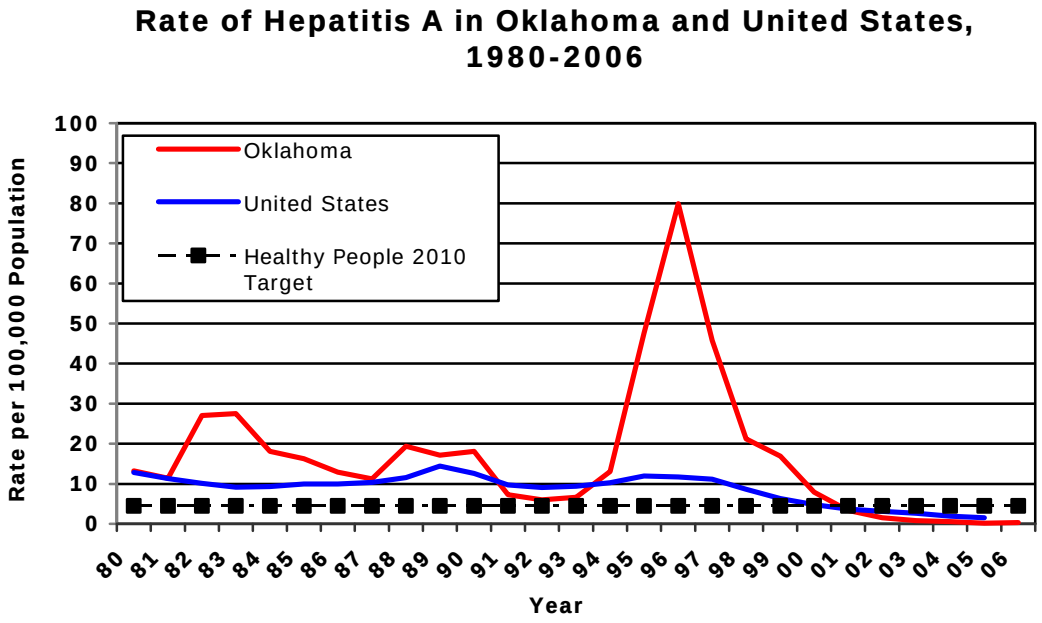
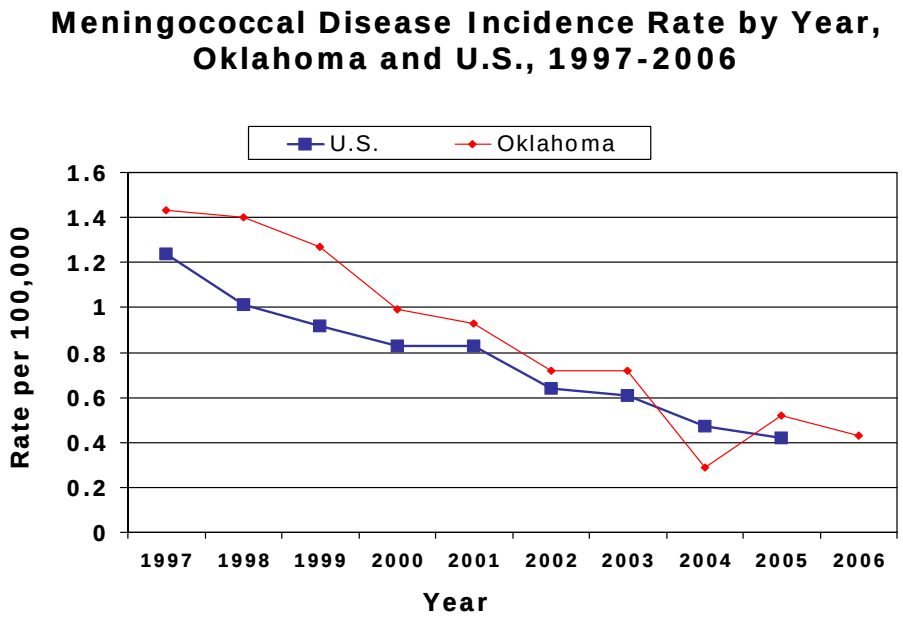
2006 Annual Summary of Infectious Diseases





Oklahoma State Department of Health

Creating a State of Health

The Annual Summary of Infectious Diseases is issued by the Oklahoma State Department of Health, as authorized by James M. Crutcher, M.D., M.P.H., Secretary of Health and Commissioner of Health, Oklahoma State Department of Health.
Good Printing printed 5,300 copies in August 2007 at a cost of $17,592.00.

Executive Summary

The 2006 Annual Summary of Infectious Diseases consolidates information on infectious disease surveillance efforts and disease investigation and control in Oklahoma for 2006. Title 63 OS §1-502 and §1-503 as well as Title 310 OAC Chapter 505 require that health care providers and laboratories report cases of certain communicable diseases to the Oklahoma State Department of Health (OSDH). This allows the surveillance, investigation, and control of the spread of disease in the population by public health personnel. Several service areas of the OSDH as well as the county health departments are charged with this important action. This publication represents a snapshot of our continuing efforts to provide information on the incidence of reportable infectious diseases in Oklahoma to health care providers.

Infectious diseases continue despite significant public health achievements throughout the twentieth century in safer food and water supplies, immunizations, and the discovery of antimicrobial therapy to treat and control the spread of infectious diseases. Oklahoma's incidence of vectorborne diseases such as Rocky Mountain spotted fever, ehrlichiosis, and tularemia continue to occur at rates higher than national levels. Oklahoma also had an increase in West Nile virus activity compared to 2005, which was consistent with the national trend. Tuberculosis continues to be an important cause of morbidity and mortality. Although the same number of tuberculosis cases were reported in 2006 compared to 2005, a steadily increasing proportion of cases are occurring among the foreign-born population: 27% of cases were foreign-born residents compared to 13% in 2002.

The year 2006 was also marked by several notable successes in infectious disease control. Aggressive public health intervention around cases of hepatitis A in the middle to late 1990s, followed by an ambitious immunization campaign, have led to the lowest incidence of hepatitis A in the history of the state. Public health investigations and immunization efforts around cases also resulted in a significant reduction in the incidence of pertussis. Some noteworthy diseases and activities are highlighted below.

Disease Reporting in Oklahoma

Within the short time span of four years, the OSDH has transitioned from a paper-based disease reporting system, in which case reports of persons having reportable communicable diseases were sent to the OSDH by mail or fax, to a secure, web-based disease reporting and investigation system. The OSDH has developed the Public Health Information and Disease Detection of Oklahoma (PHIDDO) system. Health care providers, hospital infection control practitioners, and laboratorians submit patient information, symptoms, risk factors, and laboratory test results in real-time on disease cases. OSDH personnel and county health department public health nurses use the system to conduct communicable disease case and contact investigations. Urgently notifiable diseases submitted to the PHIDDO system produce a pager alert, with both e-mail and text messages to the Epidemiologist-on-Call for rapid investigation.

Two major clinical laboratories securely transmit daily files of positive tests for reportable diseases electronically through electronic laboratory reporting (ELR) to the OSDH. This eliminates the need for a laboratory technician to report manually by using the PHIDDO secure web site or by completing the Laboratory Reportable Pathogen Card. In 2006, the system received over 12,000 reports from users via the secure web site and over 35,000 reports from the two laboratories using ELR. PHIDDO has improved the timeliness and completeness of disease reporting in Oklahoma.

Outbreak Investigation

OSDH epidemiologists are continually ready to respond rapidly by conducting outbreak investigations to (1) determine the magnitude of the outbreak; (2) identify the source(s) of transmission; and (3) institute control measures. During 2006, OSDH conducted 25 outbreak investigations. Summaries of several of these outbreaks are included in this document. Notable investigations include: a multistate outbreak of *Salmonella* Tennessee among person who consumed Great Value and Peter Pan peanut butter; an outbreak of *Clostridium perfringens* associated with consumption of turkey at a catered Christmas luncheon; and an outbreak of early syphilis in Washington County.

Influenza Surveillance

Influenza surveillance is conducted from October through May of each winter season to monitor and describe the geographic distribution of disease, measure the impact of influenza on different age groups, and identify the circulating types and subtypes. The OSDH maintains a sentinel surveillance system for influenza. For the 2006-2007 season, 30 healthcare practices distributed across 24 counties regularly reported the number of patients with influenza-like illness (ILI) by age group and influenza rapid antigen test results via a secure website, and submitted specimens to the OSDH Public Health Laboratory for viral culture. In addition, ten geographically distributed hospital laboratories reported the results of respiratory virus testing on a weekly basis during the respiratory virus season. This season, ILI surveillance was extended to a year-round program. These surveillance activities prepare the OSDH for timely detection of an influenza pandemic.

HIV/STD/Hepatitis

As HIV disease becomes a more chronically manageable disease due to improved treatment of HIV/AIDS and opportunistic infections, many people with HIV/AIDS are living longer. Viral hepatitis, especially hepatitis C, continues to increase. Chlamydia, if untreated, can cause long-term negative health outcomes such as pelvic inflammatory disease and infertility in women. This sexually transmitted disease continued to be the most commonly reported STD in Oklahoma representing 71% of reported STD's in 2006. Disproportionate rates continue to occur among female adolescents and African-American females.

During 2006, Oklahoma reported 191 cases of early syphilis, an increase of 24% over 2005 cases. Thirteen percent of cases were associated with an outbreak in Washington County in which the primary risk factor was exchange of sex for money and/or drugs. Syphilis facilitates the transmission of HIV.

2006 Annual Summary
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Oklahoma State Department of Health
Creating a State of Health

August 23, 2007

Dear Colleague:

We are pleased to send you a copy of the 2006 Annual Summary of Infectious Diseases. The information contained in this report consolidates summaries of communicable disease surveillance and investigations conducted by the Oklahoma State Department of Health during 2006. Specifically it contains: 1) information on infectious disease reports at the state and county level, 2) disease specific data by category, and 3) additional information on special surveillance projects and outbreak investigations in Oklahoma.

This annual summary was developed to provide health care professionals information about the occurrence of communicable diseases in Oklahoma. It is my hope that the data in this summary will be helpful to you in your practice. It is part of our continuing efforts to return useful information to you from the data you have reported to us. Use of this summary should give you a better idea of the incidence of reportable infectious diseases in your community, the variation in disease incidence by county, and the variation in disease between Oklahoma and the nation.

Sincerely,

James M. Crutcher, M.D., M.P.H.
Secretary of Health and
Commissioner of Health

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Abbreviations

ACIP	Advisory Committee on Immunization Practices
ADS	Acute Disease Service
AIDS	Acquired Immunodeficiency Syndrome
CDC	Centers for Disease Control and Prevention
CDD	Communicable Disease Division
CDN	Communicable Disease Nurse
FDA	Food and Drug Administration
HIV	Human Immunodeficiency Virus
HPV	Human papillomavirus
MSM	Men who have sex with men
OCCHD	Oklahoma City-County Health Department
OSDH	Oklahoma State Department of Health
PCR	Polymerase Chain Reaction
PEP	Post Exposure Prophylaxis
PFGE	Pulsed-Field Gel Electrophoresis
PHL	Public Health Laboratory
STD	Sexually Transmitted Diseases
TCCHD	Tulsa City-County Health Department
U.S.	United States

TITLE 310. OKLAHOMA STATE DEPARTMENT OF HEALTH
CHAPTER 515. COMMUNICABLE DISEASE AND INJURY REPORTING
EFFECTIVE 6/25/07

310:515-1-1. Purpose

The rules in this Chapter implement the Communicable Diseases Reporting Regulations, 63 O.S. 1981, § 1-503.

310:515-1-1.1. Definitions

"**AIDS**" means Acquired Immunodeficiency Syndrome.

"**Anti-HAV-IgM+**" means a positive test result for the hepatitis A virus immunglobulin M antibody.

"**Anti-HBc-IgM+**" means a positive test result for the hepatitis B core immunglobulin M antibody.

"**CD4**" means cluster of differentiation 4 glycoprotein that serves as a receptor for HIV on T helper cells.

"**Department**" or "**OSDH**" means the Oklahoma State Department of Health.

"***E. coli***" means *Escherichia coli*.

"**EHEC**" means enterohemorrhagic *Escherichia coli*.

"**EIA**" means enzyme immunoassay.

"**HBeAg+**" means a positive test result for the hepatitis B "e" antigen.

"**HBsAg+**" means a positive test result for the hepatitis B surface antigen.

"HBV DNA+" means a positive test result for deoxyribonucleic acid of the hepatitis B virus.

"**HIV**" means Human Immunodeficiency Virus.

"**PHIDDO**" or "**PHIDDO system**" means Public Health Investigation and Disease Detection of Oklahoma system.

"**NAT for HCV RNA+**" means a nucleic acid amplification test with a positive test result for hepatitis C virus ribonucleic acid.

"**Outbreak of an apparent infectious disease**" means a cluster of cases from different households of potentially infectious disease of known or unknown etiology. The cases would have a similar clinical syndrome if laboratory testing is pending or inconclusive. Examples of such outbreaks include but are not limited to a cluster of cases of gastrointestinal illness, respiratory illness, or rash illness of unknown etiology.

"**RIBA**" means recombinant immunoblot assay.

"**S/co**" means the signal-to-cut-off-ratio.

"**Spp**." is an abbreviation referring to the term "species," and is used to broaden the anteceding term in order to include all organisms that may be found or described within a given genus.

"**Unusual disease or syndrome**" means a case of a rare, possibly infectious disease of known or unknown etiology, even if laboratory testing may be pending or inconclusive. Examples of such unusual diseases or syndromes include but are not limited to, unexplained adult respiratory distress syndrome, hemorrhagic fever, vesicular rash illness, or an illness associated with an unusual pattern of illness or death among animals.

"VISA" means vancomycin intermediate *Staphylococcus aureus*.

"VRSA" means vancomycin resistant *Staphylococcus aureus*.

310:515-1-2. Diseases to be reported

The diseases listed in this Chapter must be reported, along with patient identifiers, demographics, and contact information, to the Department upon discovery as dictated in sections OAC 310:515-1-3 and OAC 310:515-1-4. The current OSDH Disease Reporting Manual shall serve as the reference for disease-specific diagnostic test results to be reported. Ancillary laboratory test results, signs, and symptoms must be reported upon request. Laboratories having greater than 400 positive tests performed on-site per year for reportable diseases described in 310:515-1-3, 310:515-1-4(1) and 310:515-1-4(2), or as may be otherwise required to be reported by OSDH, shall begin reporting no later than August 30, 2010 using secure electronic data transmission.

310:515-1-3. Diseases to be reported immediately

The following diseases must be reported by any health practitioner or laboratory personnel to the OSDH by telephone (405-271-4060 or 800-234-5963) or electronically via the secure web-based Public Health Investigation and Disease Detection of Oklahoma system immediately upon suspicion, diagnosis, or testing as specified in the OSDH Disease Reporting Manual.

(1) Anthrax (*Bacillus anthracis*).
(2) Bioterrorism – suspected disease.
(3) Botulism (*Clostridium botulinum*).
(4) Diphtheria (*Corynebacterium diphtheriae*).
(5) *Haemophilus influenzae* invasive disease.
(6) Hepatitis A (Anti-HAV-IgM+).
(7) Hepatitis B during pregnancy (HBsAg+).
(8) Measles (Rubeola).
(9) Meningococcal invasive disease (*Neisseria meningitidis*).
(10) Outbreaks of apparent infectious disease.
(11 Plague (*Yersinia pestis*).
(12) Poliomyelitis.
(13) Rabies.
(14) Smallpox.
(15) Tularemia (*Francisella tularensis*).
(16) Typhoid fever (*Salmonella typhi*).
(17) Viral hemorrhagic fever.

310:515-1-4. Additional diseases, conditions, and injuries to be reported

The following diseases, conditions and injuries must be reported by physicians, laboratories, and hospitals (by infection control practitioners, medical records personnel, and other designees) to the OSDH as dictated in the following subsections:

(1) **Infectious diseases.** Reports of infectious diseases and conditions listed in this subsection must be telephoned, faxed, submitted electronically via the PHIDDO system, or submitted via secure electronic data transmission to the OSDH within one (1) business day of diagnosis or positive test as specified in the OSDH Disease Reporting Manual.

(A) Acid Fast Bacillus (AFB) positive smear.
(B) AIDS (Acquired Immunodeficiency Syndrome).
(C) Arboviral infections (West Nile virus, St. Louis encephalitis virus, Eastern equine encephalitis virus, Western equine encephalitis virus, Powassan virus, California serogroup virus).
(D) Brucellosis (*Brucella* spp.).
(E) Campylobacteriosis *(Campylobacter* spp.).
(F) Congenital rubella syndrome.
(G) Cryptosporidiosis (*Cryptosporidium parvum*).
(H) Cyclosporiasis (*Cyclospora cayetanensis*).
(I) Dengue Fever.
(J) *E. coli O157, O157:H7,* or a shiga-like toxin producing *E. coli* (EHEC infections).
(K) Ehrlichiosis (*Ehrlichia* spp.).
(L)
(M) Giardiasis (*Giardia lamblia*).
(N) Hantavirus pulmonary syndrome.
(O) Hemolytic uremic syndrome, postdiarrheal.
(P) Hepatitis B. If HBsAg+, anti-HBc-IgM+, HBeAg+, or HBV DNA+ then report results of the entire hepatitis panel.
(Q) Hepatitis C. If hepatitis C EIA is confirmed by RIBA or NAT for HCV RNA, or signal-to-cut-off (s/co) ratio is predictive of a true positive then report results of the entire hepatitis panel.

(R) Hepatitis, acute unspecified.
(S) Human Immunodeficiency Virus (HIV) infection.
(T) Legionellosis (*Legionella pneumophila*).
(U) Leprosy (Hansen's Disease).
(V) Leptospirosis (*Leptospira interrogans)*.
(W) Listeriosis (*Listeria monocytogenes*).
(X) Lyme disease (*Borrelia burgdorferi*. Erythema migrans or EIA+ confirmed by Western Blot).
(Y) Malaria (*Plasmodium* spp.).
(Z) Mumps.
(AA) Pertussis (*Bordetella pertussis*).
(BB) Psittacosis (*Chlamydia psittaci*).
(CC) Rocky Mountain Spotted Fever (*Rickettsia rickettsii*).
(DD) Rubella.
(EE) Salmonellosis (*Salmonella* spp.).
(FF) Shigellosis (*Shigella* spp.).
(GG) *Staphylococcus aureus* with reduced susceptibility to vancomycin (VISA or VRSA).
(HH) *Streptococcus*, group A invasive disease.
(II) *Streptococcus pneumoniae* invasive disease, in persons less than 5 years of age.
(JJ) Syphilis (*Treponema pallidum*).
(KK) Tetanus (*Clostridium tetani*).
(LL) Trichinosis (*Trichinella spiralis*).
(MM) Tuberculosis (*Mycobacterium tuberculosis*).
(NN) Unusual disease or syndrome.
(OO) *Vibrio* spp. infections including cholera.
(PP) Yellow Fever.

(2) **Infectious diseases.** Reports of infectious diseases and conditions listed in this subsection must be reported to the OSDH within one (1) month of diagnosis or positive test as specified in the OSDH Disease Reporting Manual.

(A) CD4 cell count < 500 with corresponding CD4 cell count percentage of total (by laboratories only).
(B) Chlamydia infections (*Chlamydia trachomatis*).
(C) Creutzfeldt-Jakob disease.
(D) Gonorrhea (*Neisseria gonorrhoeae*).
(E) HIV viral load.
(F) Pelvic inflammatory disease (PID).

(3) **Occupational or Environmental diseases.** Laboratories must report blood lead level results greater than 10 ug/dL within one (1) week and results less than 10 ug/dL within one (1) month. Health care providers must report blood lead level results 20 ug/dL or greater within twenty-four (24) hours and results 10-19 ug/dL within one (1) week.

(4) **Injuries (hospitalized and fatal cases only).**

(A) Burns.
(B) Drownings and Near Drownings.
(C) Traumatic Brain Injuries.
(D) Traumatic Spinal Cord Injuries.

310:515-1-6. Additional diseases may be designated

The Commissioner of Health may designate any disease or condition as reportable for a designated period of time for the purpose of special investigation.

310:515-1-7. Control of Communicable Diseases Manual

The OSDH adopts the most recently published edition of the publication, "Control of Communicable Diseases Manual," published by the American Public Health Association, as a guideline for the prevention and control of communicable diseases. In order to determine the most recently published edition of the "Control of Communicable Diseases Manual," access the American Public Health Association web site at https://secure.apha.org/source/orders/index.cfm to identify the latest published edition of the "Control of Communicable Diseases Manual."

310:515-1-8. Organisms/specimens to be sent to the Public Health Laboratory

(a) Isolates or appropriate specimens of the following organisms shall be sent to the OSDH Public Health Laboratory for typing.

(1) *Bacillus anthracis.*
(2) *Brucella* spp.
(3) *Campylobacter* spp.
(4) *E. coli O157, O157:H7*, or a shiga-like toxin producing *E. coli* (EHEC).
(5) *Francisella tularensis.*
(6) *Haemophilus influenzae* (sterile site).
(7) HIV.
(8) *Listeria monocytogenes* (sterile site).
(9) *Mycobacterium tuberculosis*.
(10) *Neisseria meningitidis* (sterile site).
(11) *Plasmodium* spp.
(12) *Salmonella* spp.
(13) *Shigella* spp.
(14) *Staphylococcus aureus* that are VISA or VRSA
(15) *Vibrio* spp.
(16) *Yersinia* spp.

(b) Following consultation with an OSDH epidemiologist, clinical specimens from suspected cases of Botulism must be sent to the OSDH Public Health Laboratory for testing.

SUBCHAPTER 3. DISCLOSURES AND USES OF DISEASE PREVENTION AND CONTROL INFORMATION

310:515-3-1. General provisions

Information received, created and/or maintained by the Department pursuant to the provisions of the Public Health Code relating to Disease Prevention and Control is confidential and shall be protected from disclosure unless release or disclosure is sought in accordance with this subchapter or is otherwise authorized by law.

310:515-3-2. Disclosures upon written consent

Information received, created and/or maintained by the Department pursuant to the provisions of the Public Health Code relating to Disease Prevention and Control may be disclosed to a requesting person upon the presentation of a valid written consent executed by the person whose information is being kept confidential or the legal guardian or legal custodian of such person, under the following conditions:

(1) If the written consent is delivered to the Department by a person other than the person whose information is being kept confidential or the legal guardian or legal custodian of such person, the written consent must either be verified under oath or contain some form of attestation certifying or confirming the authenticity of the signature of the person whose information is being kept confidential or the legal guardian or legal custodian of such person.

(2) The written consent must advise the person whose information is being kept confidential or the legal guardian or legal custodian of such person the identity of all persons and/or entities who are likely or intended to receive or view the information sought to be released or disclosed. The identity must include the full name, address and title or office of such person or entity identified in the written consent. The written consent must state that the information will not be released or disclosed to any person or entity not so identified.

(3) The written consent must include a notice thereon, in bold typeface, that the information authorized for release may include records that may indicate the presence of a communicable or venereal disease, which may include, but are not limited to, diseases such as hepatitis, syphilis, gonorrhea and the human immunodeficiency virus, also known as Acquired Immune Deficiency Syndrome (AIDS).

(4) The written consent must advise the person whose information is being kept confidential or the legal guardian or legal custodian of such person of the provisions of 63 O.S.Supp.2005, § 1-502.2.

310:515-3-3. Grounds for denial

A person whose information is being kept confidential or the legal guardian or legal custodian of such person may be denied access to information if the information was obtained from someone other than a health care provider under a promise of confidentiality, the access requested would be reasonably likely to reveal the confidential source of the information and the requested information cannot be presented in a manner that preserves the confidentiality of the source. The Department incorporates HIPAA, 42 C.F.R. § 164.524(a)(2)(v)(2006) only as guidance in applying this section.

310:515-3-4. Disclosures permitted without a written consent

Information received, created and/or maintained by the Department pursuant to the provisions of the Public Health Code relating to Disease Prevention and Control may, without first obtaining a written consent in accordance with this subchapter, be disclosed, shared and/or disseminated with health professionals engaged in activities described or identified in the provisions of the Public Health Code relating to Disease Prevention and Control.

Changes to the Communicable Disease and Injury Reporting Rules

The new Communicable Disease and Injury Reporting rules went into effect on June 25, 2007. The new rules can be found at http://www.health.state.ok.us/program/cdd/reportable_disease.htm
Highlights of the changes are listed below.

Changes to General Disease and Condition Reporting

- The current Oklahoma State Department of Health (OSDH) Disease Reporting Manual is established as the reference for disease–specific diagnostic test results to be reported (see web site listed above).
- The new rules also require that laboratories having greater than 400 positive tests performed on-site per year for reportable diseases begin reporting by secure electronic data transmission no later than August 30, 2010.
- The secure web-based Public Health Investigation and Disease Detection of Oklahoma (PHIDDO) system is now an officially acceptable method (the preferred method) to report to the OSDH.

Changes to Diseases and Conditions to be Reported Immediately

- Hepatitis B during pregnancy has been added to the list of diseases to be reported immediately.
- Brucellosis has been moved to the list of diseases to be reported within one business day of diagnosis or positive test from the list to be reported immediately.

Changes to Diseases and Conditions to be Reported within One Business Day

- Arboviral infections reporting criteria has been changed to identify the specific viruses that should be reported: West Nile virus, St. Louis encephalitis virus, Eastern equine encephalitis virus, Western equine encephalitis virus, Powassan virus, and California serogroup virus.
- Encephalitis has been removed from the list of infectious diseases and conditions to be reported within one business day.
- Hepatitis B reporting criteria has been changed so that if HBsAg+, anti-HBc-IgM+, HBeAg+, or HBV DNA+, then the results of the entire hepatitis panel must be reported.
- Hepatitis C reporting criteria has been changed so that if HCV EIA is confirmed by RIBA, NAT for HCV RNA, or signal-to-cut-off (s/co) ratio is predictive of a true positive, then the results of the entire hepatitis panel must be reported.
- Lyme disease reporting criteria has been changed so that reports should only be submitted if a patient has an erythema migrans (EM) skin lesion or if an EIA+ for *Borrelia burgdorferi* is confirmed by Western Blot.
- *Staphylococcus aureus* with reduced susceptibility to vancomycin (VISA or VRSA) was added to the list.
- *Streptococcus pneumoniae*, invasive disease reporting criteria has been changed so that reports should only be submitted if a patient is less than 5 years of age.

Changes to Diseases and Conditions to be Reported within One Month

- CD4 cell count < 500 reporting criteria has been changed so that laboratories must also report the corresponding CD4 cell count percentage of total.
- HIV viral load was added to the list.

Changes to Organisms/Specimens to be Sent to the Public Health Laboratory

- HIV was added to the list.
- *Staphylococcus aureus* that are VISA or VRSA was added to the list.

New Subchapter on Disclosures and Uses of Disease Prevention and Control Information

- General provisions
    - States that information received, created, and/or maintained by the OSDH related to disease prevention and control is confidential and shall be protected from disclosure unless sought in accordance with the subchapter or otherwise authorized by law.
- Disclosures upon written consent
    - States the four conditions under which information received, created, and/or maintained by the OSDH related to disease prevention and control may be disclosed to a requesting person upon the presentation of a valid written consent executed by the person whose information is being kept confidential or the legal guardian or custodian of such person.
- Grounds for denial
    - States that access to information may be denied if the information was obtained from someone other than a health care provider under a promise of confidentiality.
- Disclosures permitted without a written consent
    - States that information may be disclosed, shared and/or disseminated with health professionals engaged in activities related to disease prevention and control.

For additional information or to obtain access to PHIDDO, please contact Anthony Lee AnthonyL@health.ok.gov or Kim Rayno KimR@health.ok.gov at (405) 271-4060.

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1000 NE 10th St.
Oklahoma City, OK 73117-1299
Phone Number: (800) 898-6734
Fax Number*: (405) 271-6680

HIV / STD Service
1000 NE 10th St.
Mail Drop 0308
Oklahoma City, OK 73117-1299
Phone Number: (405) 271-4636
Fax Number*: (405) 271-5149

Public Health Laboratory
1000 NE 10th St.
Oklahoma City, OK 73117-1299
Phone Number: (405) 271-5070
Fax Number*: (405) 271-4850

Mailing Isolates and Samples for Testing
Public Health Laboratory
P.O. Box 24106
OKC, OK 73124-0106

For instructions on sending isolates or clinical specimens to the OSDH PHL, contact PHL personnel between 8:00 a.m. - 4:30 p.m., Monday through Friday.

*** All FAX machines are located in locked offices and are monitored to ensure the confidentiality of disease reports.**

Number of Reported Cases of Communicable Diseases, Oklahoma, 1991 – 2006

Disease	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Botulism (Infant)	1	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0
Botulism (Foodborne)	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Brucellosis	2	1	0	0	1	1	0	0	0	1	0	1	0	0	1	2
Campylobacteriosis	205	267	199	187	289	281	247	241	320	361	308	362	417	591	547	406
Chlamydia	5714	5220	4886	3784	5050	7371	7566	9378	8737	9346	10622	10732	10983	10371	12957	12992
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Congenital rubella syndrome	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Creutzfeldt-Jakob disease	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	1
Cryptosporidiosis	8	0	1	1	12	10	12	7	14	30	16	16	24	22	46	56
Dengue Fever	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0
E. coli O157:H7 or other EHEC	0	5	8	* 13	16	14	13	26	41	19	36	25	30	29	38	44
Ehrlichiosis	3	8	0	0	0	0	0	2	1	12	24	13	36	49	96	47
GAS Invasive	0	0	0	0	0	8	3	1	12	28	49	56	99	73	132	125
Giardiasis	211	188	262	252	206	159	152	148	152	96	0	85	145	166	197	166
Gonorrhea	6546	6432	4855	4935	5652	4897	4840	4225	4291	5236	4818	4624	4543	4543	5031	4951
H. influenzae, Inv. Disease (Total)	41	20	45	44	33	31	33	35	47	46	48	53	52	67	74	78
H. influenzae, Inv. Disease, <5yrs. Type B	33	3	1	4	3	0	1	1	0	0	0	0	0	0	0	0
Hantavirus	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
Hepatitis A	273	217	206	395	1497	2516	1441	667	534	271	116	52	29	19	6	11
Hepatitis B	198	174	193	129	176	60	63	169	185	179	115	111	73	80	59	96
Hepatitis C	0	0	0	0	1	8	10	23	13	13	6	21	6	7	14	19
Hemolytic Uremic Syndrome	0	0	0	0	0	0	0	0	1	2	4	3	4	2	5	2
Legionellosis	24	8	0	0	8	16	3	18	7	5	7	5	10	24	10	10
Leptospirosis	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Listeriosis	6	8	12	11	11	5	9	19	12	8	2	9	3	4	4	5
Lyme Disease	* 23	25	20	111	57	34	45	12	8	1	0	0	0	3	0	0
Malaria	9	5	5	9	1	3	9	4	2	10	5	12	4	10	12	11
Measles (Rubeola)	0	12	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Meningococcal Inf. (*N. meningitidis*)	16	17	36	52	49	46	45	44	40	34	32	25	25	10	18	15
Mumps	15	20	11	13	1	4	3	4	5	3	0	3	2	1	2	10

Disease	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Pertussis	48	53	60	19	47	20	60	36	40	60	43	135	106	120	127	64
Plague	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Amebic Meningoencephalitis	4	6	7	0	0	0	0	2	0	0	1	0	0	0	2	0
Psittacosis											0	0	0	0	0	0
Rabies (Animal)	173	219	65	40	32	38	113	107	94	58	60	126	204	113	79	69
Rocky Mountain Spotted Fever	95	109	46	36	48	45	30	39	29	37	69	99	138	190	210	135
Rubella	2	0	1	4	0	0	0	0	1	0	0	0	0	0	0	0
Salmonellosis	481	368	320	444	471	520	392	501	468	405	503	524	494	425	448	605
Shigellosis	192	252	472	200	266	305	293	712	560	131	148	717	1078	724	937	195
S. pneumo Invasive, ≥ 5 yrs.	100	90	126	164	131	101	80	73	110	118	324	452	443	460	653	630
S. pneumo Invasive, < 5yrs.	28	11	20	54	22	6	10	13	21	16	32	47	76	52	47	73
Syphilis (Total Early)	596	709	636	399	489	398	275	264	347	245	185	183	141	88	73	191
Tetanus	0	1	1	1	0	1	2	1	0	0	1	0	0	0	0	1
Tuberculosis	206	216	209	261	237	201	211	198	208	154	194	190	163	178	144	144
Tularemia	12	10	16	4	7	4	5	5	7	11	7	10	9	19	20	3
Typhoid Fever	3	0	1	3	1	0	3	1	0	1	1	2	1	1	1	0
Vibrio parahaemolyticus	0	0	0	0	0	1	0	8	0	0	0	0	0	0	1	0
Vibrio spp	0	0	0	0	1	0	0	0	1	1	0	1	0	0	3	1
Vibrio vulnificus	0	0	0	0	2	0	0	1	0	0	0	1	1	1	1	0
West Nile Virus	0	0	0	0	0	0	0	0	0	0	0	*21	79	22	31	48
Yellow Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* First year disease was reportable by law

Incidence Rate per 100,000 Oklahoma Population^ of Reported Communicable Diseases, Oklahoma, 1991 – 2006

Disease	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Anthrax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Botulism (Infant)	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.03	0.00
Botulism (Foodborne)	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Brucellosis	0.06	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.03	0.06
Campylobacteriosis	6.52	8.49	6.33	5.94	9.19	8.93	7.85	7.66	10.17	10.46	8.93	10.49	12.08	17.13	15.85	11.77
Chlamydia	181.65	165.95	155.33	120.30	160.54	234.33	240.53	298.13	277.75	270.85	307.83	311.01	318.29	300.55	375.49	376.51
Cholera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Congenital rubella syndrome	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Creutzfeldt-Jakob disease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.12	0.03
Cryptosporidiosis	0.25	0.00	0.03	0.03	0.38	0.32	0.38	0.22	0.45	0.87	0.46	0.46	0.70	0.64	1.33	1.62
Dengue Fever	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.06	0.00
E. coli O157:H7 or other EHEC	0.00	0.16	0.25	*0.41	0.51	0.45	0.41	0.83	1.30	0.55	1.04	0.72	0.87	0.84	1.10	1.28
Ehrlichiosis	0.10	0.25	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.35	0.70	0.38	1.04	1.42	2.78	1.36
GAS Invasive	0.00	0.00	0.00	0.00	0.00	0.25	0.10	0.03	0.38	0.81	1.42	1.62	2.87	2.12	3.83	3.62
Giardiasis	6.71	5.98	8.33	8.01	6.55	5.05	4.83	4.71	4.83	2.78	0.00	2.46	4.20	4.81	5.71	4.81
Gonorrhea	208.10	204.48	154.34	156.89	179.68	155.68	153.87	134.32	136.41	151.74	139.63	134.00	131.66	131.66	145.80	143.48
H. influenzae, Inv. Disease	1.30	0.64	1.43	1.40	1.05	0.99	1.05	1.11	1.49	1.33	1.39	1.54	1.51	1.94	2.14	2.26
H. influenzae, Inv. Disease, <5yrs. Type B	1.05	0.10	0.03	0.13	0.10	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hantavirus	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Hepatitis A	8.68	6.90	6.55	12.56	47.59	79.99	45.81	21.20	16.98	7.85	3.36	1.51	0.84	0.55	0.17	0.32
Hepatitis B	6.29	5.53	6.14	4.10	5.60	1.91	2.00	5.37	5.88	5.19	3.33	3.22	2.12	2.32	1.17	2.78
Hepatitis C	0.00	0.00	0.00	0.00	0.03	0.25	0.32	0.73	0.41	0.38	0.17	0.61	0.17	0.20	0.41	0.55
Hemolytic Uremic Syndrome	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.12	0.09	0.12	0.06	0.14	0.06
Legionellosis	0.76	0.25	0.00	0.00	0.25	0.51	0.10	0.57	0.22	0.14	0.20	0.14	0.29	0.70	0.29	0.29
Leptospirosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Listeriosis	0.19	0.25	0.38	0.35	0.35	0.16	0.29	0.60	0.38	0.23	0.06	0.26	0.09	0.12	0.12	0.14
Lyme Disease	*0.73	0.79	0.64	3.53	1.81	1.08	1.43	0.38	0.25	0.03	0.00	0.00	0.00	0.09	0.00	0.00
Malaria	0.29	0.16	0.16	0.29	0.03	0.10	0.29	0.13	0.06	0.29	0.14	0.35	0.12	0.29	0.35	0.32
Measles (Rubeola)	0.00	0.38	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Meningococcal Inf. (*N. meningitidis*)	0.51	0.54	1.14	1.65	1.56	1.46	1.43	1.40	1.27	0.99	0.93	0.72	0.72	0.29	0.52	0.43

Disease	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Mumps	0.48	0.64	0.35	0.41	0.03	0.13	0.10	0.13	0.16	0.09	0.00	0.09	0.06	0.03	0.06	0.29
Pertussis	1.53	1.68	1.91	0.60	1.49	0.64	1.91	1.14	1.27	1.74	1.25	3.91	3.07	3.48	3.68	1.85
Plague	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Primary Amebic Meningoencephalitis	0.13	0.19	0.22	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.03	0.00	0.00	0.00	0.06	0.00
Psittacosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rocky Mountain Spotted Fever	3.02	3.47	1.46	1.14	1.53	1.43	0.95	1.24	0.92	1.07	2.00	2.87	4.00	5.51	6.09	3.91
Rubella	0.06	0.00	0.03	0.13	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Salmonellosis	15.29	11.70	10.17	14.12	14.97	16.53	12.46	15.93	14.88	11.74	14.58	15.19	14.32	12.32	12.98	17.53
Shigellosis	6.10	8.01	15.01	6.36	8.46	9.70	9.31	22.63	17.80	3.80	4.29	20.78	31.24	20.98	27.15	5.65
S. pneumo Invasive, ≥ 5 yrs.	3.18	2.86	4.01	5.21	4.16	3.21	2.54	2.32	3.50	3.42	9.39	13.10	12.84	13.33	20.26	20.16
S. pneumo Invasive, <5yrs.	0.89	0.35	0.64	1.72	0.70	0.19	0.32	0.41	0.67	0.46	0.93	1.36	2.20	1.51	1.33	2.00
Syphilis (Total Early)	18.95	22.54	20.22	12.68	15.55	12.65	8.74	8.39	11.03	7.10	5.36	5.30	4.09	2.55	2.12	5.54
Tetanus	0.00	0.03	0.03	0.03	0.00	0.03	0.06	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03
Tuberculosis	6.55	6.87	6.64	8.30	7.53	6.39	6.71	6.29	6.61	4.46	5.62	5.51	4.72	5.16	4.17	4.17
Tularemia	0.38	0.32	0.51	0.13	0.22	0.13	0.16	0.16	0.22	0.32	0.20	0.29	0.26	0.55	0.58	0.09
Typhoid Fever	0.10	0.00	0.03	0.10	0.03	0.00	0.10	0.03	0.00	0.03	0.03	0.06	0.03	0.03	0.03	0.00
Vibrio parahaemolyticus	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Vibrio spp	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.00	0.09	0.03
Vibrio vulnificus	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.00
West Nile Virus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*0.61	2.29	0.64	0.90	1.39
Yellow Fever	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* First year disease was reportable by law

^ Oklahoma population numbers are from the U.S. Census Bureau, 1990 and 2000 Census Data available at http://www.census.gov/

Reportable Diseases by County, Oklahoma, 2006

	Campylobacteriosis		Cryptosporidiosis		*E. coli* O157:H7 and other EHEC	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	4	19.01	0	0.00	0	0.00
Alfalfa	0	0.00	0	0.00	0	0.00
Atoka	0	0.00	0	0.00	0	0.00
Beaver	0	0.00	0	0.00	0	0.00
Beckham	4	20.20	0	0.00	0	0.00
Blaine	1	8.35	0	0.00	0	0.00
Bryan	1	2.74	0	0.00	0	0.00
Caddo	2	6.63	0	0.00	0	0.00
Canadian	10	11.40	1	1.14	2	2.28
Carter	11	24.11	2	4.38	0	0.00
Cherokee	9	21.17	0	0.00	1	2.35
Choctaw	2	13.04	0	0.00	0	0.00
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	10	4.81	6	2.88	0	0.00
Coal	0	0.00	0	0.00	0	0.00
Comanche	2	1.74	3	2.61	3	2.61
Cotton	1	15.12	0	0.00	0	0.00
Craig	3	20.07	0	0.00	2	13.38
Creek	7	10.39	0	0.00	2	2.97
Custer	4	15.30	0	0.00	0	0.00
Delaware	6	16.18	2	5.39	0	0.00
Dewey	1	21.08	0	0.00	0	0.00
Ellis	0	0.00	0	0.00	1	24.54
Garfield	4	6.92	0	0.00	2	3.46
Garvin	3	11.03	0	0.00	0	0.00
Grady	9	19.77	0	0.00	0	0.00
Grant	1	19.44	0	0.00	0	0.00
Greer	3	49.50	0	0.00	0	0.00
Harmon	0	0.00	0	0.00	0	0.00
Harper	1	28.07	0	0.00	1	28.07
Haskell	3	25.44	0	0.00	0	0.00
Hughes	0	0.00	0	0.00	0	0.00
Jackson	5	17.58	0	0.00	0	0.00
Jefferson	1	14.67	0	0.00	0	0.00
Johnston	1	9.51	0	0.00	0	0.00
Kay	8	16.64	0	0.00	2	4.16
Kingfisher	1	7.18	0	0.00	0	0.00
Kiowa	1	9.78	0	0.00	0	0.00
Latimer	1	9.35	0	0.00	0	0.00
LeFlore	3	6.24	0	0.00	0	0.00

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Campylobacteriosis		Cryptosporidiosis		*E. coli* O157:H7 and other EHEC	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	2	6.23	1	3.12	0	0.00
Logan	2	5.90	0	0.00	1	2.95
Love	0	0.00	1	11.32	0	0.00
McClain	2	7.21	0	0.00	0	0.00
McCurtain	6	17.44	0	0.00	0	0.00
McIntosh	3	15.42	0	0.00	2	10.28
Major	0	0.00	0	0.00	1	13.25
Marshall	0	0.00	0	0.00	0	0.00
Mayes	4	10.43	0	0.00	1	2.61
Murray	3	23.77	1	7.92	1	7.92
Muskogee	10	14.40	6	8.64	1	1.44
Noble	3	26.29	0	0.00	0	0.00
Nowata	2	18.92	0	0.00	1	9.46
Okfuskee	2	16.93	5	42.32	0	0.00
Oklahoma	110	16.66	0	0.00	7	1.06
Okmulgee	16	40.32	0	0.00	1	2.52
Osage	2	4.50	0	0.00	0	0.00
Ottawa	3	9.04	0	0.00	0	0.00
Pawnee	1	6.02	0	0.00	0	0.00
Payne	12	17.60	7	10.27	3	4.40
Pittsburg	2	4.55	0	0.00	0	0.00
Pontotoc	5	14.23	0	0.00	2	5.69
Pottawatomie	6	9.16	0	0.00	0	0.00
Pushmataha	0	0.00	0	0.00	0	0.00
Roger Mills	0	0.00	0	0.00	0	0.00
Rogers	6	8.49	1	1.42	0	0.00
Seminole	5	20.09	0	0.00	0	0.00
Sequoyah	9	23.09	0	0.00	0	0.00
Stephens	11	25.47	11	25.47	0	0.00
Texas	5	24.87	0	0.00	0	0.00
Tillman	1	10.77	0	0.00	0	0.00
Tulsa	47	8.34	9	1.60	6	1.07
Wagoner	2	3.48	0	0.00	0	0.00
Washington	1	2.04	0	0.00	0	0.00
Washita	0	0.00	0	0.00	0	0.00
Woods	0	0.00	0	0.00	0	0.00
Woodward	0	0.00	0	0.00	1	5.41
State of Oklahoma	**406**	**11.77**	**56**	**1.62**	**44**	**1.28**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Ehrlichiosis		Giardiasis		*Haemophilus influenzae*, invasive	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	3	14.26	3	14.26	0	0.00
Alfalfa	0	0.00	1	16.38	0	0.00
Atoka	1	7.21	1	7.21	0	0.00
Beaver	0	0.00	0	0.00	0	0.00
Beckham	0	0.00	1	5.05	0	0.00
Blaine	0	0.00	1	8.35	0	0.00
Bryan	0	0.00	1	2.74	0	0.00
Caddo	0	0.00	2	6.63	1	3.32
Canadian	0	0.00	3	3.42	0	0.00
Carter	0	0.00	3	6.58	5	10.96
Cherokee	2	4.70	1	2.35	2	4.70
Choctaw	0	0.00	0	0.00	0	0.00
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	1	0.48	15	7.21	8	3.85
Coal	0	0.00	0	0.00	0	0.00
Comanche	0	0.00	1	0.87	3	2.61
Cotton	0	0.00	0	0.00	0	0.00
Craig	1	6.69	0	0.00	0	0.00
Creek	1	1.48	1	1.48	1	1.48
Custer	0	0.00	1	3.83	0	0.00
Delaware	0	0.00	5	13.49	0	0.00
Dewey	0	0.00	0	0.00	0	0.00
Ellis	0	0.00	0	0.00	0	0.00
Garfield	0	0.00	1	1.73	2	3.46
Garvin	0	0.00	0	0.00	0	0.00
Grady	0	0.00	5	10.99	0	0.00
Grant	0	0.00	0	0.00	0	0.00
Greer	0	0.00	0	0.00	0	0.00
Harmon	0	0.00	0	0.00	1	30.46
Harper	0	0.00	2	56.15	0	0.00
Haskell	0	0.00	1	8.48	0	0.00
Hughes	1	7.07	0	0.00	0	0.00
Jackson	0	0.00	0	0.00	0	0.00
Jefferson	0	0.00	0	0.00	0	0.00
Johnston	0	0.00	0	0.00	0	0.00
Kay	0	0.00	2	4.16	0	0.00
Kingfisher	0	0.00	3	21.54	0	0.00
Kiowa	0	0.00	0	0.00	1	9.78
Latimer	2	18.71	0	0.00	0	0.00
LeFlore	3	6.24	3	6.24	0	0.00

