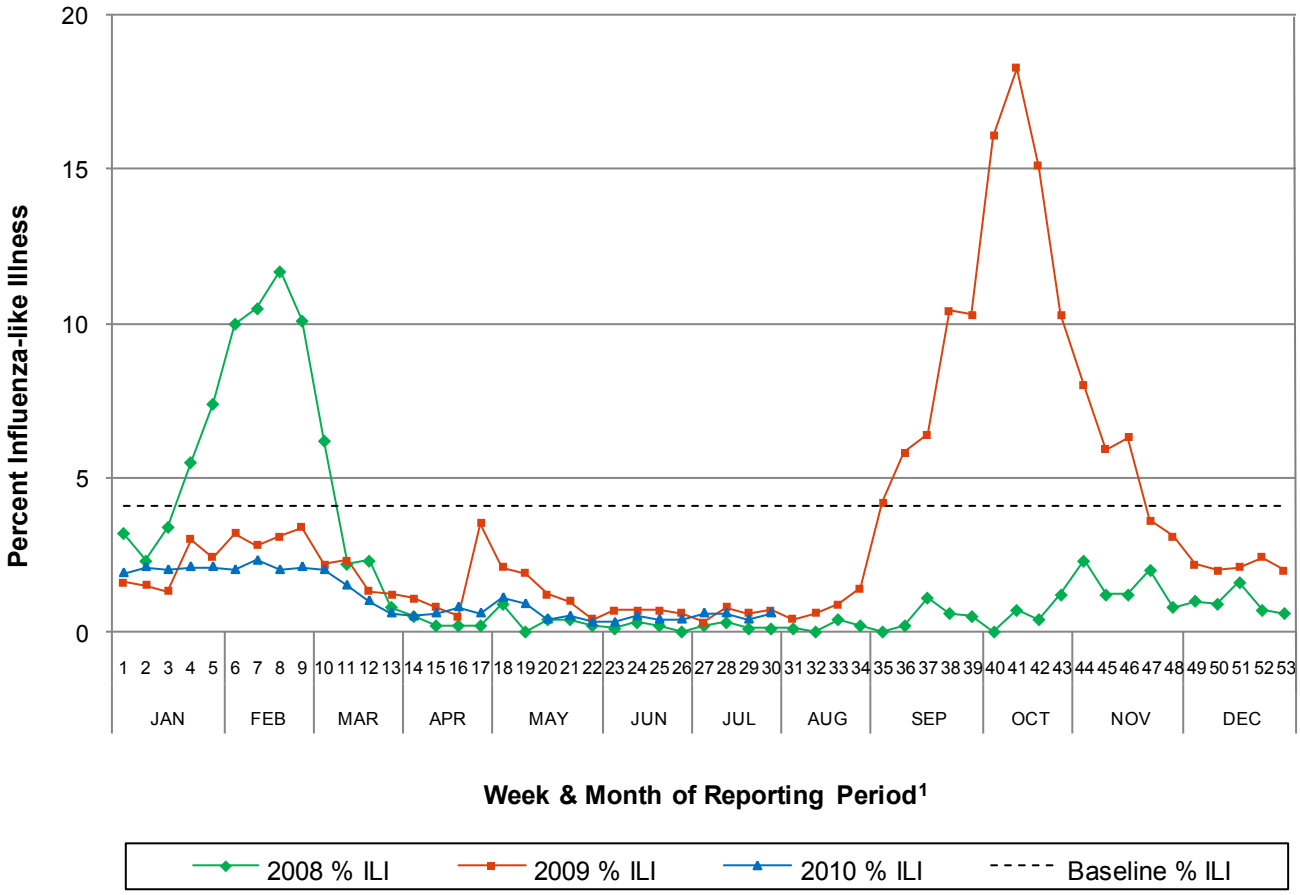
2009 Annual Summary of Infectious Diseases

Weekly Percent of Influenza-like Illness (ILI) Based on Total Patient Visits to Sentinel Physicians, Oklahoma Viral Respiratory Illness Sentinel Surveillance System, 2008-2010

Week ending July 31, 2010 (Week 30)



[1]These units correspond to the number of weeks in a year and allow for a comparison between multiple seasons.

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 Terry Cline, Ph.D., Commissioner of Health, Oklahoma State Department of Health. Docutech printed 2,500 copies in August 2010 at a cost of $5,950.00.

Executive Summary
2009 Annual Summary of Infectious Diseases

The Oklahoma State Department of Health (OSDH) is pleased to send you a copy of the 2009 Annual Summary of Infectious Diseases. The information contained in this report consolidates summaries of communicable disease surveillance and investigations conducted by the OSDH during 2009. Communicable disease summaries were written by personnel in the OSDH Acute Disease Service and HIV/STD Service. Specifically, the annual summary contains information on the number and incidence rate of infectious disease reports at the state and county level, and disease specific data collected during public health investigations.

Title 63 OS §1-503 as well as Title 310 OAC Chapter 515 require that healthcare providers and laboratories report cases of certain communicable diseases to the OSDH. This allows the surveillance, investigation, and control of the spread of disease in the population by public health personnel. Please note changes have been made to the Communicable Disease and Injury Reporting rules, which went into effect on July 25, 2010. A summary of changes to OAC 310:515 and the updated list of notifiable disease rules are included in this annual summary.

Several service areas of the OSDH as well as the county health departments are charged with surveillance, investigation, and control of spread of communicable diseases. Summarized below are a few notable observations regarding the epidemiology of communicable diseases reported and investigated by OSDH.

In 2009, 117 cases of *Bordetella pertussis,* or "whooping cough," were reported in Oklahoma, a 17% increase from 2008. Pertussis occurs in persons of all ages, but disproportionately affects children less than one year. In 2009, children less than one year of age accounted for 38% of cases resulting in an age-specific incidence rate of 79.2 per 100,000 infants; the incidence rate among infants was 16.5 to 132 times higher than all other age groups. County health department public health personnel continued to conduct investigations to identify close contacts that are recommended to receive post-exposure prophylaxis to prevent development of illness and continued transmission. In 2009, a total of 331 exposed contacts to a case of pertussis (median=2, range 0-22 contacts per case) were recommended to receive PEP.

Public health efforts of timely case diagnosis, contact investigation, administration of therapy, prevention, and education, have resulted in a steady decline of tuberculosis (TB) in Oklahoma. The incidence rate of TB has declined 42% from 178 (5.2 per 100,000) cases in 2004 to 102 (2.8 per 100,000) cases in 2009. Despite this public health achievement in reducing the burden of tuberculosis in Oklahoma, TB continues to require significant public health resources in diagnosis, treatment, and management of contacts.

Significant racial and age disparities continue among reported sexually transmitted diseases. In particular, the highest rates of reported syphilis, HIV/AIDS, *Chlamydia* and *Gonorrhea* cases occurred among African Americans. The highest age-specific incidence rates of syphilis and HIV/AIDS cases occurred among young adults 20 to 29 years of age. A similar age trend was observed among the incidence of reported *Chlamydia* and *Gonorrhea* cases; the highest rates occurred among young adults 15 to 19 years of age followed by adults 20 to 24 years of age.

The incidence rate of reported salmonellosis cases during 2009 decreased 27% compared to 2008, marking the first decrease in the incidence of reported *Salmonella* cases since 2004. However, multistate outbreaks due to widely distributed food products continue to occur. The OSDH Public Health Laboratory continues to perform serogroup identification and pulsed field gel electrophoresis (PFGE), a molecular method of DNA fingerprinting, on all submitted *Salmonella* isolates. PFGE subtyping complements disease surveillance by detecting clusters of indistinguishable PFGE patterns among isolates of Oklahoma cases as well as patterns identified by other state public health laboratories. Once clusters are detected, public health officials rapidly investigate to identify a common source and coordinate with food regulatory agencies to initiate product recalls, which prevents the continued occurrence of illness among persons who may consume the implicated products.

