Encephalitis, Parasitic]
	Salmonellosis	Changes to the laboratory criteria and addition of the suspect case classification.
	Shigellosis	Changes to the laboratory criteria and addition of the suspect case classification.
	Unexplained death with history of fever	Changes to the clinical description.
2013	Arboviral diseases (including West Nile virus)	Arboviral disease case definition moved to reportable conditions section; separate West Nile virus infection case definition removed (with no change to content).
	Botulism	Changes to the classification (botulism with subtypes: foodborne, wound and other).
	<i>Burkholderia mallei</i> (Glanders)	Changes to the classification (Separated from <i>Burkholderia pseudomallei</i>).
	Cholera	Changes to the laboratory criteria.
	Cryptosporidiosis	Changes to the laboratory criteria.
	Encephalitis, viral or parasitic	Differentiation between encephalitis - parasitic and encephalitis - viral. Case definition for Infections caused by free-living amebae moved to Encephalitis, parasitic.
	Enterohemorrhagic <i>Escherichia coli</i>	Changes to the laboratory criteria and to the probable case definition.
	<i>Haemophilus influenzae</i>	Changes to the confirmed and probable case definitions.
	Hansen's disease	Changes to the laboratory criteria.

Hepatitis A	Addition of the probable case definition.
Hepatitis B acute	Addition of the probable and suspect case definitions.
Hepatitis C acute	Changes to the clinical description.
Hepatitis C chronic or past infection	Changes to the laboratory criteria and to the confirmed case definition.
Influenza A novel virus	Addition of influenza A novel virus to the reportable conditions.
Leptospirosis	Changes to the clinical and laboratory criteria
Lyme disease	Changes to the confirmed and probable case definitions.
Measles	Changes to the laboratory criteria and deletion of the suspect case classification.
Mumps	Changes to the confirmed case definition.
Plague	Changes to the confirmed and probable case definitions and addition of the suspect case classification.
Rocky Mountain spotted fever	Changes to the suspect case definition.
Rubella	Changes to the laboratory criteria and to the confirmed and suspect case definition.
Severe acute respiratory syndrome-associated coronavirus disease	Changes to the exposure criteria.
Streptococcal group A	Clinical criteria for STSS have been moved to the Toxic Shock Syndrome case definition
Toxic shock syndrome	Changes to the laboratory criteria and all case definitions for Streptococcal toxic shock syndrome
Varicella	Changes to the laboratory criteria and addition of suspect case classification.

MORBIDITIES DIFFERENT FROM CDC/CSTE CASE DEFINITIONS

Year	Morbidity
2013	Coccidioidomycosis
	Enterohemorrhagic <i>Escherichia coli</i>
	Hepatitis A
	Hepatitis B, acute
	Pertussis
	Rocky Mountain spotted fever
	Varicella and varicella deaths

C. LINKS TO ADHS REPORTS

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COCCIDIOIDOMYCOSIS

- 2012 Annual Report: <http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/valley-fever/reports/valley-fever-2012.pdf>
- 2007 - 2011 5 Year Review: <http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/valley-fever/reports/valley-fever-2007-2011.pdf>

ENTERIC DISEASES

Reports can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#data-reports-archive>) under the corresponding year tab.

- Lab-Based Surveillance for E. coli, 2008
- Lab-Based Surveillance for Shigellosis, 2008

INFLUENZA AND RSV

Reports can be found on the ADHS Flu page (<http://www.azdhs.gov/phs/oids/epi/flu/index.htm>) clicking on “Influenza Season Weekly Activity Reports” for the season of interest, and then opening the Influenza or RSV Season Summaries on the following page.

- Influenza Report 2012-2013
- RSV Report 2012-2013
- Influenza Report 2011-2012
- RSV Report 2011-2012
- Influenza Report 2010-2011
- RSV Report 2010-2011
- 2009-2010 Influenza Summary, including the 2009 H1N1 Pandemic
- 2009-2010 Respiratory Syncytial Virus (RSV) Summary
- 2008-2009 RSV Summary
- 2007-2008 Influenza Season Summary (9/30/07 - 7/26/08)
- RSV Hospitalizations 2004-2008

INVASIVE DISEASES

Reports can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#data-reports-archive>) under the corresponding year tab.

- [Susceptibility Pattern Information for *Streptococcus pneumoniae*, January 2009-June 2009](#)
- [Susceptibility Pattern Information for *Streptococcus pneumoniae*, March 2008-December 2008](#)
- [Susceptibility Pattern Information for Methicillin Resistant *Staphylococcus aureus*, January 2009-June 2009](#)
- [Susceptibility Pattern Information for Methicillin Resistant *Staphylococcus aureus*, March 2008-December 2008](#)
- [Invasive *Streptococcal pneumoniae* Serotype Report, 2008](#)

OUTBREAKS

Reports can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#data-reports-archive>) under the corresponding year tab.

- [Infectious Disease Annual Outbreak Summary Report 2013](#)
- [Infectious Disease Annual Outbreak Summary Report 2012](#)
- [Infectious Disease Annual Outbreak Summary Report 2011](#)
- [Infectious Disease Annual Outbreak Summary Report 2010](#)
- [Infectious Disease Annual Outbreak Summary Report 2009](#)
- [Infectious Disease Annual Outbreak Summary Report 2008](#)

UNEXPLAINED DEATHS WITH HISTORY OF FEVER (UNEX)

Reports can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#data-reports-archive>) under the corresponding year tab.

- [2011 UNEX Annual Report](#)
- [2009 UNEX Semi-Annual Report](#)
- [2008 UNEX Annual Report](#)

VECTOR-BORNE AND ZOO NOTIC DISEASES

Reports can be found at the ADHS Annual Report Archive web page (<http://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#data-reports-archive>) under the corresponding year tab (unless otherwise indicated).

- [Rabies data and maps 2001-2014:](#)
<http://www.azdhs.gov/preparedness/epidemiology-disease-control/rabies/index.php#data-publications-maps>
- [West Nile virus data and maps](#)
- [AZ Vector-Borne & Zoonotic Diseases Annual Report](#)

D. ADHS PUBLICATIONS

The citations listed on the following pages reference peer-reviewed publications or Morbidity and Mortality Weekly Report (MMWR) articles published in 2008 through 2013, and with at least one author from the ADHS Office of Infectious Disease Services. Publications by Epidemiologic Intelligence Service (EIS) Officers or persons in other training positions assigned to ADHS are included; publications authored by Arizona local health department staff are also listed. This list might not include all the publications that fit these criteria.

These publications provide further information and context for many of the morbidities and topics discussed in this report.

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COCCIDIOIDOMYCOSIS

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