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Ehrlichiosis		Giardiasis		*Haemophilus influenzae*, invasive	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	0	0.00	2	6.23	0	0.00
Logan	0	0.00	0	0.00	1	2.95
Love	0	0.00	0	0.00	0	0.00
McClain	0	0.00	5	18.02	1	3.60
McCurtain	1	2.91	0	0.00	0	0.00
McIntosh	0	0.00	1	5.14	0	0.00
Major	0	0.00	0	0.00	0	0.00
Marshall	0	0.00	0	0.00	0	0.00
Mayes	2	5.21	1	2.61	2	5.21
Murray	0	0.00	1	7.92	0	0.00
Muskogee	0	0.00	6	8.64	0	0.00
Noble	0	0.00	0	0.00	1	8.76
Nowata	0	0.00	0	0.00	0	0.00
Okfuskee	0	0.00	1	8.46	0	0.00
Oklahoma	4	0.61	26	3.94	19	2.88
Okmulgee	2	5.04	3	7.56	1	2.52
Osage	0	0.00	2	4.50	0	0.00
Ottawa	1	3.01	1	3.01	0	0.00
Pawnee	0	0.00	3	18.06	0	0.00
Payne	3	4.40	2	2.93	1	1.47
Pittsburg	6	13.65	0	0.00	2	4.55
Pontotoc	1	2.85	2	5.69	0	0.00
Pottawatomie	2	3.05	3	4.58	2	3.05
Pushmataha	2	17.14	0	0.00	0	0.00
Roger Mills	0	0.00	0	0.00	1	29.10
Rogers	2	2.83	4	5.66	0	0.00
Seminole	0	0.00	0	0.00	1	4.02
Sequoyah	2	5.13	2	5.13	0	0.00
Stephens	0	0.00	3	6.95	0	0.00
Texas	0	0.00	0	0.00	0	0.00
Tillman	0	0.00	0	0.00	0	0.00
Tulsa	2	0.36	29	5.15	20	3.55
Wagoner	1	1.74	9	15.65	2	3.48
Washington	1	2.04	3	6.12	0	0.00
Washita	0	0.00	0	0.00	0	0.00
Woods	0	0.00	0	0.00	0	0.00
Woodward	0	0.00	0	0.00	0	0.00
State of Oklahoma	**47**	**1.36**	**166**	**4.81**	**78**	**2.26**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Hepatitis A		Hepatitis B		Meningococcal invasive disease	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	0	0.00	1	4.75	0	0.00
Alfalfa	0	0.00	0	0.00	0	0.00
Atoka	0	0.00	1	7.21	0	0.00
Beaver	0	0.00	0	0.00	0	0.00
Beckham	0	0.00	0	0.00	0	0.00
Blaine	0	0.00	0	0.00	0	0.00
Bryan	0	0.00	0	0.00	0	0.00
Caddo	0	0.00	3	9.95	0	0.00
Canadian	0	0.00	2	2.28	0	0.00
Carter	0	0.00	0	0.00	0	0.00
Cherokee	0	0.00	1	2.35	1	2.35
Choctaw	0	0.00	1	6.52	0	0.00
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	1	0.48	4	1.92	0	0.00
Coal	0	0.00	0	0.00	0	0.00
Comanche	0	0.00	5	4.35	0	0.00
Cotton	0	0.00	0	0.00	0	0.00
Craig	0	0.00	2	13.38	0	0.00
Creek	0	0.00	7	10.39	0	0.00
Custer	0	0.00	0	0.00	0	0.00
Delaware	0	0.00	0	0.00	0	0.00
Dewey	0	0.00	0	0.00	0	0.00
Ellis	0	0.00	0	0.00	0	0.00
Garfield	0	0.00	0	0.00	0	0.00
Garvin	0	0.00	0	0.00	0	0.00
Grady	0	0.00	1	2.20	0	0.00
Grant	0	0.00	0	0.00	0	0.00
Greer	1	16.50	1	16.50	0	0.00
Harmon	0	0.00	0	0.00	0	0.00
Harper	0	0.00	0	0.00	0	0.00
Haskell	0	0.00	0	0.00	0	0.00
Hughes	0	0.00	1	7.07	1	7.07
Jackson	0	0.00	0	0.00	0	0.00
Jefferson	0	0.00	0	0.00	0	0.00
Johnston	0	0.00	1	9.51	0	0.00
Kay	1	2.08	0	0.00	1	2.08
Kingfisher	0	0.00	0	0.00	0	0.00
Kiowa	0	0.00	0	0.00	0	0.00
Latimer	0	0.00	0	0.00	0	0.00
LeFlore	0	0.00	2	4.16	0	0.00

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Hepatitis A		Hepatitis B		Meningococcal invasive disease	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	0	0.00	3	9.35	0	0.00
Logan	0	0.00	0	0.00	1	2.95
Love	1	11.32	0	0.00	0	0.00
McClain	0	0.00	1	3.60	0	0.00
McCurtain	0	0.00	0	0.00	0	0.00
McIntosh	0	0.00	1	5.14	0	0.00
Major	0	0.00	0	0.00	0	0.00
Marshall	0	0.00	0	0.00	0	0.00
Mayes	0	0.00	0	0.00	0	0.00
Murray	0	0.00	0	0.00	0	0.00
Muskogee	0	0.00	4	5.76	0	0.00
Noble	0	0.00	0	0.00	0	0.00
Nowata	0	0.00	0	0.00	0	0.00
Okfuskee	0	0.00	0	0.00	0	0.00
Oklahoma	2	0.30	4	0.61	3	0.45
Okmulgee	0	0.00	6	15.12	0	0.00
Osage	0	0.00	4	9.00	1	2.25
Ottawa	0	0.00	0	0.00	0	0.00
Pawnee	0	0.00	1	6.02	0	0.00
Payne	0	0.00	0	0.00	1	1.47
Pittsburg	0	0.00	4	9.10	1	2.28
Pontotoc	0	0.00	2	5.69	0	0.00
Pottawatomie	0	0.00	3	4.58	0	0.00
Pushmataha	0	0.00	0	0.00	0	0.00
Roger Mills	0	0.00	0	0.00	0	0.00
Rogers	0	0.00	0	0.00	0	0.00
Seminole	0	0.00	2	8.03	1	4.02
Sequoyah	0	0.00	7	17.96	0	0.00
Stephens	0	0.00	0	0.00	0	0.00
Texas	1	4.97	0	0.00	0	0.00
Tillman	0	0.00	0	0.00	0	0.00
Tulsa	4	0.71	16	2.84	2	0.36
Wagoner	0	0.00	0	0.00	1	1.74
Washington	0	0.00	0	0.00	0	0.00
Washita	0	0.00	0	0.00	0	0.00
Woods	0	0.00	0	0.00	0	0.00
Woodward	0	0.00	5	27.05	1	5.41
State of Oklahoma	**11**	**0.32**	**96**	**2.78**	**15**	**0.43**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Pertussis		Rocky Mountain Spotted Fever		Salmonellosis	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	0	0.00	2	9.51	5	23.77
Alfalfa	0	0.00	1	16.38	2	32.76
Atoka	0	0.00	1	7.21	2	14.41
Beaver	0	0.00	0	0.00	0	0.00
Beckham	2	10.10	0	0.00	6	30.30
Blaine	0	0.00	0	0.00	0	0.00
Bryan	0	0.00	0	0.00	2	5.47
Caddo	0	0.00	0	0.00	3	9.95
Canadian	0	0.00	1	1.14	16	18.24
Carter	0	0.00	1	2.19	10	21.92
Cherokee	0	0.00	1	2.35	7	16.46
Choctaw	0	0.00	2	13.04	1	6.52
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	3	1.44	3	1.44	23	11.06
Coal	0	0.00	0	0.00	3	49.74
Comanche	2	1.74	1	0.87	10	8.70
Cotton	0	0.00	0	0.00	0	0.00
Craig	1	6.69	0	0.00	4	26.76
Creek	0	0.00	2	2.97	18	26.72
Custer	0	0.00	1	3.83	10	38.25
Delaware	2	5.39	3	8.09	7	18.88
Dewey	0	0.00	0	0.00	0	0.00
Ellis	0	0.00	0	0.00	0	0.00
Garfield	1	1.73	0	0.00	10	17.30
Garvin	0	0.00	2	7.35	11	40.43
Grady	2	4.39	0	0.00	8	17.58
Grant	0	0.00	0	0.00	2	38.88
Greer	0	0.00	0	0.00	1	16.50
Harmon	0	0.00	0	0.00	0	0.00
Harper	4	112.30	0	0.00	0	0.00
Haskell	0	0.00	2	16.96	3	25.44
Hughes	0	0.00	2	14.13	1	7.07
Jackson	0	0.00	0	0.00	7	24.61
Jefferson	0	0.00	1	14.67	3	44.00
Johnston	0	0.00	0	0.00	2	19.02
Kay	1	2.08	0	0.00	6	12.48
Kingfisher	0	0.00	1	7.18	1	7.18
Kiowa	0	0.00	1	9.78	3	29.33
Latimer	0	0.00	1	9.35	3	28.06
LeFlore	1	2.08	9	18.71	10	20.79

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Pertussis		Rocky Mountain Spotted Fever		Salmonellosis	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	0	0.00	2	6.23	6	18.70
Logan	1	2.95	2	5.90	6	17.69
Love	0	0.00	1	11.32	0	0.00
McClain	0	0.00	2	7.21	5	18.02
McCurtain	0	0.00	5	14.53	3	8.72
McIntosh	1	5.14	0	0.00	2	10.28
Major	0	0.00	0	0.00	2	26.51
Marshall	0	0.00	1	7.58	4	30.34
Mayes	2	5.21	5	13.03	8	20.85
Murray	0	0.00	1	7.92	2	15.84
Muskogee	0	0.00	2	2.88	12	17.28
Noble	0	0.00	1	8.76	0	0.00
Nowata	0	0.00	0	0.00	0	0.00
Okfuskee	0	0.00	0	0.00	3	25.39
Oklahoma	14	2.12	19	2.88	118	17.87
Okmulgee	0	0.00	1	2.52	4	10.08
Osage	0	0.00	1	2.25	8	18.00
Ottawa	0	0.00	4	12.05	2	6.03
Pawnee	0	0.00	1	6.02	6	36.12
Payne	0	0.00	4	5.87	17	24.93
Pittsburg	0	0.00	15	34.13	6	13.65
Pontotoc	0	0.00	3	8.54	8	22.76
Pottawatomie	0	0.00	7	10.68	11	16.79
Pushmataha	0	0.00	2	17.14	9	77.14
Roger Mills	0	0.00	0	0.00	4	116.41
Rogers	3	4.25	3	4.25	16	22.65
Seminole	2	8.03	1	4.02	1	4.02
Sequoyah	1	2.57	2	5.13	7	17.96
Stephens	3	6.95	2	4.63	19	44.00
Texas	0	0.00	0	0.00	6	29.84
Tillman	0	0.00	0	0.00	1	10.77
Tulsa	16	2.84	10	1.78	90	15.98
Wagoner	0	0.00	0	0.00	9	15.65
Washington	0	0.00	0	0.00	3	6.12
Washita	0	0.00	0	0.00	0	0.00
Woods	1	11.00	0	0.00	3	33.01
Woodward	1	5.41	0	0.00	4	21.64
State of Oklahoma	**64**	**1.85**	**135**	**3.91**	**605**	**17.53**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Shigellosis		*Streptococcus*, Group A Invasive		*Streptococcus pneumoniae*, Inv.	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	0	0.00	1	4.75	4	19.01
Alfalfa	1	16.38	0	0.00	0	0.00
Atoka	0	0.00	0	0.00	1	7.21
Beaver	0	0.00	0	0.00	0	0.00
Beckham	0	0.00	1	5.05	5	25.25
Blaine	1	8.35	0	0.00	2	16.70
Bryan	0	0.00	0	0.00	2	5.47
Caddo	0	0.00	0	0.00	12	39.80
Canadian	2	2.28	3	3.42	14	15.96
Carter	2	4.38	1	2.19	11	24.11
Cherokee	0	0.00	0	0.00	6	14.11
Choctaw	0	0.00	0	0.00	3	19.55
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	8	3.85	3	1.44	29	13.94
Coal	0	0.00	0	0.00	1	16.58
Comanche	12	10.44	4	3.48	18	15.65
Cotton	0	0.00	0	0.00	1	15.12
Craig	4	26.76	1	6.69	1	6.69
Creek	19	28.20	1	1.48	17	25.23
Custer	0	0.00	1	3.83	6	22.95
Delaware	0	0.00	0	0.00	3	8.09
Dewey	0	0.00	0	0.00	1	21.08
Ellis	0	0.00	0	0.00	0	0.00
Garfield	4	6.92	0	0.00	19	32.86
Garvin	0	0.00	0	0.00	11	40.43
Grady	8	17.58	5	10.99	11	24.17
Grant	0	0.00	0	0.00	2	38.88
Greer	0	0.00	0	0.00	1	16.50
Harmon	0	0.00	1	30.46	0	0.00
Harper	1	28.07	0	0.00	0	0.00
Haskell	0	0.00	0	0.00	7	59.36
Hughes	1	7.07	0	0.00	3	21.20
Jackson	6	21.10	0	0.00	3	10.55
Jefferson	0	0.00	0	0.00	0	0.00
Johnston	0	0.00	0	0.00	2	19.02
Kay	1	2.08	1	2.08	2	4.16
Kingfisher	1	7.18	1	7.18	0	0.00
Kiowa	1	9.78	1	9.78	0	0.00
Latimer	0	0.00	1	9.35	2	18.71
LeFlore	0	0.00	0	0.00	4	8.31

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Shigellosis		*Streptococcus*, Group A Invasive		*Streptococcus pneumoniae*, Inv.	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	1	3.12	1	3.12	8	24.94
Logan	0	0.00	1	2.95	8	23.58
Love	0	0.00	0	0.00	2	22.65
McClain	2	7.21	0	0.00	3	10.81
McCurtain	0	0.00	1	2.91	7	20.35
McIntosh	0	0.00	1	5.14	6	30.84
Major	0	0.00	0	0.00	2	26.51
Marshall	0	0.00	0	0.00	4	30.34
Mayes	1	2.61	1	2.61	11	28.67
Murray	0	0.00	0	0.00	2	15.84
Muskogee	3	4.32	0	0.00	7	10.08
Noble	0	0.00	1	8.76	1	8.76
Nowata	0	0.00	0	0.00	0	0.00
Okfuskee	1	8.46	0	0.00	1	8.46
Oklahoma	41	6.21	37	5.60	187	28.31
Okmulgee	27	68.04	1	2.52	6	15.12
Osage	0	0.00	0	0.00	3	6.75
Ottawa	0	0.00	1	3.01	6	18.08
Pawnee	0	0.00	0	0.00	2	12.04
Payne	0	0.00	2	2.93	12	17.60
Pittsburg	0	0.00	2	4.55	13	29.58
Pontotoc	2	5.69	3	8.54	5	14.23
Pottawatomie	4	6.10	1	1.53	20	30.52
Pushmataha	0	0.00	0	0.00	1	8.57
Roger Mills	0	0.00	2	58.21	0	0.00
Rogers	10	14.16	1	1.42	6	8.49
Seminole	3	12.05	0	0.00	4	16.07
Sequoyah	2	5.13	0	0.00	6	15.40
Stephens	0	0.00	0	0.00	9	20.84
Texas	1	4.97	0	0.00	0	0.00
Tillman	5	53.84	0	0.00	1	10.77
Tulsa	18	3.20	41	7.28	130	23.08
Wagoner	0	0.00	1	1.74	14	24.35
Washington	2	4.08	0	0.00	8	16.33
Washita	0	0.00	0	0.00	0	0.00
Woods	0	0.00	1	11.00	1	11.00
Woodward	0	0.00	0	0.00	3	16.23
State of Oklahoma	**195**	**5.65**	**125**	**3.62**	**703**	**20.37**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Tuberculosis		Tularemia		West Nile Virus	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	0	0.00	0	0.00	0	0.00
Alfalfa	0	0.00	0	0.00	0	0.00
Atoka	1	7.21	0	0.00	0	0.00
Beaver	1	17.07	0	0.00	1	17.07
Beckham	0	0.00	0	0.00	1	5.05
Blaine	0	0.00	0	0.00	0	0.00
Bryan	3	8.21	0	0.00	0	0.00
Caddo	3	9.95	0	0.00	1	3.32
Canadian	3	3.42	0	0.00	2	2.28
Carter	2	4.38	0	0.00	7	15.34
Cherokee	4	9.41	1	2.35	0	0.00
Choctaw	0	0.00	0	0.00	0	0.00
Cimarron	0	0.00	0	0.00	0	0.00
Cleveland	9	4.33	0	0.00	1	0.48
Coal	0	0.00	0	0.00	0	0.00
Comanche	4	3.48	0	0.00	2	1.74
Cotton	0	0.00	0	0.00	0	0.00
Craig	0	0.00	0	0.00	0	0.00
Creek	2	2.97	0	0.00	0	0.00
Custer	1	3.83	0	0.00	0	0.00
Delaware	1	2.70	0	0.00	0	0.00
Dewey	0	0.00	0	0.00	0	0.00
Ellis	0	0.00	0	0.00	0	0.00
Garfield	3	5.19	0	0.00	0	0.00
Garvin	1	3.68	1	3.68	0	0.00
Grady	1	2.20	0	0.00	2	4.39
Grant	0	0.00	0	0.00	0	0.00
Greer	0	0.00	0	0.00	0	0.00
Harmon	0	0.00	0	0.00	0	0.00
Harper	2	56.15	0	0.00	0	0.00
Haskell	0	0.00	0	0.00	0	0.00
Hughes	1	7.07	0	0.00	0	0.00
Jackson	1	3.52	0	0.00	1	3.52
Jefferson	0	0.00	0	0.00	1	14.67
Johnston	1	9.51	0	0.00	0	0.00
Kay	2	4.16	0	0.00	0	0.00
Kingfisher	0	0.00	0	0.00	0	0.00
Kiowa	0	0.00	0	0.00	0	0.00
Latimer	0	0.00	0	0.00	0	0.00
LeFlore	0	0.00	0	0.00	0	0.00

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Diseases by County, Oklahoma, 2006

	Tuberculosis		Tularemia		West Nile Virus	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	0	0.00	0	0.00	0	0.00
Logan	1	2.95	0	0.00	0	0.00
Love	1	11.32	0	0.00	0	0.00
McClain	0	0.00	0	0.00	0	0.00
McCurtain	5	14.53	0	0.00	1	2.91
McIntosh	0	0.00	0	0.00	0	0.00
Major	0	0.00	0	0.00	0	0.00
Marshall	0	0.00	0	0.00	1	7.58
Mayes	3	7.82	0	0.00	0	0.00
Murray	0	0.00	0	0.00	0	0.00
Muskogee	5	7.20	0	0.00	0	0.00
Noble	0	0.00	0	0.00	0	0.00
Nowata	0	0.00	0	0.00	0	0.00
Okfuskee	1	8.46	0	0.00	0	0.00
Oklahoma	32	4.85	1	0.15	11	1.67
Okmulgee	1	2.52	0	0.00	1	2.52
Osage	1	2.25	0	0.00	0	0.00
Ottawa	0	0.00	0	0.00	1	3.01
Pawnee	0	0.00	0	0.00	0	0.00
Payne	3	4.40	0	0.00	0	0.00
Pittsburg	1	2.28	0	0.00	3	6.83
Pontotoc	2	5.69	0	0.00	1	2.85
Pottawatomie	7	10.68	0	0.00	0	0.00
Pushmataha	0	0.00	0	0.00	0	0.00
Roger Mills	0	0.00	0	0.00	1	29.10
Rogers	0	0.00	0	0.00	1	1.42
Seminole	1	4.02	0	0.00	0	0.00
Sequoyah	1	2.57	0	0.00	0	0.00
Stephens	1	2.32	0	0.00	1	2.32
Texas	5	24.87	0	0.00	0	0.00
Tillman	1	10.77	0	0.00	0	0.00
Tulsa	20	3.55	0	0.00	5	0.89
Wagoner	3	5.22	0	0.00	1	1.74
Washington	1	2.04	0	0.00	0	0.00
Washita	0	0.00	0	0.00	0	0.00
Woods	1	11.00	0	0.00	1	11.00
Woodward	1	5.41	0	0.00	0	0.00
State of Oklahoma	**144**	**4.17**	**3**	**0.09**	**48**	**1.39**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2000 Census Bureau county population and multiplying by 100,000.

Reportable Sexually Transmitted Diseases by County, Oklahoma, 2006

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Adair	67	318.47	9	42.78	*	*
Alfalfa	8	131.04	*	*	*	*
Atoka	22	158.51	6	43.23	*	*
Beaver	5	85.37	*	*	*	*
Beckham	76	383.86	13	65.66	*	*
Blaine	23	192.05	*	*	*	*
Bryan	141	385.94	30	82.12	*	*
Caddo	120	398.01	49	162.52	*	*
Canadian	177	201.83	38	43.33	*	*
Carter	130	284.96	81	177.55	*	*
Cherokee	221	519.74	43	101.13	*	*
Choctaw	54	351.98	17	110.81	*	*
Cimarron	*	*	*	*	*	*
Cleveland	557	267.77	114	54.80	*	*
Coal	14	232.13	4	66.32	*	*
Comanche	823	715.68	316	274.79	9	7.83
Cotton	10	151.19	3	45.36	*	*
Craig	46	307.69	5	33.44	*	*
Creek	220	326.57	53	78.67	*	*
Custer	122	466.68	23	87.98	*	*
Delaware	39	105.19	*	*	*	*
Dewey	5	105.42	*	*	*	*
Ellis	5	122.70	*	*	*	*
Garfield	206	356.32	86	148.76	*	*
Garvin	72	264.61	18	66.15	*	*
Grady	95	208.72	24	52.73	*	*
Grant	6	116.64	*	*	*	*
Greer	12	197.99	*	*	*	*
Harmon	8	243.68	4	121.84	*	*
Harper	5	140.37	*	*	*	*
Haskell	28	237.45	*	*	*	*
Hughes	36	254.35	7	49.46	*	*
Jackson	124	436.02	83	291.85	*	*
Jefferson	8	117.34	*	*	*	*
Johnston	22	209.26	*	*	*	*
Kay	131	272.46	28	58.24	*	*
Kingfisher	21	150.80	6	43.08	*	*
Kiowa	20	195.56	3	29.33	*	*
Latimer	27	252.53	6	56.12	*	*
LeFlore	129	268.14	9	18.71	*	*

^ 2006 Rates illustrate county specific incidence rates per 100,000 population.

*Confidentiality concerns restrict releasing data for counties in Oklahoma that have two or fewer cases

Reportable Sexually Transmitted Diseases by County, Oklahoma, 2006

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	**Number**	**Rate^**	**Number**	**Rate^**	**Number**	**Rate^**
Lincoln	83	258.73	15	46.76	*	*
Logan	156	459.85	76	224.03	*	*
Love	21	237.80	3	33.97	*	*
McClain	57	205.48	6	21.63	*	*
McCurtain	147	427.30	36	104.65	*	*
McIntosh	71	364.93	10	51.40	*	*
Major	7	92.78	*	*	*	*
Marshall	19	144.11	3	22.75	*	*
Mayes	97	252.81	12	31.28	*	*
Murray	27	213.90	3	23.77	*	*
Muskogee	370	532.75	146	210.22	*	*
Noble	19	166.51	7	61.34	*	*
Nowata	20	189.23	*	*	*	*
Okfuskee	27	228.54	7	59.25	*	*
Oklahoma	3502	530.25	2042	309.18	92	13.93
Okmulgee	184	463.65	38	95.75	*	*
Osage	60	135.02	7	15.75	*	*
Ottawa	107	322.35	16	48.20	*	*
Pawnee	30	180.59	15	90.30	*	*
Payne	286	419.42	67	98.25	*	*
Pittsburg	125	284.39	36	81.91	*	*
Pontotoc	179	509.35	36	102.44	*	*
Pottawatomie	229	349.51	49	74.79	*	*
Pushmataha	20	171.42	6	51.43	*	*
Roger Mills	5	145.52	*	*	*	*
Rogers	199	281.71	40	56.62	3	4.25
Seminole	114	457.94	20	80.34	*	*
Sequoyah	89	228.37	19	48.75	*	*
Stephens	86	199.16	24	55.58	*	*
Texas	71	353.11	4	19.89	*	*
Tillman	39	419.94	14	150.75	*	*
Tulsa	2357	418.43	1039	184.45	36	6.39
Wagoner	118	205.25	33	57.40	*	*
Washington	131	267.37	21	42.86	24	48.98
Washita	27	234.62	*	*	*	*
Woods	24	264.06	3	33.01	*	*
Woodward	53	286.70	*	*	*	*
State of Oklahoma	**12,992**	**376.51**	**4,951**	**143.48**	**191**	**5.54**

^ 2006 Rates illustrate county specific incidence rates per 100,000 population.

* Confidentiality concerns restrict releasing data for counties in Oklahoma that have two or fewer cases

Estimated Numbers of Persons Living with HIV Infection (non-AIDS), (per 100,000 population) by County of Residence, as of December 31, 2006, Oklahoma.

County	HIV Infection	Prevalence Rate per 100,000	County	HIV Infection	Prevalence Rate per 100,000
Adair	**	**	Lincoln	4	12.5
Alfalfa	**	**	Logan	23	67.8
Atoka	**	**	Love	**	**
Beaver	**	**	Major	3	39.8
Beckham	7	35.4	Marshall	5	37.9
Blaine	10	83.5	Mayes	7	18.2
Bryan	9	24.6	McClain	12	43.3
Caddo	20	66.3	McCurtain	7	20.3
Canadian	39	44.5	McIntosh	4	20.6
Carter	11	24.1	Murray	**	**
Cherokee	9	21.2	Muskogee	22	31.7
Choctaw	7	45.6	Noble	6	52.6
Cimarron	**	**	Nowata	**	**
Cleveland	127	61.1	Okfuskee	**	**
Coal	**	**	Oklahoma	865	131.0
Comanche	127	110.4	Okmulgee	8	20.2
Cotton	**	**	Osage	7	15.8
Craig	4	26.8	Ottawa	7	21.1
Creek	15	22.3	Pawnee	6	36.1
Custer	11	42.1	Payne	23	33.7
Delaware	3	8.1	Pittsburg	14	31.9
Dewey	3	63.3	Pontotoc	12	34.1
Ellis	**	**	Pottawatomie	20	30.5
Garfield	27	46.7	Pushmataha	**	**
Garvin	**	**	Rogers Mills	**	**
Grady	14	30.8	Rogers	22	31.1
Grant	**	**	Seminole	9	36.2
Greer	4	66.0	Sequoyah	8	20.5
Harmon	**	**	Stephens	9	20.8
Harper	**	**	Texas	8	39.8
Haskell	**	**	Tillman	**	**
Hughes	**	**	Tulsa	587	104.2
Jackson	6	21.1	Wagoner	9	15.7
Jefferson	4	58.7	Washington	9	18.4
Johnston	3	28.5	Washita	**	**
Kay	15	31.2	Woods	**	**
Kingfisher	4	28.7	Woodward	6	32.5
Kiowa	**	**	Other/Unknown*	4	NA
Latimer	**	**		**	**
LeFlore	16	33.3	**Total**	**2,243**	**65.0**

"Other/Unknown" are clients who are residing in Oklahoma where the county of residence at first diagnosis was not documented.

**Confidentiality concerns restrict releasing data for counties which have two (2) or fewer cases.

Estimated Numbers of Persons Living with AIDS (per 100,000 population) by County of Residence, as of December 31, 2006, Oklahoma.

County	AIDS Cases	Prevalence Rate per 100,000	County	AIDS Cases	Prevalence Rate per 100,000
Adair	8	38.0	Lincoln	10	31.2
Alfalfa	**	**	Logan	14	41.3
Atoka	8	57.6	Love	**	**
Beaver	**	**	Major	**	**
Beckham	3	15.2	Marshall	**	**
Blaine	5	41.8	Mayes	10	26.1
Bryan	14	38.3	McClain	13	46.9
Caddo	10	33.2	McCurtain	8	23.3
Canadian	38	43.3	McIntosh	7	36.0
Carter	11	24.1	Murray	**	**
Cherokee	14	32.9	Muskogee	31	44.6
Choctaw	4	26.1	Noble	**	**
Cimarron	**	**	Nowata	3	28.4
Cleveland	82	39.4	Okfuskee	5	42.3
Coal	**	**	Oklahoma	817	123.7
Comanche	49	42.6	Okmulgee	15	37.8
Cotton	**	**	Osage	9	20.3
Craig	10	66.9	Ottawa	8	24.1
Creek	20	29.7	Pawnee	8	48.2
Custer	8	30.6	Payne	18	26.4
Delaware	7	18.9	Pittsburg	14	31.9
Dewey	**	**	Pontotoc	7	19.9
Ellis	**	**	Pottawatomie	29	44.3
Garfield	14	24.2	Pushmataha	**	**
Garvin	7	25.7	Rogers Mills	**	**
Grady	14	30.8	Rogers	16	22.6
Grant	**	**	Seminole	7	28.1
Greer	**	**	Sequoyah	13	33.4
Harmon	**	**	Stephens	8	18.5
Harper	**	**	Texas	3	14.9
Haskell	6	50.9	Tillman	**	**
Hughes	**	**	Tulsa	632	112.2
Jackson	9	31.6	Wagoner	12	20.9
Jefferson	3	44.0	Washington	14	28.6
Johnston	**	**	Washita	**	**
Kay	13	27.0	Woods	**	**
Kingfisher	**	**	Woodward	4	21.6
Kiowa	**	**	Other/Unknown*	29	NA
Latimer	3	28.1		**	**
LeFlore	20	41.6	**Total**	**2,168**	**62.8**

"Other/Unknown" are clients who are residing in Oklahoma where the county of residence at first diagnosis was not documented.

**Confidentiality concerns restrict releasing data for counties which have two (2) or fewer cases.

Public Health Laboratory: Update

The Public Health Laboratory (PHL) provides accurate, and high quality laboratory testing to the citizens of Oklahoma by working closely with all divisions of the Oklahoma State Department of Health. The PHL actively participates in the evolving process to promote and improve the health and quality of life for the citizens of Oklahoma by being an essential component of both the State and the National Public Health infrastructure.

A national public health laboratory network has been established, and the PHL actively participates in this network to protect the health and safety of the citizens of Oklahoma. Infectious disease surveillance, detection and rapid diagnosis of communicable diseases, as well as, detection of possible bioterrorism events allow the PHL to be one of the first lines of defense for Oklahoma.

As the PHL, we provide laboratory support for the following programs:

- Disease Control and Prevention
- Maternal and Child Health
- Newborn Screening, and
- STD/HIV Services, and
- Terrorism Prepardeness

Currently the PHL participates in:

- Epidemiology surveillance activities
- Outbreak investigations
- Monitoring for emergence of new infectious agents and re-emergence of older infectious agents,
- Oversee laboratory quality assurance for County Health Department laboratory operations,
- Provide training of private and public laboratory personnel, and
- Support surveillance for possible Bioterrorism events.

The following are some of the services the PHL provides to the citizens of Oklahoma and the nation.

Bacteriology/Parasitology Section:

The general bacteriology laboratory performs primary isolation and identification on clinical specimens of human and nonhuman origin, as well as, identifying referred isolates from laboratories across the State. This section also performs testing for food borne pathogens during outbreak situations.

The enteric bacteriology section examines stools from both human and nonhuman sources for a wide variety of enteropathogens including: *Salmonella spp*., *Shigella spp*., enterohemorrhagic *Escherichia coli*, *Campylobacter spp*., *Vibrio* spp., *Yersinia enterocolitica*, *Aeromonas spp*., *Pleisomonas shigelloides, Bacillus cereus* and *Staphylococcus aureus*. In addition to clinical specimens, all *Salmonella, Shigella*

and enterohemorrhagic *E. coli* isolated in clinical laboratories are required to be sent to this laboratory for speciation and serotyping.

Identification of bacterial strains are performed by using a combination of rapid and traditional biochemical testing, serotyping and Real Time Polymerase Chain Reaction (PCR). All isolates of *Escherichia coli* are screened by Real Time PCR to detect the presence of STX I and STX II genes that are responsible for the production of shiga like toxins. The direct fluorescent antibody stain for *Bordetella pertussis* and *Bordetella parapertussis* has been replaced by Real Time PCR.

The Parasitology Section examines stool, referred stains, and blood for amoebas, nematodes, cestodes, and trematodes. Techniques used for these examinations include wet mounts using iodine and saline, trichrome stain and modified acid fast stain for the detection of *Cryptosporidium* and *Cyclospora*.

2006 Specimens:

Organism	Total #
*Salmonell*a spp.	589
Shigella spp.	152
Suspect Shiga toxin Producing *E. coli*	136
Shiga toxin producing *E. coli*	40
Campylobacter spp.	256
Clinical stools	279
Bordetella pertussis & parapertussis screens	239
Bordetella pertussis positive	11
Bordetella paratussis positive	3
Group B Streptococcus screening	422
Group B Streptococcus positive	51

Molecular-Bioterrorism Section

The Bioterrorism Section consists of a Biosafety Level 3 and a Biosafety Level 3 enhanced facility with the ability to rapidly and safely identify anthrax and other potential agents of Bioterrorism (BT). Culture, fluorescent antibody staining, real time-PCR, and time resolved fluorescence assays are used to rapidly detect select agents thought to be most probable for use in BT events. These agents include *Bacillus anthracis, Yersinia pestis, Brucella species, Francisella tularensis*, *Burkholderia mallei/pseudomallei*, Ricin toxin, *Staphylococcus* enterotoxin B, *Clostridium botulinum* toxins as well as a variety of orthopox/nonorthopox viruses and avian influenza. The PHL is a Level B or Reference laboratory in the National Laboratory Response Network (LRN) employing standardized reagents and methods from CDC. The section also has the capability to gene sequence, which allows more accurate and rapid identification of unusual isolates by comparing the genetic structure with established databases.

Due to an increased awareness of avian influenza A H5N1 and the awareness of pandemic flu, the PHL was able to purchase instrumentation to rule out an exposure to this influenza strain. New viral extraction and real time PCR equipment will decrease the detection time of Influenza H5 by 2-3 hours. Preliminary rapid results are available within approximately 5 hours while definitive viral culture may take 3-5 days. All respiratory viral samples are routinely screened for Influenza A H1, H3, H5 and H7 and Influenza B. This same technology also gives the PHL added testing volume if needed for large-scale BT events.

The Molecular section collaborated with a commercial vendor in early validation studies of a respiratory viral panel (RVP). The PHL was the only lab in the US chosen to participate. Due to our technical expertise and quality results, an FDA approved kit, which simultaneously detects 17 different viruses including Influenza H5, should be on the market by mid-2007.

PulseNet Section

The Public Health Laboratory routinely analyzes all *Salmonella, Shigella, Escherichia coli* O157:H7, and *Listeria monocytogenes* isolates by Pulsed-field gel electrophoresis (PFGE). *Campylobacter*, *Haemophilus, Neisseria, Serratia, Pseudomonas,* MRSA*,* as well as a variety of other bacteria may be run based on need. PFGE patterns of each strain are digitalized and stored as computer files. These files can then be compared locally, national or internationally for similarity by standardized computer software.

PFGE is an invaluable epidemiological tool that characterizes chromosomal bacterial DNA allowing quick comparisons, which often will detect outbreaks before they reach epidemic proportions. Only a few isolates of a particular bacteria in one area of the country or state may often go unnoticed as an outbreak, but when these PFGE patterns are compared to the national database, they may be found to be part of a larger outbreak in other regions of the country. Currently, the Public Health Laboratory is a member of PulseNet, which is the standardized international molecular subtyping network of databases for foodborne pathogens provided by the Center for Disease Control and Prevention (CDC). PulseNet allows all 50 states, as well as the Food and Drug Agency, US Department of Agriculture, and Canadian Provinces to interact with one another to quickly recognize outbreaks at the outset when prevention measures can be effectively taken. PulseNet has recently expanded to include PulseNet Europe, Asia Pacific, Middle East, and Latin America.

In 2006 the PFGE lab analyzed over 2800 samples. These included:

Total	Organism
900	*Salmonella*
200	*Shigella*
100	*E. coli*
50	*Listeria*
200	MRSA
120	*Pseudomonas*
90	*Campylobacter*

PFGE staff responded to over 300 outbreak postings on PulseNet's WebBoard. The Webboard is an electronic forum that allows all PFGE laboratorians and epidemiologists to post outbreak or investigational information. Oklahoma posted over 30 clusters identified in our state to the WebBoard, and alerted state epidemiologists to approximately 30 additional smaller clusters.

The PFGE lab was also involved in testing during 2 national food recalls: the *E. coli* tainted spinach and *Salmonella* tainted peanut butter outbreaks.
Due to our technical expertise and training we were able to contribute to both outbreaks. Using PFGE results, we were able to eliminate Oklahoma O157:H7 *E. coli* suspects from the national cluster for spinach. The PHL was the first Public Health Laboratory to isolate *Salmonella* Tennessee from contaminated peanut butter. As of June 2006, approximately 25 *S.* Tennessee isolates from patient and/or peanut butter samples have been submitted to PulseNet's national database from our PHL.

Mycobacteriology / Mycology Section

The Mycobacteriology/Mycology section functions to isolate and identify tuberculosis and other *Mycobacterium sp*. The laboratory accepts specimens from all County Health Departments and hospitals located in Oklahoma. Specimens are processed in the laboratory with an acid-fast stain result available within 24 hours. Specimens are also inoculated into a liquid media and onto a solid media. Once growth is detected, mycolic acid analysis is performed utilizing high performance liquid chromatography (HPLC). In addition, DNA probes are utilized followed by traditional biochemical tests for identification to complete identification for samples not identified through mycolic acid analysis. Antimicrobial susceptibility to first line antimycobacterial drugs is performed on all isolates grown or referred.

The Mycology section serves the State of Oklahoma by isolating and identifying fungal specimens. The laboratory receives clinical specimens and referred isolates. The laboratory utilizes DNA probe technology for the rapid identification of *Histoplasma capsulatum*, *Blastomyces dermatitidis* and *Coccidiodes immitis*. Yeasts are identified by carbon assimilation tests. Fungal isolates are identified using microscopic and macroscopic observations with additional tests used to supplement as needed.

2006 Mycobacteriology and Mycology Numbers

- 6032 specimens processed for mycobacteria
- 385 referred specimens received for mycobacteria identification
- 340 (5.64%) specimens processed were culture positive for *M. Tuberculosis Complex* (M.tb.C)
- 41 (10.65%) referred specimens were culture positive for M.tb.C
- 498 (8.26%) specimens processed were smear positive
- 77 specimens had M.tb.C drug susceptibilities performed
- 5 M.tb.C. specimens were 0.1ug/ml INH resistant. Of these 2 were also 0.4ug/ml INH resistant
- 4 M.tb.C. specimens were 100.0 ug/ml PZA resistant
- 169 specimens were received for mycology testing

Virology Section

The Virology Section isolates and identifies all common viral agents by cell culture. This section comprises an essential part in the Influenza Surveillance Program. By providing strain characterization of influenza isolates, we assist in the determination of yearly vaccine strain selection and the efficacy of the vaccine. Virus isolation and identification enables us to track disease producing viral agents, which may become epidemic in Oklahoma.

The Virology section also performs rabies examinations by direct immunofluorescence on brain specimens from any animal suspected of having rabies, especially if a human or animal exposure is suspected. The rabies laboratory has a key role in the prevention and control of rabies in Oklahoma. This is the only laboratory in the State that provides rabies testing. Being a fatal disease, rapid laboratory diagnosis of the rabies virus can lead to timely and effective prophylaxis for exposed humans.

In 2006 the PHL tested 1,171 specimens for rabies. The most common animals tested are listed below:

Type Animal	Negative	Positive
Bat	28	3
Cat	337	4
Cow	52	6
Dog	563	1
Horse	27	5
Skunk	61	50

This section conducts testing for the two most common agents of sexually transmitted diseases, *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC). A nucleic acid amplified assay is used to test endocervical and male urethral swab

specimens from all the county health departments in the State of Oklahoma and several health clinics. We also test urine specimens from the Juvenile Detention Centers, a high-risk population, for CT and GC. Urine collection is a noninvasive method of sampling juveniles.

Early diagnosis of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* leads to timely treatment, thereby reducing the possibility of complications and the risk of further transmission.

Test	Total Tested	Positive CT	Positive GC	Positive Ct/GC
CT/GT	68252	6201	1961	1053

Test	Total Tested	Positive H1	Positive H3	Positive B
Influenza	3055	41	1961	1053

Immunology Section

The Immunology section supports the HIV/STD service and many Oklahoma healthcare providers by performing human immunodeficiency virus (HIV) antibody screening using the enzyme linked immunoassay (EIA) and Western Blot for confirmation. The lab screened approximately 36,500 specimens in 2006, and confirmed 240 specimens. The majority of county health departments in Oklahoma monitor prenatal patients or those patients who are considering pregnancy for rubella. Rubella screening is performed for county health departments.

This section works closely with Epidemiology on several infectious disease surveillance projects, including the Tick Panel Study testing for *Ehrlichia chaffeensis* and *Rickettesia ricketsii* (RMSF). These bacteria are identified using immunofluorescence antibody technology. The Immunology Section also monitors human arboviral activity in the state for the West Nile Virus and St. Louis Encephalitis. This testing utilizes a method developed by the CDC and includes the antigen capture of IgM antibodies. Since hepatitis has become a major public health issue in Oklahoma, the Public Health Laboratory has implemented hepatitis “B” testing for maternity patients and hepatitis “C” testing for approved facilities only.

Test	Total tested	Positive	Negative
HIV/WIB	36,408	277	36,131
Rubella	1,328	1,216	112
Arbovirus			
West Nile	156	60	96
SLE	153	29	124
Tick Panel			
RMSF	160	34	126
Ehrlichia	160	3	157
Hepatitis			
HbsAg	1,439	23	1,416
HCV	106	32	74

Syphilis Section

The Syphilis Section is responsible for the laboratory diagnosis of syphilis in Oklahoma. Patients with syphilis, either active or treated, will show a rise in their serum titer, although an incubating patient may have a negative antibody test. A pregnant female may also transmit the organism through the placenta to the fetus. The test used for syphilis screening is a nontreponemal test (RPR). The Syphilis section screened approximately 35,000 specimens during 2006. The confirmatory test for syphilis is the TP-PA. It is a qualitative gelatin agglutination assay to detect *Treponemal pallidum* antibodies in human serum. A positive test only shows that the patient has had syphilis at some point in his life, not that the infection is current. This section confirmed approximately 450 specimens by TP-PA this year in Oklahoma. This test has allowed more rapid reporting of suspected syphilis cases at a cost savings to the public.

Test	Total Tested	Positive	Negative
RPR	34,187	614	33,573
TPPA	758	441	317

Newborn Metabolic Screening Section

In 2006, the Newborn Screening Laboratory performed state mandated screens on 55,906 neonatal specimens. Each specimen was screened for Congenital Hypothyroidism, Congenital Adrenal Hyperplasia, Phenylketonuria (PKU), Galactosemia, Cystic Fibrosis, and Hemoglobinopathies. On June 5, 2006 the Newborn Screening panel was expanded to include screening for Medium-chain acyl-CoA dehydrogenase deficiency (MCAD); and 33,242 neonatal specimens were screened for this disorder

during the remainder of 2006. With early identification & treatment of these disorders, many Oklahoma children are saved from death, mental retardation, or chronic disease problems.

Disorder Name	Specimens Screened	Positive Screens	Confirmed Cases (info provided by Follow-up)
Congenital Hypothyroidism (CH)	55906	38	16
Phenylketonuria (PKU)	55906	32	2 classic PKU & I benign Hyperphe
Galactosemia	55906	10	1 classic & 2 variants
Cystic Fibrosis (CF)	55906	122	14 classic CF & 3 mid CF variants
Congenital Adrenal Hyperplasia (CAH)	55906	21	1 classic salt-waster
Hemoglobinopathies (HGB)	55906	15	15
Mediun-chain acyl-CoA dehydrogenase deficiency (MCAD)	33242	24	2
Total	**55906**	**262**	**51**

State Training Program

In 2006, the Public Health Laboratory provided training to Oklahoma laboratories in 3 critical categories: rule-out/referral protocols for select agents of bioterrorism; shipping and packaging regulations changes for infectious substances; collection/packaging/transfer of clinical specimens from a chemical terrorism event.

Rule-out/referral protocols were initiated and the trainings were held at 18 of the 66 sentinel laboratories, training 98 laboratorians on the protocols for ruling-out/referring Category A select agents (*Bacillus anthracis, Yersinia pestis, Francisella tularensis, Brucella sp., Variola and* viral hemorrhagic fevers). Changes in the infectious shipping regulations going into affect in October 2006 and January 2007 were discussed at each training. Data was collected on pandemic influenza testing, biosafety and transfer capabilities in Oklahoma laboratories.

Trainings in collection, packaging, transfer, and chain-of-custody during a response to a chemical terrorism event were completed with the last 9 hospitals out of 120. Seventy-seven laboratorians and emergency room personnel were trained on CDC protocols.