During 2009, a multistate outbreak of *S*. Typhimurium was detected by PFGE typing; 714 cases from 46 states were associated with this outbreak including four Oklahoma cases. An epidemiologic investigation implicated consumption of a wide variety of peanut butter-containing products. Public health investigation resulted in the recall of more than 2,800 peanut-containing products produced by a wide variety of companies.

Another multistate outbreak involving an Oklahoma resident was due to *S*. Montevideo; 272 cases from 42 states were linked to this outbreak including one Oklahoma resident. An epidemiologic investigation conducted by state public health officials determined consumption of black and red pepper used on Italian style meats was associated with development of illness; investigation resulted in a recall of several Italian style meat products coated with red and black pepper.

Oklahoma's incidence of vectorborne diseases such as Rocky Mountain spotted fever and ehrlichiosis continue to occur at rates higher than national levels. In 2009, Oklahoma experienced the highest incidence of Rocky Mountain spotted fever (RMSF) during the past 15 years and the highest incidence of ehrlichiosis since becoming a reportable disease during 2000. A total of 488 cases of RMSF (342 cases) and ehrlichiosis (146 cases) were reported. Among RMSF cases, the incidence rate among persons who reported their race as Native American/Alaska Native was 3.5 times higher than the overall rate. Similarly, the incidence rate of ehrlichiosis among Native Americans/Alaska Natives was 3 times higher than other racial background reported by cases.

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 and epidemiologic trends of infectious diseases in the state of Oklahoma. Additional summaries of reportable diseases in Oklahoma and resources on disease reporting are available on the OSDH website at http://www.ok.gov/health.

2009 Annual Summary
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For instructions on sending isolates or clinical specimens to the Public Health Laboratory (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.

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Changes to the Communicable Disease and Injury Reporting Rules

The new Communicable Disease and Injury Reporting rules will go into effect on July 25, 2010 (http://www.ok.gov/health/documents/Ch515.pdf). The significant changes to the rules are listed below.

Definitions

The updated definitions are:

- "Outbreak of disease" means two or more cases residing in different households that have a similar clinical syndrome of a potentially infectious disease, toxin, or agent of known or unknown etiology.
- "Unusual disease or syndrome" means a case of an uncommon, possibly infectious disease of known or unknown etiology, even if laboratory testing may be pending or inconclusive, or if testing for common etiologies is negative. Such cases of disease may not normally be endemic to Oklahoma, may be an emerging or re-emerging disease, and/or represent diseases for which a public health intervention may be needed. Examples of such unusual diseases or syndromes include but are not limited to, unexplained adult respiratory distress syndrome, rash illness with atypical presentation, or an illness occurring along with an unusual pattern of illness or death among animals.

Diseases and Conditions to be Reported within One Business Day

Diseases/conditions that are no longer reportable

- Cyclosporiasis (*Cyclospora cayetanensis*)
- Giardiasis (*Giardia lamblia*)
- *Streptococcus*, group A invasive disease

Disease/condition that has been modified

- Hepatitis C – limited reporting to persons < or = 40 years or in persons having jaundice or ALT > or = 400 regardless of age with laboratory confirmation

For more information or to access the Public Health Investigation and Disease Detection of Oklahoma (PHIDDO) system, please contact Jeannie Williams (JeanT@health.ok.gov), Tony McCord (TonyWM@health.ok.gov), or Anthony Lee (AnthonyL@health.ok.gov) at (405) 271-4060.

TITLE 310. OKLAHOMA STATE DEPARTMENT OF HEALTH
CHAPTER 515. COMMUNICABLE DISEASE AND INJURY REPORTING
EFFECTIVE 7/25/2010

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

When used in this Chapter, the following words or terms shall have the following meaning unless the context of the sentence requires another meaning**:**

"**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*.

"**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 disease**" means two or more cases residing in different households that have a similar clinical syndrome of a potentially infectious disease, toxin, or agent of known or 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 an uncommon, possibly infectious disease of known or unknown etiology, even if laboratory testing may be pending or inconclusive, or if testing for common etiologies is negative. Such cases of disease may not normally be endemic to Oklahoma, may be an emerging or re-emerging disease, and/or represent diseases for which a public health intervention may be needed. Examples of such unusual diseases or syndromes include but are not limited to, unexplained adult respiratory distress syndrome, rash illness with atypical presentation, or an illness occurring along 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 “Oklahoma Disease Reporting Manual” shall serve as the standard for disease-specific diagnostic test results to be reported. Ancillary laboratory test results, signs, and symptoms must be reported upon request. The current edition of the "Oklahoma Disease Reporting Manual" may be accessed from the Acute Disease Service disease reporting and alerts web page of the OSDH web site at http://IDReportingAndAlerts.health.ok.gov. 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 electronically via the secure web-based Public Health Investigation and Disease Detection of Oklahoma system or by telephone (405-271-4060 or 800-234-5963) immediately upon suspicion, diagnosis, or testing as specified in the "Oklahoma 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 submitted electronically via the PHIDDO system, telephoned, faxed, or submitted via secure electronic data transmission to the OSDH within one (1) business day of diagnosis or positive test as specified in the "Oklahoma 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* spp.).
(H) Dengue Fever.
(I) *E. coli O157, O157:H7,* or a Shiga toxin producing *E. coli* (STEC infections).
(J) Ehrlichiosis (*Ehrlichia* or *Anaplasma* spp.).
(K) Hantavirus pulmonary syndrome.
(L) Hemolytic uremic syndrome, postdiarrheal.
(M) Hepatitis B. If HBsAg+, anti-HBc-IgM+, HBeAg+, or HBV DNA+ then report results of the entire hepatitis panel.
(N) Hepatitis C in persons < or = 40 years or in persons having jaundice or ALT > or = 400 regardless of age with laboratory confirmation. If hepatitis C EIA is confirmed by RIBA or NAT for HCV RNA, or signal-to-cut-off (s/co) ratio or index is predictive of a true positive then report results of the entire hepatitis panel.
(O) Human Immunodeficiency Virus (HIV) infection.
(P) Influenza associated pediatric mortality

(Q) Legionellosis (*Legionella* spp.).
(R) Leptospirosis (*Leptospira interrogans)*.
(S) Listeriosis (*Listeria monocytogenes*).
(T) Lyme disease (*Borrelia burgdorferi*).
(U) Malaria (*Plasmodium* spp.).
(V) Mumps.
(W) Pertussis (*Bordetella pertussis*).
(X) Psittacosis (*Chlamydophia psittaci*).
(Y) Q Fever (*Coxiella burnetti*).
(Z) Rocky Mountain Spotted Fever (*Rickettsia rickettsii*).
(AA) Rubella.
(BB) Salmonellosis (*Salmonella* spp.).
(CC) Shigellosis (*Shigella* spp.).
(DD) *Staphylococcus aureus* with reduced susceptibility to vancomycin (VISA or VRSA).
(EE) *Streptococcus pneumoniae* invasive disease, in persons less than 5 years of age.
(FF) Syphilis (*Treponema pallidum*).
(GG) Tetanus (*Clostridium tetani*).
(HH) Trichinellosis (*Trichinella spiralis*).
(II) Tuberculosis (*Mycobacterium tuberculosis*).
(JJ) Unusual disease or syndrome.
(KK) *Vibrio* spp. infections including cholera.
(LL) 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.

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) *E. coli O157, O157:H7*, or a Shiga toxin producing *E. coli* (STEC).
(4) *Francisella tularensis.*
(5) *Haemophilus influenzae* (sterile site).
(6) *Listeria monocytogenes* (sterile site).
(7) *Mycobacterium tuberculosis*.
(8) *Neisseria meningitidis* (sterile site).
(9) *Plasmodium* spp.
(10) *Salmonella* spp.
(11) *Staphylococcus aureus* that are VISA or VRSA
(12) *Vibrio* spp.
(13) *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.