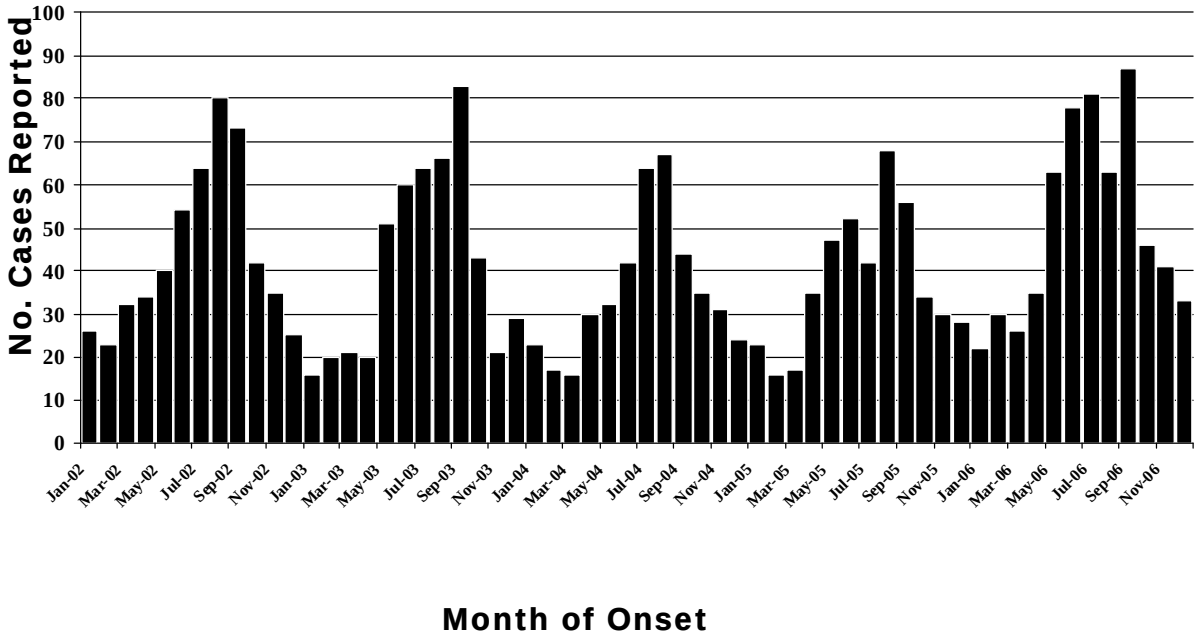
In an effort to reduce response time during a bioterrorism event or during an outbreak, sentinel programs were set-up in 9 laboratories across the state. The

program known as STATPack or Secure Telecommunication and Application Terminal Package (STATPack) allows these 9 (or 11 total to be installed) sentinels to send to the PHL, via live video feeds, macro and micro images of suspect organisms for consultation. The PHL is also able to receive still photos of these images through a closed email system. Sentinels during an event or outbreak can send an emergency message 24/7 to an on-call PHL laboratorian for immediate response. Over 40 laboratorians were trained on STATPack at these sites.

2006 Training Topic	Laboratories/Hospitals Trained	Personnel Trained
Rule-out Referral Protocols	18	98
Chemical Terrorism Collection Protocols	9	77
STATPack	9	40+

Enteric / Diarrheal Diseases

Distribution of Reported *Salmonella* Cases in Oklahoma by Month of Onset, 2002-2006



Campylobacteriosis

2006 Case Total 406 **2006 Rate 11.77 per 100,000**
2005 Case Total 544 **2005 Rate 15.77 per 100,000**

Campylobacteriosis is a common diarrheal illness in the United States. Oklahoma saw a 25.8% decrease in 2006 reported cases from 2005. The 2006 incidence rate for campylobacteriois in Oklahoma was 11.77 per 100,000 population. Over the past ten years, the rate of campylobacteriosis in Oklahoma has increased from 8.93 cases per 100,000 in 1996 to 11.77 per 100,000 population in 2006.

In Oklahoma, 406 cases of campylobacteriosis were reported in 2006. The median age for reported cases was 29 years with a range from seven days old to 94 years of age. Males had a higher overall incidence rate with 12.74 cases per 100,000 compared to females who had a rate of 10.60 per 100,000. Among age groups, males less than ten years of age had the highest incidence rate of campylobacteriosis (26.3 per 100,000) followed by females in the same age group (18.8 per 100,000). Males had higher rates of disease in all age groups with the exception of age groups 10 to 19 years and 20 to 29 years.

Of those individuals who reported one race (N=398), the highest incidence rate was in whites with 12.33 cases per 100,000, followed by American Indian/Alaskan Natives with a rate of 6.59 per 100,000, blacks with 4.60 per 100,000 and Asians with a rate of 2.14 per 100,000 population. For individuals who reported more than one race, five cases reported American Indian/Alaskan Native and white, one case reported black and white and one case reported American Indian/Alaskan Native, black and white. Ethnicity was reported for 77.1% of cases, of which 11.2% were Hispanic or Latino.

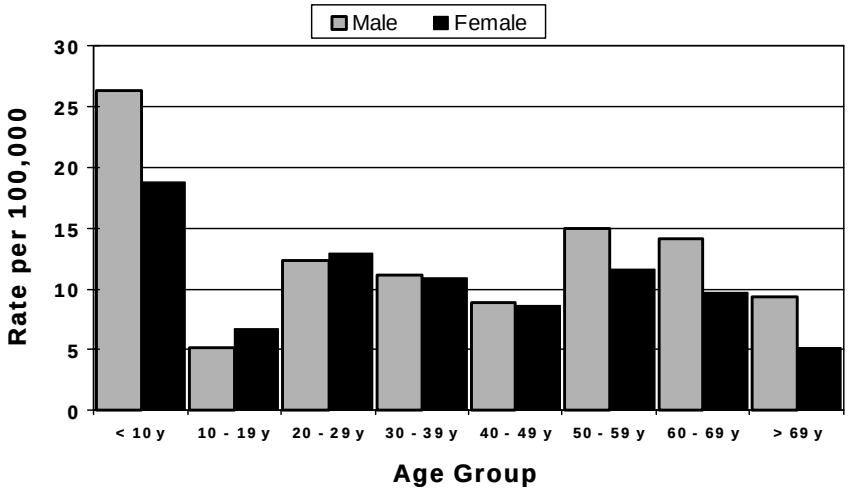
Seventy individuals (17.2%) were hospitalized due to campylobacteriosis and no cases expired due to this disease. The median age of hospitalized individuals was 34 years with a range from one month to 94 years. Hospitalization was more likely to occur among older cases. Among the hospitalized cases, 14.3% were 60-69 years and 17.1% were greater than 70 years of age. For the non-hospitalized cases, 6.6% were 60-69 years and 3.6% were greater than 70 years of age. Common symptoms for campylobacteriosis include diarrhea (sometimes bloody), cramping, abdominal pain, fever, nausea and vomiting. Of the reported cases in Oklahoma, 389 (88.9%) experienced diarrhea and of those individuals with diarrhea 132 (36.6%) had bloody diarrhea and 120 (30.8%) reported mucus in their stool. Two hundred and eighty-one cases (69.2%) had abdominal cramps, 216 (53.2%) reported nausea, 147 (36.2%) reported vomiting and 235 (57.9%) reported fever.

Several species of *Campylobacter* were isolated from stool samples. Species was ascertained for 66.3% of cases; most common species identified were *Campylobacter jejuni* with 92.6% of cases, 3.7% were identified as *C. coli* and 3.3% were *C. jejuni* variation *doylei*.

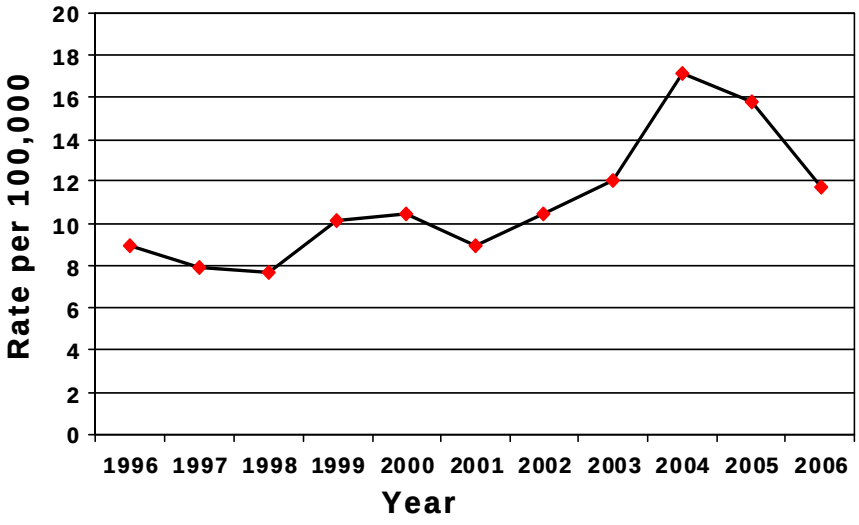
In 2006, there were no reported outbreaks associated with campylobacteriosis in Oklahoma. Of the 406 reported cases, 86.2% were sporadic cases while 56 cases (13.8%) were epidemiologically linked to another case. The counties with an incidence rate per 100,000 population twice the Oklahoma state rate included Carter (24.1), Greer (49.5), Harper (28.1), Haskell (25.4), Murray (23.8), Noble (26.3), Okmulgee (40.3), Stephens (25.5) and Texas (24.9).

Campylobacter is common cause of "Traveler's diarrhea". Of the 2006 cases, only four had a definite out of country exposure and an additional four with a definite out of state exposure.

Rate of Reported Campylobacteriosis Cases by Age Group and Gender, Oklahoma, 2006



Rate of Reported *Campylobacter* Cases by Year, Oklahoma, 1996-2006



Cryptosporidiosis

2006 Case Total 56 **2006 Rate 1.62 per 100,000**
2005 Case Total 46 **2005 Rate 1.33 per 100,000**

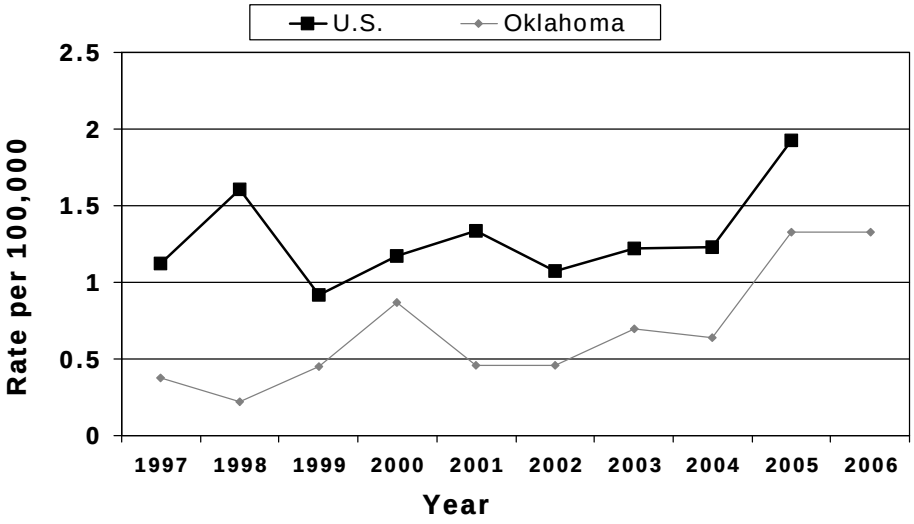
Fifty-six cases of cryptosporidiosis were reported to the OSDH in 2006 resulting in a 18% increase compared to the number of cases reported in 2005. The 2006 incidence rate in Oklahoma was 2.3 times higher than the previous five-year (2001-2005) average rate of 0.72 per 100,000. For the period of 1997 through 2006, the incidence rate of cryptsporidiosis in Oklahoma has consistently been lower than the United States rate (refer to cryptosporidiosis incidence rate graph).

The age range of cryptosporidiosis cases was 1 month to 88 years with a median age of 34 years. Fifty-five percent (n=31) of cases occurred among females resulting in a gender-specific rate of 1.77 per 100,000; a similar incidence rate occurred among males (1.48 per 100,000). Race-specific rates were similar among individuals that reported their race as white (1.79 per 100,000), American Indian (1.46 per 100,000) and black (1.15 per 100,000). Racial background was unknown for 2 cases. Cryptosporidiosis occurred among residents of 14 (18%) counties. The highest incidence rates occurred among residents of Stephens (25.5 per 100,000), Payne (10.3 per 100,000) and Muskogee County (8.6 per 100,000).

No cases died due to cryptosporidiosis; however, 13 cases required hospitalization resulting in a rate of 23 percent. Symptoms reported by cases included watery diarrhea (82%), abdominal cramps (71%), anorexia (59%), vomiting (50%) and weight loss (47%). Case investigations conducted by local county health department public health nurses revealed eleven cases were identified among individuals associated with high-risk settings such as attendees or employees of childcare settings (5%), direct patient care providers (5%) and food handlers (9%). No secondary cases were identified within these high-risk settings. Investigation did not reveal any outbreaks caused by cryptosporidiosis during 2006.

Cryptosporidiosis is a parasitic disease characterized by diarrhea, which may be profuse and watery, general malaise, fever, anorexia, nausea and vomiting. Confirmation requires the identification of cysts or trophozoites in a stool specimen. The collection of fecal specimens for ova & parasites (O&P) identification may not be a laboratory test that is routinely performed. Therefore, when a parasitic etiology is suspected, clinicians should request testing for these specific organisms. Clinicians should also request several stool specimens from their patient since oocysts may be passed intermittently and may not be identified from just one specimen. County health department public health nurses investigate all reported cases of cryptosporidiosis to institute interventions for cases associated with high-risk settings and identify potential outbreaks associated with a common source.

Cryptosporidiosis Incidence Rate by Year, Oklahoma and U.S., 1997-2006



* Finalized national cryptosporidiosis data for 2006 was not available during the publication of this summary.

Giardiasis

2006 Case Total 166 **2006 Rate 4.81 per 100,000**
2005 Case Total 197 **2005 Rate 5.71 per 100,000**

One hundred and sixty-six cases of giardiasis were reported in 2006 to the OSDH resulting in an incidence rate of 4.8 per 100,000. This rate represents a 15.8% decrease from 2005. Cases of giardiasis were reported from 43 counties. The county with the highest incidence rate was Harper (56 per 100,000) followed by Kingfisher (21.5 per 100,000). Other counties with high incidence rates were Pawnee and Craig (18 per 100,000) as well as Alfalfa (16.4 per 100,000). There was no geographic clustering noted.

Cases ranged in age from 11 months to 83 years of age with a median age of 29 years. Children are infected more frequently than adults especially those who are not toilet-trained and who may be in a childcare setting (CCS). The principal mode of transmission is person-to-person via hand to mouth transfer of cysts from an infected person. In 2006, 44 (26.5%) cases were children less than five years of age. In the less than five years of age group, the rate of cases in males (23 per 100,000) was nearly twice the rate of cases in females (13 per 100,000).

The majority of cases were male (55%, N=92). The rate of cases in males (5.4 per 100,000) was higher than the rate of cases in females (4.2 per 100,000). For cases that reported their racial background (N=130), the highest rates occurred among American Indians (6.6 per 100,000) and Asians (6.4 per 100,000). The incidence rate for those who reported their race as white was 4.6 per 100,00 population followed by those who reported their race as black (2.3 per 100,000).

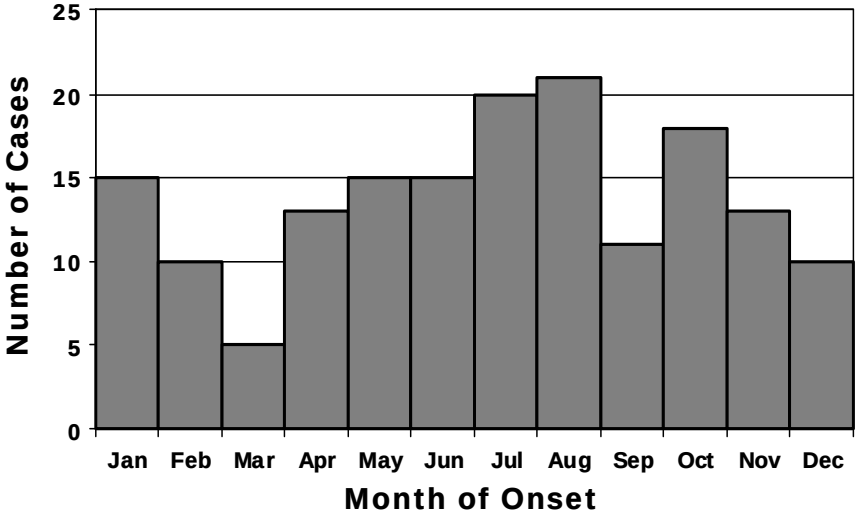
Giardiasis is typically a mild, self-limiting enteric disease with symptoms ranging from asymptomatic infections to chronic disease. Predominant symptoms reported by cases included diarrhea (96.7%), watery diarrhea (75.2%), malaise (72.2%), bloating (65.5%), abdominal cramps (64%), weight loss (56.6%) and greasy stools (45.4%). The number of loose stools in a 24-hour period ranged from one to 72 with a median of ten. Thirteen cases (7.8%) required hospitalization for the disease and no deaths were reported.

Due to the primary mode of transmission being person-to-person via fecal-oral route, giardiasis is known to spread readily within high-risk settings such as foodservice establishments, child care centers (CCS), long-term care facilities, health care settings, as well as within the household of a case. Only 23 (14%) cases reported having CCS association with 91.3% of cases attending and 8.6% working in the CCS. There were no cases who worked as a food handler.

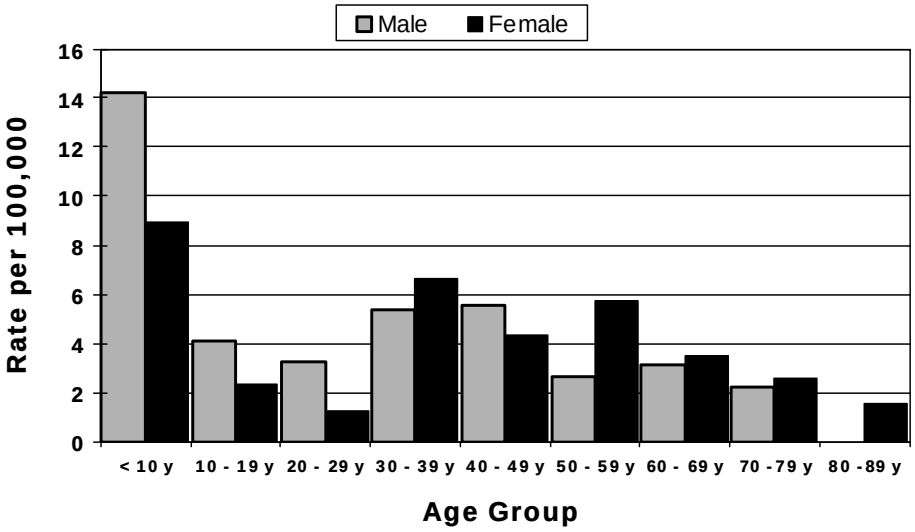
Cases of giardiasis are required to be reported to the OSDH within one business day so that they may be investigated. Clinicians should suspect giardiasis when a patient displays with an infection of the small intestine especially associated with chronic diarrhea, pale and greasy stools, and weight loss. Diagnosis is made by obtaining a stool sample for identification of cysts or trophozoites. Because cysts

are not always present in the stool of infected persons, 3 negative results are needed to rule out giardiasis. If a case works as a food handler, provides direct patient care, or attends or works in a childcare setting, the case must be excluded until diarrhea has ceased for at least 24 hours.

Reported Number of *Giardia* Cases by Month, Oklahoma, 2006



Rate of Reported *Giardia* Cases by Age Group and Gender, Oklahoma, 2006



Enterohemorrhagic *Escherichia Coli* Infection and Post-Diarrheal Hemolytic Uremic Syndrome

2006 Case Total 44	**2006 Rate 1.28 per 100,000**
2005 Case Total 38	**2005 Rate 1.10 per 100,000**

The disease category of enterohemorrhagic *Escherichia coli* includes infection with species of *E. coli* that produce shiga toxin, notably *E. coli* O157:H7, along with several other less common types. The 44 cases of EHEC reported in 2006 are the highest number of cases reported in any year since 1994, when the infection became reportable in Oklahoma (see graph). Eighty-four percent (37/44) of Oklahoma's EHEC cases were caused by E. coli O157:H7. The number of cases of EHEC rose 10% between 2005-2006, which follows on a 38% increase between 2004-2005. Twenty-two of 77 counties had cases of EHEC in 2006. No counties had both a high rate of disease and a high number of cases (that is, more than three cases).

EHEC infection occurred in slightly more females than in males, (26/44 cases, 59%) in 2006. As in previous years, children continue to experience a higher rate of infection with EHEC. Children less than five years of age had a rate of disease of 7.62 per 100,000, which is six times the rate for all ages. Incidence rates of EHEC infection are much higher in warmer months (see graph), although the reasons for this are not well understood. Increased outdoor activities, including contact with infected animals may be one reason for the increase, as failure to wash hands after contact with animals, for example, after visiting a petting zoo, is a well-known risk factor for EHEC infection. Swimming in bodies of untreated water in which animal feces is present, such as ponds and streams into which cattle feces might be washed by runoff, is another plausible risk factor for EHEC infection that occurs more often in warmer months.

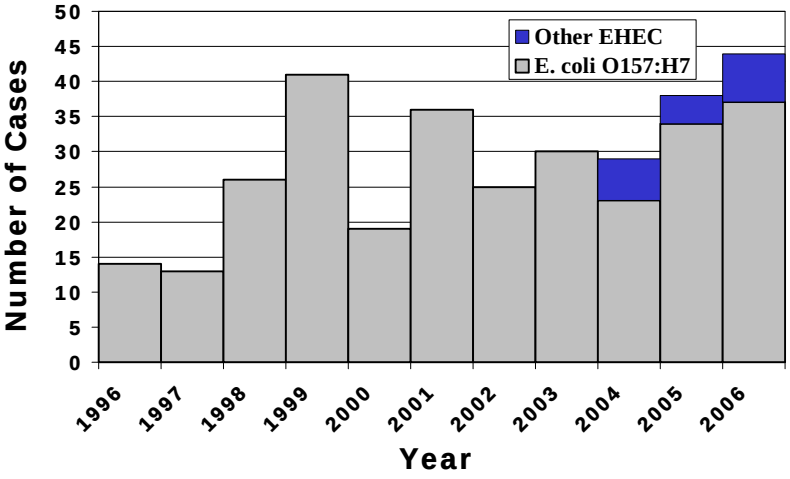
Twelve cases were hospitalized. One person, a 64 year-old woman, died following infection with EHEC. The median age of hospitalized persons was 7 years with a range from 16 months to 64 years of age. Similarly, the median age of individuals not hospitalized was 6 years with a range from 9 months to 83 years of age.

Racial information was available for 38 of 44 (86.4%) cases. Thirty-four (89.5%) reported their racial background as white; three (7.9%) cases reported their race as Native American; and one person's race was reported as both white and Native American. Information regarding Hispanic ethnicity was available for 37 of 44 (84.1%) cases. Of these, three (8.1%) reported Hispanic ethnicity.

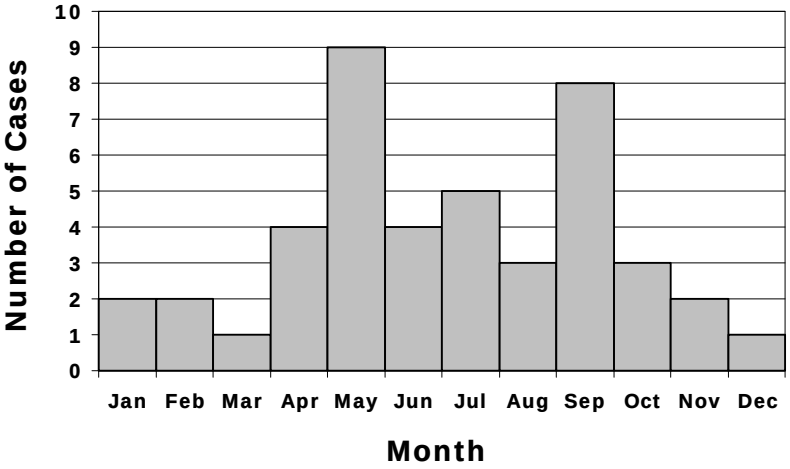
Post-diarrheal hemolytic uremic syndrome (HUS) follows *E. coli* O157:H7 infection in approximately 8% of infections; the rate of HUS may be different following infection with other strains of EHEC. In 2006, two cases of post-diarrheal HUS were reported to OSDH CDD. Both were white females aged 7

and 22 months. In neither instance was a pathogen isolated from the child's stool; however, one case was epidemiologically linked to a sibling who had culture-confirmed *E. coli* O157:H7 from stool. No outbreaks of EHEC occurred in Oklahoma in 2006. A well-publicized multistate outbreak of *E coli* O157:H7 involving spinach occurred in 2006; however, of the cases presented above, none exhibited the pulsed-field gel electrophoresis pattern associated with the outbreak strain.

Reported Number of *E. coli* O157:H7 and other Enterohemorrhagic *E. coli* (EHEC) Cases by Year, Oklahoma, 1996-2006



Reported Number of *E. coli* O157:H7 and other Enterohemorrhagic *E. coli* (EHEC) Cases by Month of Onset, Oklahoma, 2006



Salmonellosis

2006 Case Total 605 **2006 Rate 17.5 per 100,000**
2005 Case Total 448 **2005 Rate 13.0 per 100,000**

The incidence rate of Salmonella cases increased from 13 cases per 100,000 to 17.5 cases per 100,000 representing a 36% increase between 2005 and 2006. The rates for Oklahoma have been quite similar to the national rates for the past 10-years without much fluctuation (refer to graph). In 2006, cases were reported from 65 counties in Oklahoma. The highest rates were reported from Roger Mills (116 per 100,000), followed by Pushmataha (77 per 100,000), Coal (49.7 cases per 100,000), Jefferson and Stephens (44 per 100,000) as well as Garvin County (40 per 100,000). No geographic clustering was noted.

Salmonellosis is a reportable disease in Oklahoma and all clinical isolates are required to be sent to the PHL for serotyping. Fifty-seven different serotypes were identified in 2006. Serotype identification was available for 87% of cases (N=528). The two most common serotypes were *Salmonella* Typhimurium (26%, 137/528) and *Salmonella* Newport (17%, 89/528). These two serotypes accounted for 43% of all of the isolates serotyped by the PHL. The third most common serotype identified among submitted isolates was *S.* Enteritidis*,* which represented 9.3% (N=49) of serotypes isolated. These three serotypes are consistently the three most common *Salmonella* serotypes among isolates submitted to the OSDH Public Health Laboratory.

Cases ranged in age from 22 days to 92 years of age with a median of 23 years. In 2006, 235 (38%) cases were in children less than five years of age (48.8 per 100,000 age specific population) and 56 cases occurred in those 70 to 79 years of age (27 per 100,000 age specific population). The highest gender specific rates occurred among males less than five years of age (54 per 100,000) followed by females less than 5 years old (43.5 per 100,000). Notably, the incidence rate for females (27 per 100,000) 50 to 59 years of age was three times that of males (8 per 100,000) in the same age group.

Cases were evenly distributed between the females (52%) and males (48%) resulting in incidence rates of 17.04 per 100,000 among males and 17.84 per 100,000 among females. For cases that reported race (N=552), higher rates were reported among persons who were American Indian and Alaska Natives (17.9 per 100,000), and Whites (17 per 100,000) followed by Black or African Americans (13 per 100,000).

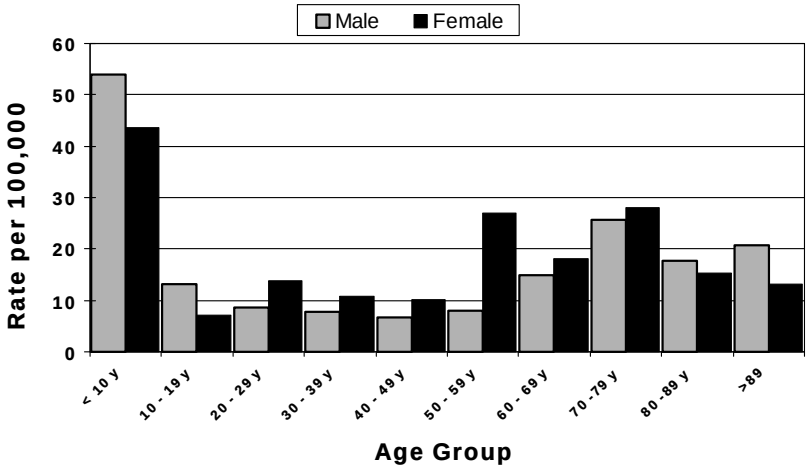
Most cases of *Salmonella* each year occur during the spring and summer months resulting in a seasonal trend. The highest number of cases occurred in September (14.4%, N=87), June (13%, N=78) and July (13%, N=78). The fewest number of cases was reported in January (3.6%, N=22).

Due to the modes of transmission of *Salmonella*, high-risk settings include childcare center settings (CCS), places where food is prepared, health care settings and long-

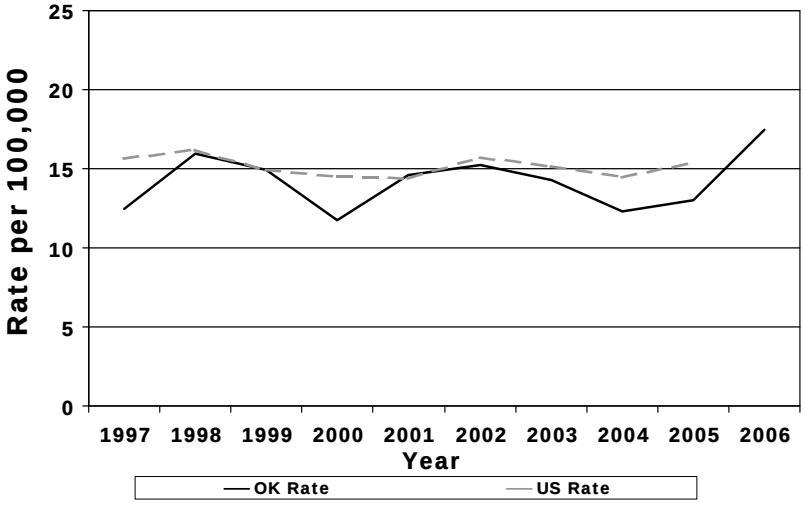
term care settings. Of the cases that reported a high-risk setting (N=99), 40% of the cases had a CCS association with 36 attendees and 4 employees. Five of these cases were food handlers, one case was associated with a correctional facility, three cases provided direct patient care and seven cases were residents of a long-term care setting or nursing home.

Prominent symptoms included diarrhea (94.8%), abdominal cramps (83.3%) and fever (74.7%). Vomiting was reported by 48.5% of cases followed by bloody diarrhea (41.8%). The duration of diarrhea ranged between one and 90 days with a median of 16 days. Thirty-three percent of cases were hospitalized and two deaths due to salmonellosis were reported.

Rate of Reported Salmonellosis Cases by Age Group and Gender, Oklahoma, 2006



Rate of Reported Salmonellosis Cases by Year, Oklahoma, 1997-2006



Shigellosis

2006 Case Total	**195**	**2006 Rate**	**5.65 per 100,000**
2005 Case Total	**937**	**2005 Rate**	**27.15 per 100,000**

The number of shigellosis cases reported in 2006 was 195 representing a 79% decrease compared to the number of cases from 2005. Among reported cases in 2006, 143 (73.3%) cases were laboratory confirmed and 51 (23.7%) were symptomatic individuals epidemiologically linked to a confirmed case. All infections of *Shigella* are required to be reported to the OSDH and all isolates must be forwarded to the OSDH PHL for confirmation and speciation. *Shigella sonnei* was the most predominant species to cause disease, comprising 95% (N=137) of the isolates speciated by the PHL in 2006. *S. flexneri* accounted for the other 5% of species identified (N=7).

Cases ranged in age from six months to 80 years of age with a median age of eight years. Sixty-one (31%) cases occurred among children five to nine years of age (25 per 100,000 population) and 53 cases occurred in those less than five years of age (22 per 100,000). In the five to nine year age group, the rate of cases in females (28 per 100,000) was twice the rate of cases in males (14 per 100,000). The highest rates of disease with *Shigella* occur in children under the age of ten due to a number of factors including susceptible immune system, greater likelihood to be in a childcare setting and less likely to practice proper hand hygiene.

The rate of cases in females (6.5 per 100,000) was higher than the rate in males (4.4 per 100,000). For cases that reported a race (N=169), higher rates occurred among American Indians (9.52 per 100,000) and those who reported their race as black (6.5 per 100,000).

Cases of shigellosis were reported from 32 counties. The county with the highest incidence rate was Okmulgee (68 per 100,000) followed by Tillman (53.8 per 100,000). Other counties with high incidence rates were Creek and Harper (28 per 100,000) as well as Craig (26.7 per 100,000). There was no geographic clustering noted. Five cases reported travel to other countries during their incubation period.

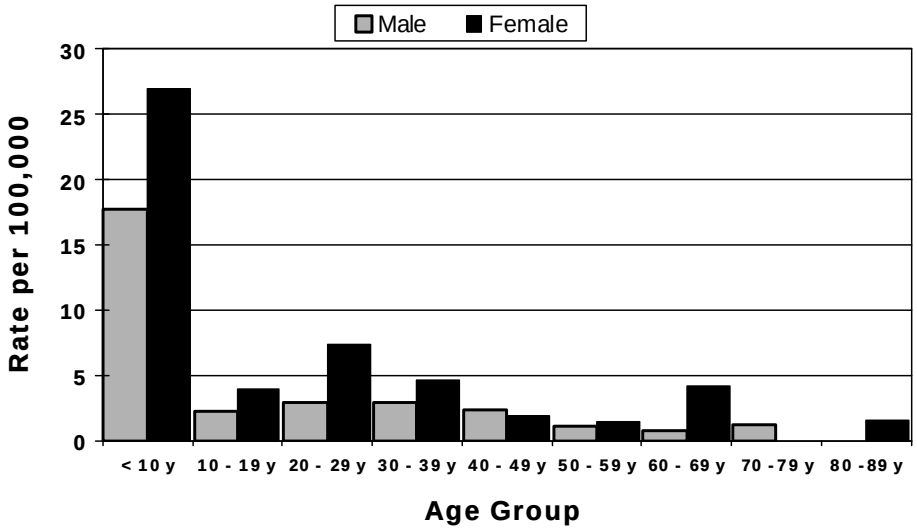
Due to the low infectious dose of 10-100 organisms, shigellosis is known to have a high secondary attack rate within high-risk settings such as foodservice establishments, childcare centers (CCS), long-term care facilities, and health care settings as well as among households members of cases. Only 39 cases reported having CCS association with 92.3% of cases attending and 7.7% working in the CCS. Of cases that reported association with a high-risk setting (N=75), 52% were associated with a CCS. Among other high-risk settings, four (5%) cases worked in a healthcare setting and three (4%) cases worked as food handlers.

Shigellosis is typically a mild, self-limiting enteric disease. Predominant symptoms included diarrhea (98.9%), cramps (80.4%), fever (73.6%) and nausea (53.7%). The number of loose stools in a 24-hour period ranged from three to 60. The range

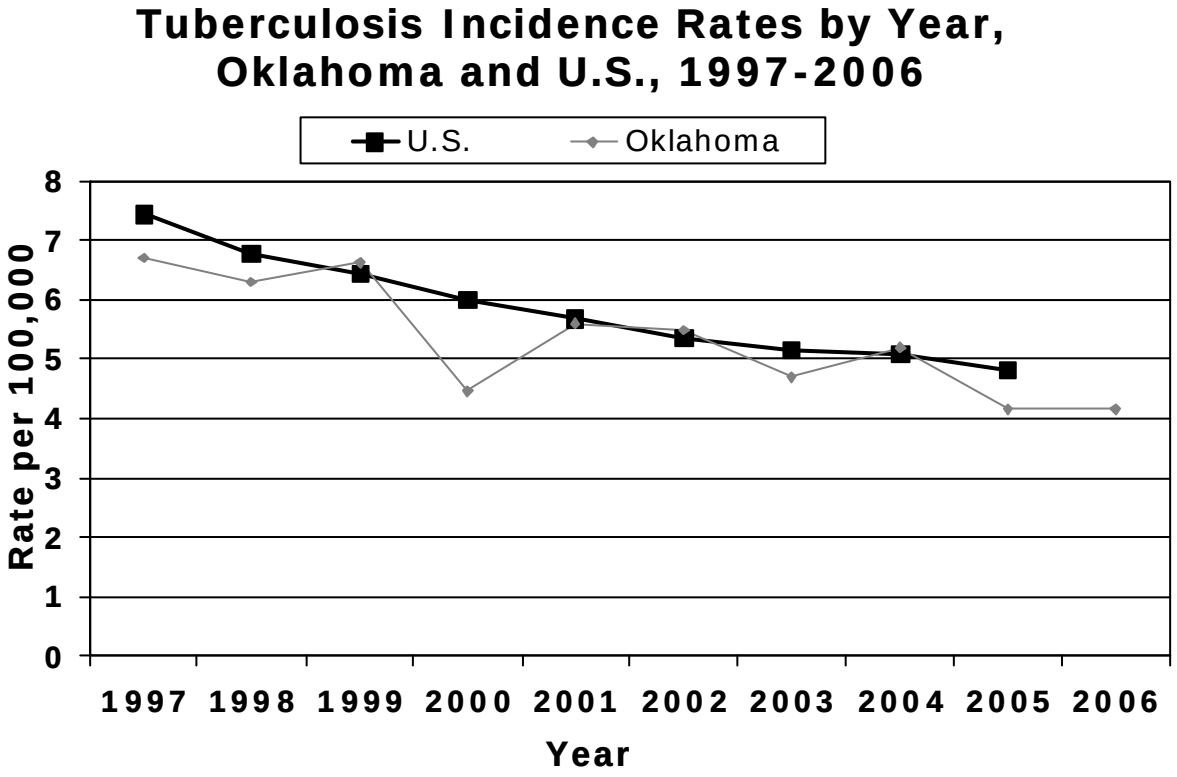
of duration of diarrhea was from five to 90 days. Twenty-six cases (13%) required hospitalization and no deaths were reported in 2006.

Due to the high secondary attack rates of shigellosis in high-risk settings, it is important to rapidly implement control measures to limit spread. Such measures include increased efforts to rapidly identify suspects and remove them from high-risk settings while diarrhea is present and promotion of frequent hand hygiene and environmental cleaning. Appropriate antibiotic therapy is recommended for persons in high-risk settings to lessen the severity of illness and reduce the length of bacterial shedding. Public health interventions include inspections of these facilities by county health department public health nurses and sanitarians when outbreaks occur.

Rate of Reported *Shigella* Cases by Age Group and Gender, Oklahoma, 2006



General Communicable Diseases



Finalized U.S. Tuberculosis numbers for 2006 not available at the time of this publication

Brucellosis

2006 Case Total 2
2005 Case Total 1

Brucellosis is a zoonotic disease that encompasses infection with one of a number of *Brucella* species, including *B. abortus*, *B. melitensis*, *B. suis*, *B. ovis*, and *B. canis*. Cattle and other bovine animals are the primary reservoir for *B. abortus*; sheep and goats are associated with *B. melitensis* and *B. ovis*; swine can harbor *B. suis*; and domestic and wild canines serve as the host for *B. canis*.

Although brucellosis rates are high in certain regions of the World such as the Mediterranean, northern Africa, and Mexico, the occurrence of human brucellosis in the United States has steadily declined coinciding with the progressive state-by-state eradication of *B. abortus* and *B. suis* from domestic cattle and swine, respectively. Nationally, the last incidence peak of the disease occurred in 1975 when more than 300 cases were reported to the CDC. For the past decade, less than 100 cases have been reported annually by all states combined. Since 1991, an average of less than one case (0.6) per year has been reported to the OSDH. In 2006, two cases of brucellosis were identified in Oklahoma. These cases are illustrative of the changing epidemiology of brucellosis where the majority of U. S. cases are now due to ingestion of unpasteurized cheese products, either imported as ethnic foods or eaten during international travel, or associated with the slaughter of feral swine.

Case #1: During early October 2006, a 52 year-old Hispanic male began experiencing intermittent fevers, loss of appetite, arthralgias, and weight loss. On December 21, 2006, he was hospitalized for intractable lower back pain (5 weeks duration) and further evaluation of lumbar diskitis and osteomyelitis accompanied by right leg weakness. *Brucella melitensis* biovar 1 was isolated from a blood culture specimen. Interview with the case patient revealed that he had been residing in the United States for 30 years but traveled to Zacatecas, Mexico in August 2006. Raw goat milk cheese was consumed during this Mexican trip.

Case #2: On April 4, 2007, a four year-old Hispanic boy was admitted to an Oklahoma hospital with severe left-sided hip pain and refusal to bear weight. He had been experiencing an intermittent fever for about 4 months. A blood culture specimen collected on April 17 grew a suspect *Brucella spp* and was forwarded to the OSDH Public Health Laboratory for speciation. The isolate was confirmed as *B. melitensis* biovar 1. The boy lived in an immigrant household, but the family did not report any recent foreign travel.

Laboratory Testing

In both 2006 cases, diagnosis was made by bacterial culture and isolation. This is the preferred method of confirmatory diagnosis because isolation of the organism allows for *Brucella* species identification and typing. If brucellosis is suspected, the laboratory should be given advance notification to ensure safe handling of specimens and to hold cultures for at least 30 days before discarding.

Polymerase chain reaction (PCR) testing is also available at the OSDH Laboratory; advance consultation is recommended before submitting specimens for PCR testing.

Serological testing to diagnose brucellosis is frequently used, but clinicians should be knowledgeable about the type of test ordered and its limitations. Almost all of the assays that are offered by commercial reference laboratories for brucellosis testing are qualitative enzyme-linked immunosorbent assays (ELISA). The ELISA test wells are coated with a *B. abortus* antigen (a smooth strain), so the presence of antibodies to other smooth strains of Brucellae (*B. melitensis* and *B. suis*) will be detected. The numerical value that is reported is not an antibody titer and cannot be evaluated for exposure timing or disease confirmation. Additionally, the commercial IgM tests are poorly specific for *Brucella spp* and frequently result in false positive results. There are no currently available tests to detect antibodies to *B. canis*, which is a rough strain.

If a positive ELISA test result is obtained, it must be evaluated in context of the patient's clinical presentation and exposure/travel history. When the whole picture is suggestive of brucellosis, serial cultures of blood, bone marrow aspirates, or tissue discharges should be attempted. During an OSDH case investigation, acute and convalescent serum specimens may be requested for forwarding to CDC for confirmation by tube agglutination testing.

Legionellosis

2006 Case Total 10 **2006 Rate 0.29 per 100,000**
2005 Case Total 10 **2005 Rate 0.29 per 100,000**

Ten cases of legionellosis were reported in 2006, the same number of cases as 2005. Two cases, both residents of Tulsa County, were associated with an outbreak that was associated with a hotel in Arkansas. (See *Multi-State Outbreak Associated with an Arkansas Hotel—Summary of Oklahoma Cases*). However, this is a 58% decrease from 2004, when 24 cases occurred. An outbreak of legionellosis associated with a hotel hot tub and pool area caused 2004 to be the year with the highest cases reported in the past 10 years.

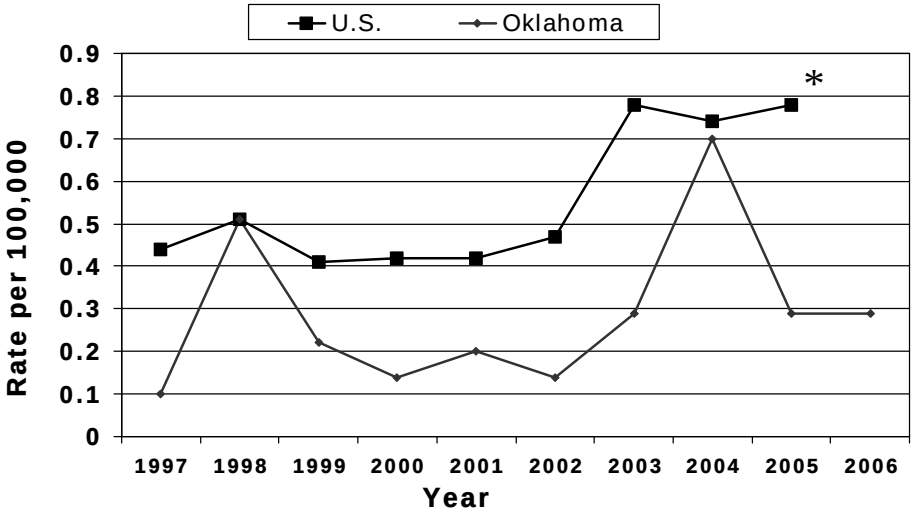
Cases occurred among residents of 7 counties: Choctaw (1 case), LeFlore (1 case), Muskogee (2 cases), Oklahoma (1 case), Tulsa (4 cases, including 2 associated with an Arkansas hotel) and Washita (1 case). Ages ranged from 40 to 72 years with a median age of 59 years. All but one case occurred in persons 50 or older; the age specific incidence rate for those 50 and older was 9.14 per 100,000.

Six (60%) cases were male; three cases died resulting in a case fatality rate of 30%. Racial information was available for 9 patients, all were white, and of the eight cases for whom ethnicity was known, all were non-Hispanic.

Reported cases of legionellosis in Oklahoma continue to be below the national average (see graph). The true incidence of legionellosis may be lower in Oklahoma when compared to the United States as a whole; however, it is possible that the disease is underdiagnosed and/ or underreported. Clinicians are encouraged to consider legionellosis in patients with pneumonia. Demonstration of *Legionella pneumophila* serotype 1 in respiratory secretions, or detection by urine antigen are considered diagnostic.

In 2006, eight of the ten cases were diagnosed using urinary antigen tests, two were diagnosed when *Legionella pneumophila* serotype 1 was identified from bronchial wash specimens. Serologic tests for legionellosis exist, however, confirmation requires demonstration of a fourfold change in antibodies between the acute and convalescent phase. Because of the difficulties sometimes encountered in obtaining convalescent sera, as well as the need for timely laboratory confirmation, urinary antigen testing may be a better diagnostic method for many patients suspected of having legionellosis.

Legionellosis Incidence Rate by Year, Oklahoma and U.S., 1997-2006



* Finalized national legionellosis data for 2006 was not available during the publication of this summary.

Malaria

2006 Case Total 11 **2006 Rate 0.32 per 100,000**
2005 Case Total 12 **2005 Rate 0.35 per 100,000**

Malaria is a severe illness caused by the mosquito-borne parasite *Plasmodium.* Four species of *Plasmodium* cause illness in humans: *P. falciparum, P. vivax, P. ovale and P. malariae.* Of these, *P. falciparum* is the most life threatening. In the United States, malaria occurs in persons with a history of recent travel to endemic areas. Antimalarial chemoprophylaxis is recommended for travelers to those areas, and is effective in preventing the disease.

Each of the eleven cases of malaria reported in Oklahomans in 2006 were considered imported, meaning that the cases had lived or traveled to endemic countries during their exposure periods. The cases were evenly distributed between males (n=6, 55% of cases, 0.35 per 100,000) and females (n=5, 45%, 0.28 per 100,000). Cases occurred in residents of 6 counties: Tulsa (5), Oklahoma (2), Blaine (1), Comanche (1), Jackson (1) and Muskogee (1). The ages of cases ranged from 3 to 55 years with a median age of 35 years. Cases reporting their race as black (n = 9, 81%) represented the higher incidence with a rate of 3.2 per 100,000, compared to those of white race (n = 2, 19%) with a rate of 0.07 per 100,000.

All 11 cases reported travel to areas where malaria is endemic during the exposure period. Ten (91%) traveled to West Africa (five to Nigeria, one each to Angola, Cameroon, Ghana and Liberia). One (9%) traveled to Saudi Arabia. Most cases traveled for personal reasons, but two cases indicated occupational travel purposes: one was an airline pilot and one was deployed for military duty.

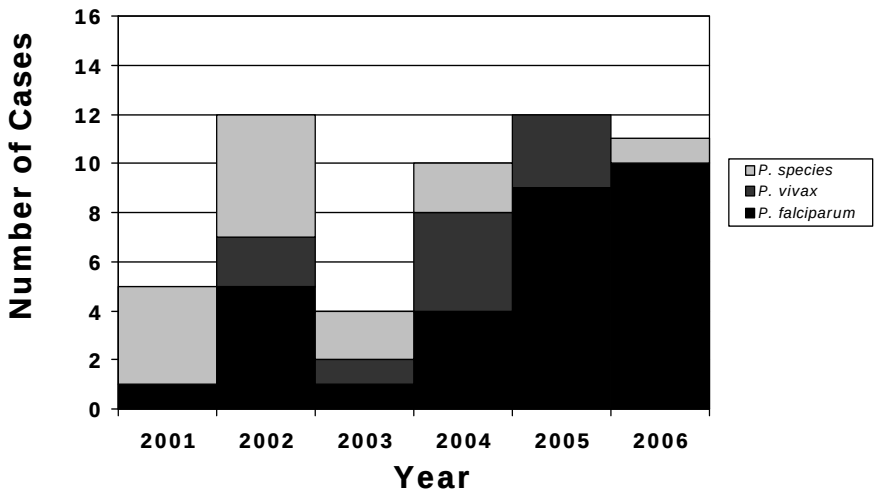
Five (45%) cases were hospitalized with lengths of stay ranging from 3 to 10 days (median length of stay = 6 days). No deaths were reported among malaria cases. Of the ten whose prophylaxis status was known, eight did not take any antimalarial prophylaxis, one admitted not taking the medication as ordered, and another indicated having purchased the medication while abroad, and was later told that it was counterfeit, which is a known risk.

Malaria is a reportable disease in Oklahoma. Confirmation of malaria is accomplished through microscopic identification of the parasites in the patient's blood. Thick and thin slides prestained with Giemsa or Giemsa-Wright stain are required for examination. Slides from suspected malaria cases must be sent to the OSDH PHL for confirmation (*310 O.A.C. § 315 Subchapter 1 et. seq*.). Ten cases' specimens were forwarded to the OSDH PHL for confirmation in 2006. Of these, nine were confirmed as *P. falciparum*. The PHL was not able to speciate one specimen due to low parasitemia. One specimen was read as *P. falciparum* by a regional lab, but was not forwarded to the OSDH PHL for confirmation.

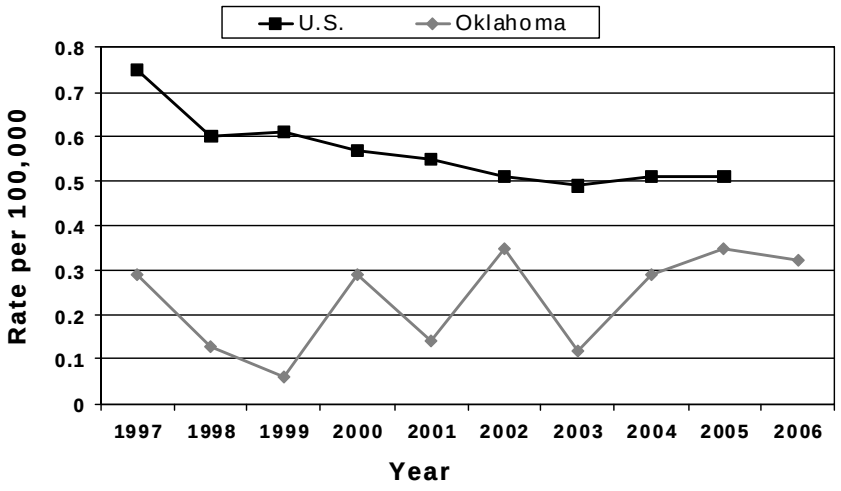
Antimalarial prophylaxis is region-specific and must be prescribed by a healthcare provider. It must be started 1-2 days before travel to the area of risk, taken daily

while at risk, and daily for 7 days after leaving the risk area. It must be taken at the same time each day with food or milk. In addition to appropriate prophylaxis, it is recommended to avoid mosquito exposure through use of insect repellent containing DEET (N, N-diethyl-m-toluamide), and mosquito nets treated with permethrin, which may also be used on clothing and other items. Use of flying mosquito repellent is also advised. Travelers who develop fever or flu-like illness (chills, headache, fatigue, muscle aches) while traveling or up to 1 year later should seek professional medical care. See the CDC Travelers' Health website at http://www.cdc.gov/travel/index.htm for further recommendations.

Reported Number of Malaria Cases by Species and Year, Oklahoma, 2001-2006



Malaria Incidence Rate by Year, Oklahoma and U.S., 1997-2006



Mumps

2006 Case Total 10 **2006 Rate 0.29 per 100,000**
2005 Case Total 2 **2005 Rate 0.06 per 100,000**

In January 2006, an outbreak of mumps occurred in the midwestern states of the United States. A total of 45 states and the District of Columbia were involved in the outbreak reporting approximately 5,783[1] confirmed or probable cases to CDC, a 1741% increase from the 314 cases in 2005. Eighty-four percent of cases associated with the outbreak were reported in 6 states: Iowa (N=1968), Kansas (N=904), Wisconsin (N=750), Illinois (N=591), Nebraska (N=357), and South Dakota (N=288). Investigations conducted by OSDH indicated 10 cases met the surveillance criteria for mumps resulting in an IR of 0.29 per 100,000. In 2006, Oklahoma investigated 136 suspect cases of mumps. Of the 10 reported cases, none were associated with an outbreak state. The increased reports of suspected mumps cases may have been attributed to the heightened awareness among physicians of mumps as a diagnosis for parotitis due to the nationwide outbreak.

Cases were residents of eight counties; 2 (20%) cases occurred in Canadian County while the other 7 counties reported one case each including Oklahoma County (0.2 per 100,000) and Tulsa County (0.2 per 100,000). Seventy percent of the cases were female (N=7), and three cases were male. The median age was 27 years, ranging from 23 months to 72 years. Eighty percent of the cases were white, and twenty percent reported their racial background as black.

No cases were hospitalized or expired due to mumps in 2006. A clinical case is required to have acute onset of parotitis (inflammation of the parotid gland) lasting greater than or equal to two days without other apparent cause. All ten reported cases met this clinical case definition. Other symptoms reported by cases were fever (40%) and sore throat (60%). No complications such as orchitis or meningitis were reported in these cases.

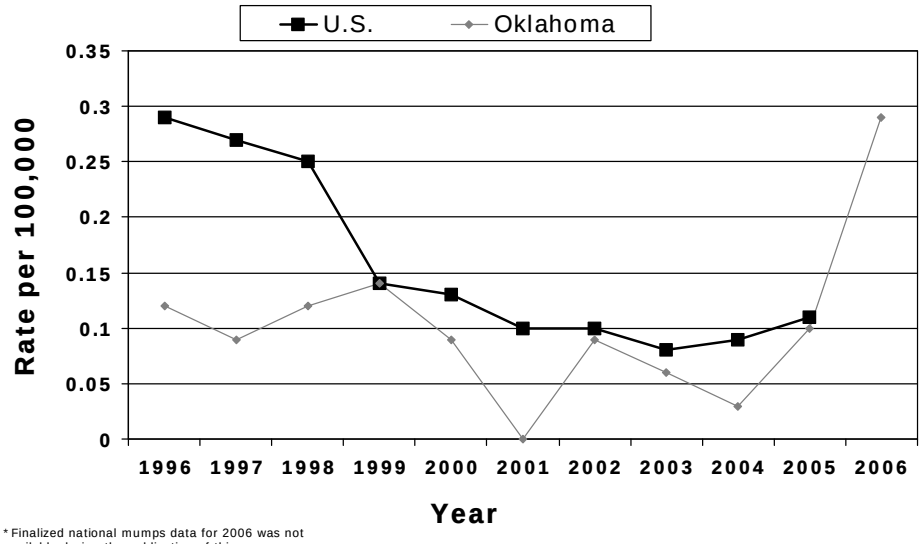
Five (50%) cases were associated with a high-risk setting including schools, colleges, and healthcare facilities. Despite the number of cases associated with a high-risk setting, no secondary cases were identified during investigations.

Since two doses of mumps vaccine are not 100% effective, mumps cases can occur in persons appropriately vaccinated.[1] Eight (80%) cases of the 10 in Oklahoma reported vaccination of at least one dose of mumps vaccine. Despite the efficacy of the mumps vaccine, efforts were made to determine vaccination status of contacts to improve overall coverage. Any undervaccinated person linked to a suspect case was recommended to receive a mumps vaccination.

OSDH recommends clinicians to test patients presenting with symptoms consistent with mumps (even if vaccinated) for mumps as well as other viral causes of parotitis. Mumps virus can be isolated from a parotid duct gland swab when collected within the first three days of illness onset. In addition to collecting specimens for viral culture, clinicians should also perform IgM and IgG serologic

testing. Acute mumps infection can be confirmed by the presence of serum mumps immunoglobulin M (IgM), or by a four-fold rise in serum mumps immunoglobulin G (IgG) titer between acute and convalescent phase serum specimens.

Mumps Incidence Rate by Year, Oklahoma and U.S., 1996–2006*



* Finalized national mumps data for 2006 was not available during the publication of this summary

[1] Preliminary data. CDC. Update: Mumps Activity -- United States, January 1-October 7, 2006. MMWR 2006; 55(14;283-291).

Pertussis

2006 Case Total 64 **2006 Rate 1.85 per 100,000**
2005 Case Total 127 **2005 Rate 3.68 per 100,000**

Oklahoma reported 64 cases of pertussis in 2006 representing a 49.6% decrease from 2005 and resulting in an incidence rate of 1.85 per 100,000. Nationwide, 25,616 cases of pertussis were reported in 2005, and the U.S. incidence of reported pertussis cases was 8.7 per 100,000 population. While U.S. rates have increased from 3.47 per 100,000 in 2002 to 8.72 per 100,000 in 2005, the incidence of pertussis in Oklahoma has been stable with an incidence rate of 3.9 in 2002 to 3.68 in 2005.

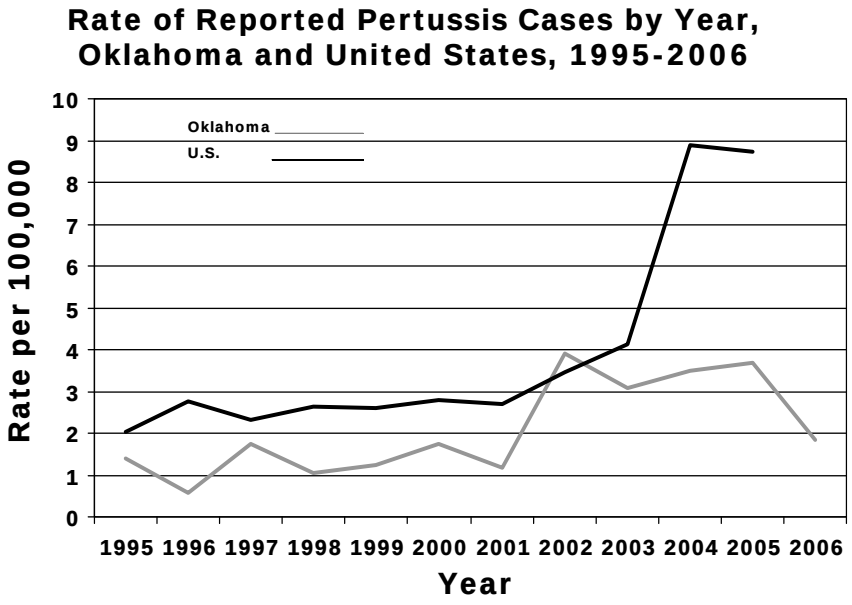
Counties reporting the highest rates of pertussis include Harper County with 112.3 per 100,000 (N=4), Woods County with 11 per 100,00 (N=1) and Beckham County with 10.1 cases per 100,000 (N=2). Forty-seven percent (N=30) of the cases were reported from Oklahoma (2.1 per 100,000, N=14) and Tulsa (2.8 per 100,000, N=16) counties.

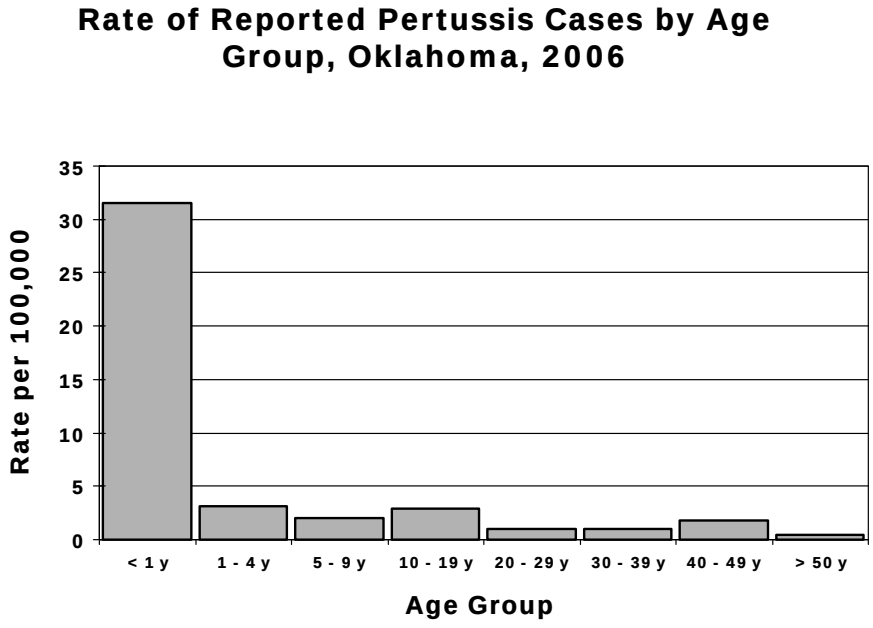
Over half (59%) of cases were female (2.17 per 100,00, N=38). When stratified by age group, rates were similar between males and females except in children less than 5 years. In this age category, the incidence rate among females was 2.1 times greater than the incidence rate among males (12.2 per 100,000 vs. 5.76 per 100,000). Eighty-four percent (N=54) reported their racial background as white (2.05 per 100,000). Five cases reported their racial background as Native American (1.83 per 100,00). Two cases (3.1%) reported multiple races. Cases ranged in age from 8 days to 66 years with a median age of 15 years. The highest rate of pertussis occurred in those under the age of one year with 31.5 cases per 100,000 (N=15). Other age categories with high rates of pertussis included 15 to 19 years (4.08 per 100,000, N=11) and 1 to 4 years (3.17 per 100,000, N=9). Children under the age of 5 years accounted for 33% of cases with an incidence rate of 8.89 per 100,000 (N=21). Infants less than six months of age accounted for 20% of cases (N=13). Adults over the age of twenty accounted for 34% of cases (N=23).

Thirteen percent (N=8) of cases were hospitalized due to pertussis; infants under the age of 6 months accounted for 88% of those hospitalized. No deaths were due to pertussis in 2006.

Eighty-nine percent (N=57) of cases reported to have paroxysmal cough, 48% (N=31) reported post-tussive vomiting, 56% (N=36) reported an inspiratory whoop, and 34% (N=22) of cases reported apnea. The median duration of cough was 37 days with a range from 13 days to 115 days. Among those under one year of age, 80% (N=12) reported a paroxysmal cough, 67% (N=10) of cases reported apnea, 53% (N=8) of cases reported an inspiratory whoop, and 53% (N=8) reported post-tussive vomiting. The most frequently reported symptoms among those age 20 and older was paroxysms (96%, N=22) followed by 61% (N=14) reporting an inspiratory whoop.

Thirty-eight percent (N=24) of cases were associated with a high risk setting. The most common setting was working in or attending school (22%, N=14). Other high risk settings included health care (7.8%, N=5), childcare facilities (4.7%, N=3), and nursing homes (3.1%, N=2). No outbreaks of pertussis were reported in high-risk settings such as schools, childcare facilities, or other institutional settings in Oklahoma in 2005.





Animal Rabies

2006 Statewide Case Total 69
2005 Statewide Case Total 79

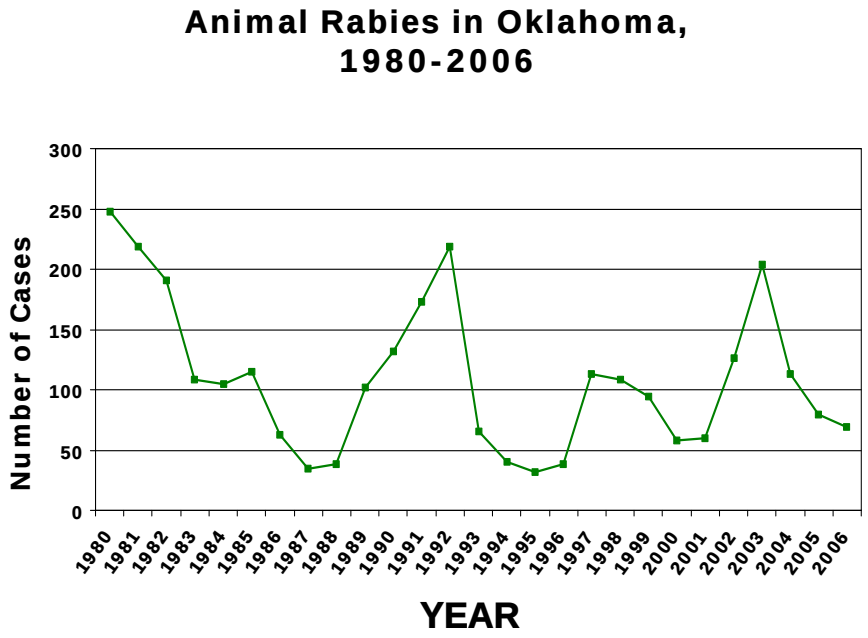
Statewide, animal rabies incidence continues to decline following a peak of 204 cases in 2003. A total of 69 cases of animal rabies were laboratory confirmed in 2006, compared to 79 cases in 2005, a 13% decline in cases. The rabid animals included 50 (72%) skunks, 6 (9%) cows, 5 (7%) horses, 4 (6%) cats, 3 (4%) bats, and 1 dog. The majority of cases (59%) occurred from March through July, with 12 cases occurring in July alone.

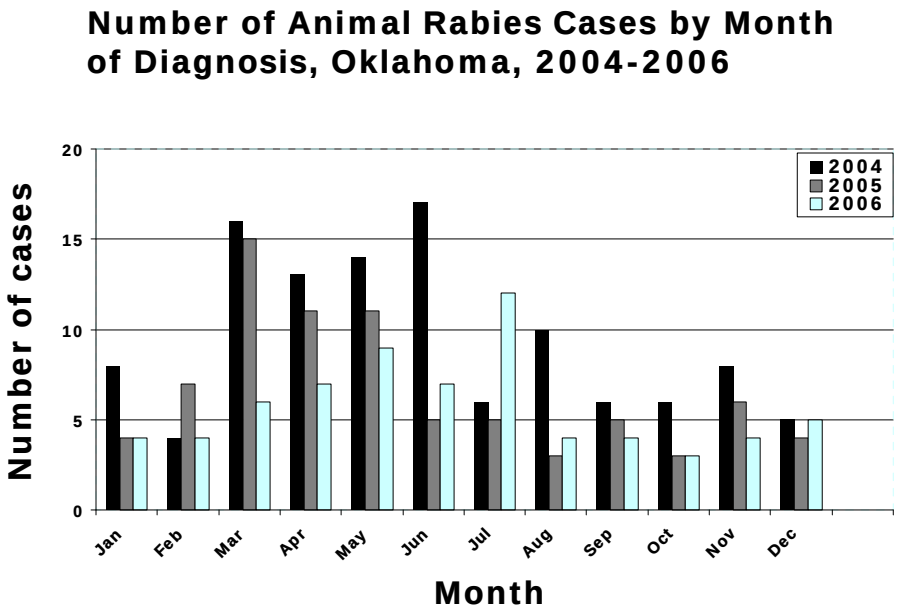
During 2006, rabies was confirmed in animals from 43 (56%) of the 77 counties in Oklahoma. The counties with the highest number of rabid animals included Oklahoma (5), Garfield (5), Grady (3), Hughes (3), and Washington (3). Brain tissue from 1,263 animals was submitted to the OSDH Public Health Laboratory for testing; overall test positivity was 5.5%. By species, the highest percent positivity was found in the following; skunks (54.9%), horses, (15.6%), cattle (10.3%), and bats (9.7%).

Individual case investigations of these rabid animals and exposure risk assessments were performed by OSDH CDD epidemiologists. A total of 30 persons were identified as exposed to rabies, either from a bite or saliva contact to a mucous membrane or broken skin, and advised to receive rabies post exposure prophylaxis (PEP). Animal exposure assessments revealed a total of 131 owned animals that had direct contact with or had probable exposure to a rabid animal. Of these, 96 (73%) were unvaccinated and the owner elected euthanasia. Seven animals (7%) were unvaccinated, and the owners elected quarantine under the supervision of a licensed veterinarian for a period of six months. Twenty-eight (21%) exposed pets were currently vaccinated against rabies and were ordered to receive a rabies booster.

Animal bites are a common cause for emergency room or medical clinic visits. Although it is imperative that a rabies risk assessment be performed when evaluating a person for an animal bite wound, it is not generally necessary to immediately begin rabies PEP. All healthy dogs and cats that bite a person, regardless of vaccination status, may be observed for 10 days from the bite incident, to rule out rabies transmission. The decision to initiate rabies PEP can be deferred for 48 to 72 hours while the animal is being located for observation or testing. Rabies biologics, particularly the human rabies immune globulin, is costly, subject to shortages, and should not be inappropriately administered. Rabies PEP should not be initiated when the animal's whereabouts are known and the animal can be observed for the 10-day period. Wild carnivorous animals such as skunks, foxes, or coyotes, and bats that bite a person should immediately be euthanized and submitted for testing. Squirrels, rabbits, rats, mice, and opossums rarely transmit rabies. Therefore, it is usually NOT necessary to test these types of animals unless the animal was exhibiting very unusual behavior.

An epidemiologist is on call 24/7 for rabies consultations and can be reached through the Communicable Disease Division at (405) 271-4060.





Tetanus

2006 Case Total 1 **2006 Rate 0.03 per 100,000**
2005 Case Total 0 **2005 Rate 0.00 per 100,000**

Tetanus is a rare but severe disease in the United States. In Oklahoma, five cases have been reported since 1996. Tetanus is a reportable disease in Oklahoma due to the severity of disease and availability of an immunoglobulin for those contracting the disease. Cases reported to the OSDH CDD are investigated to determine how the disease was acquired, history of tetanus vaccination and whether immunoglobulin is recommended. One case of tetanus was reported to the OSDH during 2006. Prior to 2006, the last case of tetanus in Oklahoma occurred in 2001.

In December 2006, a 19-year-old LeFlore County resident presented to the emergency room with a two-day history of painful muscular contractions, spasms induced by sensory stimuli and trismus. Blood cultures revealed no growth. Investigation of the case revealed a history of self-body piercing, and a wound on foot due to a nail. The patient reported his last tetanus shot was received prior to entering kindergarten with no booster doses administered sequentially. The patient was administered Tetanus Immune Globulin (TIG) based on the history of a recent puncture wound and symptoms suggestive of tetanus.

Since the introduction of the tetanus vaccine during the 1940's, reported tetanus incidence rates decreased in the United States from approximately 500 to 600 cases annually to approximately 30 cases. Almost all reported cases of tetanus are in persons who have either never been vaccinated, or who completed a primary series but have not had a booster dose in the preceding 10 years.[1] The most common sources of tetanus are acute injuries or wounds including puncture wounds, lacerations, and abrasions. Common exposures to tetanus include stepping on nails or barbed wire, animal bites, self-piercing, and self-performed tattoos. Drug injection users are also at high risk for tetanus. Neonatal tetanus is a form that occurs in newborn infants. This type of tetanus usually occurs through the infection of the unhealed umbilical stump, particularly when the stump in cut with an unsterile instrument. Neonatal tetanus is common in developing countries, but very rare in the US.[1]

There are no laboratory findings characteristic of tetanus. If tetanus if suspected, tetanus immune globulin should be administered. If tetanus vaccination is uncertain or the patient has had less than 3 doses of tetanus vaccine, Td toxoid should be given along with the TIG.[1] This is because early doses of toxoid may not induce immunity but prime the immune system, and TIG provides only temporary immunity. Giving both the vaccination and the TIG ensures that protective levels of antitoxin are achieved.[1] It is important that persons receive the vaccine regardless of their disease status, since disease does not confer immunity.

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[1] CDC. Epidemiology and Prevention of vaccine-Preventable Disease. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. 9th ed. Washington DC: Public Health Foundation, 2006. pp 69-78.

Tuberculosis

2006 Case Total 144		**2006 Rate**	**4.2 per 100,000**
2005 Case Total 144		**2005 Rate**	**4.2 per 100,000**

Tuberculosis (TB) is caused by the bacteria *Mycobacterium tuberculosis*, and is a treatable and preventable infectious disease. Tuberculosis continues to be an important cause of morbidity and mortality in Oklahoma. In 2006 and 2005, 144 Oklahomans were reported with active tuberculosis each year, an incidence rate of 4.2 cases per 100,000 persons per year. In 2006, 52 of 144 (36%) cases were residents of either Oklahoma County or Tulsa County. The remaining 92 cases were scattered over the state, with many counties having one or two cases.

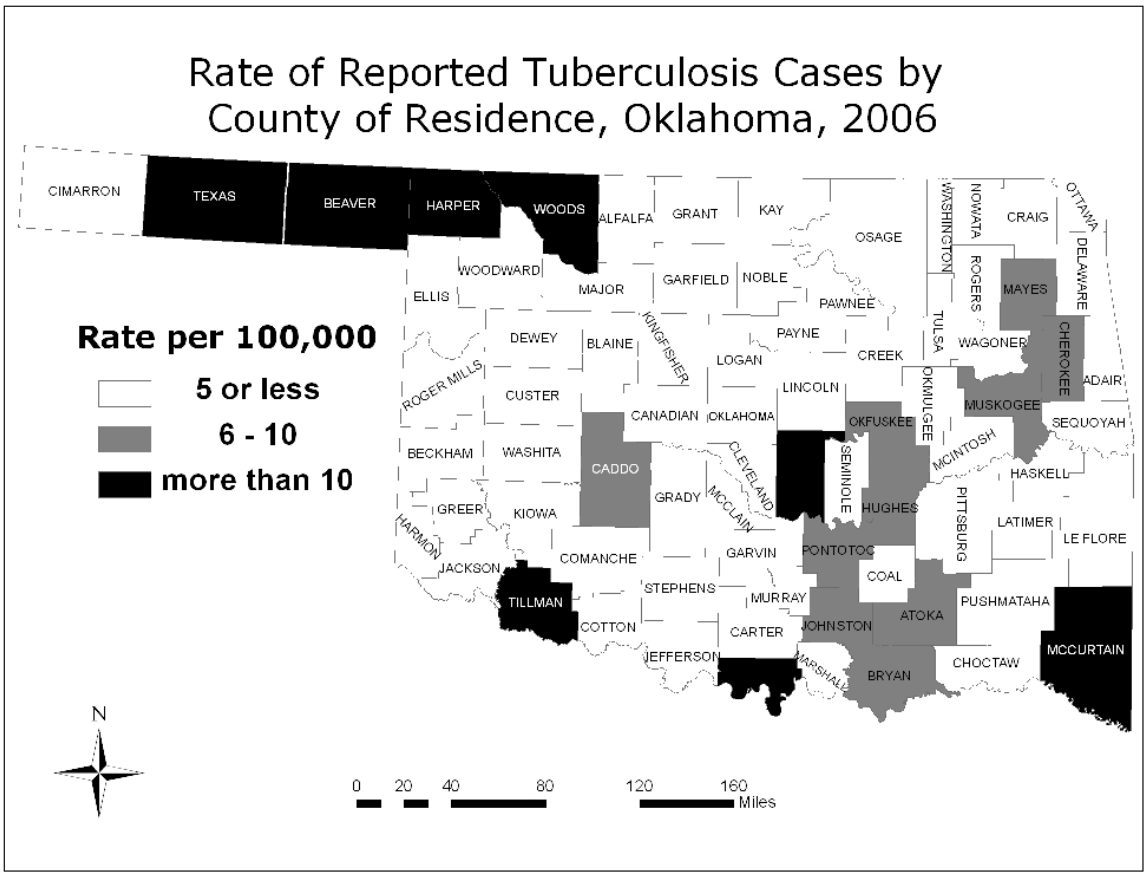
Tuberculosis primarily affects adults. The rate of TB in persons ≥ 65 years has decreased from 11 cases per 100,000 in 2001 to 7 cases per 100,000 in 2006. For the past five years, tuberculosis was a contributing cause of death in an average of 10 deaths per year. The average age at death for these cases was 60 years. In 2006, 8 cases (6%) were in the homeless population, 8 cases (6%)were from nursing homes, 6 cases (4%) had a co-morbidity of AIDS, and 7 cases (5%) were from the correctional system. Two percent (3 of 78) of culture confirmed cases were resistant to Isoniazid in 2006.

The incidence rate of tuberculosis varies across racial and ethnic groups. In 2006, the highest incidence rate of TB was in the Asian group, with 43 cases per 100,000 population. The incidence rate in Hispanics was 13 per 100,000 population. The incidence rate among the American Indians and blacks was 8 per 100,000, while among whites it was 3 per 100,000 population.

The proportion of TB cases among the foreign-born population has been increasing in Oklahoma. In 2002, 13% of Oklahoma cases were foreign-born. This proportion increased to 21% in 2004, and to 27% in 2006. This increase is similar to trends seen elsewhere in the U.S.

Knowledge of high risk groups for TB infection and disease will enhance clinician ability to diagnose the disease. Persons at higher risk include:

- persons that are close contacts to a person with TB (i.e., those sharing the same household or other enclosed environments);
- foreign-born persons, including children, from areas that have a high TB incidence or prevalence such as Asia, Africa, Latin America, Eastern Europe, and Russia;
- residents and employees of high-risk congregate settings such as correctional institutions, nursing homes, homeless shelters, and mental institutions;
- health care workers who serve high-risk clients;
- infants, children, and adolescents exposed to adults in high-risk categories;
- persons that identify themselves to be intravenous substance abusers;
- racial or ethnic minority populations such as Asians, Hispanics, African Americans, American Indians; and
- persons that are homeless.


Rate of Reported Tuberculosis Cases by County of Residence, Oklahoma, 2006
Rate per 100,000
5 or less
6 - 10
more than 10
CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
DELAWARE
WOODWARD
ELLIS
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
TULSA
WAGONER
CHEROKEE
ADAIR
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
ROGER MILLS
CUSTER
LINCOLN
OKMULGEE
MUSKOGEE
SEQUOYAH
CANADIAN
OKLAHOMA
OKFUSKEE
BECKHAM
WASHITA
CADDO
CLEVELAND
SEMINOLE
MCINTOSH
HASKELL
GRADY
MCCLAIN
HUGHES
PITTSBURG
GREER
KIOWA
HARMON
LATIMER
LE FLORE
COMANCHE
GARVIN
PONTOTOC
JACKSON
COAL
TILLMAN
STEPHENS
MURRAY
PUSHMATAHA
ATOKA
COTTON
CARTER
JOHNSTON
JEFFERSON
MARSHALL
BRYAN
CHOCTAW
MCCURTAIN
N
0 20 40 80 120 160 Miles

Vibriosis

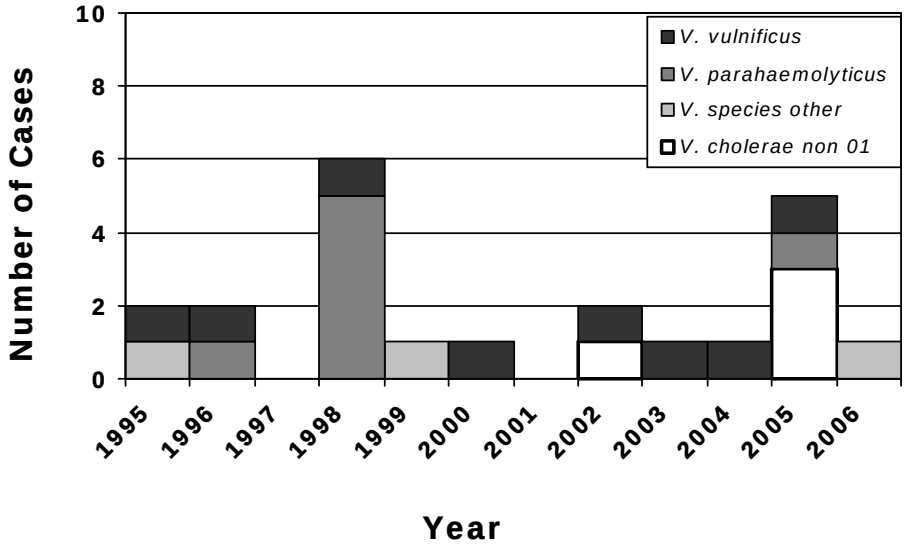
2006 Case Total 1 **2006 Rate 0.03 per 100,000**
2005 Case Total 5 **2005 Rate 0.14 per 100,000**

The *Vibrio* species that are pathogenic to humans include *V. cholerae* O1/O139, *V. cholerae* non-O1/O139*, V. parahaemolyticus* and *V. vulnificus.* Symptoms of illness range in severity from gastroenteritis and wound infections to septicemia. *Vibrio* infections are reportable in Oklahoma and isolates of *Vibrio* species are required to be forwarded to the OSDH PHL for confirmation and speciation. Typically, less than ten cases are reported per year in Oklahoma. In 2006, the OSDH CDD identified and investigated one *Vibrio* case. A summary of that case follows.

A 33-year-old white female resident of Oklahoma County reported onset of severe gastrointestinal illness during November 2006. Symptoms included abdominal distention, dehydration, profuse watery diarrhea, headache, tenesmus, nausea, abdominal pain, and joint discomfort. The case had a history of gastric bypass. She was not hospitalized but described visiting the local emergency department on more than one occasion where she was treated with rehydration and antibiotics. Her diarrhea continued intermittently for at least 2 months until a stool specimen was obtained in early January 2007. The specimen was forwarded to the OSDH PHL where it was confirmed as *Vibrio fluvialis.* The case denied raw seafood consumption but described having eaten at a seafood buffet on multiple occasions near the time of her illness onset. The Oklahoma City County Health Department performed an inspection of the restaurant; no violations were identified regarding storage, preparation, and record keeping of seafood.

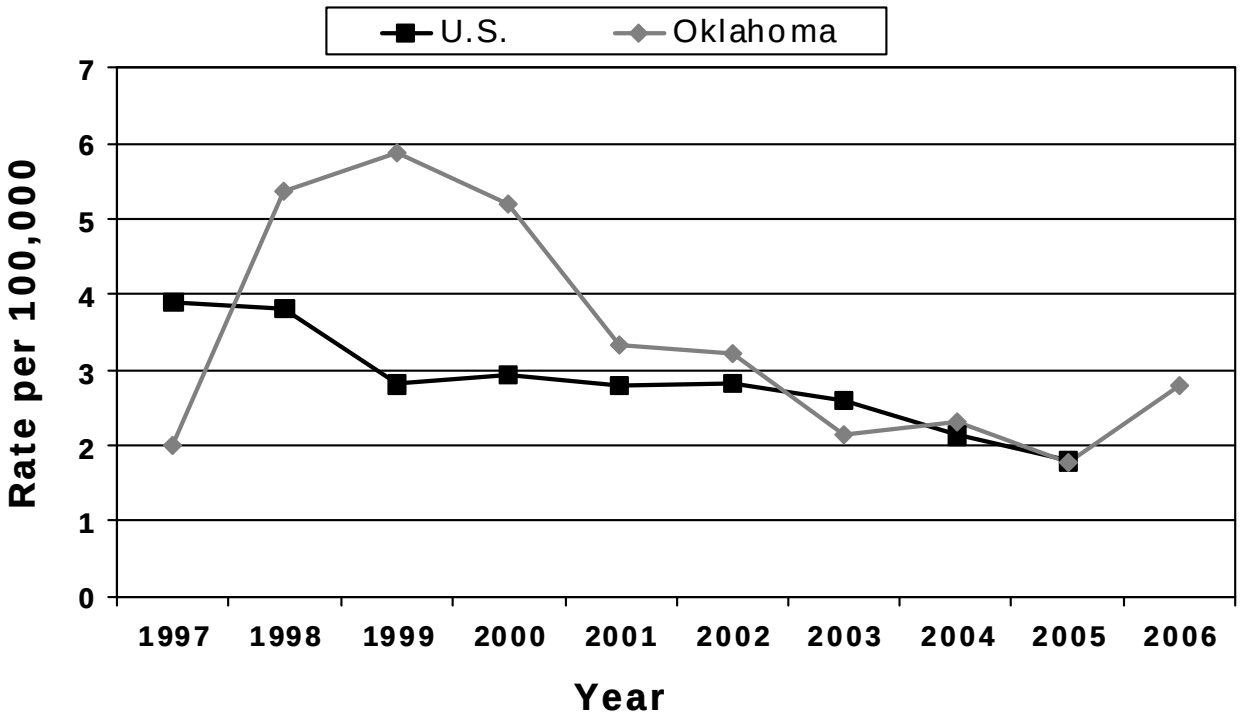
Those at highest risk of life-threatening illness due to *Vibrio* species (spp) include persons with liver disease, alcoholism, diabetes mellitus, malignancies, or immunosuppressive disorders. Healthcare providers should advise their patients with these conditions not to eat raw or undercooked seafood, particularly raw shellfish. When acute gastroenteritis occurs following consumption of raw or undercooked shellfish, obtaining a stool specimen to test for *Vibrio spp* is advised. *Vibrio spp* should also be suspected in individuals with a history of exposure to warm seawater and presenting with severe wound infections.

Reported Number of *Vibrio* Cases by Species and Year, Oklahoma, 1995-2006



Hepatitis

Acute Hepatitis B Incidence Rate by Year, Oklahoma and U.S., 1997-2006



Hepatitis A

2006 Case Total 11 **2006 Rate 0.32 per 100,000**
2005 Case Total 6 **2005 Rate 0.17 per 100,000**

The incidence of hepatitis A remained below the U.S. incidence rate and Healthy People 2010 target for the sixth year in a row. Only 11 cases of hepatitis A were reported to the OSDH CDD in 2006. No outbreaks of hepatitis A were identified in 2006. Cases were reported among residents from 7 counties: Tulsa (0.71 per 100,000, N=4), Oklahoma County (0.3 per 100,000, N=2), Cleveland (0.48 per 100,000, n=1), Greer (16.5 per 100,000, n=1), Kay (2.08 per 100,000, n=1), Love (11.32 per 100,000, n=1) and Texas (4.97 per 100,000, n=1).

The age range of cases was 21 to 75 years with a median age of 28. Seven cases (63.6%) fell into the 20-29 age group. Six (54.5%) cases were female and five (45.5%) were male. The rate of hepatitis A among males (0.34 per 100,000) was slightly higher than the rate in females (0.29 per 100,000). Eight cases reported their racial background as white (0.30 per 100,000), one reported race as black (0.38 per 100,000) and two were unknown. Five of eight reported Hispanic ethnicity (2.79 per 100,000).

In addition to a positive serologic test for acute hepatitis A virus (HAV) infection (IgM anti-HAV), the case definition consists of an acute illness with (a) discrete onset of symptoms <u>and</u> (b) jaundice <u>or</u> elevated serum aminotransferase levels. The hallmark symptoms of hepatitis A include at least one of the following: dark "tea-colored" urine, clay-colored stools or jaundice. Ten cases (91%) reported dark urine, nine cases (82%) reported jaundice and three (27%) reported clay colored stool. Among other symptoms, ten cases (91%) reported nausea, six cases (55%) reported right upper quadrant pain, and six (55%) cases reported vomiting.

One patient (9%) was hospitalized overnight, and no deaths due to hepatitis A occurred. Two cases were associated with high-risk settings (nursing home and food production) but no secondary cases occurred. Five (45%) cases were confirmed as imported from other countries.

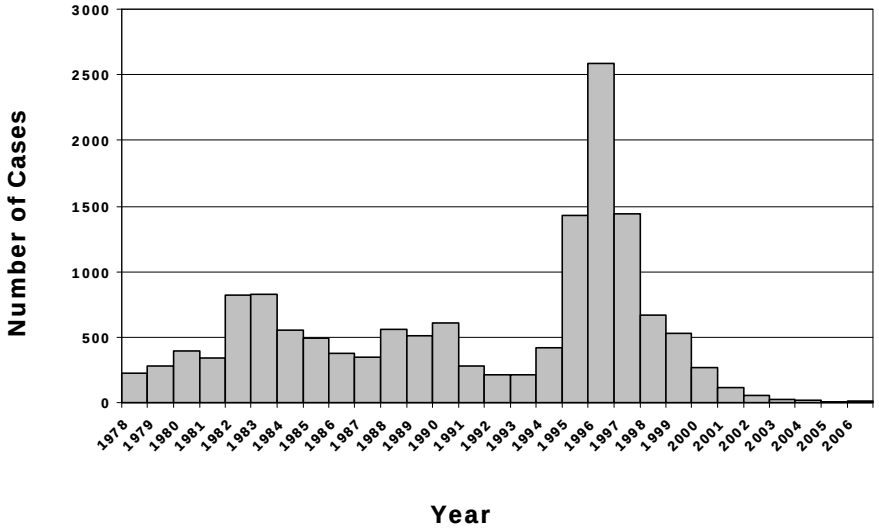
Hepatitis A is an immediately reportable disease. The public health investigation of a suspected or confirmed case of hepatitis A involves identification of high-risk settings and susceptible contacts who are at risk of infection. County health department nurses rapidly investigate all reported cases. Those assessed as being at risk of infection are advised to receive immune globulin (Ig) for short-term immunity and are also advised to concurrently receive the first dose of Hepatitis A vaccine for long-term immunity. Both of these pharmaceuticals are provided through the county health departments. The vaccine is recommended for persons traveling to countries where hepatitis A is endemic.

A study performed by the Centers for Disease Control and Prevention (CDC) described the occurrence of false positive IgM anti-HAV tests in older persons with no hepatitis symptoms.[1] In the absence of symptoms, use of Ig is not indicated

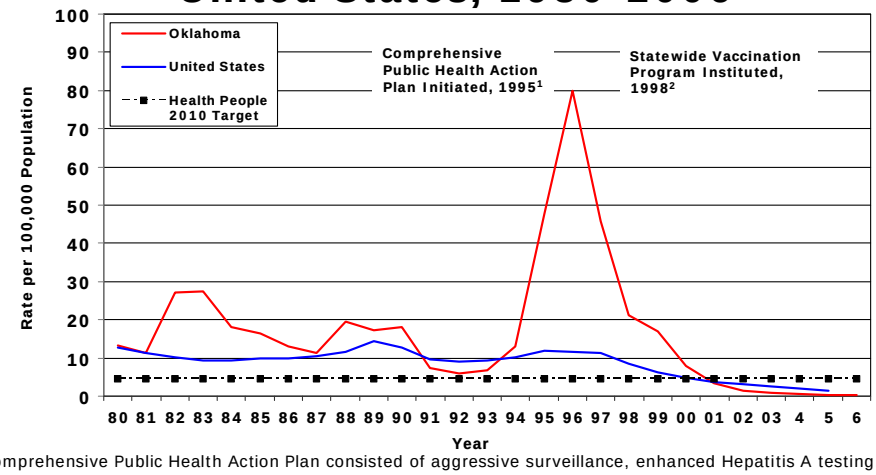
because the infectious period cannot be determined and the window of opportunity to prevent disease is unknown. Limiting the use of IgM anti-HAV tests to those persons with evidence of clinical hepatitis or with recent exposure is recommended.

[1] Centers for Disease Control and Prevention. Positive Test Results for Acute Hepatitis A Virus Infection Among Persons With No Recent History of Acute Hepatitis – United States, 2002-2004. MMWR 2005;54:453-456.

Reported Cases of Hepatitis A by Year, Oklahoma, 1978-2006



Rate of Hepatitis A in Oklahoma and United States, 1980-2006



[1] Comprehensive Public Health Action Plan consisted of aggressive surveillance, enhanced Hepatitis A testing, aggressive confirmed and epi-link case investigation and contact prophylaxis, and public awareness and prevention media campaigns.

[2] Due to the statewide outbreak of Hepatitis A 1995-1997, Oklahoma became the first state in the nation to mandate Hepatitis A vaccinations for daycare and school (K and 7th grade) admission in 1998.

[3] The Healthy People 2010 Target Rate for Hepatitis A in the United States is 4.5 cases per 100,000 population.