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1980 - 2009

Disease	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Botulism (Foodborne)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0
Botulism (Infant)	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0
Brucellosis	10	8	8	6	7	5	0	5	3	4	1	2	1	0	0	1
Campylobacteriosis	15	56	116	*212	216	305	288	252	212	223	247	205	267	199	187	289
Chlamydia	0	0	0	0	0	0	0	0	0	0	0	*5714	5220	4886	3784	5050
Cholera	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Congential 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	0	0	0	0
Cryptosporidiosis	0	0	0	0	81	27	11	14	11	12	6	8	0	1	1	12
Cyclosporiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dengue Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diphtheria	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Escherichia coli O157:H7 and other Shiga toxin producing *E. coli*	0	0	0	0	0	0	0	0	0	6	4	0	5	8	*13	16
Ehrlichiosis	0	0	0	0	0	0	0	23	14	1	1	3	8	0	0	0
Giardiasis	6	171	249	*269	372	340	265	207	264	229	214	211	188	262	252	206
Gonorrhea	13844	15909	16021	15230	13088	13005	12572	9657	7411	6846	6464	6546	6432	4855	4935	5652
Haemophilus influenzae , Invasive Disease (Total)	101	97	120	*179	240	303	290	244	236	154	134	76	33	45	44	33
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	0	0	2	*13	39	6	3	0	0	0	78	33	3	1	4	3
Hantavirus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemolytic Uremic Syndrome, post diarrheal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hepatitis A	403	344	821	833	548	491	390	338	580	501	588	273	217	206	395	1497
Hepatitis B	226	256	358	354	208	256	240	250	209	221	183	198	174	193	129	176
Hepatitis C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Influenza Associated Pediatric Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Legionellosis	0	7	13	*12	19	24	24	32	20	26	15	24	12	14	7	8
Leprosy	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Leptospirosis	2	0	0	4	0	1	0	0	0	0	1	0	0	0	0	0
Listeriosis	0	1	3	0	1	10	20	17	14	17	16	6	8	12	11	11
Lyme Disease	0	0	0	0	0	0	0	3	9	16	20	23	25	20	111	57
Malaria	15	8	8	9	14	8	12	5	11	8	10	9	5	5	9	1
Measles	776	6	30	1	9	1	41	4	8	73	88	0	12	0	0	0

*First year disease was reportable by law

^*H. influenzae* isolates required to be sent to OSDH PHL for serotyping.

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1980 - 2009

Disease	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Meningococcal Invasive Disease	33	47	33	39	30	41	38	40	27	29	21	16	18	36	52	49
Mumps	0	0	0	0	0	0	0	102	295	184	74	15	20	11	*13	1
Pertussis	30	3	10	348	248	209	149	173	72	54	48	48	53	60	19	47
Plague	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Poliomyelitis	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Psittacosis	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
Q Fever	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Rabies (Animal)	246	219	191	108	104	111	62	35	38	102	132	173	219	65	40	32
Rabies (Human)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rocky Mountain spotted fever	77	101	89	221	137	103	110	86	103	60	68	95	111	46	36	48
Rubella	8	4	3	1	0	2	0	6	1	1	1	2	0	1	4	0
Staphylococcus aureus , Vancomycin intermediate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staphylococcus aureus , Vancomycin resistant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Streptococcus pneumoniae , Invasive disease, <5 years	19	22	38	20	18	29	199	16	11	20	37	28	13	87	73	48
Streptococcus pyogenes (Group A), Invasive disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	404	424	516	613	445	474	512	474	500	446	441	481	368	320	444	471
Shigellosis	267	470	440	241	220	301	256	166	233	236	510	192	252	472	200	266
St. Louis Encephalitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syphilis	427	479	593	571	532	538	489	552	479	375	589	596	709	636	399	489
Tetanus	1	2	1	0	2	1	1	1	1	2	0	0	1	1	1	0
Trichinellosis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tuberculosis	333	381	335	331	262	264	267	250	277	218	243	206	216	209	261	237
Tularemia	24	44	36	35	24	22	19	27	17	8	10	12	10	16	4	7
Typhoid Fever	9	5	4	3	5	2	3	6	0	1	3	3	0	1	3	1
Vibrio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Vibrio parahaemolyticus	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Vibrio vulnificus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Nile Virus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*First year disease was reportable by law

^*H. influenzae* isolates required to be sent to OSDH PHL for serotyping.

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1980 - 2009

Disease	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Botulism (Foodborne)	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Botulism (Infant)	0	0	0	1	0	1	0	0	0	1	0	0	0	0
Brucellosis	1	0	0	0	1	0	1	0	0	1	2	1	0	2
Campylobacteriosis	281	247	241	320	361	308	362	417	591	544	405	530	486	384
Chlamydia	7371	7566	9378	8737	9346	10622	10732	10983	10371	12957	13206	12529	14173	14991
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Congential Rubella Syndrome	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	1	1	1	1
Cryptosporidiosis	10	12	7	14	*30	16	16	24	22	46	56	216	238	141
Cyclosporiasis	0	0	0	0	0	0	*0	0	0	0	2	0	0	0
Dengue Fever	0	0	1	0	0	0	*0	1	0	2	0	3	2	0
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escherichia coli O157:H7 and other Shiga toxin producing *E. coli*	14	13	26	41	19	36	25	30	29	38	43	33	135	64
Ehrlichiosis	0	0	2	12	*12	24	13	36	49	96	47	106	121	147
Giardiasis	159	152	148	152	96	0	85	145	166	200	167	172	172	175
Gonorrhea	4897	4840	4225	4291	5236	4818	4624	4543	4543	5031	5170	4827	4945	4661
Haemophilus influenzae , Invasive Disease (Total)	31	33	35	47	^46	48	53	52	67	74	78	93	90	92
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	0	1	1	0	^0	0	0	0	0	0	0	0	0	2
Hantavirus	1	0	0	0	*0	1	0	0	0	0	0	0	0	0
Hemolytic Uremic Syndrome, post diarrheal	0	0	0	1	*2	4	3	4	2	5	3	8	51	17
Hepatitis A	2516	1441	667	534	271	116	52	29	19	6	11	13	13	6
Hepatitis B	60	63	169	185	179	115	111	73	80	59	96	152	129	122
Hepatitis C	8	10	23	13	*13	6	21	6	7	14	19	49	21	27
Influenza Associated Pediatric Mortality	0	0	0	0	0	0	0	0	0	0	0	0	2	*9
Legionellosis	16	4	18	6	5	7	5	10	24	10	10	9	11	10
Leprosy	0	0	0	1	*0	1	0	0	0	0	1	0	0	0
Leptospirosis	0	0	0	1	0	0	1	0	0	0	0	1	0	0
Listeriosis	5	9	19	12	*8	2	9	3	4	4	5	2	7	8
Lyme Disease	34	45	12	8	1	0	0	0	3	0	0	1	2	2
Malaria	3	9	4	2	10	5	12	4	10	12	11	10	5	2
Measles	0	1	0	0	0	0	0	0	0	0	0	0	0	0

*First year disease was reportable by law

^*H. influenzae* isolates required to be sent to OSDH PHL for serotyping.