National Data Provided by the Centers for Disease Control Oklahoma Data Provided by the Communicable Disease Division, Oklahoma State Department of Health

Hepatitis B

2006 Case Total	**96**	**2006 Rate**	**2.78 per 100,000**
2005 Case Total	**59**	**2005 Rate**	**1.17 per 100,000**

Hepatitis B vaccination is the most effective measure to prevent hepatitis B virus (HBV) infection and its consequences, including cirrhosis of the liver, liver cancer, liver failure, and death. With the successful integration of hepatitis B vaccine into the childhood immunization schedule and the subsequent decline in acute hepatitis B disease among children, the incidence of acute hepatitis B is now highest among adults. In adults, ongoing HBV transmission occurs primarily among unvaccinated persons with behavioral risk factors for HBV transmission (e.g., heterosexuals with multiple sex partners, injection-drug users [IDUs], and men who have sex with men [MSM]) and among household contacts and sex partners of persons with chronic HBV infection.

In Oklahoma, reported acute hepatitis B cases increased significantly from 2005 through 2006. This increase was most likely related to increased effort on the part of the Communicable Disease Nurses at the county health departments and the Viral Hepatitis Program staff at the Oklahoma State Department of Health to obtain liver enzyme panel information on those reports of hepatitis B laboratory results, i.e. a positive IgM antibody test to hepatitis B core antigen (anti-HBc) or a positive test for hepatitis B surface antigen (HbsAg). The criteria to meet the CDC surveillance case definition for acute hepatitis B is a positive anti-HBc or HbsAg laboratory result coupled with an acute onset of illness characterized by jaundice or elevated serum aminotransferase (ALT) levels.

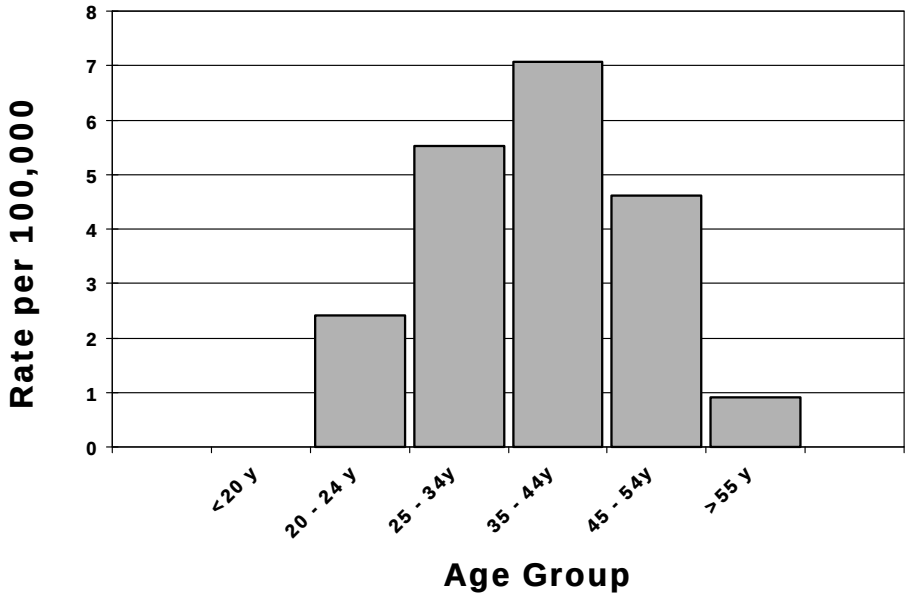
Males comprised the highest percentage of acute HBV infections with 55 of 96 cases (57%); 41 cases (43%) were female. Hepatitis B rates varied by age with the highest case rates reported among persons aged 35 to 44 years (7.06 per 100,000), followed by 24 to 34 years (5.53 per 100,000), and 45 to 54 years (4.62 per 100,000). No cases were reported among persons less than 21 years of age. This Oklahoma data reflects the nationwide trend as mentioned previously, and is a testament to the success of the universal school entry immunization requirement.

The highest race-specific rates of acute hepatitis B were reported among Native Americans (5.85 per 100,000), followed by whites (2.58 per 100,000) and blacks (2.29 per 100,000). No cases were reported among Hispanics or Asian/Pacific Islanders during 2006.

Thirty-four percent of hepatitis B cases were hospitalized for acute illness. One death was due to HBV hepatitis. Acute hepatitis B incidence rates of 10 per 100,000 or higher occurred in six counties. By descending rate, these included Woodward, Sequoyah, Greer, Okmulgee, Craig and Creek.

The implementation of a comprehensive strategy for achieving the elimination of hepatitis B in the U.S. has been in place for several years. A dramatic decline in the incidence of hepatitis B nationwide indicates that this strategy is successful but must be continued. Interventions included in the strategy are: screening of all pregnant women for HBV infection; administration of post-exposure prophylaxis to infants born to infected women; routine vaccination of all infants and children <19 years; and targeted vaccination of individuals at increased risk of hepatitis B exposure, such as health care workers, dialysis patients, household contacts and sex partners of persons with chronic HBV infection, recipients of certain blood products, persons with a recent history of having had multiple sex partners or a STD, men who have sex with men, and injecting drug users.

Rate of Reported Acute Hepatitis B Cases by Age Group, Oklahoma, 2006



Hepatitis C

2006 Case Total	**19**	**2006 Rate**	**0.55 per 100,000**
2005 Case Total	**14**	**2005 Rate**	**0.41 per 100,000**

The FDA licensed the first test to detect antibodies to the hepatitis C virus (anti-HCV) in 1990. Since that time, new versions of these and other FDA-approved anti-HCV tests have been used widely for clinical diagnosis and screening of asymptomatic persons. Testing for anti-HCV should include use of an antibody screening assay, and then for screening test-positive results, a more specific supplemental assay such as a recombinant immunoblot assay (RIBA) or a nucleic acid test (NAT). The Centers for Disease Control and Prevention (CDC) have expanded recommendations for anti-HCV testing to include an option for reflex supplemental testing based on screening test-positive signal-to-cut-off (s/co) ratios and more recently, indexes. Use of s/co ratios and indexes minimize the amount of supplemental testing that needs to be performed while improving the reliability of reported test results.

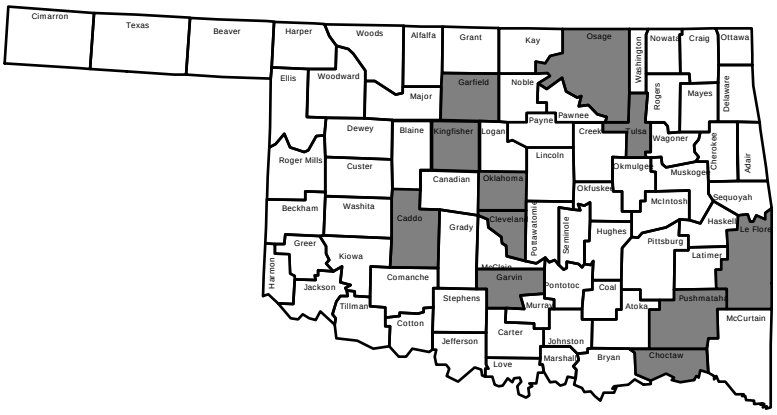
In 2005, a total of 2,604 positive laboratory tests for hepatitis C were reported to the OSDH and in 2006, this number increased to 3,936. This illustrates the growing burden of hepatitis C surveillance. The majority of the reports represent infected individuals who have not been previously reported to the OSDH, and are chronically infected with HCV. Only 19 of the 3,936 received reports (0.4%) were classified as a case based on the CDC acute hepatitis C virus infection surveillance case definition.

Of the 19 acute hepatitis C cases, eleven (58%) were male and eight (42%) were female. The youngest person with confirmed acute hepatitis C was 16 years of age and the oldest was 55 years of age. The highest rates were among the ages of 15 to 24 years (1.16 per 100,000), and 35 to 44 years (1.14 per 100,000), followed by 45 to 59 years (0.79 per 100,000) and 25 to 34 years (0.44 per 100,000). The highest race-specific rates were seen among Native Americans (1.82 per 100,000), followed by blacks (0.76 per 100,000), and whites (0.45 per 100,000).

Eight cases (42%) of acute hepatitis C reported jaundice. Risk factor information collected during case investigations revealed that seven (37%) had obtained tattoos during the potential exposure period, and eight (42%) had a history of injection drug use.

Acute hepatitis C cases were distributed across eleven counties. Tulsa county data reflected a seven-fold increase in acute hepatitis C cases from 2005 to 2006 (no confirmed cases in 2005, seven cases identified in 2006). Review of data collected during case investigations showed no common association between Tulsa county cases, nor a potential point source. The ages ranged from 21 to 55 years old. Three of the seven cases (43%) admitted to injectable drug use and the same three cases admitted to receiving a tattoo. Injectable drug use continues to be the greatest risk factor for hepatitis C virus infection.

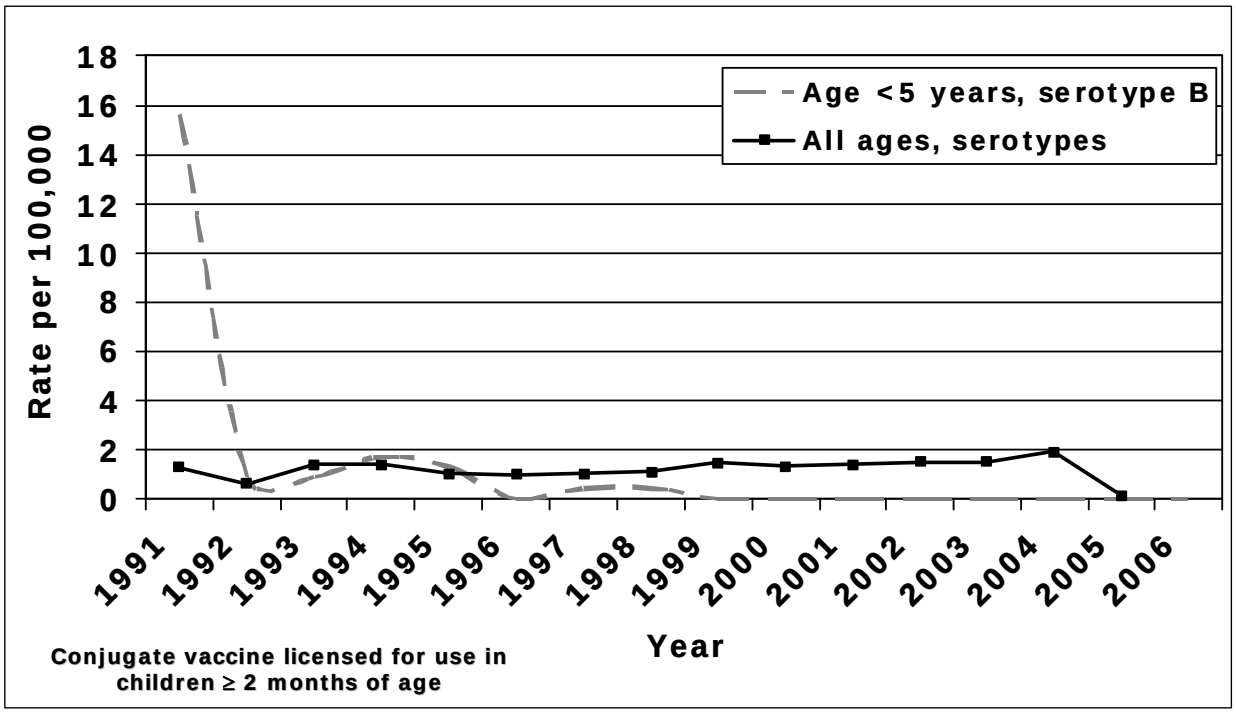
Reported Acute Hepatitis C Cases by County of Residence, Oklahoma, 2006



Counties reporting acute cases of hepatitis C

Meningitis / Septicemia

Rate of Reported *H. Influenzae* Cases, All Ages and Serotypes, and < 5 Years, Serotype B, Oklahoma, 1991–2006



Haemophilus influenzae Invasive Disease

2006 Case Total 78 **2006 Rate 2.26 per 100,000**
2005 Case Total 74 **2005 Rate 2.14 per 100,000**

Seventy-eight cases of invasive *Haemophilus influenzae* disease were reported in 2006, a 5.4% increase from 2005. Over the last five years, the rate of invasive *Haemophilus influenzae* disease has increased yearly in Oklahoma (see graph). Both Oklahoma and the United States have experienced an increase in incidence rates of total cases; however, Oklahoma rates have still been higher than the national rates. National disease estimates for 2006 are not yet available.

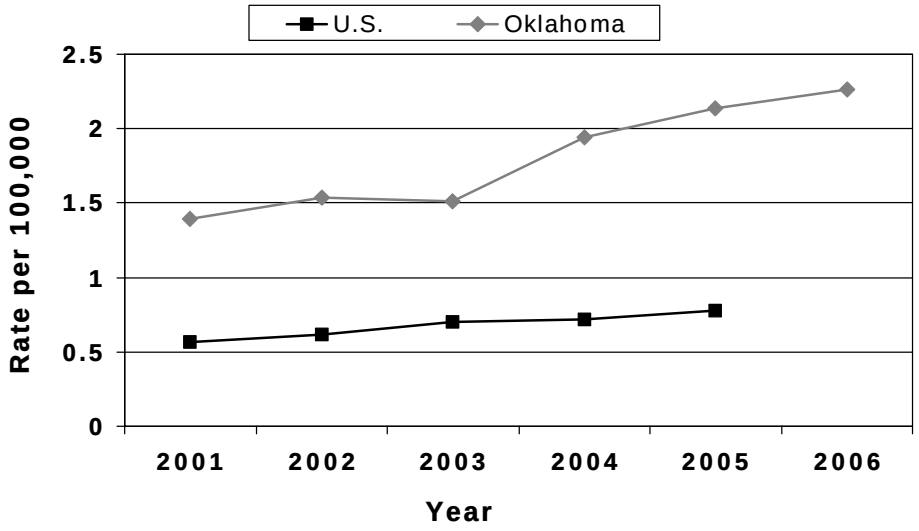
Cases ranged in age from 2 months to 98 years, with a median of 64 years of age. Forty-eight (61.5%) cases were female. Among the 77 cases reporting only one racial group, blacks had the highest rate of disease (N=9, 3.45 per 100,000). The incidence rate was 2.56 per 100,000 for American Indians, and 2.21 per 100,000 for whites respectively. One (1.2%) case reported multiple races. Of the 41 cases for which Hispanic ethnicity was ascertained, four cases reported a Hispanic ethnicity, a rate of 2.23 per 100,000. Nineteen cases occurred in Oklahoma County (2.88 per 100,000), and 20 cases occurred in Tulsa County (3.55 per 100,000). The counties with the highest rates of disease were Harmon (30.46 per 100,000) and Roger Mills (29.1 per 100,000); however, each county had one case. Bactermia/sepsis was reported in 54 cases (69%), pneumonia was reported in 2 (67%), and meningitis was reported in 3 cases (4%). Fifty-one (65%) cases of invasive *Haemophilus influenzae* disease were hospitalized, and five (6.4%) died.

Laboratories in Oklahoma are required to submit sterile-site isolates of *H. influenzae* to the Public Health Laboratory (PHL) for confirmation and serotyping. Of the isolates serotyped at the PHL, 43 (55%) were nontypeable, 15 (19.2%) were serotype f, 7 (9%) were serotype a, 6 (7.7%) were serotype e, and 1 (1.28%) was serotype c.

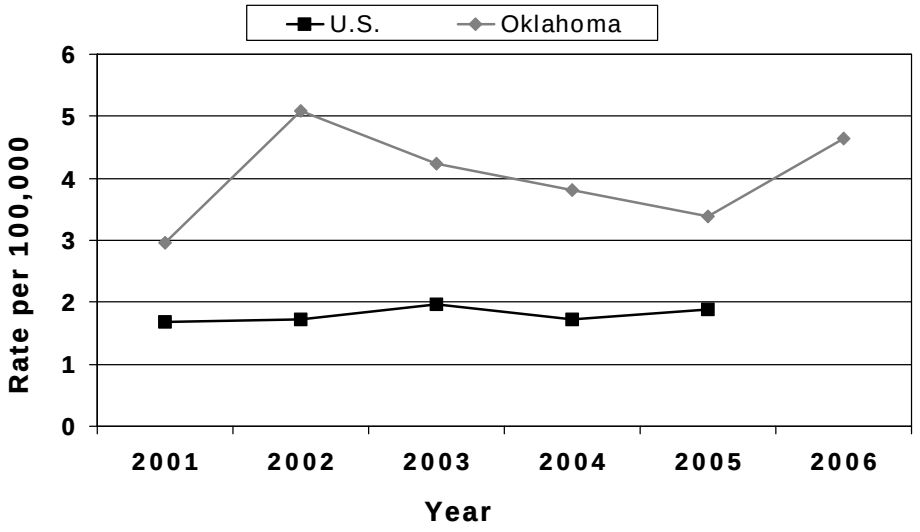
<u>*H. influenzae* Invasive Disease in Children Less Than 5 Years of Age</u>
Eleven cases occurred in children less than five years of age, a 37.5% increase from 2005 (N=8). Four cases were female (36%). Of these 11 cases, race was ascertained for nine: five (55%) were white, 2 (22%) were American Indian, and 2 (22%) were black. One (11%) case reported Hispanic ethnicity. Four cases (36%) were hospitalized and no deaths occurred in this group.

No cases of *H. influenzae* type b (Hib) occurred in children less than five years of age in 2006. Isolates were submitted for all eleven cases: 5 were nontypeable (45%), 2 were serotype a (18%), and one each were serotype c, e, and f. The last case of Hib in an Oklahoma child occurred in 1998.

Rate of *Haemophilus influenzae* Invasive Disease Oklahoma and U.S., 2001-2006



Rate of *Haemophilus influenzae* Invasive Disease Among Children Less Than 5 Years Old, Oklahoma and U.S., 2001-2006



Invasive Group A Streptococcus

2006 Case Total 125 **2006 Rate 3.62 per 100,000**
2005 Case Total 132 **2005 Rate 3.83 per 100,000**

Invasive Group A Streptococcus was added to the Oklahoma reportable disease list during June 2000. One hundred thirty-two cases of invasive *S. pyogenes* (3.83 cases per 100,000) were reported in 2005, a 31% increase from the previous year. No outbreaks, geographic clusters, or other trends were identified.

Occurrence of reported cases by gender was evenly distributed with 66 cases reported among females (52.8%) and 59 cases among males (47.2%). The ages of cases ranged from two months to 93 years with a median age of 62 years. Twelve cases (9.6%, 5.4 per 100,000) occurred in children under 10 years of age, and 30 (24%, 9.17 per 100,000) occurred in persons over age 69. Those over 50 years of age had the highest observed rates of Group A *Strep* invasive disease (refer to incidence rate graph). The rate of disease among infants less than one year was 6.31 per 100,000 (3 cases).

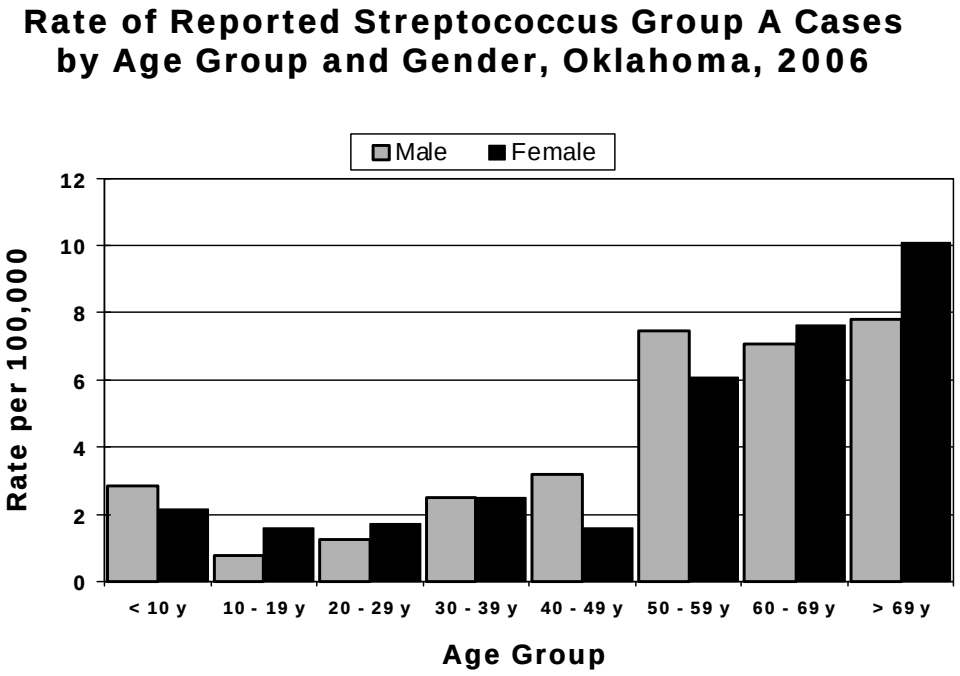
The highest rate of disease occurred among persons that reported their racial background as black with a rate of 6.90 cases per 100,000 population (18 cases), followed closely by American Indians at 6.22 per 100,000 (17 cases) and whites at 3.06 per 100,000 (81 cases). Persons reporting their race as Asian resulted in a race-specific rate of 2.14 per 100,000 (1 case). This race distribution is very similar to the previous year. Three cases' races were unknown, and one case reported multiple races (American Indian and white).

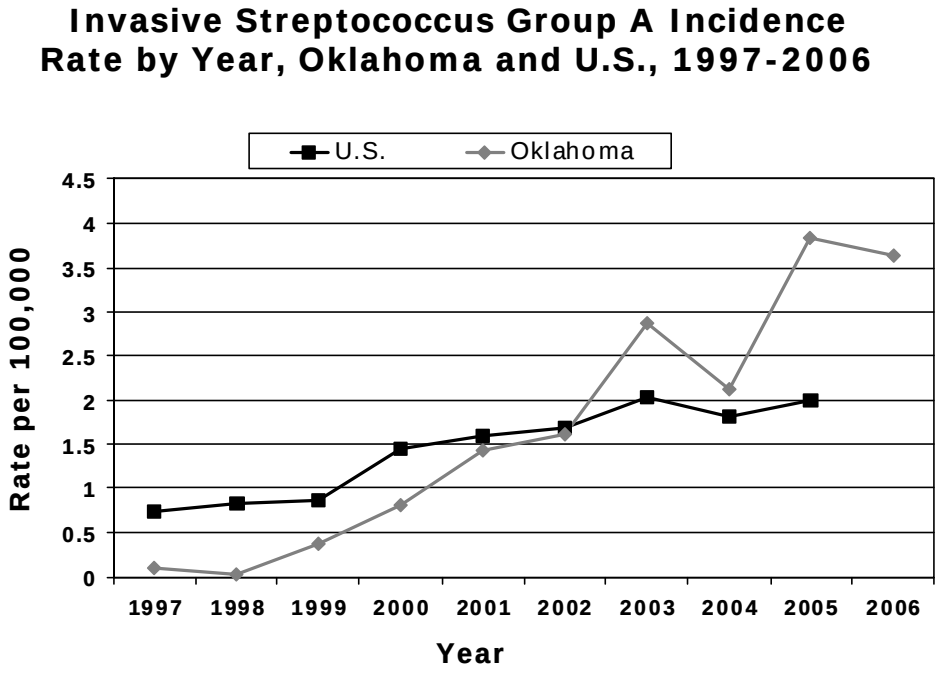
Cases were identified in 33 counties across the state with the greatest number of cases occurring in Tulsa (41 cases, 32.8%) and Oklahoma (37 cases, 29.6%) counties. Ninety-seven patients' hospitalization status was reported, and of those, 84 (86.6%) were confirmed to have been hospitalized. Of the 122 cases whose outcomes were confirmed, 20 died resulting in a case fatality rate of 16.4%. The ages of those who died ranged from 2 months to 96 years with a median of 60 years.

Invasive group A streptococcal infections may manifest as several clinical syndromes, including: pneumonia, bacteremia in association with cutaneous infection (e.g., cellulitis, erysipelas, or infection of a surgical or nonsurgical wound), deep soft-tissue infection (e.g., myositis or necrotizing fasciitis), meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (i.e., puerperal fever), neonatal sepsis, and nonfocal bacteremia. The most common presentation was bacteremia/sepsis (116 cases, 92.8%). The next most common presentation was cellulitis (not necrotizing fasciitis) with 23 cases (18.4%).

Ten cases (8%) presented with necrotizing fasciitis, and four of those cases expired. The age range of patients with necrotizing fasciitis was 20 to 65 years with a median of 54 years. Of those who died, ages ranged from 32 to 65 with a median of 54 years. Two patients were known to have a history of diabetes with

complications and the other two did not have a known underlying illness at presentation.





Invasive *Streptococcus pneumoniae*

2006 Case Total 703 **2006 Rate 20.4 per 100,000**
2005 Case Total 700 **2005 Rate 20.3 per 100,000**

Seven hundred and three invasive *S. pneumoniae* cases were reported in 2006 representing a 0.4% increase compared to the number of cases reported in 2005. The overall incidence rate in Oklahoma was 20.4 per 100,000. All isolates from a normally sterile site (e.g., blood, cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid) reported to the OSDH CDD are included in this category. The most common condition reported from invasive pneumococcal disease (IPD) was bacteremia/sepsis, with pneumonia as the most common secondary condition. Cases occurred among residents of 64 (83%) counties. Cases were most frequently reported among residents of Oklahoma (187 cases; 28.3 per 100,000), Tulsa (130 cases; 23.1 per 100,000), and Cleveland (29 cases; 13.9 per 100,000) counties.

The reported number of cases by month of symptom onset illustrated a seasonal trend where invasive *S. pneumoniae* cases increased during the winter months. In 2006, invasive *S. pneumoniae* cases peaked in February with 117 cases (16.6%) with 64% (N=450) of cases occurring between November and March. Cases ranged in age from 1 day to 99 years with a median age of 56 years. The highest age-specific incidence rates were observed among adults greater than or equal to 65 years (55.49 per 100,000, N=253) and in children <1 year (48.4 per 100,000, N=23). In children <5 years, the rate was 30.9 per 100,000. Incidence rates were similar between males (20.58 per 100,000, N=349) and females (19.72 per 100,000 population, N=346). Age-specific rates revealed a higher incidence among males than females in all age groups except those persons greater than 70 years of age.

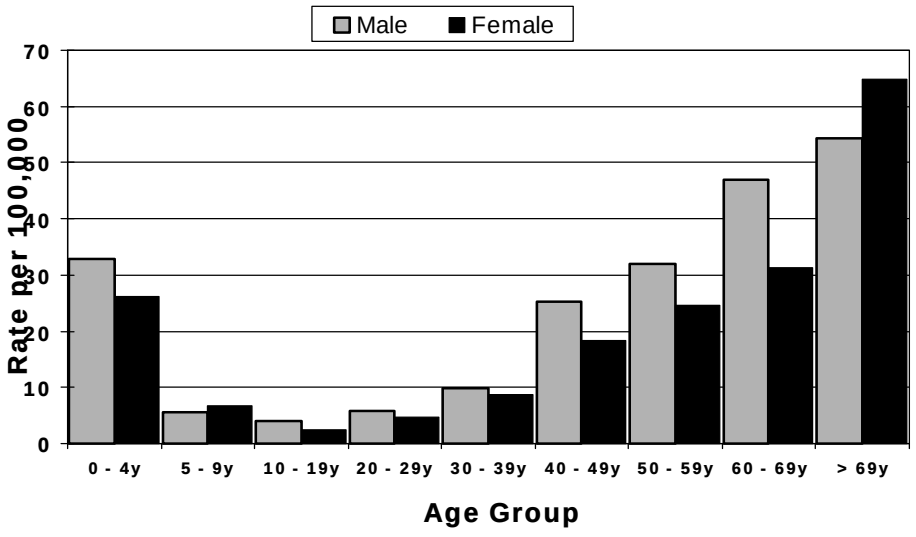
The highest number of cases occurred among persons who reported their race as white (78%), but the highest rate of *S. pneumoniae* was reported among persons who reported their race as black (29.89 cases per 100,000, N=78). Two persons reported multiple races. The rate of reported *S. pneumoniae* cases among other races were: white at 20.81 cases per 100,000, American Indians at 13.54 per 100,000, and Asian at 2.14 cases per 100,000. Four hundred forty-nine cases (64%) were hospitalized due to Invasive *S. pneumoniae*; with 64% (N=289) of those hospitalized were 50 years or older. Blacks had the highest hospitalization rate (15.33 per 100,000, N=40) due to IPD, with no difference in hospitalization rate between males and females. Sixty-four cases died due to invasive *S. pneumoniae* resulting in a case fatality rate of 9.1%, 80% (N=51) of those who died due to IPD were 50 years or older. Whites had the highest death rate (2.05 per 100,000, N= 54), with no difference in death rates between males and females.

Children <5 Years of Age

Children less than 5 years of age in Oklahoma constituted 10% (N=73) of all IPD cases in 2006. Gender of cases had a similar distribution (males=40, females=30). Thirty-seven (51%) cases were hospitalized due to IPD. The most common presentation of IPD was bactermia/sepsis (96%, N=70) and meningitis (6.8%, N=5). Secondary infections included pneumonia (28.7%, N=21) and otitis media (8.2%, N=6). One child expired due to IPD, having both bacteremia and meningitis. Sixteen children (22%) reported receiving the pneumococcal conjugate vaccine, and 3 (19%) were considered at the date of disease onset.

In November 2006, OSDH implemented new submission requirements regarding IPD. All sterile site isolates of *Streptococcus pneumoniae* in children less than five years of age are to be submitted to the OSDH Public Health Laboratory (PHL) for serotyping. This serotyping data will be used to evaluate the occurrence of invasive pneumococcal disease due to vaccine preventable serotypes among children less than five years of age and determine the number of invasive pneumococcal disease cases that can be prevented by broader pneumococcal conjugate vaccine coverage in Oklahoma. The OSDH PHL in conjunction with CDC has implemented protocols to identify serotypes among submitted isolates.

Rate of Reported Invasive *Streptococcus pneumonia* Cases by Age Group and Gender, Oklahoma, 2006



Meningococcal Invasive Disease

2006 Case Total 15 **2006 Rate 0.43 per 100,000**
2005 Case Total 18 **2005 Rate 0.52 per 100,000**

The number of reported invasive meningococcal disease cases decreased 20% from 2005 to 2006 in Oklahoma. This trend is consistent with the overall downward trend in the number of reported meningococcal cases nationally in the past decade. Oklahoma had a rate of 0.43 cases per 100,000 population in 2006.

The median age for reported cases was 19 years with a range of five months to 65 years of age. Sixty percent of cases were male. Race classification was ascertained for all cases. Among racial groups, blacks had the highest incidence rate of 0.77 per 100,000 population, followed by American Indians with a rate of 0.73 per 100,000, and whites with a rate of 0.42 per 100,000. Ethnicity was reported for 73% of the cases; Hispanic ethnicity was not reported by any case. The geographic distribution included three cases in Oklahoma County, two cases in Tulsa County and one case in each Cherokee, Hughes, Kay, Logan, Osage, Payne, Pittsburg, Seminole, Wagoner and Woodward counties.

Fourteen of the fifteen reported cases of meningococcal invasive disease were hospitalized; one case-patient expired prior to hospitalization. One additional case expired during the course of the illness, resulting in a total of two deaths. Both cases were male, one was 44 years of age and the other was 19 months. Bacteremia/sepsis was reported in 93.3% of cases, disseminated intravascular coagulation in 26.7%, pneumonia in 20%, and meningitis in 20% of cases.

Sterile site isolates of *Neisseria meningitidis* are required to be submitted to the Public Health Laboratory for confirmation and serogroup identification. Seven (50%) isolates from 2006 were not groupable, four (28.6%) isolates were group B, and one isolate was identified for each of the groups C, X and Y.

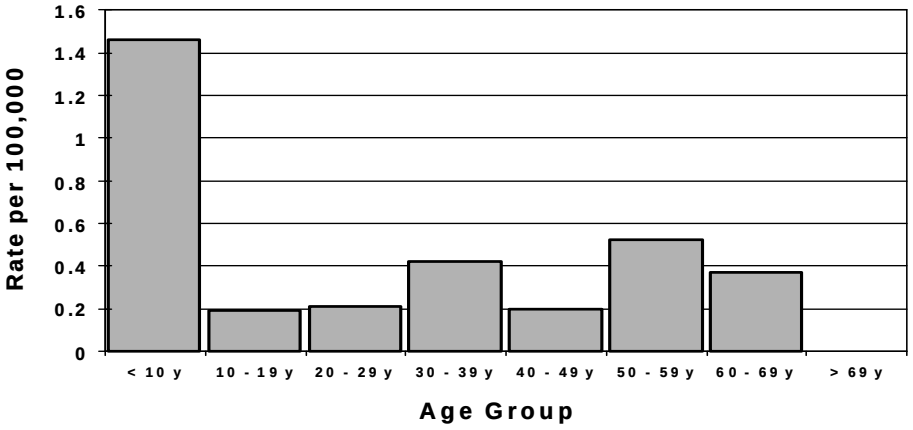
Two vaccines are currently available for prevention of meningococcal disease, which protection against serogroups A, C, Y and W-135. None of the 2006 reported cases had been vaccinated. Vaccination is recommended for young adolescents and individuals who are at an increased risk for disease. These individuals include college freshman living in a dormitory setting, microbiologists who have frequent exposure to *Neisseria meningitidis*, military personnel, individuals who travel to endemic areas, individuals who have terminal complement component deficiencies, and individuals who have anatomic or functional asplenia.[1]

A suspected or confirmed case of meningococcal invasive disease triggers an investigation by personnel at the state and county health departments. Although the likelihood of secondary cases is extremely low, the severity of the disease warrants quick public health action to prevent disease. The risk of disease in a

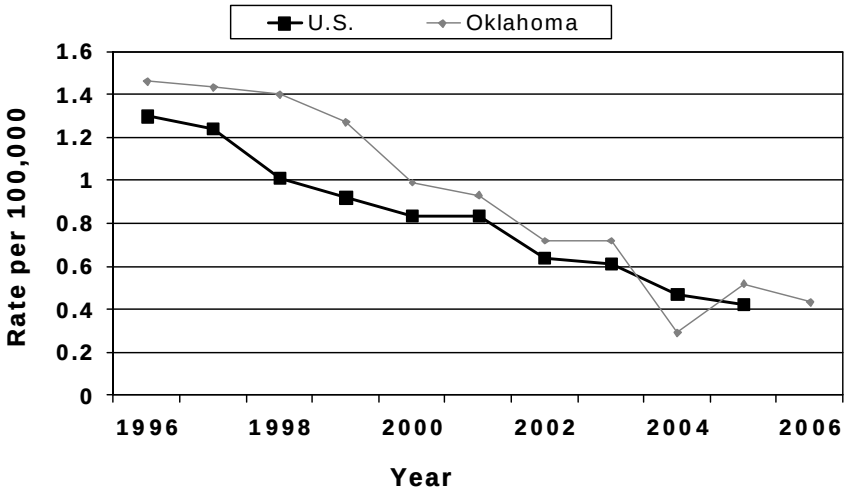
[1] Centers for Disease Control and Prevention. Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7): page 15.

household member is two to four per 1,000 exposed, 500 to 800 times higher than the risk for the general population.[2] Recommendations for post exposure chemo-prophylaxis are made to individuals dependent on the level of exposure to the case. In 2006, the median number of contacts per case receiving prophylaxis was 13, with a range of zero to 42. No secondary cases occurred.

Rate of Meningococcal Disease by Age Group
Oklahoma, 2006



Rate of Meningococcal Invasive Disease
Oklahoma and U.S., 1996-2006



[2] Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. 8th ed. Washington DC: Public Health Foundation, 2005.

Listeriosis

2006 Case Total 5 **2006 Rate 0.14 per 100,000**
2005 Case Total 4 **2005 Rate 0.12 per 100,000**

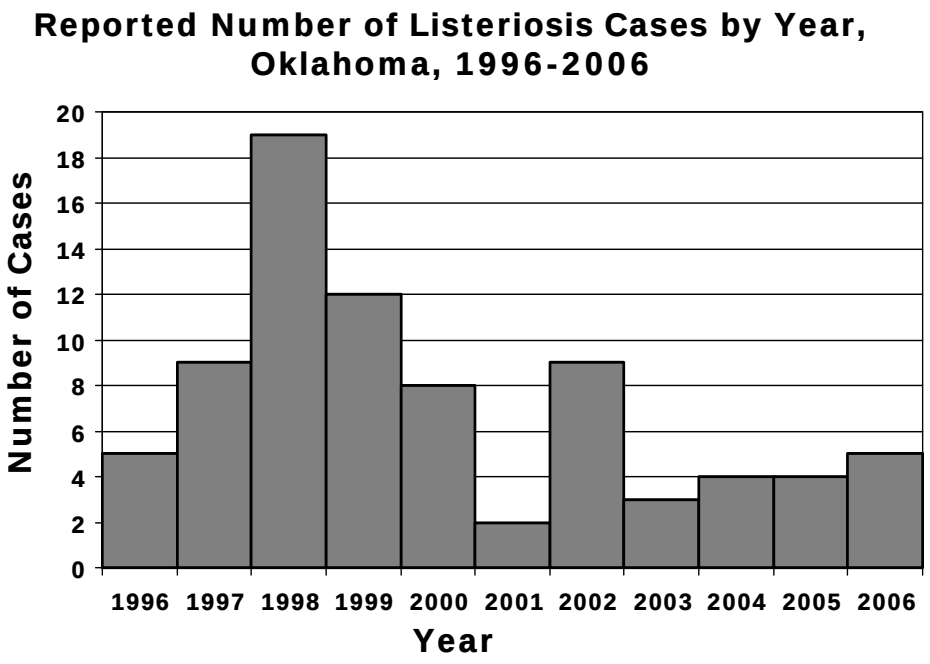
Listeriosis, although not a common disease, is often severe. Specific high risk groups such as individuals who are immunocomprised, pregnant or elderly are more likely to develop disease. The severity of the disease increases with the infection spreading to the nervous system causing symptoms ranging from headache and stiff neck to confusion and convulsions. In a pregnant woman, listeriosis can cause stillbirth, miscarriage, premature delivery or infection of the infant.

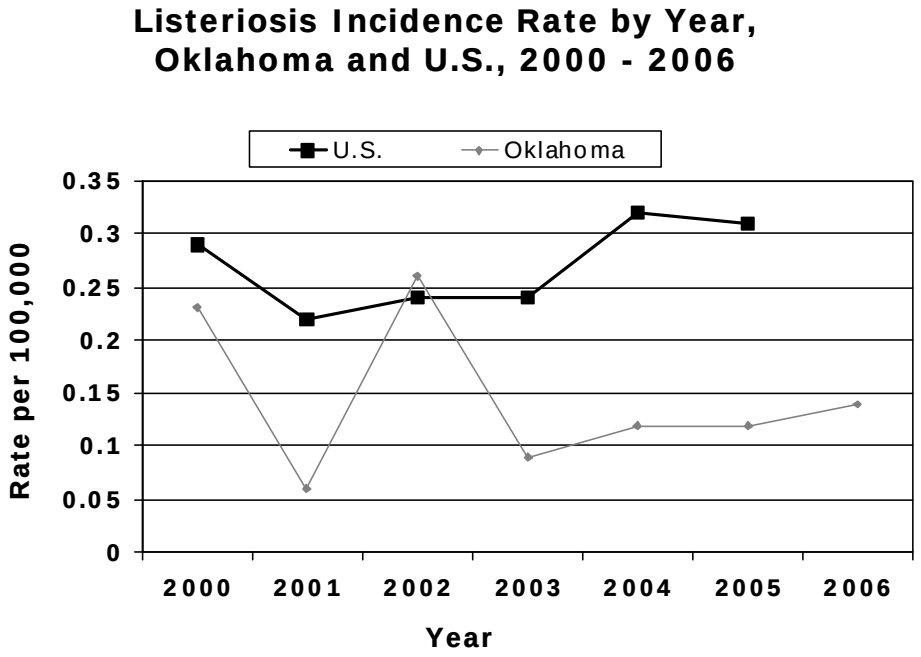
In Oklahoma, Listeriosis became notifiable in 2000. Since that time, there has been a range of two to nine cases reported each year. For the last three years, four to five cases have been reported each year. Oklahoma's incidence rate of listeriosis since 2000 has consistently remained below the national rate except for an increase in 2002 when the Oklahoma and U.S. rates were comparable at 0.26 and 0.24 per 100,000 respectively.

Of the five reported cases of listeriosis in Oklahoma in 2006, the median age was 58 years with a range of 43 to 69 years of age. Four of the five individuals were male (80%). Two cases reported their race as white with an unknown Hispanic ethnicity (40%), two cases (40%) reported their race as white for race and no Hispanic ethnicity, with the final case reporting Hispanic ethnicity and unknown race (20%). The geographic distribution of the cases was broad with two cases in Oklahoma county and one case each in Cleveland, Craig and Rogers counties.

Three of the five cases were hospitalized (60%), although not all specifically due to this disease. No cases expired during the course of their disease. The clinical symptoms of the cases were broad, four cases exhibited fever (80%) and one reported headache (20%). Four cases developed bacteremia (80%), while no cases developed meningitis or neurological symptoms. Additionally, no cases were pregnant, a common risk factor for listeriosis.

Prompt diagnosis of listeriosis is essential for effective treatment. Treatment with antibiotics given quickly to an infected mother can prevent infection of the fetus or newborn. All 2006 listeriosis cases reported in Oklahoma were sporadic cases. Outbreaks can occur due to a contaminated food item and suspicion of a common source should be quickly reported to the OSDH CDD to identify the source and prevent further infection. Identification of *Listeria monocytogenes* must be made from a normally sterile site such as blood or cerebrospinal fluid (or less commonly, joint, pleural, or peridcardial fluid) and confirmed by the OSDH PHL.

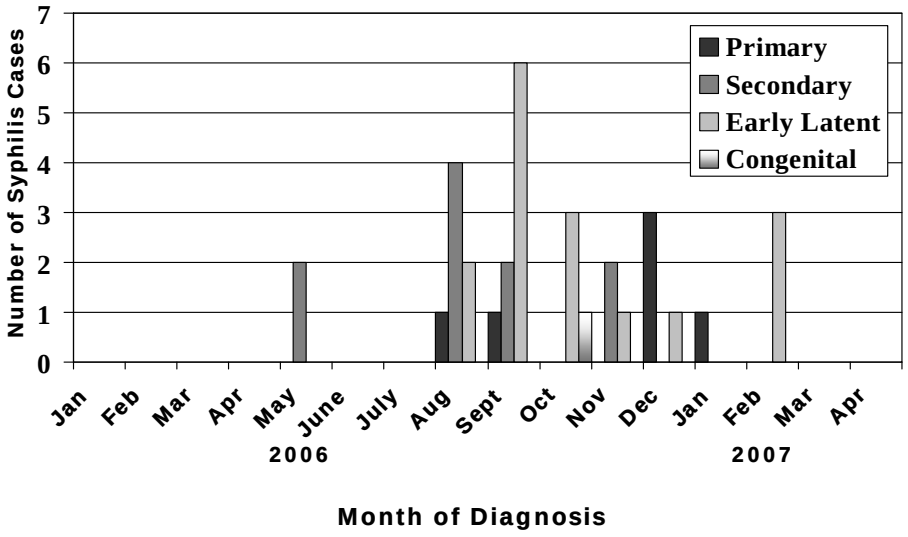

Reported Number of Listeriosis Cases by Year, Oklahoma, 1996-2006
Number of Cases
0
2
4
6
8
10
12
14
16
18
20
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year


Listeriosis Incidence Rate by Year, Oklahoma and U.S., 2000 - 2006
U.S.
Oklahoma
Rate per 100,000
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
2000
2001
2002
2003
2004
2005
2006
Year

Sexually Transmitted Diseases

Bartlesville Syphilis Outbreak, 2006-2007

Number of Cases by Stage of Syphilis at Diagnosis



Chlamydia

2006 Case Total 12,992 **2006 Rate 376.5 per 100,000**
2005 Case Total 13,407 **2005 Rate 380.5 per 100,000**

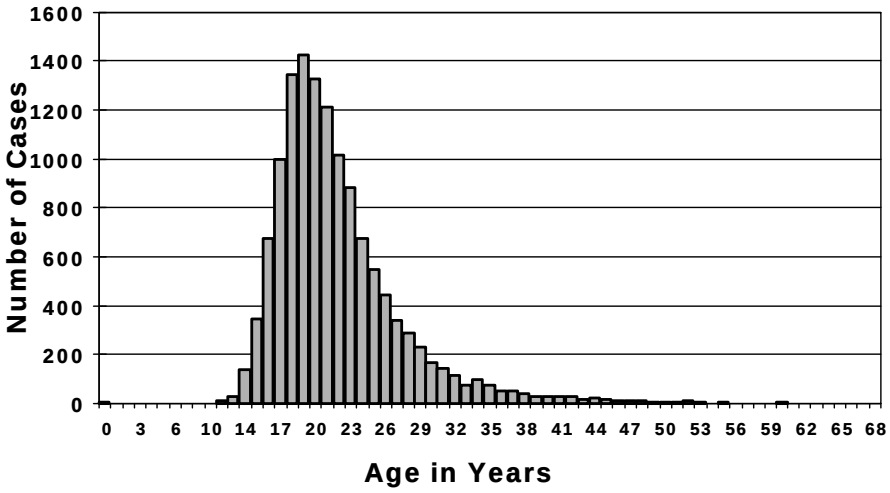
Chlamydia is a common sexually transmitted disease (STD) caused by the bacterium *Chlamydia trachomatis*. It is the most prevalent sexually transmitted disease (STD) in Oklahoma accounting for 71% of reported STD's in 2006. Although symptoms of chlamydia are usually mild or absent, serious complications that cause irreversible damage can develop "silently" before a patient ever recognizes a problem. In women, chlamydia can cause pelvic inflammatory disease, ectopic pregnancy, chronic pain, and/or infertility. However, up to 70% of women with chlamydia are asymptomatic. In addition, a pregnant woman infected with chlamydia can transmit the infection to her baby during a vaginal birth, potentially resulting in neonatal opthalmia and pneumonia. Men infected with chlamydia may have penile discharge while 1%-25% of men infected are asymptomatic. Possible complications of male infections include epididymitis, infertility, and Reiter syndrome (reactive arthritis). In men, receptive anorectal intercourse may result in chlamydial proctitis.

Of the chlamydia cases reported in 2006, 4,198 (32%) patients reported their race as African-American with a rate of 1,609 per 100,000 population. By comparison, 1,382 (11%) cases were reported in Native Americans at a rate of 273 per 100,000, and 6,044 (46%) cases were detected among Caucasians for a race-specific rate of 230 per 100,000. This finding is compatible with national trends with the rate of chlamydia among blacks being over eight times higher than that of whites.

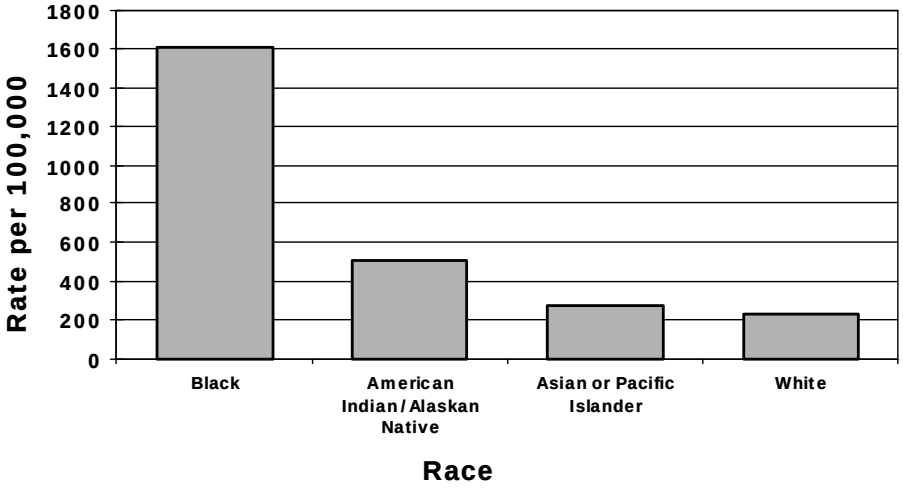
In 2006, 78% of reported cases of chlamydia were people under the age of 25. Notably, 38% of the reported infections were persons under the age of 20. Nearly three quarters of the chlamydia cases (9,678) were identified in female patients. This likely reflects the greater number of women being screened for chlamydia infection. The lower rates among men also suggest that many of the sex partners of women with chlamydia are not diagnosed or reported. With the advent of nucleic acid amplification tests that can be performed on urine, it is believed that more men (symptomatic and asymptomatic) will be diagnosed with chlamydia infection.

By county, Comanche county reported the highest case rate (715 cases per 100,000). Other high morbidity counties are Cherokee, Muskogee, and Oklahoma counties. Fifty of the 77 counties had infection rates greater than 200.0 per 100,000. In 2005, Oklahoma ranked 13th nationally with a rate of 380.5 cases per 100,000, a rate that is above the national average of 332.5 per 100,000.

Number of Reported Chlamydia Cases by Age in Oklahoma, 2006



Rate of Reported Chlamydia Cases by Race, Oklahoma, 2006



Gonorrhea

2006 Case Total 4,951 **2006 Rate 143.5 per 100,000**
2005 Case Total 5,228 **2005 Rate 148.4 per 100,000**

Gonorrhea is the second most prevalent sexually transmitted disease reported in Oklahoma after Chlamydia. Gonorrhea is caused by *Neisseria gonorrhoeae*, a bacterium that can grow and multiply in warm, moist areas of the reproductive tract, mouth, throat, eyes, and anus. In women, gonorrhea can result in pelvic inflammatory disease, ectopic pregnancy, cervicitis, and eventual infertility. In addition, pregnant women infected with gonorrhea can also infect their unborn babies through the amniotic fluid or during birth. In men, this infection most often manifests as purulent urethral discharge and dysuria, and can cause infertility.

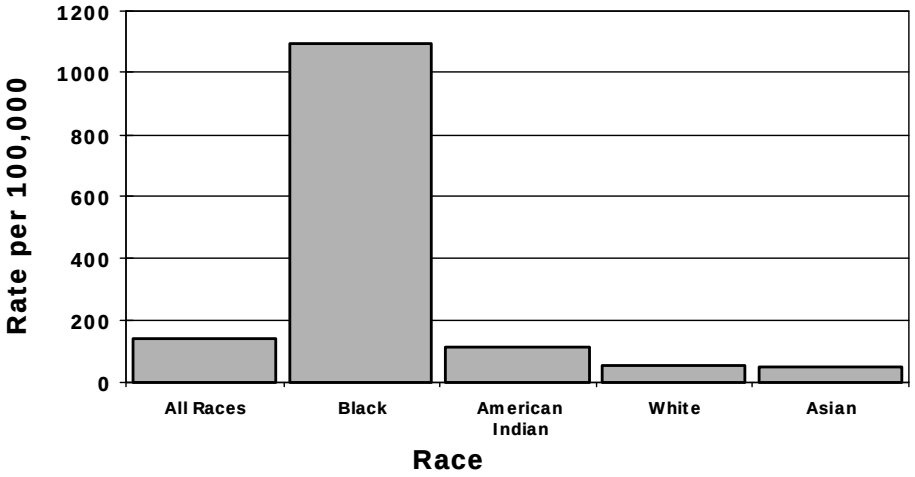
During 2006, 4,951 infections of gonorrhea were reported. Overall, more gonococcal infections were identified in females (2,780, 56%) than males (2,171, 44%). Forty percent of infections occurred in those ages 20-24 (1,799) and 22% occurred in people under the age of 20 (2,809). By race, 2,855 cases (58%) were black, 1,429 cases (29%) were white, 306 cases (6%) were American Indian, and 23 cases were Asian (0.5%). A striking difference in race-specific rates is present in blacks as compared to other races. The 2006 incidence rate is 1,094 cases per 100,000 population among black Oklahomans compared to 54 cases per 100,000 white Oklahomans and 112 per 100,000 among American Indians.

The trend of higher morbidity in blacks has continued since testing began in 1943. A breakdown of gender by race for 2006 data shows that 70% (1,523) of the 2,171 infections among males occurred among black males. Comparatively, 48.0% (1,332) of the 2,780 infections among females occurred among black females. In 2006, the age-specific prevalence rate of gonorrhea in the 15-19 year old black population was 3,414.9 per 100,000, compared to 218.7 per 100,000 in the 15 -19 year old white population. Among this age group in 2006, the racial impact was more evident by analysis of race and gender where the data showed a black male to white male infection rate ratio of 38:1 in the 15-19 year old age group. Among the females in this same age group, the infection rate ratio of black to white was 11:1. The distribution of infection among the 20-24 year old age group followed the same trend but at a lower rate ratio.

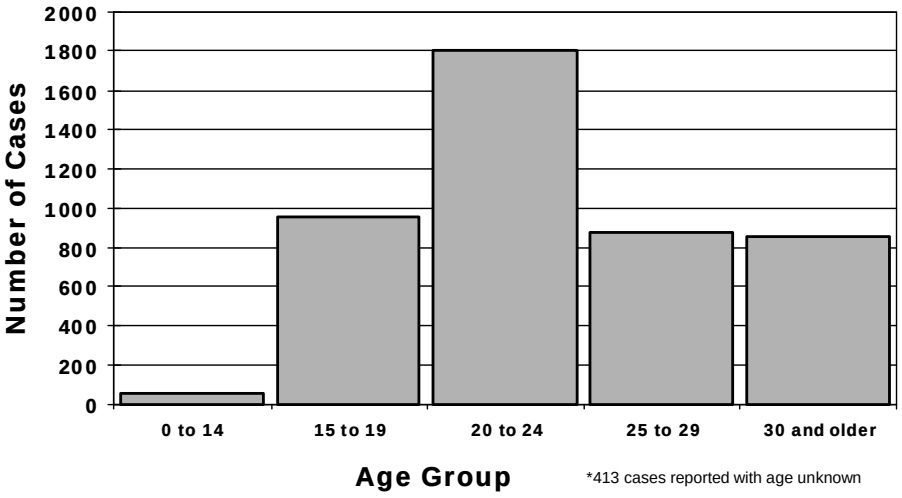
Oklahoma (309/100,000), Jackson, Comanche, Logan and Muskogee counties reported the highest rates of gonorrhea at greater than 200 infections per 100,000. For the state as a whole, the prevalence rate decreased slightly from 148.4 per 100,000 in 2005 to 143.5 per 100,000 in 2006. In 2005, Oklahoma ranked 12th nationally with an excess of 32.8 cases per 100,000 above the national average of 115.6 per 100,000.

In 2006, the OSDH Infertility Prevention project screened 70,505 clients for gonorrhea. The number of positive tests (2,930) comprised 60% of the total number of infections reported. Eighty percent (56,310) of those tested were females and 66% (58,159) were under the age of 30.

Rate of Reported Gonorrhea Cases by Race, Oklahoma, 2006



Number of Reported Gonorrhea Cases by Age,* Oklahoma, 2006



*413 cases reported with age unknown

Total Early Syphilis

2006 Case Total 191 **2006 Rate 5.5 per 100,000**
2005 Case Total 145 **2005 Rate 4.5 per 100,000**

Syphilis, caused by *Treponema pallidum*, is a genital ulcerative disease. Syphilis is transmitted from person to person through direct contact with a syphilis lesion. Lesions occur mainly on the external genitalia, vagina, anus and rectum, but may also occur in the mouth and on the lips. Syphilis infection may occur during vaginal, anal, or oral sex. In addition, a pregnant woman with syphilis can pass it on to her unborn child. Symptoms of syphilis differ according to the disease stage (early, secondary, or latent) and many people have no symptoms for years, yet remain at risk for complications if not treated. Overall in the U.S., the rates in men are higher than that in women. The overall rates, in conjunction with reports of syphilis outbreaks in men who have sex with men (MSM), suggest that rates of syphilis in MSM are increasing. In addition, syphilis infection facilitates transmission of HIV.

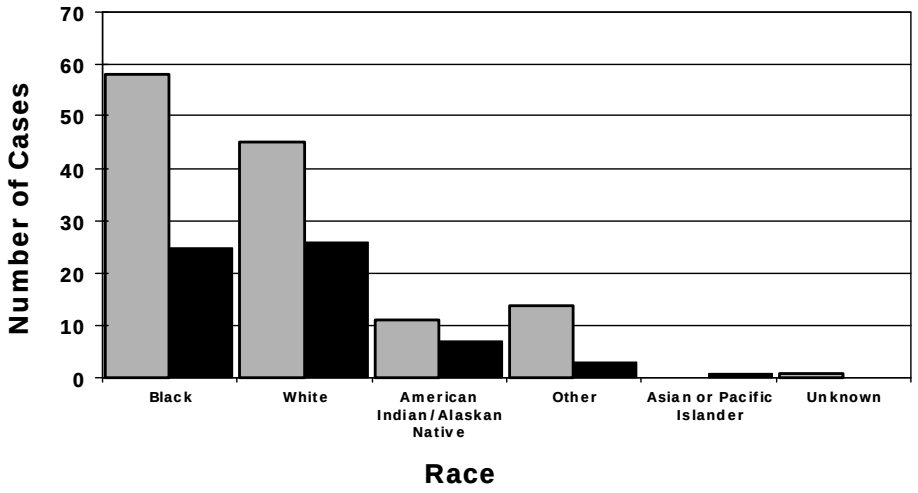
During 2006, there were 191 syphilis infections reported in Oklahoma. Of those, forty-three percent were black with a race-specific rate of 31.8 cases of syphilis per 100,000 population. Thirty-seven percent of the reported cases were white for a rate of 2.7 per 100,000 population. This equates to an almost 12:1 rate ratio of blacks to whites. When comparing cases for both race and sex, the rate ratio is nearly 13:1 black males versus white males. This disparity also existed in the female population with a rate ratio among black females versus white females of 10:1.

Of the total cases of early syphilis reported in 2006, 52% were reported in persons between 20-29 years of age. The high morbidity counties for early syphilis were Oklahoma (92), Tulsa (36), and Washington (24). These three counties accounted for 80% of the total early syphilis infections. All 24 cases of early syphilis diagnosed in Washington County were associated with an outbreak (described in more detail in the Outbreak of Early Syphilis Summary located in the outbreak investigations section) in which the primary risk factor was exchange of sex for money and/or drugs.

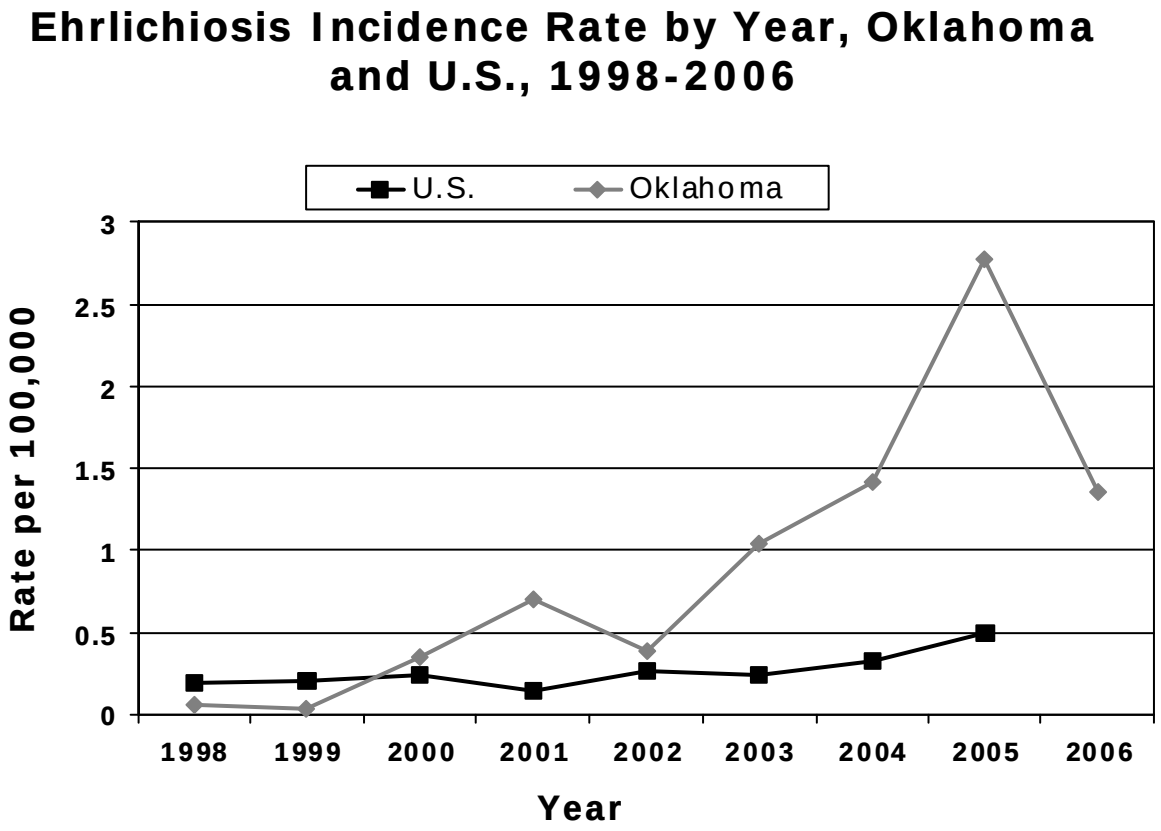
More than half of the cases of syphilis reported in Oklahoma were residents of the Oklahoma City metropolitan statistical area (MSA). This MSA includes Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma counties. Oklahoma county residence was reported by 48% of all reported cases.

In 2004, a national ranking for all stages of syphilis listed Oklahoma as 29th in the nation with a rate of 4.8 infections per 100,000 population. In 2005, Oklahoma moved to the 28th position with a small decrease in rate from 4.8 to 4.5 per 100,000 population.

Number of Reported Syphilis Cases by Race and Gender, Oklahoma, 2006



Vectorborne Diseases



Ehrlichiosis

2006 Case Total 47 **2006 Rate 1.36 per 100,000**
2005 Case Total 96 **2005 Rate 2.78 per 100,000**

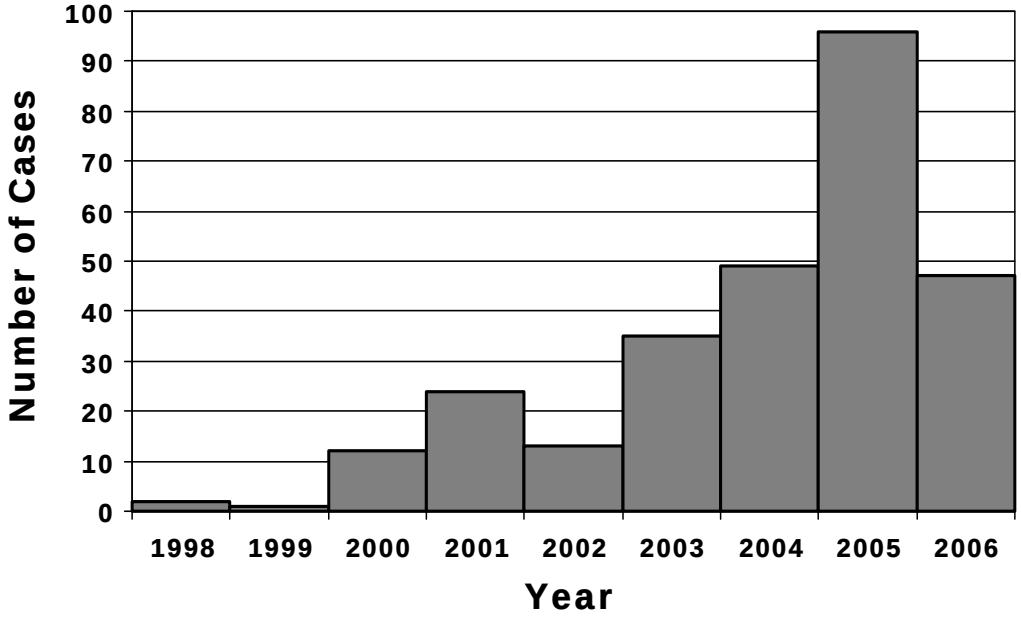
Forty-seven cases of ehrlichiosis were reported to the OSDH CDD in 2006, an incidence rate of 1.36 per 100,000 population. This is a decrease of 51% compared with 2005 (N=96) data. A similar decline was observed for RMSF and tularemia. Cases of ehrlichiosis were reported in 25 (32%) counties in Oklahoma. The counties with the highest incidence rates of ehrlichiosis were Pushmataha with a rate of 17.1 per 100,000 population, Jefferson with a rate of 14.7 per 100,000 population, Pittsburg with a rate of 11.4 per 100,000 population, Latimer with a rate of 9.4 per 100,000 population, and Okfuskee with a rate of 8.5 per 100,000 population. The highest number of cases came from Pittsburg (5) and LeFlore (3). The incidence of ehrlichiosis is higher in the eastern part of the state, which parallels with eastern Oklahoma's higher tick population.

The age of ehrlichiosis cases ranged from 2 to 81 years with a median age of 50 years. The age groups with the highest incidence rates were adults aged 50 to 59 years (3.4 per 100,000 population) followed by adults aged 60 to 69 years (2.2 per 100,000 population). Twenty-eight cases (60%) were male and nineteen (40%) were female. Thirty-five (75%) cases reported their race as white, nine (19%) as Native American, two (4%) as black, and one (2%) unknown. Native Americans had a rate of illness of 3.29 per 100,000 population which was 2.5 times higher than whites with a rate of 1.33 per 100,000 population. Native Americans disproportionately higher rates of illness may be correlated with their geographical distribution in the Oklahoma.

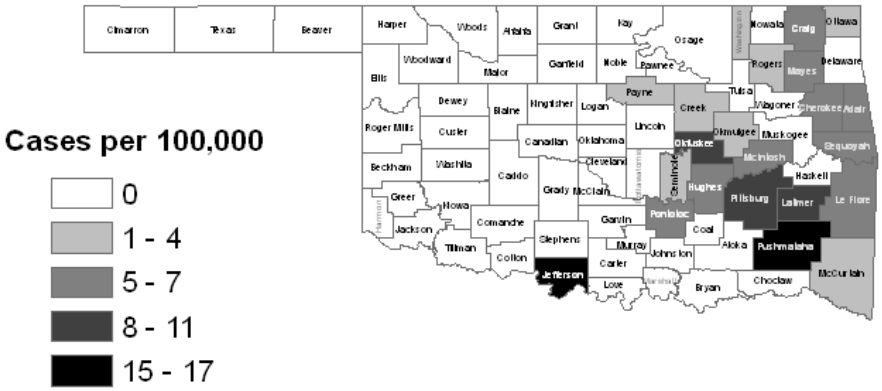
While cases were reported throughout the year, seventy-four percent were reported from May through August, which correlated with the period of increased tick vector activity. Symptoms reported by cases included fever (100%), headache (87%), myalgia (72%), anorexia (70%), nausea (64%), cramps (38%), rash (37%), dyspnea (36%), confusion (35%), and vomiting (33%). Twenty-three cases (49%) were hospitalized and 3 deaths were reported. All deaths were adult age and two deaths had a delay in diagnosis/treatment. Thirty-two (68%) cases reported a tick bite and thirty-one (66%) reported being in a wooded area during their exposure period.

Serologic testing is the most widely available laboratory method and used most frequently in testing for ehrlichiosis. It is important to measure both IgG and IgM antibody titer levels using paired serum specimens, first, during the acute stage of illness (within a week of onset) and again during the convalescent stage (2 to 4 weeks later) for case confirmation. Diagnosis is confirmed by a four-fold change in antibody titers. Treatment for ehrlichiosis should be initiated before lab confirmation, when there is a high suspicion of tickborne illness, to reduce the severity of the disease.

Reported Number of Ehrlichiosis Cases by Year, Oklahoma, 1998-2006



Rate of Reported Ehrlichiosis Cases by County of Residence, Oklahoma, 2006



Rocky Mountain Spotted Fever

2006 Case Total 134 **2006 Rate 3.9 per 100,000**
2005 Case Total 210 **2005 Rate 6.1 per 100,000**

Rocky Mountain spotted fever (RMSF) is the most common tick-borne infection in Oklahoma. In 2006, 134 reports met the confirmed or probable surveillance case definition resulting in a statewide incidence rate of 3.9 cases per 100,000 population. This was the first decline in case numbers since 2001 and represents a 35% decrease from 2005. The significant decrease in RMSF cases is attributable to the very hot and dry weather that most of Oklahoma experienced during the spring and summer months of 2006 which suppressed tick vector populations. Oklahoma continues to be one of the highest incidence states of RMSF, with rates ten times higher than the national rate.

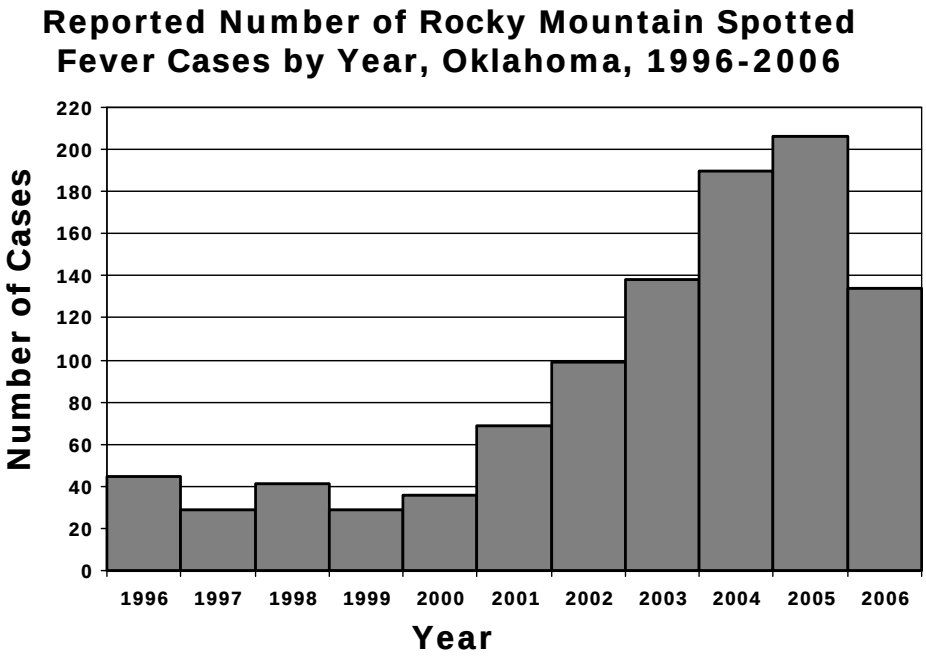
The incidence of RMSF is consistently higher in the eastern part of the state where there is a more favorable tick habitat for *Dermacentor variabilis* (the American dog tick), the principal vector of RMSF. The counties with the highest incidence rates of RMSF were Pittsburg with a rate of 29.6 per 100,000 (N=13), Pushmataha with a rate of 17.1 per 100,000 (N=2), Haskell with a rate of 17.0 per 100,000 (N=2), and LeFlore with a rate of 16.6 per 100,000 (N=8). The highest number of cases reported from any county was 13 in Pittsburg County, followed by 11 in Oklahoma County. County location of cases is classified according to the case-patient's residence and does not necessarily reflect the county of exposure.

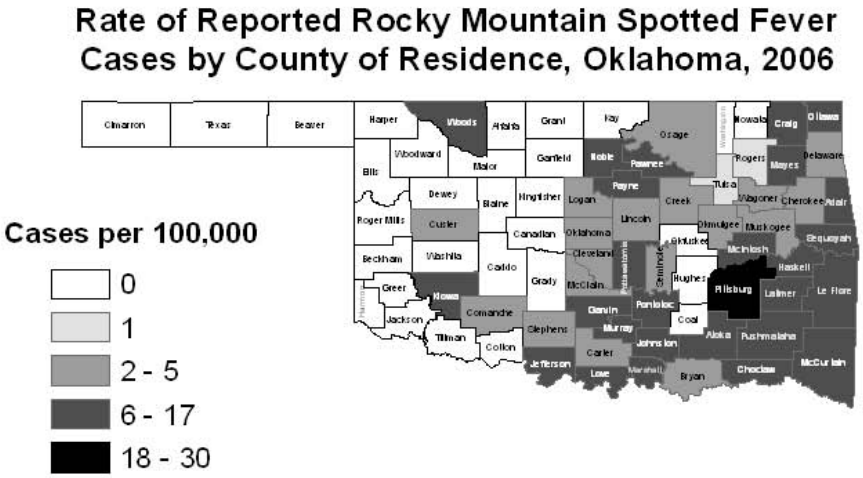
The age of RMSF cases ranged from 2 to 84 years with a median age of 37 years. The age groups with the highest incidence were adults aged 60 to 69 years (6.25 per 100,000 population) followed by the 50 to 59 year age group (4.7 per 100,000 population). Seventy-eight (58%) cases were male and fifty-six (42%) cases were female. Males had a higher rate of RMSF of 4.6 per 100,000 population compared to females with a rate of 3.2 per 100,000 population. The majority of cases (69%) were white; 20% were American Indian or Alaska Native, 2% were black, 2% were multi race, 1% were Native Hawaiian or Pacific Islander, and 6% were of unknown race.

Eighty-eight percent of cases reported an onset of symptoms during the months of April through September peaking in June (33 cases) and July (32 cases). The most common symptoms were self-reported fever (99%), chills (77%), headache (75%), myalgia (71%) and rash (48%). Of the sixty-two that presented with a rash, sixteen (26%) reported a palmar rash and/or a plantar rash. Twenty-six percent of cases were hospitalized and there were no reported deaths in 2006. Eighty-nine cases (67%) recalled a tick bite within 14 days of symptom onset.

Serologic testing is the most widely available laboratory method and used most frequently in testing for RMSF. The quantitative indirect immunofluorescence assay (IFA) is the preferred serologic test as current commercially available ELISA tests are not quantitative, and hence cannot be used to measure changes in antibody titer. It is important to measure both IgG and IgM antibody titer levels using paired

serum specimens, first, during the acute stage of illness (within a week of onset) and again during the convalescent stage (2-4 weeks later) for case confirmation. Diagnosis is confirmed by a four-fold change in antibody titers. Treatment for RMSF should be initiated before lab confirmation, when there is a high suspicion of tickborne illness, to reduce the severity of the disease. Doxycycline is the antibiotic of choice in both children and adults.





Tularemia

2006 Case Total 3 **2006 Rate 0.09 per 100,000**
2005 Case Total 20 **2005 Rate 0.58 per 100,000**

In 2006, three cases of tularemia were reported to the OSDH CDD. This represents an eighty-five percent decrease from 2005 and is likely due to the severe drought conditions that the state experienced in 2006, as tick vector populations are diminished during periods of high temperature and low rainfall. Cases were reported in June through August. During the past ten years, (1997-2006), the average number of cases reported was 10 cases per year. Tularemia is an immediately notifiable condition and is considered a bioterrorism agent. However, tularemia is endemic in Oklahoma, and CDD conducts an immediate investigation to determine the source of exposure. Surveillance activities and case investigations of tularemia are important to better target prevention messages for tick bite prevention and safe handling of animals. This article summarizes the epidemiologic, clinical, and laboratory information from the investigation of Oklahoma's three cases.

Case 1: Cherokee County Ulceroglandular Case

During July 2006, OSDH CDD was notified of a 34 year-old American-Indian/Alaskan Native female from Cherokee County who was hospitalized for 2 days with fever (102.7 degrees Fahrenheit), abdominal cramps, adenopathy of the groin, chest pain, chills, diarrhea, dyspnea, fatigue, headache, loss of appetite, malaise, photophobia, sore throat, vomiting, weakness, weight loss, blurred vision, and a necrotic lymph node. Lab results confirmed *Francisella tularensis* from positive EIA/ELISA serology titer of greater than or equal to 1:160. The case could not recall a tick bite although reported exposure to a tick infested area where a tick bite was possible. The case participated in hunting. There was no previous history of traveling out of state or to other areas of Oklahoma, which indicated exposure likely occurred within her county of residence.

Case 2: Oklahoma County Ulceroglandular Case

During August 2006, a 20 year-old white male from Oklahoma County was evaluated as an outpatient complaining of a rash, adenopathy, and an ulcer on his left finger. Wound exudate was collected and culture results confirmed *Francisella tularensis*. Epidemiologic investigation revealed the case was bitten by a cat prior to the development of the ulcer at the site of the bite.

Case 3: Garvin County Typhoidal Case

During June 2006, a 60 year-old white male from Garvin County was hospitalized with symptoms of fever (103.8 degrees Fahrenheit), abdominal cramps, chills, cough, diarrhea, dyspnea, fatigue, myalgia, vomiting, and sepsis. *Francisella tularensis* was isolated from a blood specimen. Exposure history collected during investigation indicated the case spent a lot of time outdoors with exposure to tick

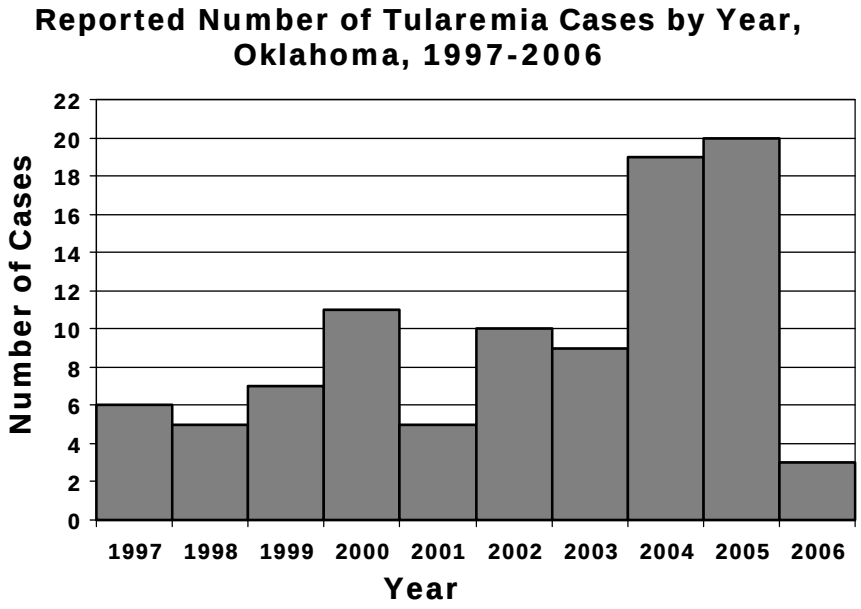
infested areas and a history of multiple tick bites. The case did not have a history of traveling out of state or to other areas of Oklahoma, which indicated exposure likely occurred within her county of residence.

Symptoms of tularemia can present in a variety clinical forms. Persons can experience an illness characterized by an indolent ulcer at the site of introduction of the organism along with swelling of the regional lymph nodes (ulceroglandular). Other persons may present with no apparent ulcer, but only with one or more enlarged and painful lymph nodes (glandular). Oropharyngeal symptoms will occur if a person ingests the organism in contaminated food or water resulting in a painful pharyngitis, abdominal pain, diarrhea and vomiting (oropharyngeal). Inhalation of the organism will result in a pneumonic involvement or a primary septicemic syndrome (typhoidal). Oculoglandular disease is characterized by a painful purulent conjunctivitis with regional lymphadenitis.[1] Clinical presentation is affected by the route of exposure. Common reservoirs for Francisella tularensis include wild and domestic animals and hard ticks, the dog tick and the lone star tick. Transmission can occur through a bite of an infected tick or animal, handling infected animals, drinking contaminated water, or inhaling dust from contaminated soil. There is no person-to-person transmission.

Since tularemia has a broad clinical spectrum and may be overlooked in the differential diagnosis of patients with suspected infectious diseases, tularemia should be considered in the differential diagnosis of any patient in Oklahoma who has unexplained febrile illness and exposure to ticks, biting flies, or animal tissue, particularly rabbits.

Reference

1. Heymann, David L., Control of Communicable Disease Manual 18th ed. American Public Health Association; 2004.



West Nile Virus

2006 Case Total 48 **2006 Rate 1.4 per 100,000**
2005 Case Total 31 **2005 Rate 0.9 per 100,000**

2006 marked the fifth season of West Nile (WN) virus transmission in Oklahoma and the eighth year of national tracking from its identification in the United States. Since national surveillance began in 1999, there have been a total of 23,974 human cases with 962 deaths reported in the United States with infections reported in animals or people from all 48 contiguous states, Canada and Mexico. In 2006, a total of 4,269 human cases of WN disease and 177 associated deaths were reported to the CDC by 43 states representing a 42% increase in cases from 2005. Nationally, most of the WN virus activity was seen in the northwestern and central mountain states with the highest number of cases being reported from Idaho (996), Texas (354), and Colorado (345).

Consistent with the national trend, Oklahoma also had an increase of WN activity compared to 2005. The state's 2006 incidence of human WN disease was 48 cases of WN Fever or WN neuroinvasive disease resulting in a 55% increase over the previous season. These cases were distributed across 23 counties with geographic clustering in the northwestern and south central regions of the state. Counties with the highest incidence rates per 100,000 population included Roger Mills (29.1), Beaver (17.1), Carter (15.3), Jefferson (14.7), and Woods (11.0). Symptom onsets ranged from June 26 to October 26, 2006. Sixty percent of the case patients were male; median age of all patients was 61 years (range 13-88). Twenty-six of the cases (54.2%) had WN meningoencephalitis or meningitis. There were 6 WN-associated deaths with an overall case fatality rate of 12.5% (6/48); a four-fold increase as compared to the previous season. Prominent symptoms reported for all cases included fever (93.1%), muscle weakness (85.1%), headache (82.6%), altered mental status (52.4%), vertigo (48.9%), vomiting (47.7%), and rash (44.7%). Other common complaints of case patients included tremors, confusion, stiff neck and photophobia. Acute flaccid paralysis was reported in two case patients and Guillain-Barre syndrome was reported in one case patient. Tracking of WN cases for comorbidities as a risk factor is not standardized or available for all cases. However, two case patients suffered from leukemia, three cases had a history of diabetes, and two cases were previous organ transplant recipients. In 2006, 71% of cases were hospitalized (34 of 48). This proportion is 48% greater than that reported in 2005 and suggests that surveillance in 2006 was more likely to capture the more severe clinical presentations of WN disease with an underreporting or under detection of WN fever cases. Only 51% of interviewed cases (21 of 41) reported known exposure to mosquitoes within two weeks of symptom onset.

The 2006 WN season followed the normal pattern of seasonality for human disease in Oklahoma with the first cases being identified in late June to July with peak activity occurring during mid-August. In Oklahoma, WN cases tend to follow a bimodal epidemiologic curve with the primary peak incidence occurring in August

followed by a smaller peak in late September. The last cases of the season frequently have disease onsets during the month of October, or early November.

Since July 2003, blood collection facilities have performed a nucleic acid amplification test (NAT) to screen for WN viremia. All donations from NAT-positive donors are excluded and follow-up testing is performed. These individuals are interviewed further to document WN virus infection and to determine if WN virus-associated symptoms develop. In 2006, 15.4% (2/13) of viremic blood donors developed symptoms of WN disease as compared to 56% (9/16) in 2005.

2007 Surveillance and Laboratory Testing

Throughout the mosquito season, Oklahoma physicians are urged to consider diagnostic testing for WN virus in patients with compatible clinical presentations for either WN fever or WN neuroinvasive disease. Recent medical studies have shown that even patients who have WN fever may experience lasting and prolonged sequelae. In a study of long-term functional outcomes of WN fever cases, many patients commonly reported persistent problems such as fatigue (96%), headaches (71%), and concentration problems (53%).[1]

As more WN virus seasons have passed, there is a greater likelihood that Oklahomans have been previously exposed to WN virus; therefore, caution must be used when interpreting WN virus serology. Most commercial laboratories offer both IgM and IgG antibody testing for WN virus. In almost all acute cases of WN disease, the IgM antibody component will be positive along with a positive IgG fraction. If results indicate a negative IgM test with seroreactivity for the IgG fraction only, these results likely represent a patient with prior exposure to WN virus that resulted in an asymptomatic or mild infection. In these cases with only IgG positive results, WN virus is unlikely to be the cause of the patient's recent symptomatology and further evaluation is recommended.

The OSDH Public Health Laboratory (PHL) continues to offer human WN virus testing free of charge. The PHL performs IgM-capture ELISA, the most sensitive screening test for acute infections, on cerebrospinal fluid (CSF) and serum. PCR testing is also available for CSF. Physicians who submit a CSF specimen should also submit a serum specimen (for IgM ELISA) from the case patient due to the lower sensitivity of the PCR test. WN virus resources and testing information can be accessed on-line at http://www.health.ok.gov/program/cdd/wnv/index.html.

[1]Watson JT et al. Annals of Internal Medicine, 2004;141: 360-365.

Avian, Equine, and Human West Nile Virus Surveillance; Oklahoma, 2002-2006

Case Number				NAT Positive Blood Donors	
Year	Avian	Equine	Human	Blood Donor	Symptomatic
2002	441	965	21	N/A^	N/A^
2003	401	169	79	26	1 (4%)
2004	388	32	22	8	1 (13%)
2005	N/A*	32	31	16	9 (56%)
2006	N/A*	2	48	13	2 (15%)

*Collection and testing of wild birds was discontinued.

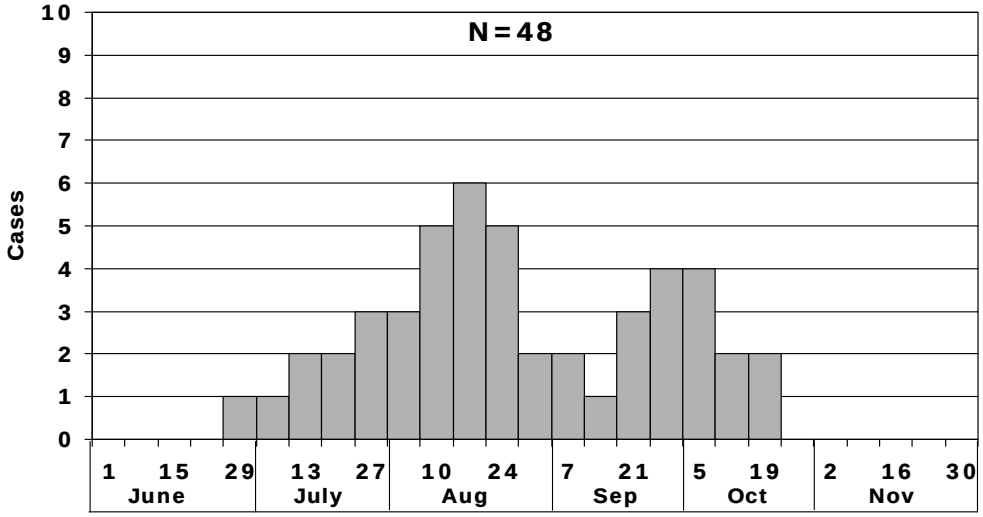
^Routine blood donor screening began on July 1, 2003.

Oklahoma Counties with Highest Rates* of Reported Human WN Disease; 2006 and Cumulative 2002-2006

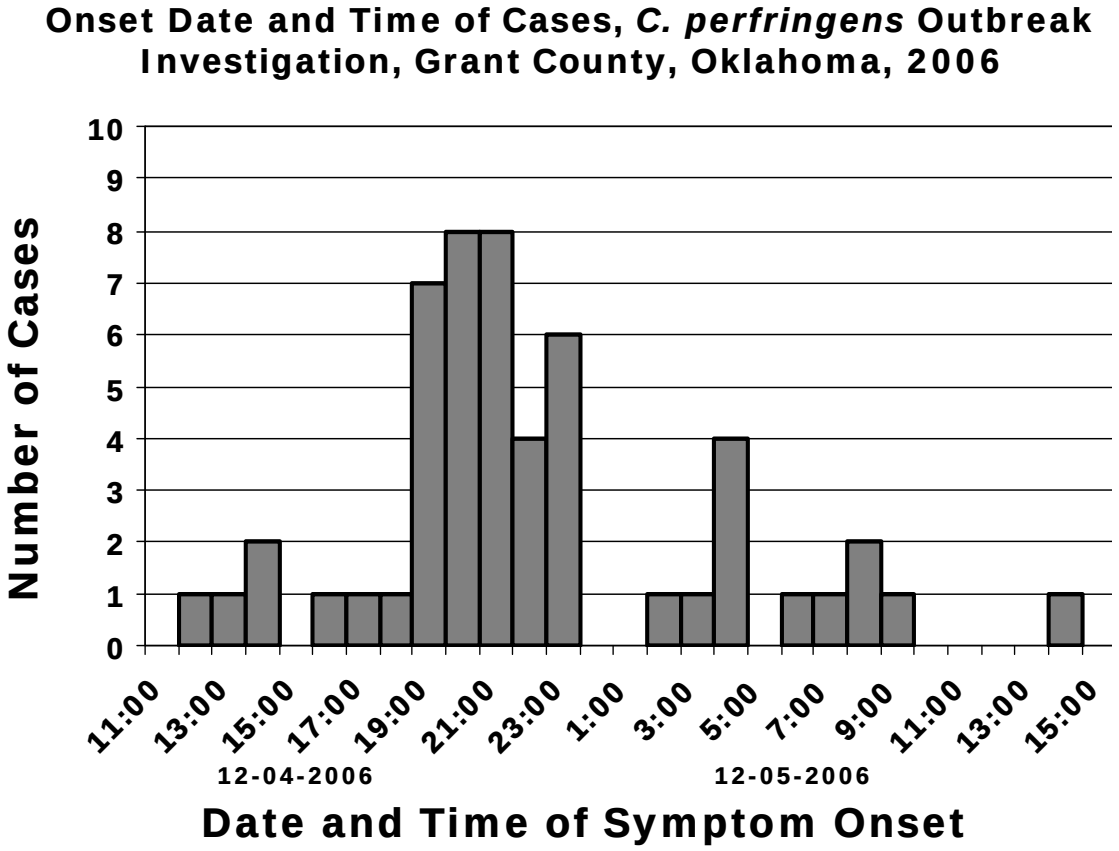
2006		Counties with Highest West Nile Disease Incidence Rates; 2002-2006	
County	Rate	County	2002-2006 Rate
Roger Mills	29.1	Texas	124.3
Beaver	17.1	Beaver	102.4
Carter	15.3	Cimarron	63.5
Jefferson	14.7	Grant	58.3
Woods	11.0	Woods	33.0
Marshall	7.6	Roger Mills	29.3
Pittsburg	6.8	Carter	26.5
Beckham	5.1	Ellis	25.5
Grady	4.4	Okmulgee	17.6
Jackson	3.5	Haskell	16.9
State Total	1.4	State Total	5.8

*Incidence rates per 100,000 population calculated on U.S. Census 2000

Cases of Human West Nile Virus Disease by Week of Onset, Oklahoma 2006



Special Investigations & Outbreak Investigations



Multistate Investigation of *Clostridium difficile Epidemic Strain*

Prepared by Becky Coffman, RN, M.P.H.

In 2006, Oklahoma identified the presence of a new more virulent strain of *Clostridium difficile*, which has been associated with a more severe clinical course of *C. difficile*-associated diarrhea (CDAD). *C. difficile* typically affects older or severely ill hospitalized patients or residents of long-term care settings. The Centers for Disease Control and Prevention (CDC) has documented the emergence of this new strain, the North American pulsed-field type 1 (NAP-1) in low risk populations such as previously healthy individuals living in the community and peripartum women.

An Oklahoma Health Alert Network Advisory was released in April 2006 that summarized the presence of CDAD in other states and the suspicion of the presence of the new strain in Oklahoma. Healthcare providers who suspected CDAD in low-risk patients were asked to submit stool specimens to the Oklahoma State Department of Health Public Health Laboratory (OSDH PHL) for culture. If successfully cultured, the isolates would be sent to the CDC to be tested for the new strain.

In November 2006, two *C. difficile* isolates from two Oklahomans with CDAD initially identified by EIA were submitted by an acute healthcare facility, verified by the OSDH PHL and forwarded to the CDC. The epidemic strain NAP-1 was confirmed in isolates submitted, correlating with the changing epidemiology of *C. difficile* being observed nationwide and in Oklahoma.

The first case occurred in a 62-year-old white male from Oklahoma county, who had recurrent *C. difficile* per documentation of a positive test three months previously. He was hospitalized for over 4 months. The second case occurred in a 63 year old white male from Jackson county, with no known history of *C. difficile*. Both cases were successfully treated with metronidazole and recovered.