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1980 - 2009

Disease	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Meningococcal Invasive Disease	46	45	44	40	34	32	25	24	10	18	15	23	17	17
Mumps	4	3	4	5	3	0	3	2	1	2	11	7	1	3
Pertussis	21	60	36	40	60	43	135	106	122	125	64	58	100	117
Plague	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psittacosis	0	0	4	0	*0	0	0	0	0	0	0	0	0	0
Q Fever	0	0	0	0	0	0	0	0	1	3	0	2	3	*2
Rabies (Animal)	38	113	107	94	58	60	126	204	113	79	69	78	42	49
Rabies (Human)	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Rocky Mountain spotted fever	45	30	39	29	37	69	99	138	190	206	135	187	267	342
Rubella	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Staphylococcus aureus , Vancomycin intermediate	0	0	0	0	0	0	0	0	0	0	0	*1	0	0
Staphylococcus aureus , Vancomycin resistant	0	0	0	0	0	0	0	0	0	0	0	*0	0	0
Streptococcus pneumoniae , Invasive disease, <5 years	19	22	26	45	38	58	67	81	52	48	73	77	76	63
Streptococcus pyogenes (Group A), Invasive disease	8	3	1	12	*28	49	56	99	73	132	125	87	138	158
Salmonellosis	520	392	501	468	404	503	524	494	425	448	604	709	901	657
Shigellosis	305	293	712	560	131	148	717	1078	724	936	196	162	234	399
St. Louis Encephalitis	0	0	0	0	0	1	*0	0	0	0	0	0	0	0
Syphilis	398	275	264	347	245	185	183	141	88	73	193	150	212	256
Tetanus	1	2	0	0	0	1	0	0	0	0	1	0	0	0
Trichinellosis	1	0	0	0	*0	0	0	0	0	0	0	0	0	0
Tuberculosis	201	211	198	208	154	194	190	163	178	144	144	149	100	102
Tularemia	4	5	5	7	11	7	10	9	19	20	3	18	7	7
Typhoid Fever	0	3	1	0	1	1	2	1	1	1	0	3	3	2
Vibrio spp.	1	0	9	1	0	0	1	*1	0	3	1	2	5	2
Vibrio parahaemolyticus	0	0	0	0	0	0	0	*0	0	1	0	0	1	0
Vibrio vulnificus	0	0	0	0	1	0	1	*0	1	1	0	0	0	0
West Nile Virus	0	0	0	0	0	0	*17	79	22	33	48	107	9	10

*First year disease was reportable by law

^*H. influenzae* isolates required to be sent to OSDH PHL for serotyping.

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1980 - 2009*

Disease	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
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
Botulism (Foodborne)	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Botulism (Infant)	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00
Brucellosis	0.33	0.26	0.26	0.20	0.23	0.17	0.00	0.17	0.10	0.13	0.03	0.06	0.03	0.00	0.00
Campylobacteriosis	0.50	1.85	3.83	7.01	7.14	10.08	9.52	8.33	7.01	7.37	7.85	6.52	8.49	6.33	5.94
Chlamydia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	181.7	165.9	155.3	120.3
Cholera	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Congential 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
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	0.00	0.00	0.00
Cryptosporidiosis	0.00	0.00	0.00	0.00	2.68	0.89	0.36	0.46	0.36	0.40	0.19	0.25	0.00	0.03	0.03
Cyclosporiasis	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
Dengue 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
Diphtheria	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	0.00
Escherichia coli O157:H7 and other Shiga toxin producing *E. coli*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.13	0.00	0.16	0.25	0.41
Ehrlichiosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.46	0.03	0.03	0.10	0.25	0.00	0.00
Giardiasis	0.20	5.65	8.23	8.89	12.30	11.24	8.76	6.84	8.73	7.57	6.80	6.71	5.98	8.33	8.01
Gonorrhea	457.6	525.9	529.6	503.4	432.6	429.9	415.6	319.2	245.0	226.3	205.5	208.1	204.5	154.3	156.9
Haemophilus influenzae , Invasive Disease (Total)	3.34	3.21	3.97	5.92	7.93	10.02	9.59	8.07	7.80	5.09	4.26	2.42	1.05	1.43	1.40
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	0.00	0.00	0.86	5.60	16.79	2.58	1.29	0.00	0.00	0.00	34.43	14.57	1.32	0.44	1.77
Hantavirus	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
Hemolytic Uremic Syndrome, post diarrheal	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
Hepatitis A	13.32	11.37	27.14	27.53	18.11	16.23	12.89	11.17	19.17	16.56	18.69	8.68	6.90	6.55	12.56
Hepatitis B	7.47	8.46	11.83	11.70	6.88	8.46	7.93	8.26	6.91	7.31	5.82	6.29	5.53	6.14	4.10
Hepatitis C	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
Influenza Associated Pediatric Mortality	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
Legionellosis	0.00	0.23	0.43	0.40	0.63	0.79	0.79	1.06	0.66	0.86	0.48	0.76	0.38	0.45	0.22
Leprosy	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	0.06	0.00
Leptospirosis	0.07	0.00	0.00	0.13	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Listeriosis	0.00	0.03	0.10	0.00	0.03	0.33	0.66	0.56	0.46	0.56	0.51	0.19	0.25	0.38	0.35
Lyme Disease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.30	0.53	0.64	0.73	0.79	0.64	3.53
Malaria	0.50	0.26	0.26	0.30	0.46	0.26	0.40	0.17	0.36	0.26	0.32	0.29	0.16	0.16	0.29
Measles	25.65	0.20	0.99	0.03	0.30	0.03	1.36	0.13	0.26	2.41	2.80	0.00	0.38	0.00	0.00

*Oklahoma population numbers are obtained from the U.S. Census Bureau Decennial Census numbers. 2009 population numbers are obtained from the 2008 U.S. Census Bureau Population Estimates.

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1980 - 2009*

Disease	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Meningococcal Invasive Disease	1.09	1.55	1.09	1.29	0.99	1.36	1.26	1.32	0.89	0.96	0.67	0.51	0.57	1.14	1.65
Mumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.37	9.75	6.08	2.35	0.48	0.64	0.35	0.41
Pertussis	0.99	0.10	0.33	11.50	8.20	6.91	4.93	5.72	2.38	1.78	1.53	1.53	1.68	1.91	0.60
Plague	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	0.00	0.00
Poliomyelitis	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	0.00	0.00
Psittacosis	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Q Fever	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rabies (Human)	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rocky Mountain spotted fever	2.55	3.34	2.94	7.31	4.53	3.40	3.64	2.84	3.40	1.98	2.16	3.02	3.53	1.46	1.14
Rubella	0.26	0.13	0.10	0.03	0.00	0.07	0.00	0.20	0.03	0.03	0.03	0.06	0.00	0.03	0.13
Staphylococcus aureus , Vancomycin intermediate	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
Staphylococcus aureus , Vancomycin resistant	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
Streptococcus pneumoniae , Invasive disease, <5 years	8.18	9.47	16.36	8.61	7.75	12.48	85.66	6.89	4.74	8.61	16.33	12.36	5.74	38.41	32.23
Streptococcus pyogenes (Group A), Invasive 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	0.00	0.00	0.00
Salmonellosis	13.35	14.02	17.06	20.26	14.71	15.67	16.92	15.67	16.53	14.74	14.02	15.29	11.70	10.17	14.12
Shigellosis	8.83	15.54	14.54	7.97	7.27	9.95	8.46	5.49	7.70	7.80	16.21	6.10	8.01	15.01	6.36
St. Louis Encephalitis	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
Syphilis	14.11	15.83	19.60	18.87	17.59	17.78	16.16	18.25	15.83	12.40	18.72	18.95	22.54	20.22	12.68
Tetanus	0.03	0.07	0.03	0.00	0.07	0.03	0.03	0.03	0.03	0.07	0.00	0.00	0.03	0.03	0.03
Trichinellosis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Tuberculosis	11.01	12.59	11.07	10.94	8.66	8.73	8.83	8.26	9.16	7.21	7.73	6.55	6.87	6.64	8.30
Tularemia	0.79	1.45	1.19	1.16	0.79	0.73	0.63	0.89	0.56	0.26	0.32	0.38	0.32	0.51	0.13
Typhoid Fever	0.30	0.17	0.13	0.10	0.17	0.07	0.10	0.20	0.00	0.03	0.10	0.10	0.00	0.03	0.10
Vibrio spp.	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
Vibrio parahaemolyticus	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	0.00
Vibrio vulnificus	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
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	0.00	0.00	0.00	0.00

*Oklahoma population numbers are obtained from the U.S. Census Bureau Decennial Census numbers. 2009 population numbers are obtained from the 2008 U.S. Census Bureau Population Estimates.

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1980 - 2009*

Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
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
Botulism (Foodborne)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Botulism (Infant)	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Brucellosis	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.03	0.06	0.03	0.00	0.05
Campylobacteriosis	9.19	8.93	7.85	7.66	10.17	10.46	8.93	10.49	12.08	17.13	15.77	11.74	15.36	13.34	10.54
Chlamydia	160.5	234.3	240.5	298.1	277.8	270.8	307.8	311.0	318.3	300.6	375.5	382.7	363.1	389.1	411.6
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
Congential 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
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	0.03	0.03	0.03	0.03
Cryptosporidiosis	0.38	0.32	0.38	0.22	0.45	0.87	0.46	0.46	0.70	0.64	1.33	1.62	6.26	6.53	3.87
Cyclosporiasis	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Dengue Fever	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.09	0.05	0.00
Diphtheria	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
Escherichia coli O157:H7 and other Shiga toxin producing *E. coli*	0.51	0.45	0.41	0.83	1.30	0.55	1.04	0.72	0.87	0.84	1.10	1.25	0.96	3.71	1.76
Ehrlichiosis	0.00	0.00	0.00	0.06	0.38	0.35	0.70	0.38	1.04	1.42	2.78	1.36	3.07	3.32	4.04
Giardiasis	6.55	5.05	4.83	4.71	4.83	2.78	0.00	2.46	4.20	4.81	5.80	4.84	4.98	4.72	4.80
Gonorrhea	179.7	155.7	153.9	134.3	136.4	151.7	139.6	134.0	131.7	131.7	145.8	149.8	139.9	135.8	128.0
Haemophilus influenzae , Invasive Disease (Total)	1.05	0.99	1.05	1.11	1.49	1.33	1.39	1.54	1.51	1.94	2.14	2.26	2.70	2.47	2.53
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	1.32	0.00	0.44	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Hantavirus	0.00	0.03	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
Hemolytic Uremic Syndrome, post diarrheal	0.00	0.00	0.00	0.00	0.03	0.06	0.12	0.09	0.12	0.06	0.14	0.09	0.23	1.40	0.47
Hepatitis A	47.59	79.99	45.81	21.20	16.98	7.85	3.36	1.51	0.84	0.55	0.17	0.32	0.38	0.36	0.16
Hepatitis B	5.60	1.91	2.00	5.37	5.88	5.19	3.33	3.22	2.12	2.32	1.71	2.78	4.40	3.54	3.35
Hepatitis C	0.03	0.25	0.32	0.73	0.41	0.38	0.17	0.61	0.17	0.20	0.41	0.55	1.42	0.58	0.74
Influenza Associated Pediatric Mortality	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	0.05	0.25
Legionellosis	0.25	0.51	0.13	0.57	0.19	0.14	0.20	0.14	0.29	0.70	0.29	0.29	0.26	0.30	0.27
Leprosy	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Leptospirosis	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Listeriosis	0.35	0.16	0.29	0.60	0.38	0.23	0.06	0.26	0.09	0.12	0.12	0.14	0.06	0.19	0.22
Lyme Disease	1.81	1.08	1.43	0.38	0.25	0.03	0.00	0.00	0.00	0.09	0.00	0.00	0.03	0.05	0.05
Malaria	0.03	0.10	0.29	0.13	0.06	0.29	0.14	0.35	0.12	0.29	0.35	0.32	0.29	0.14	0.05
Measles	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	0.00	0.00

*Oklahoma population numbers are obtained from the U.S. Census Bureau Decennial Census numbers. 2009 population numbers are obtained from the 2008 U.S. Census Bureau Population Estimates.

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1980 - 2009*

Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Meningococcal Invasive Disease	1.56	1.46	1.43	1.40	1.27	0.99	0.93	0.72	0.70	0.29	0.52	0.43	0.67	0.47	0.47
Mumps	0.03	0.13	0.10	0.13	0.16	0.09	0.00	0.09	0.06	0.03	0.06	0.32	0.20	0.03	0.08
Pertussis	1.49	0.67	1.91	1.14	1.27	1.74	1.25	3.91	3.07	3.54	3.62	1.85	1.68	2.75	3.21
Plague	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
Poliomyelitis	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
Psittacosis	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Q Fever	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.09	0.00	0.06	0.08	0.05
Rabies (Human)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Rocky Mountain spotted fever	1.53	1.43	0.95	1.24	0.92	1.07	2.00	2.87	4.00	5.51	5.97	3.91	5.42	7.33	9.39
Rubella	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	0.00
Staphylococcus aureus , Vancomycin intermediate	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	0.00
Staphylococcus aureus , Vancomycin resistant	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
Streptococcus pneumoniae , Invasive disease, <5 years	21.19	8.39	9.71	11.48	19.87	16.08	24.54	28.35	34.27	22.00	20.31	30.89	32.58	28.51	1.73
Streptococcus pyogenes (Group A), Invasive disease	0.00	0.25	0.10	0.03	0.38	0.81	1.42	1.62	2.87	2.12	3.83	3.62	2.52	3.79	4.34
Salmonellosis	14.97	16.53	12.46	15.93	14.88	11.71	14.58	15.19	14.32	12.32	12.98	17.50	20.55	24.74	18.04
Shigellosis	8.46	9.70	9.31	22.63	17.80	3.80	4.29	20.78	31.24	20.98	27.13	5.68	4.69	6.42	10.95
St. Louis Encephalitis	0.00	0.00	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
Syphilis	15.55	12.65	8.74	8.39	11.03	7.10	5.36	5.30	4.09	2.55	2.12	5.59	4.35	5.82	7.03
Tetanus	0.00	0.03	0.06	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Trichinellosis	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tuberculosis	7.53	6.39	6.71	6.29	6.61	4.46	5.62	5.51	4.72	5.16	4.17	4.17	4.32	2.75	2.80
Tularemia	0.22	0.13	0.16	0.16	0.22	0.32	0.20	0.29	0.26	0.55	0.58	0.09	0.52	0.19	0.19
Typhoid Fever	0.03	0.00	0.10	0.03	0.00	0.03	0.03	0.06	0.03	0.03	0.03	0.00	0.09	0.08	0.05
Vibrio spp.	0.10	0.03	0.00	0.29	0.03	0.00	0.00	0.03	0.03	0.00	0.09	0.03	0.06	0.14	0.05
Vibrio parahaemolyticus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00
Vibrio vulnificus	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00
West Nile Virus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	2.29	0.64	0.96	1.39	3.10	0.25	0.27

*Oklahoma population numbers are obtained from the U.S. Census Bureau Decennial Census numbers. 2009 population numbers are obtained from the 2008 U.S. Census Bureau Population Estimates.

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Campylobacteriosis		Cryptosporidiosis		*E. coli* O157:H7 and other STEC		Ehrlichiosis	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	5	22.92	0	0.00	0	0.00	5	22.92
Alfalfa County	1	17.74	0	0.00	0	0.00	0	0.00
Atoka County	2	13.65	0	0.00	0	0.00	2	13.65
Beaver County	0	0.00	0	0.00	0	0.00	0	0.00
Beckham County	2	9.46	0	0.00	0	0.00	0	0.00
Blaine County	0	0.00	0	0.00	0	0.00	0	0.00
Bryan County	3	7.48	0	0.00	2	4.99	0	0.00
Caddo County	2	6.89	0	0.00	0	0.00	0	0.00
Canadian County	6	5.66	0	0.00	1	0.94	0	0.00
Carter County	4	8.34	6	12.51	2	4.17	0	0.00
Cherokee County	6	13.12	19	41.55	2	4.37	3	6.56
Choctaw County	0	0.00	0	0.00	0	0.00	0	0.00
Cimarron County	0	0.00	0	0.00	0	0.00	0	0.00
Cleveland County	13	5.42	21	8.76	3	1.25	2	0.83
Coal County	1	17.48	0	0.00	0	0.00	0	0.00
Comanche County	0	0.00	2	1.79	0	0.00	1	0.89
Cotton County	0	0.00	1	16.15	0	0.00	0	0.00
Craig County	2	13.22	0	0.00	0	0.00	2	13.22
Creek County	6	8.59	7	10.03	3	4.30	4	5.73
Custer County	2	7.57	0	0.00	3	11.36	0	0.00
Delaware County	4	9.89	2	4.95	2	4.95	2	4.95
Dewey County	1	22.78	1	22.78	0	0.00	0	0.00
Ellis County	1	25.18	0	0.00	0	0.00	0	0.00
Garfield County	16	27.51	0	0.00	1	1.72	0	0.00
Garvin County	4	14.68	1	3.67	0	0.00	0	0.00
Grady County	4	7.83	1	1.96	0	0.00	0	0.00
Grant County	0	0.00	1	22.47	1	22.47	0	0.00
Greer County	1	17.50	0	0.00	0	0.00	0	0.00
Harmon County	1	35.17	0	0.00	0	0.00	0	0.00
Harper County	2	60.79	0	0.00	0	0.00	0	0.00
Haskell County	1	8.23	0	0.00	0	0.00	3	24.69
Hughes County	1	7.34	0	0.00	1	7.34	3	22.02
Jackson County	12	47.55	1	3.96	3	11.89	0	0.00
Jefferson County	1	16.08	0	0.00	0	0.00	0	0.00
Johnston County	0	0.00	1	9.72	0	0.00	0	0.00
Kay County	7	15.34	0	0.00	2	4.38	2	4.38
Kingfisher County	5	34.97	1	6.99	0	0.00	0	0.00
Kiowa County	1	10.64	0	0.00	0	0.00	1	10.64