Although only these two cases have been laboratory confirmed in Oklahoma, based on clinical presentation it is presumed that the strain has occurred in other persons in the state. Once the presence of the new strain has been confirmed in a state, further testing to identify the strain in individuals is not needed because the treatment guidelines are the same for low and high virulent *C. difficile* infections.

The Society for Healthcare Epidemiology of America (SHEA) treatment guidelines for *C. difficile* infections were published in 1995.[1] Recommendations include withdrawing the inciting antibiotics, avoiding antimotility meds, and treating with oral metronidazole for 10-14 days. Oral vancomycin may be used but should be reserved for metronidazole failures or more severe disease.[2] Patience is needed during the first week of treatment as symptoms resolve slowly, although some improvement should be seen in 24 to 48 hours. Switching treatment is advised only if the patient worsens (i.e. develops ileus, continued leukocytosis, etc.). Intracolonic vancomycin with or without intravenous metronidazole should be

considered for severe disease. Consultation with infectious disease specialists is highly recommended as well.

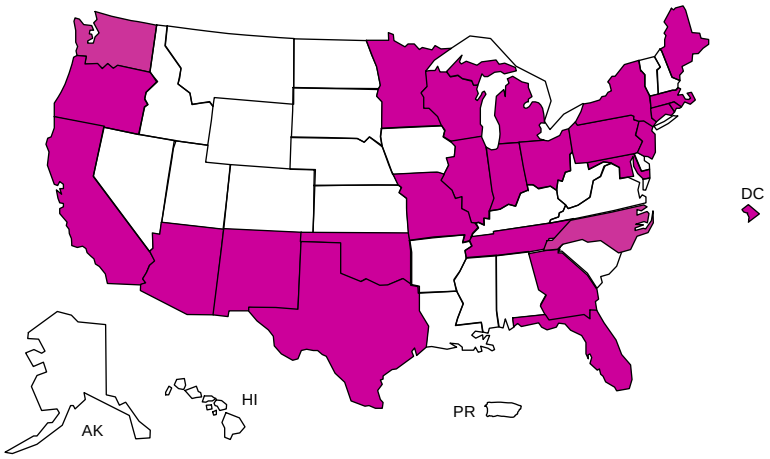
Measures involved in preventing this illness and its spread include judicious antibiotic prescribing, infection prevention and control measures, early detection, prompt treatment and close monitoring for progression during treatment.

References:
1. SHEA (Society for Healthcare Epidemiology of America) position paper with control recommendations (longer): Gerding DN, Johnson S, Peterson LR, Mulligan ME, Silva JJr. *Clostridium difficile* – associated diarrhea and colitis. _Infect Control Hosp Epidemiol 1995;16(8):459-477. Available at http://www.shea-online.org/Assets/files/position_papers/Cldiff95.PDF.

2. Centers for Disease Control and Prevention. Recommendations for preventing the spread of vancomycin resistance: recommendations of the Hospital Infection Control Practices Advisory Committee (HICPAC). MMWR 1995;44(No. RR-12):

States with the Epidemic Strain NAP1 of *C.difficile* Confirmed by CDC (N=27)

Updated 4/3/2007



Nationwide Outbreak of *Salmonella* Tennessee Associated with Peanut Butter, Summary of Oklahoma Cases

Prepared by Carmen Clarke, M.P.H.

In late 2006, foodborne disease epidemiologists at state health departments and the Centers for Disease Control noted a large increase in *Salmonella* Tennessee isolates from state public health laboratories. PulseNet, a system that allows the comparison of "DNA fingerprints" of pathogens from isolates from around the country, demonstrated that the majority of these isolates had closely related genetic patterns. To identify a common exposure, state and federal epidemiologists began an outbreak investigation.

A case-control study conducted in February strongly implicated Peter Pan and Great Value peanut butter, which were produced at the same plant in Georgia. Cases were 10.9 times more likely to have eaten Peter Pan or Great Value peanut butter than neighborhood controls (matched odds ratio 10.9, 95% confidence interval, 3.8-43.0). These findings were communicated to FDA, which on February 14 issued a health alert to consumers indicating that they should not eat these products. The FDA also initiated an investigation into the Georgia plant. ConAgra, the plant operator, announced a voluntary product recall at the same time.

About 2,500 *Salmonella* serotypes are known to cause human disease, but many are uncommon sources of infection. *Salmonella* Tennessee is rarely isolated from persons with salmonellosis. Between January, 2004 and July, 2006, 3 of 1190 (.003%) *Salmonella* isolates identified by the Oklahoma Public Health Laboratory (PHL) were *S*. Tennessee. In addition to identifying serotypes, the PHL performs pulsed-field gel electrophoresis (PFGE), also called "DNA fingerprinting" on all *Salmonella* isolates, which allows genetic characterization within serotypes. Isolates with indistinguishable PFGE patterns are often associated with common sources of exposure.

As of June 18, 2007, eighteen cases of *Salmonella* Tennessee infection with PFGE patterns matching those linked to the national outbreak were identified in Oklahoma. Ages ranged from 1 to 80 years, median age was 56 years. Fifteen (83%) of the cases were female. The isolate source was urine in 9 cases (50%), and the remaining 9 isolates were obtained from stool. Onset dates ranged from October 1, 2006 to May 26, 2007 (see graph). Sixteen of 18 cases were interviewed regarding symptoms and exposures, 2 confirmed cases were not available to interview. Gastrointestinal symptoms, including one or more symptoms such as diarrhea, vomiting, abdominal cramps, and nausea were present in 12 cases, while 4 cases had urinary tract infections without gastrointestinal symptoms. Seven of the 12 cases with gastrointestinal symptoms reported having concurrent urinary tract discomfort or had *Salmonella* isolated from urine. One case, a dialysis patient receiving routine urine cultures, had *Salmonella* Tennessee isolated from urine but had neither urinary nor gastrointestinal symptoms. No cases

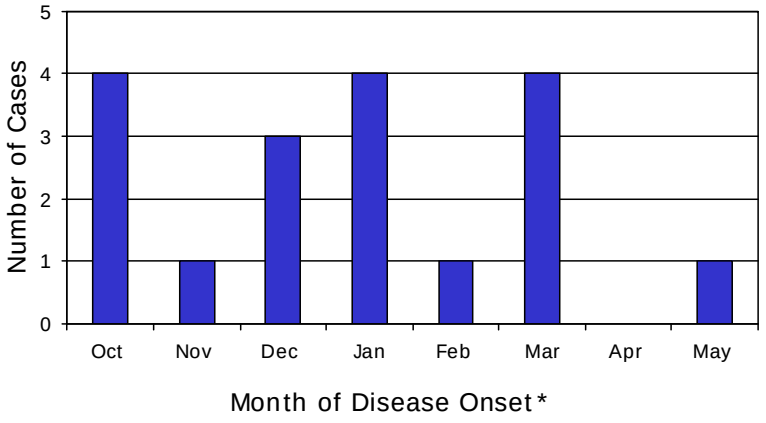
were hospitalized due to salmonellosis, and no cases died. Cases occurred in 14 Oklahoma counties; Alfalfa (1), Canadian (2), Carter (1), Choctaw (1), Comanche (1), Garvin (1), Grady (1), Jefferson (1), McClain (1), McIntosh (1), Oklahoma (4), Pawnee (1), Pottawatomie (1), and Rogers (1).

Of the 16 cases available for interview, 14 reported peanut butter consumption in the 7 days prior to onset of symptoms (or specimen collection in the instance of the asymptomatic case). Of the 14, eight reported eating Peter Pan peanut butter and 2 reported eating Great Value peanut butter. One person reported eating both brands. Three persons reported eating brands other than those implicated in the outbreak.

Seven jars of opened peanut butter consumed by confirmed cases were available for testing at the PHL; two were found to have *Salmonella* Tennessee; PFGE testing confirmed that they matched the outbreak pattern. Both positive jars were Peter Pan peanut butter; however, the five negative jars were also Peter Pan brand.

Nationally, as of May 22, 628 human cases of *Salmonella* Tennessee with matching PFGE patterns have been reported to CDC. Case demographics were similar between Oklahoma and the U.S. For cases with onset after public notification of the recall, interviews continued to determine whether consumers continued to eat implicated peanut butter.

Human Cases of Confirmed Salmonella
Tennessee Associated with Peanut Butter by
Month of Disease Onset
Oklahoma, 2006-2007



* Date of first isolate used when onset date unknown, or when symptom onset occurred after test result.

Multistate Investigation of *Salmonella typhimurium*

Prepared by Renee Powell, M.P.H.

During June 2006, the OSDH Public Health Laboratory (PHL) notified the Communicable Disease Division (CDD) of 10 Oklahoma cases of *Salmonella* Typhimurium with indistinguishable pulsed-field gel electrophoresis (PFGE) patterns suggesting a common source. Initial interviews conducted by CDD staff and county health department public health nurses indicated fifty-seven percent (8 of 14) of cases had exposure to poultry purchased at farm stores.

CDD conducted a case-control study to test the hypothesis that contact with baby birds purchased from farm stores was associated with salmonellosis. For the investigation, a case was defined as a person who had a history of a *Salmonella* Typhimurium infection with the matching PFGE pattern. Cases were re-interviewed regarding exposure to various types of birds and farm stores during the 5 days prior to symptom onset. An attempt was made to find two controls for each case. Controls were matched to cases by age categories of those less than one year of age, one to four years, five to nine years, 10 to 14 years, and 15 years or older. If a case was 15 years of age or older, controls had to be within a 10 year age range above or below the age of the case. Controls were recruited by using a forward digit dialing system based on the 10-digit phone number of cases adding two digits to the last two numbers. Controls were interviewed about April 1st and May 30th time period. Exclusion criteria for controls were experiencing diarrhea ($\geq$3 loose stools in a 24 hour period) or having a history of a salmonellosis between April 1st and May 30th.

Symptom onset dates of cases ranged from April 3rd through June 6th. The majority of cases were female (57%, N=8). Ages ranged from 4 months to 73 years with a median age of 6 years. Fifty-seven percent of the cases were 4 years of age or younger with 28.6% of cases occurring in those less than 1 year of age.

Reported symptoms among cases included diarrhea (100%), fever (92.9%), abdominal cramping (83.3%), nausea (54.5%), vomiting (50%) and bloody diarrhea (42.9%). The duration of illness ranged from three to ten days with a median of 4.8 days. Seven cases were hospitalized and no deaths were associated with this outbreak.

CDD epidemiologists were successful in re-interviewing 10 of 14 cases (71.4%). Two controls were obtained for 9 of the 10 cases with a total of 18 controls. Analysis of survey responses indicated a statistically significant association was found between having contact with baby birds (chicks, ducks, turkeys, geese, bantams, and other birds) and illness (X^2=6.61, p-value of 0.01). Having visited a farm store or feed store and development of illness was also statistically significant (CMH X^2=5.6, p-value of 0.02).

The outbreak described in this report and previous outbreaks exhibit that direct contact with baby birds is a well documented risk factor for salmonellosis, especially

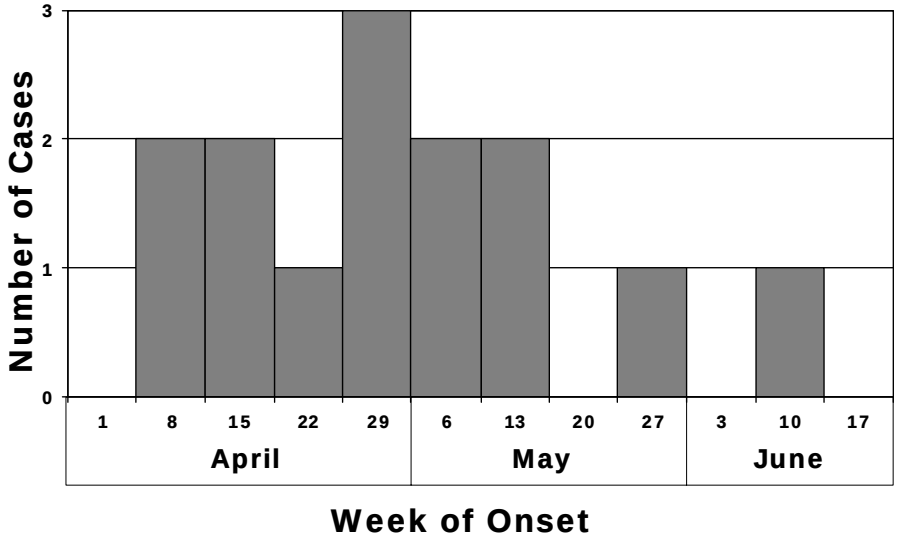
with children who receive baby birds as gifts during Easter.[1,2] Children have more frequent hand-to-mouth contact and are less likely to practice proper hand hygiene after handling fowl.

To prevent such outbreaks from occurring, people should avoid contact with bird feces and practice careful hand hygiene after handling birds or anything that has come in contact with them.[3] Chicks, ducklings, and other young birds pose a risk to infants, children aged <5 years, or immunocompromised individuals. People should be informed about the risk of purchasing baby birds as pets.[3]

References:

1. CDC. *Salmonella hadar* associated with pet ducklings----Connecticut, Maryland, and Pennsylvania, 1991. MMWR 1992;41;185--7.
2. CDC. *Salmonella* serotype *Montevideo* infections associated with chicks---- Idaho, Washington, and Oregon, spring 1995 and 1996. MMWR 1997;46:237-9.
3. CDC. Salmonellosis Associated with Chicks and Ducklings ---- Michigan and Missouri, Spring 1999.MMWR 2000;49:297-9.

Cluster of Cases of *Salmonella typhimurium* with Matching PFGE Patterns by Week of Onset, Oklahoma, 2006 (N=14)



Multistate Outbreak of Legionellosis Associated with an Arkansas Hotel—Summary of Oklahoma Cases

Prepared by Carmen Clarke, M.P.H.

Legionellosis is a disease with two distinct clinical forms. Legionnaires' disease (LD) is characterized by pneumonia and influenza-like symptoms, including anorexia, malaise, myalgia, headache, rapidly rising fever, and chills. Pontiac fever (PF) is a milder illness with the same symptoms as LD, but without pneumonia. Both are caused by *Legionellae spp*, which are ubiquitous in natural and man-made aquatic environments and multiply in the presence of warm temperatures. The disease is transmitted primarily by aerosolized water, such as air conditioning cooling towers, humidifiers, whirlpool spas, and respiratory therapy devices.

On July 19, 2006, the OSDH Communicable Disease Division (CDD) was notified by the Arkansas Department of Health and Human Services (DHHS) Division of Health (DOH) of two persons suspected of having LD following travel to Arkansas, as well of reports of others with respiratory symptoms. Both persons with suspected LD were adult relatives of children participating in a weeklong baseball tournament in Arkansas. All members of the Oklahoma baseball team stayed at the same hotel in Arkansas. Families arrived on or around July 9 and departed on or around July 15.

In response, Oklahoma State Department of Health (OSDH), the Arkansas DHHS-DOH, and 26 other state health departments, investigated the outbreak. A comprehensive report entitled *Final Report, Legionellosis Oubreak, Arkansas, July 1-19, 2006* was prepared by the Arkansas DHHS-DOH.

Sixty-five Oklahoma residents were found to have stayed at the hotel during the period of interest (July 1-19), 34 of whom were associated with the youth baseball team. Fifty-four (83%) of the 65 Oklahomans were locatable and consented to be interviewed. A total of 16 persons met the case definition for legionellosis, including 2 people that met the case definition for LD, and 14 individuals that met the case definition for PF (overall attack rate 24.6%). Cases reported an onset of symptoms from July 2 through July 17. Fifteen of 16 persons meeting the case definition of legionellosis were members of the baseball team. Of the 14 persons that met the PF case definition, 14.3% sought medical care from a private physician. Both LD cases were hospitalized.

A retrospective cohort study of the baseball team and family members who traveled with the team was conducted. Thirty-eight of 46 (82.6%) members of the cohort reported entering the hotel pool/hot tub area. All cases reported visiting the area. Cases were significantly more likely to have visited the pool area than non-cases (RR 1.57 95% CI 1.25-2.00). Additionally, swimming pool use (RR 1.57, 95% CI 1.13-2.17) and hot tub use (RR 1.84,

95% CI 1.25-2.71) were each significantly associated with development of legionellosis.

Significant dose-response relationships were identified between the number of times guests swam in the hotel pool (Mantel-Haenszel X^2 = 10.3, P=.0013), or used the hotel hot tub (Mantel-Haenszel X^2 = 15.8, P<.0001) and development of illness. The median number of times cases used the pool was 4 (range 0-12 times) compared to 0 times among non-cases (range 0-7 times). Cases used the hot tub a median of 3.5 times (range 0-10) while non-cases used the hot tub a median of 0 times (range 0-6). The median time in hours cases spent in the pool was 2.5 hours (range 0-14 h), while the median time in non-cases was 0 hours (range 0-14 h), which was statistically significant (Wilcoxon rank-sum two-sided p=0.0034). The median time of hot tub exposure was 0.6 hours (range 0-4h) and 0 hours among non-cases (range 0-2 h), which was also significant; (Wilcoxon rank-sum two-sided p=0.0002).

A logistic regression model examining all of the above water exposures was constructed in order to determine the contributions of each exposure while simultaneously adjusting for their effects. When this was done, only the number of times a person entered the hot tub was found to significantly predict the likelihood of being a case (OR 2.13 95% CI 1.35-3.37), thus, each time a person used the hot tub, his or her odds of acquiring legionellosis were increased 2.13 times.

Results from the Oklahoma outbreak investigation revealed development of legionellosis (PF or LD) was associated with exposure to the indoor pool area, particularly the hot tub, at this Arkansas hotel. This finding was similar to that of the Arkansas DHHS-DOH, whose multivariate analysis revealed significant dose-response relationships between swimming in the hotel pool, using the hotel hot tub, and duration of time in the pool area and development of illness.

Emergence of Autochthonous Cutaneous Leishmaniasis in Oklahoma and Northeast Texas

Prepared by Carmen Clarke, M.P.H.

Leishmaniasis is a vector borne parasitic disease with widespread distribution on several continents including the Middle East, Africa, Asia, the Mediterranean, and the Americas. Until recently, autochthonous human infections in the United States were only known to occur in one zoonotic focus spanning the U.S.-Mexico border in southern Texas. In Mexico, two species of *Leishmania* are known to cause autochthonous cutaneous leishmaniasis (ACL), *L. braziliensis* and *L. mexicana*; cases of *L. mexicana* are believed to be more common, although testing to identify species of *Leishmania* infection is not routinely performed. Prior to the current cluster, approximately30 cases of ACL had been identified in Texas. The first reported case's onset occurred in 1903. Strain identification using isoenzyme analysis was performed on cultures obtained from eight of these cases, all were *Leishmania mexicana*.

Case Histories

In January, 2004, a 26 year-old (Case 1) male resident of McCurtain County, Oklahoma, sought medical care from a local physician for a non-healing lesion on the periorbital area of his cheek that had been present for approximately one month. The physician excised the lesion, which measured 1.0x0.7x0.4 cm, and submitted it to a pathologist for evaluation. The pathologist noted that an infectious process was likely responsible for the lesion, but ruled out *Leishmania*, acid-fast, and fungal organisms. No other lesions appeared following the excision.

With an onset of June, 2005, a 74-year-old (Case 2) female resident of Lamar County, Texas, presented to her primary care physician with an inflammatory nodule of the right eyelid. Treatment consisted of application of heat packs to the lesion. Prior to biopsy in July 2005 the lesion measured 10 x 15 mm and was crusted with a central scab. The Texas Department of State Health Services (DSHS) and the Centers for Disease Control and Prevention (CDC) confirmed the histopathologic diagnosis of leishmaniasis.

In February of 2006, a resident (Case 3) of the same town as Case 1 in McCurtain County, Oklahoma presented to the same local physician with two lesions on his right arm. The physician again biopsied both lesions, measuring 1.8x1.0x0.6 and 2.5x1.5x0.9 cm, and submitted to the same pathologist. Upon examining the lesions, the pathologist noted the presence of intracytoplasmic organisms resembling *Leishmania* sp. Recalling the case from the year before, and noting that Case 1 lived in the same town, the pathologist called the Communicable Disease Division at the Oklahoma State Department of Health. Subsequent to this finding, the pathologist revised his findings on case 1. An interview with this case revealed that his onset

occurred in December, 2005, and that no subsequent lesions appeared following the excision of his initial lesions.

In March of 2006 an 8-year-old (Case 4) female resident of Collin County presented to her primary care physician with three lesions that had onset in December 2005 and failed to heal. Treatment included topical and oral antibiotics, topical antifungals and topical steroids, none of which induced healing. Biopsy in April 2006 yielded a diagnosis of leishmaniasis. Treatment with intravenous Amphotericin B was initiated. As of November 2006 the lesions remained with slight progress in healing. PCR of the biopsy performed by CDC and the University of the Incarnate Word in San Antonio, TX, identified *Leishmania mexicana*.

This newly identified focus of ACL is the most northeasterly yet known in the Americas. As the range of the implicated rodent host in south Texas, *Neotoma micropus*, the southern plains wood rat, does not include northeast Texas or eastern Oklahoma, a new enzootic transmission cycle capable of infecting humans is believed to have emerged. The absence of human cases in this area prior to 2004, and the observed northerly spread of *Leishmania mexicana* in Texas since 1903 suggest that this focus emerged recently following introduction from the south. A closely related species, *Neotoma floridana*, the eastern wood rat, has been found naturally infected in Texas. This species' range includes the study area, and extends east to encompass most of the southeastern United States.

Leishmania species have exhibited the capacity to exploit opportunities to expand their range when certain vector/host requirements are fulfilled, leading to new transmission cycles when ecologic changes or disruptions occur. Wild, peridomestic, and domestic mammals and the sand flies that feed on them may be implicated in these cycles. Sylvatic and urban transmission cycles of both visceral leishmaniasis and ACL have been described in Latin America.

Note to clinicians: The incubation period of leishmaniasis is quite variable, ranging from 2 weeks to several months. Single or multiple skin lesions may occur, typically on exposed parts of the body. The appearance of lesions varies, from small, crusted lesions to deep ulcers. When ulcerative lesions occur, they are usually shallow, and circular, with well defined, raised borders, and a central bed of granulation tissue. These gradually increase in size but are not painful. After several months or longer, the ulcers heal spontaneously, leaving flat, atrophic, depigmented, burn-like scars. Diagnosis of leishmaniasis is made by microscopic identification of amastigotes (intracellular nonmotile form of parasite) in stained specimens from lesions. Images of *Leishmania* amastigotes may be found on the Center for Disease Control and Prevention's website at http://www.dpd.cdc.gov/dpdx/HTML/Leishmaniasis.htm.
Clinicians suspecting cases of leishmaniasis should call the Epidemiologist-on-Call at (405) 271-4060.

Summary of 2006 Norovirus Outbreak Investigations

Noroviruses are the most common cause of gastroenteritis in the United States, with an estimated 23 million cases occurring annually.[1] The average incubation period for norovirus is 24 to 48 hours, and clinical disease is characterized by acute onset of vomiting, diarrhea, or both, lasting 12 to 60 hours. Outbreaks of norovirus have occurred in multiple settings such as nursing homes and other institutational settins, restaurants and catered events, and cruise ships. The low infectious dose of norovirus (<100 viral particles), person-to-person transmission, and environmental contamination facilitates spread during outbreaks.

OSDH, Oklahoma City-County Health Department, and Tulsa City-County Health Department epidemiologists investigate outbreaks of acute gastroenteritis to (1) determine the magnitude of the outbreak; (2) identify the source(s) of transmission; and (3) institute control measures. The OSDH Public Health Laboratory has the capacity to perform norovirus testing by polymerase chain reaction (PCR) for outbreaks investigations. Three norovirus outbreaks that occurred during 2006 are highlighted below.

Outbreak of Norovirus Associated with a Bridal Shower

Prepared by Carmen Clarke, M.P.H.

In May 2006, CDD learned of a cluster of diarrheal illnesses among attendees of a bridal shower in Garfield County. Of 22 attendees, 18 were available to be interviewed (response rate=82%). Six reported experiencing diarrhea within 10 to 39 hours following the shower resulting in an attack rate of 33%). Norovirus was detected by the PHL in two of the patients' stool by PCR testing. An epidemiologic investigation into foods served at the shower found that most of the items served were obtained from an online catering service, except for a cake, which was purchased from a bakery at a local supermarket. The cake was described as a half chocolate, half white sheet cake with vanilla icing. Because many attendees removed the icing and only ate cake, it was possible to analyze white cake, chocolate cake, and icing as separate variables. Relative risks (RR) for each food and beverage served at the shower were calculated; none were significant. Because all ill persons reported eating icing, the relative risk for this exposure was undefined, but Fisher's exact test yielded a p-value of 0.10, a lower p-value than any other exposure. When dose-response was considered, an increased number of servings of icing was associated with illness (X^2 test for trend, p=0.06). Laboratory testing of the cake was negative for norovirus and no foodservice employees reported illness, however environmental investigation indicated employees had direct hand contact while preparing the icing.

Reference
1. Mead PS, Slutsker L, Dietz V, et al. Food-related illness and death in the United States. Emerg Infect Dis 1999;5:607--25.

Outbreak of Norovirus in a Canadian County Long-Term Care Facility, October 2006

Prepared by Renee Powell, M.P.H.

The long-term care division contacted the CDD on October 6, 2006 regarding a potential outbreak of gastroenteritis in up to 50 residents. The facility was located in Canadian county and provided three levels of care including independent living, assisted living, and a nursing home. An outbreak investigation was initiated to document attack rates among residents, describe the occurrence of gastroenteritis among the three residential care areas, confirm the etiologic agent, and work with the staff to institute control measures. Infection control measures, environmental cleaning, and recommendations for active surveillance for new cases of gastroenteritis were provided and implemented by the staff at that time.

Thirty-seven cases of diarrheal illness (greater than or equal to 3 loose stools in a 24-hour period) were identified among residents and 12 among the staff resulting in an attack rate of 13.6% (37 of 272) and 18.2% (12 of 66). Onsets occurred on October 6th to October 7th. The duration of symptoms ranged from 24 to 48 hours in residents and employees. In the independent living center, the attack rate in residents was 13% (26 of 200). In the assisted living center, the attack rate in residents and employees was 23% (6 of 27) and 26% (6 of 26) respectively. The attack rate among the nursing home residents was 13.3% (6 of 45) and 12.5% (5 of 40) among employees. Symptoms reported among ill individuals were diarrhea, vomiting, fever and abdominal pain.

Four specimens were submitted from residents to the PHL, two from the assisted living center and two from the nursing home. Of those, one was positive for norovirus. The early recognition of the outbreak and initiation of control measures resulted in reduced spread of disease in the institution.

Outbreak of Norovirus Among Residents and Staff of a Nursing Home, Oklahoma County, 2006

Prepared by Gail Payne, M.P.H.

On January 11, 2006, Gail Payne, M.P.H., received a call from the Oklahoma State Department of Health (OSDH) reporting an outbreak of vomiting and diarrhea among residents and staff of a nursing home (NH) located in Oklahoma County. A case was defined as anyone who, in the absence of other diagnoses, experienced vomiting, diarrhea or both on or after December 30, 2005. Forty-one cases of vomiting and/or diarrhea were found among the nursing home residents (43.6% of the total patient population). This NH also employs 92 people, 14 of whom reported illness after December 30th. Eight of the 14 ill staff persons were interviewed; they reported symptoms consistent with those of the residents. No maintenance or kitchen staff reported illness. All staff reporting illness performed direct patient care.

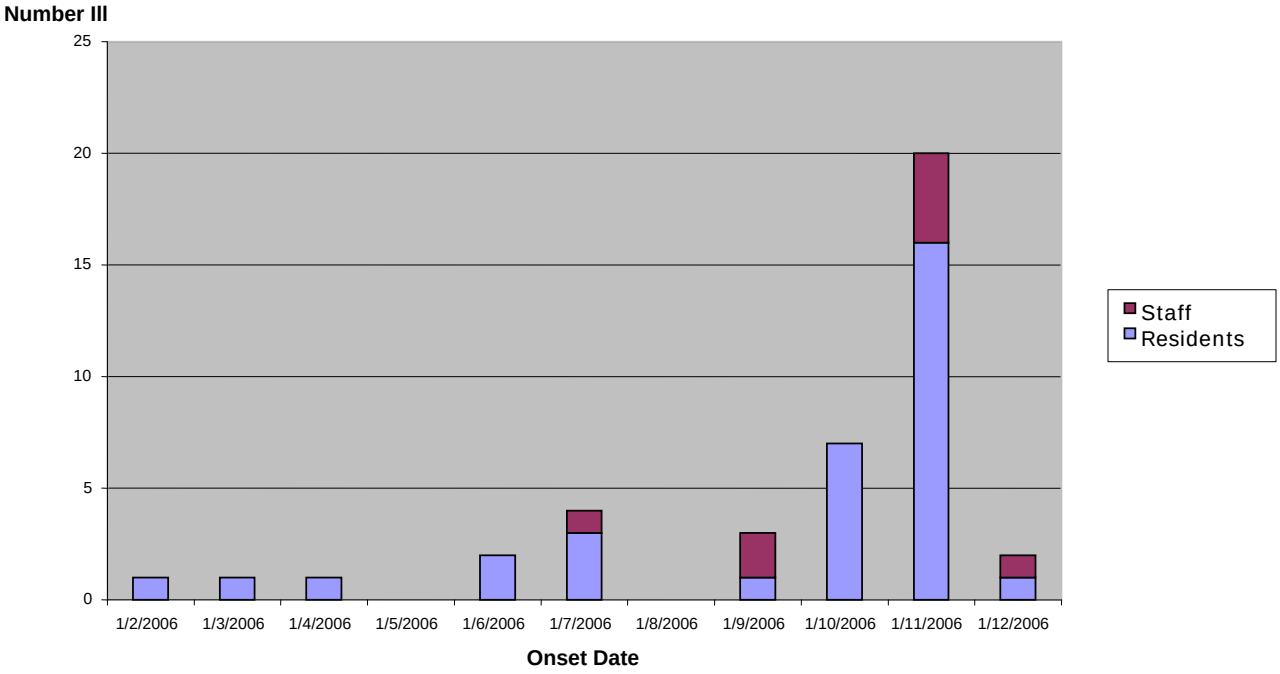
The first case of diarrhea/vomiting within the patient population occurred with onset of symptoms beginning on January 2, 2006. The outbreak peaked on January 11 with 16 cases, the last known cases reporting onset of symptoms on January 12 (Figure 1). Ill residents ranged in age from 35 to 99, with a median age of 79. The majority of cases (70%) reported diarrhea, while only half reported nausea and vomiting. Eighty-seven percent of ill staff reported nausea, 62% reported vomiting, and 100% reported diarrhea. Nine enteric stool kits were obtained; two of the samples tested by the Public Health Laboratory were positive for norovirus.

Residents were grouped into five mobility categories: ambulatory, wheelchair, walker, bedfast and unknown (Table 1). Residents are not restricted in their movements and have access to most areas of the facility. Mobility status of twenty-one of the residents could not be established; consequently, it was not possible to determine a relationship between mobility status and illness.

No dietary staff had been ill and no unusual meals were served the two weeks prior to the outbreak. The only meal out of the ordinary was a dinner for residents and their families on December 9, 2005 where turkey, dressing and ham were served in commemoration of the Thanksgiving and Christmas holidays. No food items were found to be statistically associated with illness.

Residents have freedom of movement about the facility, including access to ice machines and igloo coolers. This freedom of movement undoubtedly increased the risk of spread of illness from patient to patient, from patient to staff and vice versa. Visitors to the facility may also have been another possible source of infection. Guests are not required to sign in upon entry and have free reign about the building.

Onset of Norovirus Symptoms among Residents and Staff of a Nursing Home in Oklahoma County, January 2006



Although no food items were found to be statistically associated with illness, a subsequent finding of this study found that the more mobile a resident was, the more likely he was to become ill (Table 1). This was an unexpected finding, since a less mobile resident would come into more direct contact with staff members and thus be at greater risk of contracting infection from an ill staff member. Based on this observation, the hypothesis is that the more active and mobile residents are more likely to congregate together, have more interaction with more staff members and visitors, and may be more likely to come into more contact with contaminated items, thus increasing the chances of transmission of norovirus.

Mobility status for Nursing Home Residents During a Norovirus Outbreak, Oklahoma County, January 2006

N=63		Cases		Controls		Total
		n	%	n	%	n
Mobility						
	Ambulatory	1	(2.4)	2	(9.5)	3
	Wheelchair	25	(61.0)	2	(9.5)	27
	Walker	2	(4.9)	2	(9.5)	4
	Bedfast	6	(14.6)	1	(4.8)	7
	Unknown	7	(17.1)	14	(66.7)	21
Total		41	(100)	21	(100)	62

Foodborne Intoxication Due to *Staphylococcus aureus* in an Oklahoma County Barbecue Restaurant, June 2006

Prepared by Lesa Bowman, R.N.

On the evening of Saturday, June 24th, 2006, the Acute Disease Investigation Section (ADI) of Epidemiology Services, Oklahoma City-County Health Department (OCCHD) received a telephone call reporting several ill patients at a local hospital ER complaining of sudden onset of gastrointestinal symptoms shortly after eating at the same barbecue restaurant.

An EMSystem® alert was formulated to identify potential cases of ill persons in other emergency departments with same symptoms and history of eating at the barbecue restaurant in question. Two ADI epidemiologists immediately traveled to the Emergency Department and interviewed all ill persons either in person or via telephone.

The initial visit by an OCCHD Sanitarian to the restaurant occurred within a couple of hours after notification; the restaurant was closed, with no employees present. While driving by on Sunday, the two epidemiologists found the restaurant closed, but the owner and a couple of employees were there, restocking for the following day. The sanitarian-on-call was called and met them at the restaurant where an inspection took place. The restaurant owner and employees were interviewed and digital photos taken of the environment. The beef brisket was a commercially prepared ready-to-eat product, which was sold frozen by the meat distributor. Macaroni salad, potato salad and coleslaw were ready-to-eat products purchased from local stores. Barbecue sauce was made on location or at the owner's other location in Del City.

Clinical specimens collected included vomitus from one patient in the emergency department and a nasopharyngeal swab and skin swabs from the dominant hand of the owner/manager of the restaurant. No clinical specimens were obtained from the other ill persons. Environmental specimens collected included beef brisket and barbecue sauce from the restaurant. An unopened sample of brisket was also obtained from the distributor for testing.

Eleven ill persons were identified with symptoms including nausea, vomiting, retching, abdominal cramping, and prostration and who had a history of eating at the barbecue restaurant. No persons were identified who had eaten at the restaurant and not become ill. Forty-five percent of the ill persons were male and 54% were female, with a median age of 65 years. All ill persons ate brisket and barbecue sauce and reported illness within 2-4 hours after eating at the restaurant.

Staphylococcus aureus was found in all clinical specimens collected (vomitus, swabs from nasopharynx and hand of owner), as well as from the samples of brisket collected from the restaurant. *S. aureus* was not isolated from the unopened brisket. After further testing by the OSDH Public Health Lab, each *Staphylococcus* specimen was found to have PFGE patterns that were indistinguishable from each other and was unfamiliar to CDC's database.

Inspections of both restaurant sites resulted in the identification of numerous serious health violations. After several interviews with the owner of the restaurant, several problems were found that contributed to the occurrence of this foodborne outbreak. First, the general lack of basic food handling knowledge by the owner directly contributed to the outbreak. He failed to

understand the importance of personal hygiene (hand washing), as well as proper heating and cooling temperatures with a properly calibrated thermometer. Secondly, the lack of hand washing by staff and management during food preparation and service caused contamination of the product. Thirdly, according to the owner, the meat products were routinely heated, cooled, reheated and cooled until the product was sold. When asked how many times the brisket involved in this outbreak had been reheated, the owner indicated that it had been reheated at least 3 or 4 times. Human intoxication is caused by ingesting toxins produced in food by some strains of *S. aureus*. Generally, toxin production occurs when food has not been kept hot enough (60°C, 140°F, or above) or cold enough (7.2°C, 45°F, or below) for extended periods of time. In this case, the bacteria were added to an otherwise untainted brisket via a food worker's unwashed hands and then severely temperature abused until sold.

The owner voluntarily and permanently closed the business on June 25, 2006. He was educated by OCCHD Consumer Protection staff in food handling procedures and was provided hands-on guidance during numerous compliance inspections. Additionally, he and his wife attended a formal briefing which described basic food handling procedures and techniques, including the importance of handwashing. The owner and his wife also subsequently attended a Food Service Operator class.

Clostridium perfringens Oubreak Associated with a Catered Christmas Luncheon, Grant County, Oklahoma, December 2006

Prepared by Jolianne Stone, M.P.H.

On December 6, 2006, the OSDH-CDD was notified of an outbreak of ill persons among a group who attended a Christmas Open House luncheon on December 4, 2006. An outbreak investigation was initiated to identify the groups at risk of exposure and illness, as well as identify potential sources of transmission. A list of approximately 240 people who attended the luncheon was provided by the facility to the OSDH-CDD. Attendees were contacted by telephone and a standardized questionnaire was administered to elicit information regarding illness history and food consumed at the luncheon.

Two caterers provided the meal. One provided three turkeys that were smoked and deboned, a vegetable tray, canned items for the relish tray, and the dinner rolls. The second was an unlicensed individual who provided the barbeque beef, potato salad, cranberry salad, baked beans and the barbeque sauce. The beverages included water, iced tea and coffee, with the local school providing ice. Employees of the business that hosted the catered luncheon provided the desserts.

For this outbreak investigation, a case was defined as a person who attended the luncheon on December 4, 2006 and developed diarrhea ($\geq$3 loose stools in a 24 hour period) or vomiting within 72 hours. Seventy-six percent (N=182) of the attendees were contacted, and175 were included in the analysis. A total of 53 persons met the case definition with no secondary cases, an overall attack rate of 30%. Symptom onsets occurred between 12:45pm December 4 to 2:30pm December 5, 2006 (Figure 1). The median incubation period was 9.5 hours with a range of one to 21 hours before symptom onset. Thirty-three (63%) cases reported symptoms starting between 7:00pm and 11:00pm on December 4, 2006. Attendees consisted of both males and females with the median age of cases 65 years (range 5 to 89 years) and the median age of non-cases 64 years (range 2 years to 99 years). The most common symptoms reported among cases were diarrhea (96.2%) and abdominal pain (73.6%). Five cases reported vomiting, and three cases reported no diarrhea. Among the cases who reported diarrhea, the duration of diarrhea was from one hour to 192 hours with a median of 24 hours. No cases were hospitalized and no deaths were associated with this outbreak.

Analysis of exposures revealed consumption of turkey was significantly associated with development of gastroenteritis. Forty-nine (92.5%) cases reported eating turkey compared with 38 (31.4%) non-cases (RR= 12.2, p-value= <0.05). A significant dose-response relationship was identified between the number of pieces of turkey consumed and development of gastroenteritis (X^2 value = 47.4, p-value=<0.05)

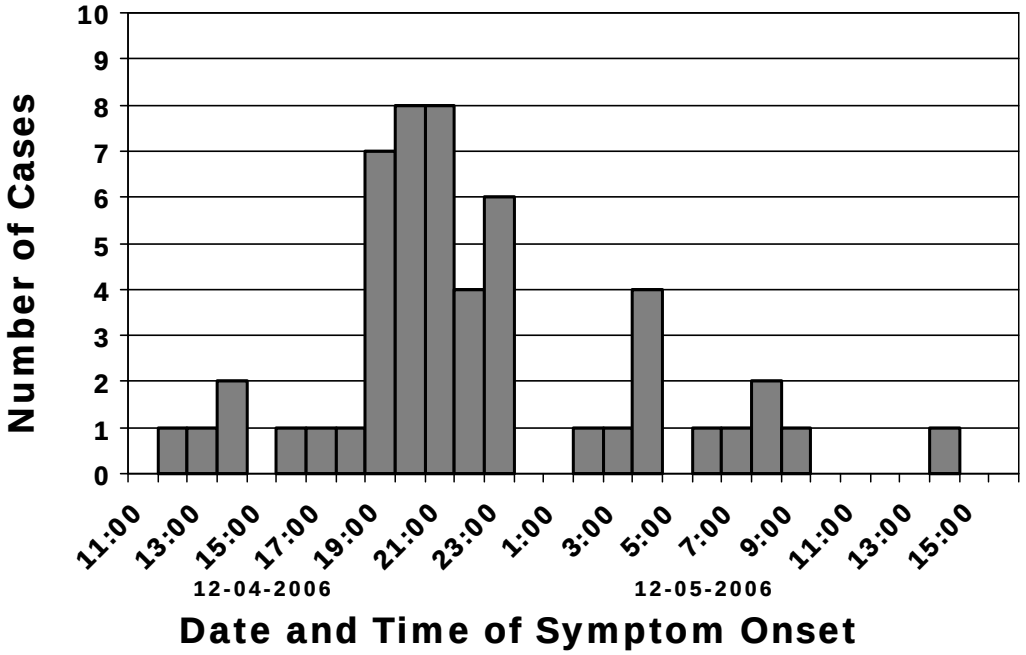
A stool sample was obtained from one case, *Clostridium perfringens* was isolated by the OSDH-PHL. Multiple organisms were cultured from the turkey sample including *Clostridium perfringens*. Cultures for all other foods submitted were sterile. The raw stool sample, the turkey sample and the *Clostridium perfringens* isolates from both sources were submitted to the Minnesota Department of Health for further testing. Enterotoxin and pulsed-field gel electrophoresis (PFGE) was completed on the turkey sample. The *C. perfringens* turkey isolate was positive for *C. perfringens* enterotoxin A and the PFGE pattern was PERF14. The PFGE pattern on the human isolate was also PERF14, and the stool sample tested positive for *C. perfringens* enterotoxin using EIA.

Epidemiologic and laboratory findings from this outbreak investigation indicated the source of transmission was from consumption of the contaminated turkey. Environmental assessments indicated a lack of temperature monitoring and improper preparation of the turkey, which allowed for the growth and proliferation of *C. perfringens*.

Foodborne transmission of disease in the United States has been estimated to cause 13.6 million illnesses and up to 2,700 deaths annually.[1] *Clostridium perfringens* is one of the most common etiologic agents of foodborne illness, representing an estimated 10% to 20% of all reported foodborne illness outbreaks.[2] The illness is characterized by diarrhea and abdominal cramps without fever, and symptoms usually begin 7 to 15 hours after consumption of the infected food with duration of illness usually lasting ≤24 hours.[3] Numerous epidemiologic studies have shown turkey is a common implicated food in outbreaks of *C. perfringens* food poisoning.[3, 4] This is usually due to improper storage and holding temperatures of poultry products prior to serving.

Previous outbreaks have often not had either food specimens or human specimens. If they do have food specimens, isolation of the implicated organism is rarely reported, or the *C. perfringens* isolates do not conform to the criteria for food-poisoning types.[4] During this outbreak, stool and food specimens were collected in a timely manner to enhance the probability a presumptive isolate would be obtained. Because of this methodology, we were able to isolate *C. perfringens* from both stool and the implicated food item and confirm the organisms were indistinguishable by PFGE. This investigation demonstrated the EIA and culture of organisms in both food and human specimens were useful tests in the confirmation of a foodborne outbreak caused by *C. perfringens*.

Onset Date and Time of Cases, *C. perfringens* Outbreak Investigation, Grant County, Oklahoma, 2006



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[1] Mead PS, Slutsker L, Dietz V, et al. Food-Related Illness and Death in the United States. Emerging Infectious Diseases 1999; 5(5): 607-625.

[2] Parikh AI, Jay MT, Kassam D, Kociemba T, Dworkis B, Bradley PD, et al. *Clostriudium perfringens* outbreak at a juvenile detention facility linked to a Thanksgiving holiday meal. West J Med 1997 June; 166:417-419.

[3] Birkhead G, Vogt RL, Heun, EM, Snyder JT, and BA McClane. Characterization of an Outbreak of *Clostridium perfringens* Food Poisoning by Quantitative Fecal Culture and Fecal Enterotoxin Measurement. J Clinical Microbiol 1988; 26(3): 471-474.

[4] Çakmak Ö, Bİİr Ormanci FS, Tayfur M, Erol I. Presence and Contamination Level of *Clostridium perfringens* in Raw Frozen Ground Poultry and Poultry Burgers. Turk J Vet Anim Sci 2006; 30: 101-5.

Outbreak of Early Syphilis, Washington County, Oklahoma, 2006 – 2007

Prepared by Mark Turner, M.P.H.

Introduction

From May 2006 – February 2007, 27 cases of early syphilis were reported in Washington County and six (6) cases in surrounding counties. The incidence of early syphilis in Washington County during 2006 was 55 cases per 100,000 persons, substantially higher than the statewide early syphilis case rate of 6.0 cases per 100,000. Previously, only one (1) case of early syphilis was identified in Washington County from 2001 – 2005. This report summarizes the results of an investigation that suggest the 2006-2007 outbreak was associated with missed opportunities for syphilis screening, delayed treatment in private health care provider facilities, and the exchange of sex for money or drugs as a primary behavioral risk factor.

Methods

To determine the scope of the outbreak, assess risk factors associated with the epidemic, and control the spread of disease, Partner Counseling and Referral Services (PCRS) interviews were conducted with all identified early syphilis (primary, secondary and early latent) cases. These face-to-face client centered interviews collected data on demographic and risk characteristics, and sought to identify contacts for additional public health follow-up. The critical interview period to identify sexual partners and cluster-linked suspects or associates varied and was determined by the case-patient's stage of syphilis at time of diagnosis. The interview assessment period for primary, secondary, and early latent syphilis was three (3) months, six (6) months and one (1) year, respectively, prior to the date of diagnosis or treatment. A partner was defined as a person with whom the case had sex within the interview assessment period; a suspect as a person that an early syphilis patient thought might benefit from a syphilis test; and an associate, as someone an uninfected partner or suspect thought might need syphilis testing.

In addition to the PCRS interviews, the Washington County Health Department (CHD) and the Oklahoma State Department of Health (OSDH) HIV/STD Service conducted targeted site visits to local health care providers to heighten awareness of the syphilis outbreak and transmitted a Health Alert Network (OK-HAN) advisory to all health care providers in the county. To heighten awareness among at-risk citizens of Washington County, informational flyers were posted in areas where the majority of the cases resided, and in their sexual venues. Articles about the outbreak were also published in the local newspaper. To identify additional cases, CHD nurses and Disease Intervention Specialists (DIS) performed syphilis screening on all volunteers at the local correctional institution from February to April 2007.

When the outbreak appeared to be over in March 2007 (one month with no new syphilis cases), the Washington CHD and the HIV/STD Service initiated a "Bartlesville Outbreak Blitz" (BOB) in April 2007. During the BOB, repeat interviews of early syphilis cases were conducted using different DIS than used during the original case investigation and in some cases, two DIS performed the re-interview.

Any partners or cluster suspects that initially could not be located or refused examination were recalled for re-interview. Additional efforts for expanded syphilis screening included volunteer testing at the local correctional institution and homeless shelters, and in food bank patrons. To ensure health care provider awareness, field visits by the Field Surveillance Specialists (FSS) targeted providers most likely to see persons that fit the demographics of the outbreak. A PowerPoint presentation, "*The Anatomy of a Syphilis Outbreak*", was developed and used to educate both teachers and students at the local Vocational Technology Center and the local hospital Emergency Room physicians.

Results

Of the 33 early syphilis cases investigated, one (1) was congenital, six (6) were primary, 10 secondary, and 15 early latent. The ages ranged from 0 – 65 with a median of 33 years of age. Thirteen cases were males, of which four (4) were black, six (6) white, two (2) American Indian, and one (1) Hispanic. Of the 20 female cases, 65% (13) were White, three (3) were Black, two (2) were American Indian, and two (2) were Hispanic.

The primary risk behavior in this outbreak was sex for money and/or drugs. Of the 33 cases, 25 (76%) were exchanging sex for drugs and/or money. The primary drug of choice was methamphetamine with 17 (52%) cases listing it as their first drug of choice; three (9%) additional persons listed it as their second drug of choice. Other drugs of first choice included cocaine (5) and alcohol (3).

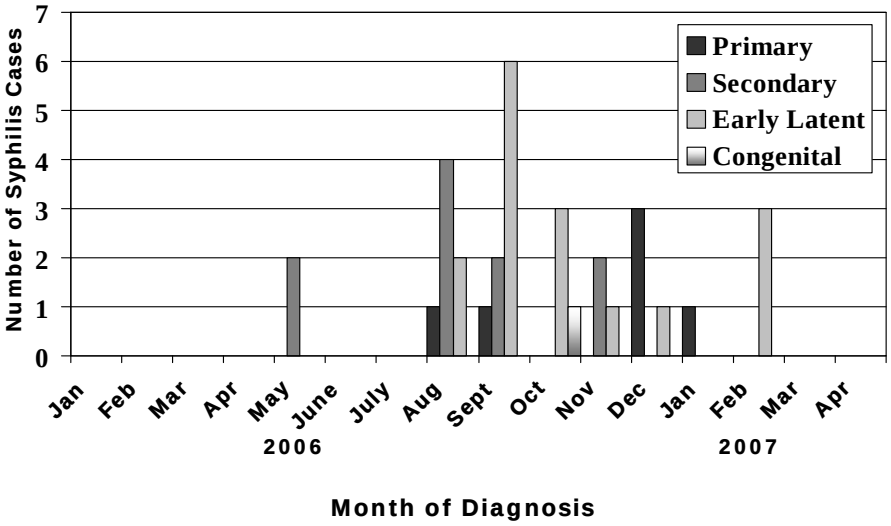
An evaluation of the PCRS efforts identified a 4.2 Partner Index and a 3.5 Cluster Index (average number of partners and clusters per early syphilis case). When compared to the Partner and Cluster Indices for all other early syphilis cases in Oklahoma during the outbreak period (2.0 and 0.5 respectively), the outbreak indices were significantly higher. Another valuable comparison is the Treatment Index (partners and clusters epidemiologically treated for syphilis). During the outbreak, the PCRS efforts achieved a significantly higher Treatment Index of 4.2 as compared to 1.0 Treatment Index for all other Oklahoma syphilis cases during the outbreak period.

Summary

This outbreak investigation identified epidemiologic factors frequently associated with syphilis outbreaks in other areas of the United States: increased illicit drug use and the exchange of money or drugs for sex. The investigation also identified missed opportunities for early identification and treatment of syphilis. Of the 33 cases identified in this outbreak, nine (27%) syphilis cases were originally misdiagnosed, but were subsequently identified by the PCRS process or a repeat visit to a health care provider.

Bartlesville Syphilis Outbreak, 2006-2007

Number of Cases by Stage of Syphilis at Diagnosis



National Surveillance Project Finds Increasing Fluoroquinolone Resistance of *Neisseria gonorrhoeae*

Prepared by Janet Wilson, RN

The Gonoccal Isolate Surveillance Project (GISP) was established in 1986 by the CDC to monitor trends in antimicrobial susceptibilities of strains of *N. gonorrhoeae* in the United States. This was done to establish a rational basis for the selection of gonococcal therapies. GISP is a collaborative project between selected sexually transmitted diseases (STD) clinics, five regional laboratories, and the CDC.

In May 2003, Oklahoma City, Oklahoma, became one of 26 cities enrolled in the GISP screening process. Since then, the Oklahoma City County Health Department (OCCHD), in collaboration with the Oklahoma State Department of Health (OSDH), has been screening clients through their STD clinic. Participants in the project are the first 25 urethral gonorrhea positive males seen at the OCCHD STD Clinic each month. The *N. gonorrhoeae* isolates from these patients are sent to the CDC Regional Lab in Alabama for further antibiotic susceptibility testing. The Regional Laboratory determines the susceptibility of isolates to penicillin, tetracycline, spectinomycin, cefixime, ceftriaxone, ciprofloxacin, and azithromycin. Clinical and demographic data are abstracted from medical records.

During the first year of participation in GISP in Oklahoma (2003), there were no resistant isolates identified. However, the following years' data have revealed that the prevalence of fluoroquinolone-resistant *N. gonorrhoeae* (QRNG) is steadily increasing and at approximately the same rate as national findings. In 2004 there were three resistant isolates identified, seven QRNG isolates in 2005, and a total of thirteen in 2006. The proportion of QRNG isolates reported in Oklahoma in 2006 was 4.3%--just slightly below the recognized threshold of 5% for changing treatment guidelines.

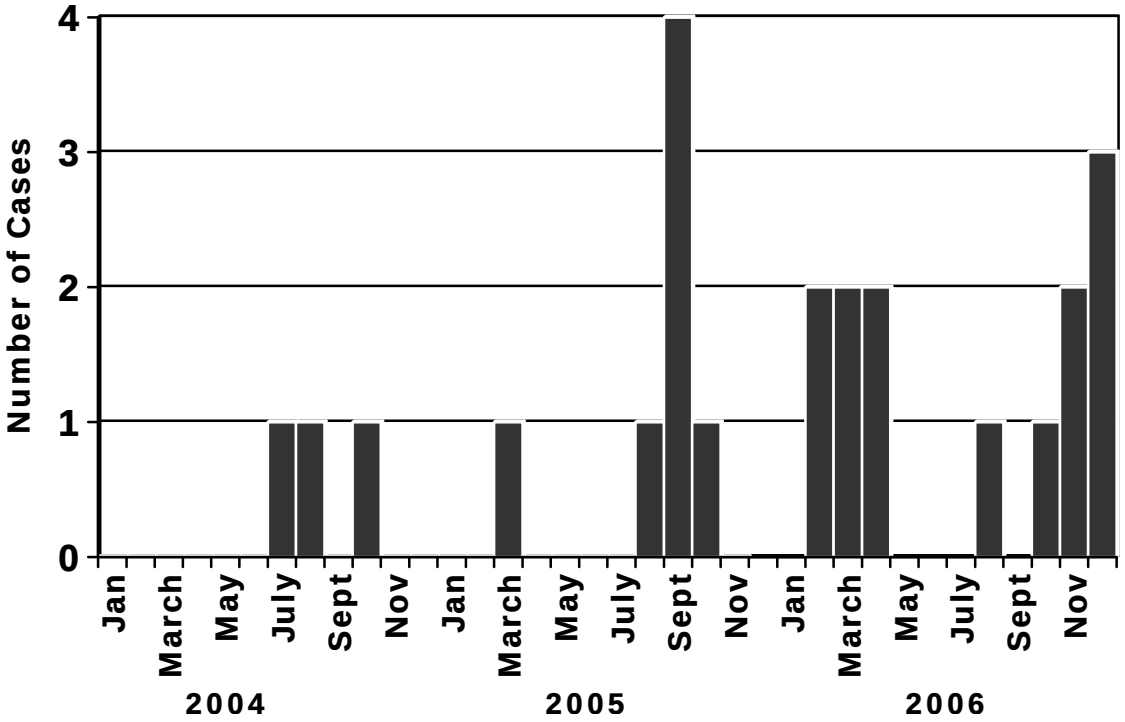
New data released by the CDC shows that QRNG is now widespread in the United States among heterosexuals and men who have sex with men (MSM). Notably, in the first half of 2006, the proportion of gonorrhea cases that were QRNG among heterosexual men reached 6.7%, an 11-fold increase from 0.6% in 2001. Based on these GISP findings, the CDC issued new guidelines for treatment of gonococcal infections on April 12, 2007. The CDC no longer recommends the fluoroquinolone class of antibiotics (ciprofloxacin, ofloxacin, and levofloxacin) as a treatment for gonorrhea in the United States. Recommended options for treating gonorrhea are now limited to a single class of antibiotics known as cephalosporins. Exceptions to this are those individuals allergic to cephalosporins who may be treated with recommended alternative treatments. The full details of CDC's treatment recommendations for gonorrhea can be found at http://www.cdc.gov/std/treatment/2006/updated-regimens.htm

Immediately after the CDC issued its updated treatment guidelines for gonococcal infections, the county health departments in Oklahoma began using ceftriaxone, a cephalosporin, for standard treatment of individuals with a positive gonorrhea

laboratory result. With the new recommendation from CDC for gonorrhea treatment, comes a new challenge. The cost per dose to treat a positive gonorrhea client at CHD STD clinics will increase from 7 cents per dose for ciprofloxacin to over $1.50 per dose for the ceftriaxone treatment.

Dr. John Douglas, director of the Division of STD Prevention, states, "We cannot afford to lose ground against a disease that continues to affect roughly 700,000 Americans each year." In that vein, we anticipate that Oklahoma City will continue to be a sentinel surveillance site and participant in GISP, and that monitoring for emerging cephalosporin resistance is forthcoming.

Fluoroquinolone resistant *Neisseria gonorrhoeae* infections identified at the Oklahoma City-County Health Department STD Clinic by Month of Culture, 2004-2006



Antibiotic Resistance Special Investigation:
Oklahoma's Second Vancomycin-Intermediate Resistant *Staphylococcus aureus* Case

Prepared by Becky Coffman, RN, M.P.H.

Staphylococcus aureus is a common bacterium, and one of the most common causes of skin infection in the United States. *S. aureus* infections are often minor, but invasive infections can cause severe disease and can be fatal. Antibiotics in the penicillin family, particularly methicillin, were effective against *S. aureus* for many years, but their misuse contributed to the emergence of methicillin-resistant *S. aureus* (MRSA) particularly in hospitals. Vancomycin was used to treat invasive MRSA, but vancomycin-resistant Enterococcus (VRE) emerged as a problem in healthcare settings and prompted the Centers for Disease Control and Prevention (CDC) to release guidelines for appropriate vancomycin use.[1] Guidance for the investigation of *S. aureus* cases with decreased susceptibility to vancomycin was released by CDC in 2004 and updated in 2006.[2] The first documented VISA (vancomycin-intermediate *S. aureus*) case occurred in Japan in 1996, and now 18* cases have been documented in the United States.[3] Two of these cases occurred in Oklahoma: the first in 2003 and a second in 2006. VRSA (vancomycin-resistant *S. aureus*) was first documented in the United States in 2002[4,] and seven cases have now been reported.

In January 2006 the Clinical and Laboratory Standards Institute (CLSI) revised the definitions for classifying isolates of *S. aureus*. *S. aureus* isolates for which vancomycin minimum inhibitory concentrations (MICs) are 4-8 µg/mL are classified as VISA, and isolates for which vancomycin MICs are ≥16 µg/mL are classified as VRSA. Previously the breakpoints were 8-16 µg/mL for VISA and ≥ 31 µg/mL for VRSA. CDC revised the laboratory testing information for *S. aureus* in regards to vancomycin susceptibility on their website to reflect the CLSI changes.[5] Additionally, new infection prevention and control guidelines were released in October 2006 to address multidrug-resistant organisms (MDROs) including MRSA, VISA and VRSA and others.[6] Contact precautions are recommended for patients with these infections, and although no transmission has been reported, limited contact investigations are recommended for VRSA cases.

In May 2006, a 68 year old patient from a small city in Oklahoma was diagnosed with VISA-associated bloodstream and surgical site infections. The patient had a history of multiple surgeries including coronary artery bypass graft, pacemaker placement and implantation of an internal cardiac defibrillator (ICD). He had recently been hospitalized at two hospitals in the state, and also had a recent history of *Staphylococcal* infections including MRSA, which was treated with vancomycin. The OSDH Communicable Disease Division was notified by the hospital of a blood culture drawn on 15 May that grew MRSA with intermediate resistance to vancomycin (MIC = 4), a change from the patient's previous susceptibility patterns. The facility infectious disease specialist was consulted and the infection control professionals at both facilities were notified. The patient was on contact precautions, and his treatment was changed to linezolid. The isolate

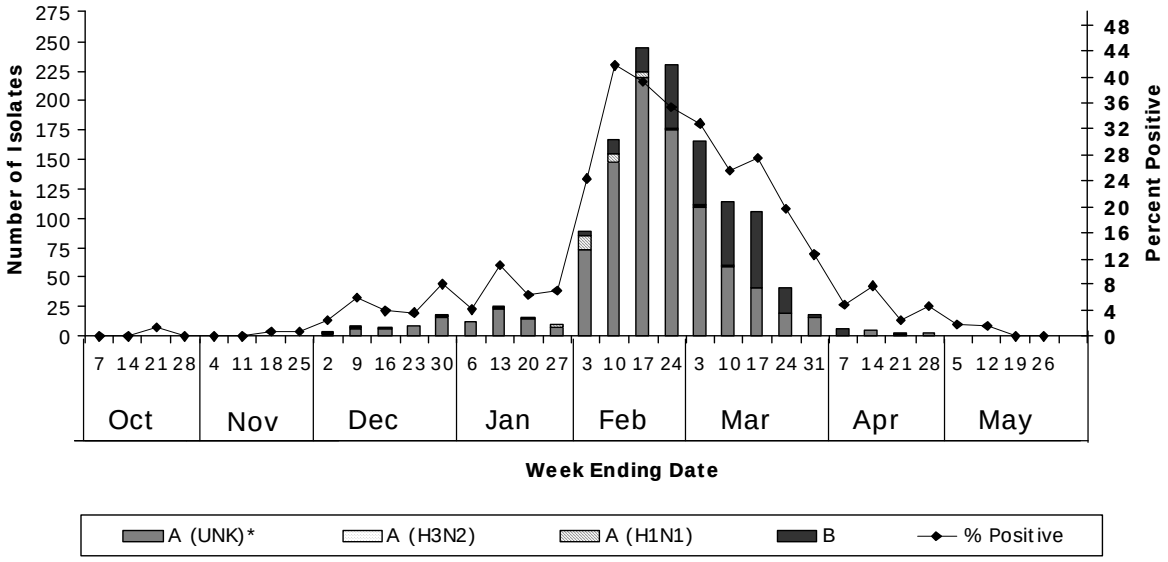
was sent to the OSDH Public Health Laboratory and forwarded to CDC where the results were confirmed. The CDC's Division of Healthcare Quality Promotion was consulted, and per their recommendations, a contact investigation was not performed. Subsequent blood cultures on this patient were negative. The patient recovered and no transmission in either healthcare facility was noted.

* Eighteen cases using the 8-16 µg/mL breakpoint definition for VISA. With the new breakpoint definition of 4-8 µg/mL, the number is approximately 100 cases.

1. Recommendations for Preventing the Spread of Vancomycin Resistance. Recommendations of the Hospital Infection Control Practices Advisory Committee (HICPAC), September 22, 1995 / 44(RR12);1-13. Available at the website (accessed 22 August 2007) http://www.cdc.gov/mmwr/PDF/rr/rr4412.pdf
2. Centers for Disease Control and Prevention. Investigation and control of vancomycin-intermediate and –resistant *Staphylococcus aureus*: A Guide for Health Departments and Infection Control Personnel. Atlanta, Ga. 2006. Available at the website (accessed 22 August 2007) http://www.cdc.gov/ncidod/dhqp/ar_visavrsa_prevention.html
3. Personal communication with Jeffrey C. Hageman, MHS, Division of Healthcare Quality Promotion, National Center for Infectious Diseases, CDC on 23 August 2007.
4. Centers for Disease Control and Prevention, Brief Report: Vancomycin-Resistant *Staphylococcus aureus* --- New York, 2004 MMWR 2004;53, pages 322-3. Available at the website (accessed 22 August 2007) http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5315a6.htm
5. Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion. Vancomycin-Intermediate/Resistant *Staphylococcus aureus* Laboratory Testing Algorithm, 2006. Available at the website (accessed 22 August 2007) http://www.cdc.gov/ncidod/dhqp/ar_visavrsa_lab.html
6. Multidrug-Resistant Organisms In Healthcare Settings, 2006. Recommendations of the Hospital Infection Control Practices Advisory Committee (HICPAC), Updated November 2006. Available at the website (accessed 22 August 2007) http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf

Surveillance Projects

Number and Percent of Sentinel Laboratory Viral Tests Positive for Influenza by Week, Oklahoma 2006-2007



† Oklahoma sentinel physicians and laboratories submit a sample of specimens to the Oklahoma Public Health Laboratory during influenza season for viral identification.

*Influenza type A (UNK) - Sub-typing not performed or results pending

Oklahoma Influenza and Respiratory Virus Surveillance Summary, 2006-2007

Prepared by Renee Powell, M.P.H.

Seasonal surveillance activities for influenza and other respiratory viruses resumed in October 2006. The number of surveillance reporting sources was expanded from 18 sentinel providers to 30 healthcare practices distributed in 24 counties. Sentinel healthcare providers report the number and age distribution of patients with influenza-like illness (ILI) via an online secure web-based site. ILI is defined as a fever (100°F [37.8^{o}C], oral or equivalent) and cough with or without a sore throat in the absence of a known cause other than influenza. These sentinel providers also submit respiratory specimens to the Oklahoma State Department of Health (OSDH) Laboratory for viral culture. Ten geographically distributed laboratories in the state voluntarily report results of respiratory virus testing (virus culture, DFA, and/or rapid tests) on a weekly basis year-round.

The objectives of the State's respiratory virus surveillance system are to detect disease transmission as early as possible, to monitor and describe the intensity and geographic distribution of disease, to measure the impact of influenza on different age groups, and to identify and publicize the circulating types and subtypes. The OSDH Communicable Disease Division (CDD) works in conjunction with communicable disease nurses in the County Health Departments as well as with local clinicians to confirm the presence of respiratory outbreaks by collecting specimens for viral culture and to provide recommendations to stem the spread of disease.

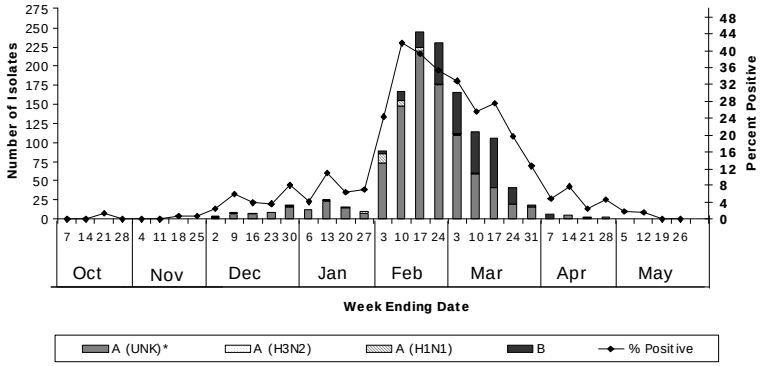
Similar to national trends, influenza activity in Oklahoma was fairly low through the end of December with ILI staying below 1%. Culture-confirmed influenza type A and B were identified in Oklahomans during the week of December 2, 2006. The percentage of patient visits due to ILI reported by sentinel providers ranged from 1.2% (37/3102) during the first week of reporting to a peak of 12.2% (310/2458) for the week ending February 17, 2007. The proportion of positive influenza tests performed at sentinel laboratories began to rise in early February with 24.2% (104/249) positive tests reported and then increased to a season high of 39.1% (298/762) during the week of February 17, 2007.

Oklahoma reached widespread activity status on January 27 and remained at that level until the end of February. Influenza activity can be highly variable from year to year, but "typical" seasons in Oklahoma do reflect peaking of activity in early to mid-February. The A (H1N1) strain predominated in the 2006-07 season and primarily affected the pediatric population. Numerous elementary schools reported short-lived outbreaks and periods of high absenteeism due to influenza. Influenza activity persisted until late April. One case of pediatric influenza-associated death was reported.

Between October 1, 2006 and June 30, 2007, the PHL performed viral isolation and culture on 161 respiratory specimens. From these, the PHL isolated 29 type A (H1N1) viruses, 12 type B, 2 type A (H3N2) and 13 unsubtyped influenza A viruses. The PHL also isolated 5 rhinoviruses, 1 cytomegalovirus, and 1 adenovirus during this time period. Respiratory syncytial virus (RSV) activity peaked in mid-January with a percent positivity of RSV tests at 56% (148/264) during the week ending January 13, 2007.

The OSDH began conducting year-round influenza and respiratory virus surveillance during 2007 to establish trends and patterns of respiratory virus activity during non-seasonal periods and to detect outbreaks. Additionally, year-round surveillance was initiated to detect the emergence of novel influenza strains or to identify other severe respiratory conditions that might not occur during the usual influenza season.

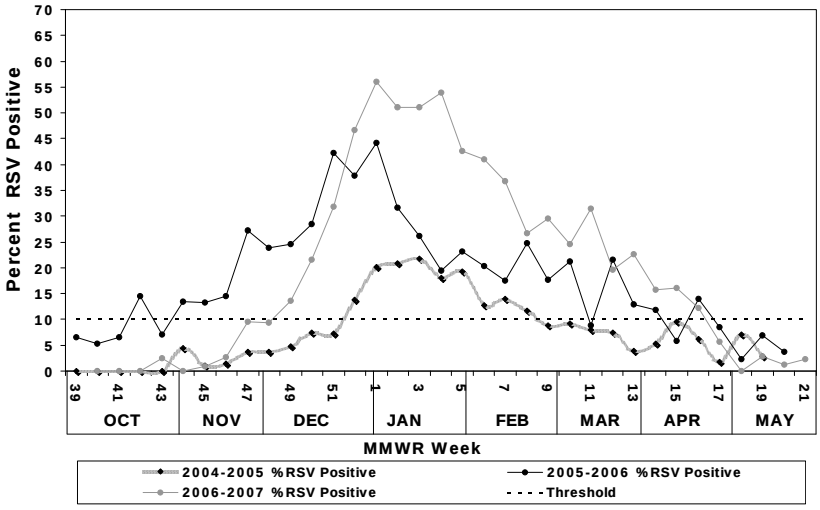
Number and Percent of Sentinel Laboratory Viral Tests Positive for Influenza by Week, Oklahoma 2006-2007



† Oklahoma sentinel physicians and laboratories submit a sample of specimens to the Oklahoma Public Health Laboratory during influenza season for viral identification.

*Influenza type A (UNK) - Sub-typing not performed or results pending

Percent of Sentinel Laboratory Viral Tests Positive for RSV by Week, Oklahoma 2004-2007



PulseNet and the Detection of Outbreaks

Prepared by Mike McDermott, B.S. and Carmen Clarke, M.P.H.

Pulsed-field gel electrophoresis (PFGE) is an invaluable epidemiological tool that characterizes chromosomal bacterial DNA, allowing quick comparisons between isolates. Compared to conventional laboratory and epidemiologic surveillance methods, PFGE can detect outbreaks more quickly, before they reach epidemic proportions. While a small number of related cases in different areas of the country or state may go unnoticed, comparison of PFGE patterns using a national database can identify potential disease outbreaks.

The Oklahoma State Department of Health Public Health Laboratory is a member of PulseNet, which is the standardized international molecular subtyping network of databases for foodborne pathogens provided by the Center for Disease Control and Prevention (CDC). PulseNet allows all US states, as well as the Food and Drug Agency, US Department of Agriculture, and Canadian provinces, to interact with one another to help quickly recognize outbreaks at the outset, when prevention measures can be effectively taken. PulseNet has recently expanded to include PulseNet Europe, Asia Pacific, Middle East, and Latin America.

The Oklahoma State Department of Health Public Health Laboratory routinely analyses all *Salmonella, Shigella, Escherichia coli* O157:H7, and *Listeria monocytogenes* isolates using (PFGE). *Campylobacter*, *Haemophilus, Neisseria, Serratia, Pseudomonas,* methicillin resistant *Staphylococcus aureus* (MRSA) and isolates of other bacterial species may be run when there is a need to determine whether cases of these diseases might be epidemiologically linked. PFGE patterns of each strain are digitized and stored as computer files. These files can then be compared locally, nationally, or internationally using specialized computer software.

In 2006, the PHL PFGE lab analyzed over 2800 samples. These included approximately 900 *Salmonella*, 200 *Shigella*, 100 *E. coli*, 50 *Listeria,* 200 MRSA, 120 *Pseudomonas* and 90 *Campylobacter* samples. CDC set a goal in 2006 to have *Salmonella, E. coli* O157:H7 and *Listeria* patterns submitted to the national database within 4 days of arrival to the lab. The PHL met this goal by averaging 3.35 days for *Salmonella* and 2.51 days for *E. coli* O157:H7. *Listeria* data is not included as all *Listeria* samples received in 2006 were for laboratory proficiency or certification sets, rather than isolates from patients.

The PulseNet WebBoard is an electronic forum that allows PFGE laboratorians and epidemiologists to post information regarding outbreaks or investigations. PFGE staff responded to over 300 outbreak postings on the WebBoard. Oklahoma posted over 30 clusters identified in our state to the WebBoard in 2006 and alerted state epidemiologists to approximately 30 additional smaller clusters.

The PFGE lab participated in two large national national foodborne outbreaks in 2006 that received widespread attention and which resulted in food recalls. The first was an outbreak of *E. coli* O157:H7 associated with spinach. Food and patient samples were collected from individuals documented to have had contact with recalled produce. However, due to PFGE's highly discriminating ability, it was determined that no reported cases of *E. coli* O157:H7 in Oklahoma were associated with the national cluster. The second recall involved the *Salmonella* Tennessee tainted peanut butter, details of this outbreak can be read in a separate article contained in this issue.

HIV Incidence Surveillance

Prepared by Terrainia Harris, MPH

The goal of HIV incidence surveillance (HIS) is to obtain the data needed to provide national and area-specific population-based estimates of new HIV infections per year. In the past, HIV surveillance has been limited to monitoring prevalence, which is the number of persons with HIV in a given population at a designated time. HIV surveillance was not able to identify HIV incidence, the number of recent HIV infections within a given population at a designated time. However, current advances in technology have resulted in the development of assays that are able to identify recent infections, i.e., infections acquired within the previous six months. HIS data will allow public health officials to monitor the epidemic accurately and allocate resources, as well as plan, implement, and evaluate prevention programs more effectively.

The Oklahoma State Department of Health (OSDH) was selected by the Centers for Disease Control and Prevention (CDC) to expand the national HIV/AIDS surveillance system to measure the number of new HIV infections nationally and regionally each year. Currently, 34 jurisdictions, covering approximately 85% of the population infected with HIV, are funded for implementation of HIV incidence surveillance. Oklahoma, in cooperation with the CDC, expanded its core HIV/AIDS surveillance activities by implementing HIS in August 2005.

The two components of estimating population-based HIV incidence are the Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS) and Testing and Treatment History (TTH) information. Public and private laboratories send remnant diagnostic HIV-positive specimens to the state public health laboratory. Once eligibility is determined by HIS, specimens are forwarded to CDC's designated STARHS testing site. The STARHS testing procedure is used to identify HIV-positive persons who were likely infected within the past 153 days, i.e., a recent infection. The TTH is a questionnaire designed by the CDC that is administered by an Oklahoma disease intervention specialist during routine partner, counseling, and referral services for HIV/AIDS. When the STARHS test result is combined with information from the TTH, an overall population-based incidence estimate can be calculated.

Cumulative as of December 31, 2006, 89 specimens were retrieved for STARHS testing. Of these 89 specimens, 34 (38%) were classified as recent infections based on test results. Seventy-four percent of those who tested "recent" according to STARHS were male and 26% were female. Sixty-two percent were white, 32% were black, and 6% were Native American/Pacific Islander. The majority of those who tested recent had a mode of exposure as homosexual/bisexual male (53%); this was followed by risk not specified (21%) and heterosexual contact (18%). The majority (44%) of the cases were between the ages of 20-29 years at the time of HIV diagnosis; 35% were 30-39 years old, and 11% were between the ages of 40-49 years.

Program Activities

Public Health Investigation and Disease Detection of Oklahoma (PHIDDO) Annual Update

Prepared by Anthony Lee, M.P.H.

The Public Health Investigation and Disease Detection of Oklahoma (PHIDDO) System is a secure, real-time, web-based system to electronically submit cases of reportable diseases and conditions. PHIDDO is currently used by hospital infection control practitioners, laboratorians, physicians' offices, and county health department personnel to report cases of the reportable infectious diseases, to conduct disease and contact investigations, and to document control measures made to prevent the spread of disease.

Two hundred and thirty-nine new users were added to PHIDDO in 2006. To educate health care providers about PHIDDO and to enroll additional users, the Acute Disease Service (ADS) of the Oklahoma State Department of Health (OSDH) promoted the PHIDDO system at the annual conferences of the Oklahoma State Medical Association, the Oklahoma Osteopathic Association, the Oklahoma Academy of Physician Assistants, and the Epidemiologists and Professionals in Infection Control. The total number of users as of this printing is shown by category in the table below.

Occupation	**Number of Users**
Public Health Nurses	270
Infection Control Practitioners	197
Laboratorians	259
Physicians/Clinic Users	47
State Health Department Users	37
Total Number of PHIDDO Users	890

Two major clinical laboratories securely transmit files of positive test results related to the reportable infectious diseases electronically through electronic laboratory reporting (ELR) to the OSDH. This eliminates the need for a laboratory technician to report manually by using the PHIDDO secure web site or by completing the Laboratory Reportable Pathogen Card. In 2006, the system received over 12,000 reports from users via the secure web site and almost 31,000 reports from the two laboratories using ELR.

Additions to PHIDDO include a module for HIV Counseling, Testing, and Referral, a module for the Investigation of Contacts to a Case of Tuberculosis, and the incorporation of ODH form 228 "Confidential Morbidity Report of Sexually Transmitted Diseases", CDC form 50.42A "Adult HIV/AIDS Confidential Case Report" and CDC form 50.42B "Pediatric HIV/AIDS Confidential Case Report" into PHIDDO.

PHIDDO users report that the system is easy to use. An e-mailed newsletter, PHIDDO Bytes, has been periodically sent out to provide users with information on new features in PHIDDO and helpful hints about using the system. For additional information or to obtain access to PHIDDO, please contact Anthony Lee AnthonyL@health.ok.gov or Kim Rayno KimR@health.ok.gov at (405) 271-4060.

Oklahoma Health Alert Network (OK-HAN)
Annual Update

Prepared by Kim Mitchell, B.S.

The Oklahoma Health Alert Network (OK-HAN) System is an emergency notification system used to provide emergent public health information to health care providers and public health partners. The OK-HAN secure Web site provides registered users the ability to view and share information in a secure format.

The OK-HAN system originally called The Reportable Health Information and Notification in Oklahoma (RHINO) System began undergoing changes in 2006, including a name change, due to national Public Health Information Network (PHIN) requirements. Other changes include a new Web site with new features and expanded functionality.

A large focus continues to be educating physicians and other health care professionals about the OK-HAN system. This includes providing information at the Physician Assistant, Oklahoma State Medical Association (OSMA), and Oklahoma Osteopathic Association (OOA) annual conferences. The Oklahoma State Board of Medical Licensure and Supervision (OSBMLS) also provided information on the Health Alert Network detailing the joint collaboration between OSDH and OSBMLS for emergency notification in a newsletter to all licensees.

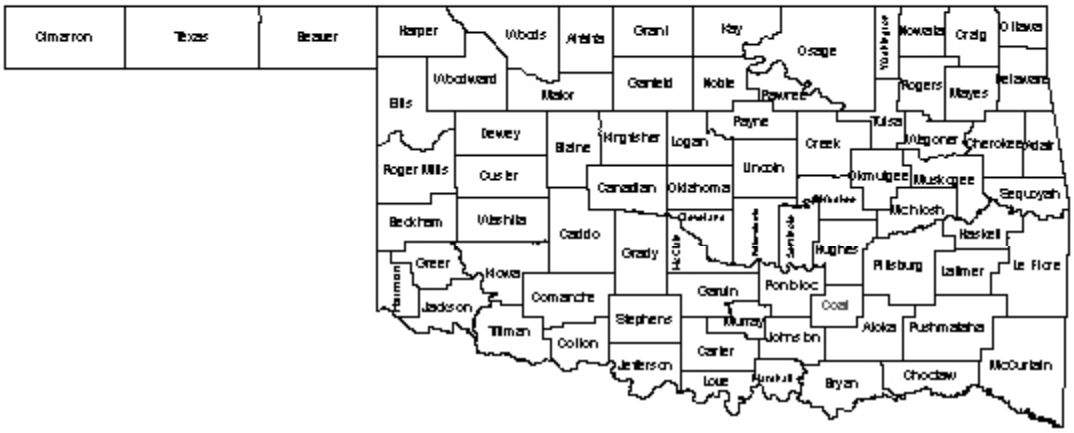
During 2006, approximately 22 notifications were distributed under a classification of alert, advisory, or update. Nineteen were sent statewide and 3 were targeted to a specific county or group of counties. The following table details numbers of OK-HAN notifications targeted to specific groups.

Group	Number of Notifications
Physicians	6
Emergency Rooms	11
Laboratories	6
Long Term Care Facilities	1
Infection Control Practitioners	15

The OK-HAN system was utilized during numerous outbreaks in the 2006 year. Notifications were distributed in response to multi-state outbreaks including E. Coli O157:H7 associated with consumption of pre-packaged spinach, E. Coli O157:H7 associated with Taco Bell restaurants, as well as the multi-state outbreak of Mumps among young adults. In addition, several OK-HAN notifications were distributed regarding state and local health issues. A notification was distributed in August regarding an outbreak of Syphilis in Washington County as well as an update regarding increased number of Syphilis cases in the Tulsa area.

The OK-HAN System was additionally used as part of numerous State and County preparedness exercises. During 2006, 11 counties used the OK-HAN system as part of a MIPS exercise or to evaluate recall responses. Physician testing continued with physicians receiving test faxes twice a year on a rotating monthly schedule by county.

Contact Information for County Health Departments



County Health Department	Address	City	Zip	Phone
ADAIR COUNTY HEALTH DEPARTMENT	600 West Hickory	Stilwell	74960	(918) 696-7292
ALFALFA COUNTY C/O GARFIELD COUNTY	P.O. Box 3266	Enid	73701	
ATOKA COUNTY HEALTH DEPARTMENT	1006 West 13th Street	Atoka	74525	(580) 889-2116
BEAVER COUNTY HEALTH DEPARTMENT	PO Box 520	Beaver	73932	(580) 625-3693
BECKHAM COUNTY HEALTH DEPARTMENT	115 South 4th	Sayre	73662	(580) 928-5551
	400 East Third	Elk City	73644	(580) 225-1173
BLAINE COUNTY HEALTH DEPARTMENT	521 West 4th	Watonga	73772	(580) 623-7977
BRYAN COUNTY HEALTH DEPARTMENT	P.O. Box 598	Durant	74702-0589	(580) 924-4285
CADDO COUNTY HEALTH DEPARTMENT	P.O. Box 236	Anadarko	73005	(405) 247-2507
CANADIAN COUNTY HEALTH DEPARTMENT	100 S. Rock Island	El Reno	73036	(405) 262-0042
	1023 East Vandament	Yukon	73099	(405) 354-4872
CARTER COUNTY HEALTH DEPARTMENT	405 South Washington	Ardmore	73401	(580) 223-9705
	PO Box 298	Healdton	73438	(580) 229-1291
CHEROKEE COUNTY HEALTH DEPARTMENT	912 South College	Tahlequah	74464	(918) 456-8826
CHOCTAW COUNTY HEALTH DEPARTMENT	103 South Fourth Street	Hugo	74743	(580) 326-8821
CIMMARON COUNTY HEALTH DEPARTMENT				Call Texas CHD
CLEVELAND COUNTY HEALTH DEPARTMENT	250 12th Ave. N.E.	Norman	73071	(405) 321-4048
	224 South Chestnut	Moore	73160	(405) 794-1591
COAL COUNTY HEALTH DEPARTMENT	P.O. Box 365	Coalgate	74538-0365	(580) 927-2367
COMANCHE COUNTY HEALTH DEPARTMENT	P.O. Box 87	Lawton	73501	(580) 248-5890
COTTON COUNTY HEALTH DEPARTMENT	1501-A South 7th	Walters	73572	(580) 875-6121
CRAIG COUNTY HEALTH DEPARTMENT	115 East Delaware	Vinita	74301	(918) 256-7531
CREEK COUNTY HEALTH DEPARTMENT	1808 South Hickory	Sapulpa	74066	(918) 224-5531
	P.O. Box 848	Drumright	74030	(918) 352-9581
	408 West 4th	Bristow	74010	(918) 367-3341
CUSTER COUNTY HEALTH DEPARTMENT	P.O. Box 698	Clinton	73601	(580) 323-2100
	220 North Bradley	Weatherford	73096	(580) 772-6417
DELAWARE COUNTY HEALTH DEPARTMENT	P.O. Drawer 370	Jay	74346	(918) 253-4511
DEWEY COUNTY HEALTH DEPARTMENT				Call Blaine CHD
ELLIS COUNTY HEALTH DEPARTMENT				Call Woodward CHD
GARFIELD COUNTY HEALTH DEPARTMENT	P.O. Box 3266	Enid	73701	(580) 233-0650
GARVIN COUNTY HEALTH DEPARTMENT	1809 South Chickasaw	Pauls Valley	73075	(405) 238-7346
	707 West Comanche	Lindsay	73052	(405) 756-2928

County Health Department	Address	City	Zip	Phone
GRADY COUNTY HEALTH DEPARTMENT	2116 Iowa Street	Chickasha	73018	(405) 224-2022
GRANT COUNTY HEALTH DEPARTMENT	115 North Main	Medford	73759	(580) 395-2906
GREER COUNTY HEALTH DEPARTMENT	PO Box 1	Mangum	73554	(580) 782-5531
HARMON COUNTY HEALTH DEPARTMENT	1104 N. 7th	Hollis	73550	(580) 688-3348
HARPER COUNTY HEALTH DEPARTMENT	P.O. Box 290	Laverne	73848	(580) 921-2029
	P.O. Box 290	Laverne	73848	(580) 735-6100
HASKELL COUNTY HEALTH DEPARTMENT	1407 N.E. D St.	Stigler	74462	(918) 967-3304
HUGHES COUNTY HEALTH DEPARTMENT	200 McDougal Drive	Holdenville	74848-2811	(405) 379-3313
JACKSON COUNTY HEALTH DEPARTMENT	401 W. Tamarack Road	Altus	73521-1599	(580) 482-7308
JEFFERSON COUNTY HEALTH DEPARTMENT	107 East Anderson Avenue	Waurika	73573-3029	(580) 228-2313
JOHNSTON COUNTY HEALTH DEPARTMENT	P.O. Box 486	Tishomingo	73460	(580) 371-2470
KAY COUNTY HEALTH DEPARTMENT	433 Fairview	Ponca City	74601	(580) 762-1641
	1706 South Main	Blackwell	74631	(580) 363-5520
KINGFISHER COUNTY HEALTH DEPARTMENT	124 East Sheridan Courthouse Annex Rm.# 101	Kingfisher	73750-3224	(405) 375-3008
KIOWA COUNTY HEALTH DEPARTMENT	431 W. Elm	Hobart	73651	(580) 726-3316
LATIMER COUNTY HEALTH DEPARTMENT	201 West Main	Wilburton	74578	(918) 465-5673
LeFLORE COUNTY HEALTH DEPARTMENT	P.O. Box 37	Poteau	74953	(918) 647-8601
	P.O. Box 964	Talihina	74571	(918) 567-2141
LINCOLN COUNTY HEALTH DEPARTMENT	101 Meadow Lane	Chandler	74834	(405) 258-2640
LOGAN COUNTY HEALTH DEPARTMENT	215 Fairgrounds Road, Suite A	Guthrie	73044	(405) 282-3485
LOVE COUNTY HEALTH DEPARTMENT	200 C.E. Colston Drive	Marietta	73448	(580) 276-2531
McCLAIN COUNTY HEALTH DEPARTMENT	919 North Ninth Street	Purcell	73080	(405) 527-6541
	P.O. Box 130	Blanchard	73010	(405) 485-3319
McCURTAIN COUNTY HEALTH DEPARTMENT	1400 Lynn Lane	Idabel	74745	(580) 286-6620
McINTOSH COUNTY HEALTH DEPARTMENT	P.O. Box 71	Eufaula	74432	(918) 689-7774
	211 W. Gentry	Checotah	74426	(918) 473-5416
MAJOR COUNTY HEALTH DEPARTMENT	501 East Broadway	Fairview	73737	(580) 227-3362
MARSHALL COUNTY HEALTH DEPARTMENT	P.O. Box 476	Madill	73446	(580) 795-3705
MAYES COUNTY HEALTH DEPARTMENT	111 Northeast First	Pryor	74361	(918) 825-4224
MURRAY COUNTY HEALTH DEPARTMENT	730 Cambridge Drive	Sulphur	73086	(580) 622-3716
MUSKOGEE COUNTY HEALTH DEPARTMENT	530 South 34th Street	Muskogee	74401	(918) 683-0321
NOBLE COUNTY HEALTH DEPARTMENT	300 East Fir Street	Perry	73077-4902	(580) 336-2257

County Health Department	Address	City	Zip	Phone
NOWATA COUNTY HEALTH DEPARTMENT				Call Rogers CHD
OKFUSKEE COUNTY HEALTH DEPARTMENT	125 North Second	Okemah	74859	(918) 623-1800
CITY-CO HEALTH DEPT OF OKLAHOMA CO	921 Northeast 23rd Street	Oklahoma City	73105	(405) 427-8651
OKMULGEE COUNTY HEALTH DEPARTMENT	1304 R.D. Miller Drive	Okmulgee	74447	(918) 756-1883
	404 East Broadway	Henryetta	74437-0078	(918) 652-8250
	P.O. Box 989	Beggs	74421	(918) 267-3606
OSAGE COUNTY HEALTH DEPARTMENT	535 Leahy, Suite 103	Pawhuska	74056	(918) 287-3740
OTTAWA COUNTY HEALTH DEPARTMENT	1930 North Elm	Miami	74354	(918) 540-2481
PAWNEE COUNTY HEALTH DEPARTMENT	639 Seventh Street	Pawnee	74058	(918) 762-3643
	1390 West Cherokee	Cleveland	74020	(918) 358-2546
PAYNE COUNTY HEALTH DEPARTMENT	1321 West 7th Avenue	Stillwater	74074	(405) 372-8200
	P.O. Box 168	Cushing	74023	(918) 225-3377
PITTSBURG COUNTY HEALTH DEPARTMENT	620 South Third	McAlester	74501	(918) 423-1267
PONTOTOC COUNTY HEALTH DEPARTMENT	1630 East Beverly - Suite 101	Ada	74820	(580) 332-2011
POTTAWATOMIE COUNTY HEALTH DEPARTMENT	1904 Gordon Cooper Drive	Shawnee	74801-8698	(405) 273-2157
PUSHMATAHA COUNTY HEALTH DEPARTMENT	318 West Main	Antlers	74523	(580) 298-6624
	P.O. Box 118	Clayton	74536	(918) 569-7973
ROGER MILLS COUNTY HEALTH DEPARTMENT				Call Beckham CHD
ROGERS COUNTY HEALTH DEPARTMENT	2664 N. Highway 88, Unit A	Claremore	74017	(918) 341-3166
SEMINOLE COUNTY HEALTH DEPARTMENT	200 South Brown	Wewoka	74884	(405) 257-5401
	1900 Boren Blvd.	Seminole	74868	(405) 382-4369
SEQUOYAH COUNTY HEALTH DEPARTMENT	612 North Oak Street	Sallisaw	74955	(918) 775-6201
STEPHENS COUNTY HEALTH DEPARTMENT	1401 Bois D'Arc	Duncan	73533	(580) 252-0270
TEXAS COUNTY HEALTH DEPARTMENT	1410 North East Street	Guymon	73942	(580) 338-8544
TILLMAN COUNTY HEALTH DEPARTMENT	1500 N. Main Street	Frederick	73542	(580) 335-2163
TULSA CITY-COUNTY HEALTH DEPARTMENT	5051 S. 129th East Avenue	Tulsa	74134	(918) 582-9355
WAGONER COUNTY HEALTH DEPARTMENT	212 North Pierce	Wagoner	74467	(918) 485-3022
	P.O. Box 962	Coweta	74429	(918) 486-2845
WASHINGTON COUNTY HEALTH DEPARTMENT	3838 State Street	Bartlesville	74006	(918) 335-3005
WASHITA COUNTY HEALTH DEPARTMENT				Call Beckham CHD
WOODS COUNTY HEALTH DEPARTMENT	901 - 14th Street	Alva	73717	(580) 327-3192
WOODWARD COUNTY HEALTH DEPARTMENT	1631 Texas Avenue	Woodward	73801	(580) 256-6416