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Campylobacteriosis		Cryptosporidiosis		*E. coli* O157:H7 and other STEC		Ehrlichiosis	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Latimer County	2	18.94	0	0.00	0	0.00	1	9.47
Le Flore County	4	8.03	0	0.00	1	2.01	6	12.05
Lincoln County	4	12.44	0	0.00	0	0.00	3	9.33
Logan County	1	2.62	1	2.62	1	2.62	0	0.00
Love County	3	32.77	3	32.77	0	0.00	0	0.00
McClain County	6	84.36	0	0.00	0	0.00	0	0.00
McCurtain County	6	40.22	0	0.00	0	0.00	1	6.70
McIntosh County	5	12.53	0	0.00	0	0.00	1	2.51
Major County	1	3.09	0	0.00	0	0.00	0	0.00
Marshall County	1	2.98	0	0.00	0	0.00	0	0.00
Mayes County	4	20.31	0	0.00	4	20.31	8	40.61
Murray County	1	7.82	0	0.00	0	0.00	0	0.00
Muskogee County	20	28.06	2	2.81	1	1.40	5	7.01
Noble County	5	44.77	0	0.00	1	8.95	0	0.00
Nowata County	0	0.00	0	0.00	0	0.00	1	9.32
Okfuskee County	1	8.95	1	8.95	0	0.00	1	8.95
Oklahoma County	86	12.17	15	2.12	7	0.99	10	1.42
Okmulgee County	2	5.10	1	2.55	0	0.00	2	5.10
Osage County	1	2.20	1	2.20	0	0.00	1	2.20
Ottawa County	5	15.70	1	3.14	0	0.00	3	9.42
Pawnee County	1	6.13	0	0.00	0	0.00	1	6.13
Payne County	7	8.94	1	1.28	3	3.83	2	2.55
Pittsburg County	3	6.65	0	0.00	0	0.00	12	26.60
Pontotoc County	5	13.51	0	0.00	1	2.70	0	0.00
Pottawatomie County	10	14.36	2	2.87	0	0.00	2	2.87
Pushmataha County	1	8.54	1	8.54	0	0.00	5	42.70
Roger Mills County	1	29.38	0	0.00	0	0.00	0	0.00
Rogers County	6	7.12	0	0.00	2	2.37	5	5.93
Seminole County	3	12.40	0	0.00	0	0.00	0	0.00
Sequoyah County	1	2.44	0	0.00	0	0.00	7	17.06
Stephens County	13	29.89	9	20.69	3	6.90	4	9.20
Texas County	0	0.00	0	0.00	0	0.00	0	0.00
Tillman County	5	63.30	0	0.00	2	25.32	0	0.00
Tulsa County	37	6.25	35	5.91	10	1.69	25	4.22
Wagoner County	3	4.35	2	2.90	1	1.45	4	5.80
Washington County	3	5.95	0	0.00	1	1.98	7	13.87
Washita County	3	25.62	0	0.00	0	0.00	0	0.00
Woods County	2	23.75	0	0.00	0	0.00	0	0.00
Woodward County	5	25.20	1	5.04	0	0.00	0	0.00
State of Oklahoma	376	10.32	141	3.87	64	1.76	147	4.04

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Giardiasis		*Haemophilus influenzae* , invasive		Hepatitis A		Hepatitis B	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	0	0.00	2	9.17	0	0.00	2	9.17
Alfalfa County	0	0.00	1	17.74	0	0.00	0	0.00
Atoka County	1	6.82	0	0.00	0	0.00	1	6.82
Beaver County	0	0.00	0	0.00	0	0.00	0	0.00
Beckham County	0	0.00	0	0.00	0	0.00	1	4.73
Blaine County	0	0.00	1	7.90	0	0.00	0	0.00
Bryan County	1	2.49	0	0.00	0	0.00	2	4.99
Caddo County	3	10.34	0	0.00	0	0.00	2	6.89
Canadian County	2	1.89	1	0.94	0	0.00	5	4.71
Carter County	3	6.25	3	6.25	0	0.00	1	2.08
Cherokee County	1	2.19	1	2.19	0	0.00	0	0.00
Choctaw County	0	0.00	0	0.00	0	0.00	0	0.00
Cimarron County	0	0.00	0	0.00	0	0.00	0	0.00
Cleveland County	19	7.92	3	1.25	1	0.42	5	2.09
Coal County	1	17.48	0	0.00	0	0.00	0	0.00
Comanche County	1	0.89	0	0.00	0	0.00	4	3.58
Cotton County	1	16.15	1	16.15	0	0.00	0	0.00
Craig County	0	0.00	2	13.22	0	0.00	0	0.00
Creek County	6	8.59	0	0.00	0	0.00	0	0.00
Custer County	0	0.00	1	3.79	0	0.00	0	0.00
Delaware County	2	4.95	0	0.00	0	0.00	2	4.95
Dewey County	0	0.00	0	0.00	0	0.00	0	0.00
Ellis County	0	0.00	0	0.00	0	0.00	0	0.00
Garfield County	1	1.72	4	6.88	0	0.00	2	3.44
Garvin County	4	14.68	1	3.67	0	0.00	1	3.67
Grady County	3	5.87	2	3.92	0	0.00	2	3.92
Grant County	0	0.00	0	0.00	0	0.00	0	0.00
Greer County	0	0.00	1	17.50	0	0.00	0	0.00
Harmon County	0	0.00	0	0.00	0	0.00	0	0.00
Harper County	0	0.00	0	0.00	1	30.40	0	0.00
Haskell County	1	8.23	0	0.00	0	0.00	0	0.00
Hughes County	0	0.00	0	0.00	0	0.00	0	0.00
Jackson County	0	0.00	0	0.00	0	0.00	1	3.96
Jefferson County	0	0.00	1	16.08	0	0.00	0	0.00
Johnston County	3	29.17	0	0.00	0	0.00	0	0.00
Kay County	2	4.38	2	4.38	0	0.00	2	4.38
Kingfisher County	0	0.00	0	0.00	0	0.00	0	0.00
Kiowa County	0	0.00	0	0.00	0	0.00	0	0.00

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Giardiasis		*Haemophilus influenzae* , invasive		Hepatitis A		Hepatitis B	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Latimer County	2	18.94	0	0.00	0	0.00	0	0.00
Le Flore County	1	2.01	1	2.01	1	2.01	6	12.05
Lincoln County	1	3.11	0	0.00	0	0.00	1	3.11
Logan County	0	0.00	1	2.62	0	0.00	1	2.62
Love County	0	0.00	0	0.00	0	0.00	0	0.00
McClain County	0	0.00	0	0.00	0	0.00	2	28.12
McCurtain County	0	0.00	0	0.00	0	0.00	0	0.00
McIntosh County	1	2.51	1	2.51	0	0.00	0	0.00
Major County	3	9.27	1	3.09	0	0.00	1	3.09
Marshall County	0	0.00	1	2.98	0	0.00	1	2.98
Mayes County	0	0.00	1	5.08	0	0.00	2	10.15
Murray County	2	15.64	0	0.00	0	0.00	0	0.00
Muskogee County	2	2.81	1	1.40	0	0.00	4	5.61
Noble County	0	0.00	0	0.00	0	0.00	0	0.00
Nowata County	1	9.32	0	0.00	0	0.00	0	0.00
Okfuskee County	0	0.00	0	0.00	0	0.00	0	0.00
Oklahoma County	39	5.52	20	2.83	2	0.28	17	2.41
Okmulgee County	2	5.10	2	5.10	0	0.00	1	2.55
Osage County	1	2.20	0	0.00	0	0.00	3	6.60
Ottawa County	3	9.42	0	0.00	0	0.00	2	6.28
Pawnee County	0	0.00	0	0.00	0	0.00	0	0.00
Payne County	5	6.39	0	0.00	0	0.00	2	2.55
Pittsburg County	2	4.43	2	4.43	0	0.00	0	0.00
Pontotoc County	1	2.70	2	5.41	0	0.00	0	0.00
Pottawatomie County	1	1.44	3	4.31	0	0.00	3	4.31
Pushmataha County	0	0.00	0	0.00	0	0.00	0	0.00
Roger Mills County	0	0.00	0	0.00	0	0.00	0	0.00
Rogers County	2	2.37	0	0.00	0	0.00	2	2.37
Seminole County	1	4.13	0	0.00	0	0.00	2	8.26
Sequoyah County	1	2.44	2	4.87	0	0.00	4	9.75
Stephens County	4	9.20	1	2.30	0	0.00	3	6.90
Texas County	0	0.00	1	4.93	0	0.00	0	0.00
Tillman County	0	0.00	0	0.00	0	0.00	0	0.00
Tulsa County	39	6.59	22	3.72	1	0.17	27	4.56
Wagoner County	5	7.25	2	2.90	0	0.00	2	2.90
Washington County	1	1.98	0	0.00	0	0.00	1	1.98
Washita County	0	0.00	1	8.54	0	0.00	1	8.54
Woods County	0	0.00	0	0.00	0	0.00	0	0.00
Woodward County	0	0.00	0	0.00	0	0.00	1	5.04
State of Oklahoma	175	4.80	92	2.53	6	0.16	122	3.35

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Hepatitis C		Meningococcal invasive disease		Pertussis		Rocky Mountain Spotted Fever	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	0	0.00	0	0.00	0	0.00	2	9.17
Alfalfa County	0	0.00	0	0.00	0	0.00	0	0.00
Atoka County	1	6.82	0	0.00	0	0.00	2	13.65
Beaver County	0	0.00	0	0.00	0	0.00	0	0.00
Beckham County	1	4.73	0	0.00	0	0.00	1	4.73
Blaine County	0	0.00	0	0.00	0	0.00	1	7.90
Bryan County	1	2.49	0	0.00	3	7.48	2	4.99
Caddo County	1	3.45	0	0.00	1	3.45	0	0.00
Canadian County	0	0.00	0	0.00	7	6.60	1	0.94
Carter County	0	0.00	0	0.00	5	10.42	2	4.17
Cherokee County	0	0.00	0	0.00	2	4.37	6	13.12
Choctaw County	0	0.00	0	0.00	0	0.00	2	13.43
Cimarron County	0	0.00	0	0.00	0	0.00	0	0.00
Cleveland County	3	1.25	1	0.42	2	0.83	4	1.67
Coal County	0	0.00	0	0.00	0	0.00	1	17.48
Comanche County	0	0.00	1	0.89	1	0.89	2	1.79
Cotton County	0	0.00	0	0.00	0	0.00	0	0.00
Craig County	0	0.00	0	0.00	0	0.00	3	19.83
Creek County	0	0.00	1	1.43	2	2.86	9	12.89
Custer County	0	0.00	1	3.79	1	3.79	1	3.79
Delaware County	0	0.00	1	2.47	0	0.00	1	2.47
Dewey County	0	0.00	0	0.00	0	0.00	0	0.00
Ellis County	0	0.00	0	0.00	0	0.00	0	0.00
Garfield County	1	1.72	1	1.72	2	3.44	4	6.88
Garvin County	0	0.00	0	0.00	1	3.67	3	11.01
Grady County	1	1.96	0	0.00	1	1.96	4	7.83
Grant County	0	0.00	0	0.00	0	0.00	0	0.00
Greer County	0	0.00	0	0.00	0	0.00	1	17.50
Harmon County	0	0.00	0	0.00	0	0.00	0	0.00
Harper County	0	0.00	0	0.00	0	0.00	0	0.00
Haskell County	0	0.00	0	0.00	0	0.00	7	57.60
Hughes County	0	0.00	0	0.00	1	7.34	1	7.34
Jackson County	1	3.96	0	0.00	2	7.93	0	0.00
Jefferson County	0	0.00	0	0.00	1	16.08	1	16.08
Johnston County	1	9.72	0	0.00	0	0.00	2	19.44
Kay County	0	0.00	1	2.19	1	2.19	1	2.19
Kingfisher County	0	0.00	0	0.00	4	27.97	0	0.00
Kiowa County	0	0.00	0	0.00	0	0.00	0	0.00

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Hepatitis C		Meningococcal invasive disease		Pertussis		Rocky Mountain Spotted Fever	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Latimer County	0	0.00	0	0.00	0	0.00	16	151.50
Le Flore County	0	0.00	1	2.01	1	2.01	36	72.29
Lincoln County	0	0.00	0	0.00	0	0.00	6	18.66
Logan County	0	0.00	1	2.62	0	0.00	3	7.87
Love County	0	0.00	0	0.00	0	0.00	0	0.00
McClain County	0	0.00	0	0.00	1	14.06	3	42.18
McCurtain County	0	0.00	0	0.00	0	0.00	9	60.33
McIntosh County	0	0.00	1	2.51	0	0.00	10	25.06
Major County	0	0.00	0	0.00	1	3.09	1	3.09
Marshall County	0	0.00	0	0.00	0	0.00	0	0.00
Mayes County	2	10.15	0	0.00	1	5.08	7	35.54
Murray County	0	0.00	0	0.00	0	0.00	1	7.82
Muskogee County	1	1.40	0	0.00	1	1.40	15	21.04
Noble County	0	0.00	0	0.00	0	0.00	1	8.95
Nowata County	0	0.00	0	0.00	3	27.96	0	0.00
Okfuskee County	0	0.00	0	0.00	1	8.95	4	35.80
Oklahoma County	4	0.57	4	0.57	16	2.26	23	3.25
Okmulgee County	0	0.00	0	0.00	6	15.30	5	12.75
Osage County	2	4.40	0	0.00	0	0.00	4	8.79
Ottawa County	1	3.14	0	0.00	1	3.14	4	12.56
Pawnee County	0	0.00	0	0.00	1	6.13	5	30.66
Payne County	0	0.00	0	0.00	1	1.28	3	3.83
Pittsburg County	1	2.22	0	0.00	4	8.87	36	79.80
Pontotoc County	0	0.00	0	0.00	0	0.00	6	16.22
Pottawatomie County	0	0.00	0	0.00	4	5.75	7	10.06
Pushmataha County	0	0.00	0	0.00	0	0.00	12	102.48
Roger Mills County	0	0.00	0	0.00	0	0.00	0	0.00
Rogers County	0	0.00	0	0.00	3	3.56	3	3.56
Seminole County	0	0.00	0	0.00	0	0.00	3	12.40
Sequoyah County	1	2.44	1	2.44	0	0.00	4	9.75
Stephens County	0	0.00	0	0.00	3	6.90	8	18.39
Texas County	0	0.00	0	0.00	1	4.93	0	0.00
Tillman County	0	0.00	0	0.00	0	0.00	0	0.00
Tulsa County	4	0.68	1	0.17	24	4.05	33	5.57
Wagoner County	0	0.00	0	0.00	2	2.90	9	13.05
Washington County	0	0.00	0	0.00	1	1.98	1	1.98
Washita County	0	0.00	0	0.00	0	0.00	0	0.00
Woods County	0	0.00	0	0.00	1	11.87	0	0.00
Woodward County	0	0.00	1	5.04	3	15.12	0	0.00
State of Oklahoma	27	0.74	17	0.47	117	3.21	342	9.39

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Salmonellosis		Shigellosis		Streptococcus, group A invasive		*S. pneumoniae* , invasive, < 5 yrs.	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	3	13.75	1	4.58	1	4.58	1	4.58
Alfalfa County	0	0.00	0	0.00	0	0.00	0	0.00
Atoka County	2	13.65	0	0.00	1	6.82	0	0.00
Beaver County	1	19.05	0	0.00	0	0.00	0	0.00
Beckham County	0	0.00	6	28.39	0	0.00	0	0.00
Blaine County	2	15.80	0	0.00	0	0.00	0	0.00
Bryan County	3	7.48	3	7.48	2	4.99	0	0.00
Caddo County	7	24.12	0	0.00	3	10.34	1	3.45
Canadian County	33	31.11	16	15.08	4	3.77	0	0.00
Carter County	12	25.01	23	47.94	6	12.51	1	2.08
Cherokee County	5	10.93	0	0.00	0	0.00	0	0.00
Choctaw County	1	6.72	0	0.00	0	0.00	0	0.00
Cimarron County	0	0.00	0	0.00	0	0.00	0	0.00
Cleveland County	41	17.10	33	13.76	3	1.25	3	1.25
Coal County	0	0.00	1	17.48	0	0.00	0	0.00
Comanche County	13	11.63	35	31.31	4	3.58	0	0.00
Cotton County	2	32.30	1	16.15	0	0.00	0	0.00
Craig County	3	19.83	8	52.87	0	0.00	0	0.00
Creek County	18	25.78	5	7.16	4	5.73	3	4.30
Custer County	6	22.72	0	0.00	0	0.00	0	0.00
Delaware County	7	17.32	0	0.00	3	7.42	0	0.00
Dewey County	0	0.00	0	0.00	0	0.00	0	0.00
Ellis County	0	0.00	0	0.00	0	0.00	0	0.00
Garfield County	4	6.88	0	0.00	3	5.16	1	1.72
Garvin County	8	29.36	5	18.35	0	0.00	0	0.00
Grady County	14	27.42	7	13.71	3	5.87	1	1.96
Grant County	2	44.94	0	0.00	0	0.00	0	0.00
Greer County	5	87.52	1	17.50	0	0.00	0	0.00
Harmon County	1	35.17	0	0.00	1	35.17	0	0.00
Harper County	3	91.19	0	0.00	0	0.00	0	0.00
Haskell County	2	16.46	0	0.00	0	0.00	0	0.00
Hughes County	3	22.02	0	0.00	0	0.00	0	0.00
Jackson County	10	39.63	1	3.96	0	0.00	0	0.00
Jefferson County	2	32.16	0	0.00	0	0.00	0	0.00
Johnston County	2	19.44	1	9.72	0	0.00	0	0.00
Kay County	13	28.49	1	2.19	1	2.19	1	2.19
Kingfisher County	5	34.97	0	0.00	1	6.99	0	0.00
Kiowa County	1	10.64	1	10.64	1	10.64	0	0.00

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Salmonellosis		Shigellosis		Streptococcus, group A invasive		*S. pneumoniae* , invasive, < 5 yrs.	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Latimer County	0	0.00	0	0.00	0	0.00	0	0.00
Le Flore County	6	12.05	0	0.00	0	0.00	0	0.00
Lincoln County	13	40.43	10	31.10	0	0.00	0	0.00
Logan County	8	21.00	0	0.00	1	2.62	1	2.62
Love County	3	32.77	1	10.92	0	0.00	0	0.00
McClain County	2	28.12	3	42.18	2	28.12	1	14.06
McCurtain County	0	0.00	0	0.00	0	0.00	3	20.11
McIntosh County	3	7.52	0	0.00	0	0.00	1	2.51
Major County	19	58.71	0	0.00	0	0.00	0	0.00
Marshall County	8	23.86	0	0.00	0	0.00	1	2.98
Mayes County	2	10.15	7	35.54	3	15.23	0	0.00
Murray County	5	39.11	4	31.29	0	0.00	0	0.00
Muskogee County	11	15.43	0	0.00	1	1.40	1	1.40
Noble County	2	17.91	2	17.91	1	8.95	0	0.00
Nowata County	0	0.00	0	0.00	0	0.00	0	0.00
Okfuskee County	1	8.95	0	0.00	1	8.95	0	0.00
Oklahoma County	96	13.59	161	22.78	39	5.52	15	2.12
Okmulgee County	9	22.95	0	0.00	1	2.55	1	2.55
Osage County	5	10.99	1	2.20	3	6.60	0	0.00
Ottawa County	4	12.56	0	0.00	1	3.14	2	6.28
Pawnee County	5	30.66	0	0.00	3	18.40	0	0.00
Payne County	14	17.88	5	6.39	0	0.00	0	0.00
Pittsburg County	10	22.17	1	2.22	1	2.22	1	2.22
Pontotoc County	2	5.41	0	0.00	0	0.00	0	0.00
Pottawatomie County	17	24.42	6	8.62	3	4.31	1	1.44
Pushmataha County	6	51.24	0	0.00	1	8.54	1	8.54
Roger Mills County	1	29.38	0	0.00	0	0.00	0	0.00
Rogers County	16	18.98	26	30.84	5	5.93	2	2.37
Seminole County	10	41.32	0	0.00	0	0.00	0	0.00
Sequoyah County	8	19.50	0	0.00	0	0.00	2	4.87
Stephens County	19	43.68	0	0.00	2	4.60	1	2.30
Texas County	1	4.93	0	0.00	0	0.00	0	0.00
Tillman County	4	50.64	0	0.00	0	0.00	0	0.00
Tulsa County	95	16.05	22	3.72	44	7.43	13	2.20
Wagoner County	6	8.70	1	1.45	3	4.35	3	4.35
Washington County	1	1.98	0	0.00	2	3.96	0	0.00
Washita County	2	17.08	0	0.00	0	0.00	1	8.54
Woods County	2	23.75	0	0.00	0	0.00	0	0.00
Woodward County	7	35.29	0	0.00	0	0.00	0	0.00
State of Oklahoma	657	18.04	399	10.95	158	4.34	63	1.73

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Tuberculosis		Tularemia		West Nile Virus	
County	Number	Rate	Number	Rate	Number	Rate
Adair County	1	4.58	0	0.00	0	0.00
Alfalfa County	0	0.00	0	0.00	0	0.00
Atoka County	0	0.00	0	0.00	0	0.00
Beaver County	0	0.00	0	0.00	0	0.00
Beckham County	1	4.73	0	0.00	0	0.00
Blaine County	1	7.90	0	0.00	0	0.00
Bryan County	1	2.49	0	0.00	0	0.00
Caddo County	0	0.00	0	0.00	0	0.00
Canadian County	0	0.00	0	0.00	0	0.00
Carter County	0	0.00	0	0.00	2	4.17
Cherokee County	1	2.19	0	0.00	0	0.00
Choctaw County	1	6.72	0	0.00	1	6.72
Cimarron County	0	0.00	0	0.00	0	0.00
Cleveland County	6	2.50	1	0.42	0	0.00
Coal County	0	0.00	0	0.00	0	0.00
Comanche County	2	1.79	0	0.00	1	0.89
Cotton County	0	0.00	0	0.00	0	0.00
Craig County	0	0.00	0	0.00	0	0.00
Creek County	0	0.00	0	0.00	0	0.00
Custer County	1	3.79	0	0.00	0	0.00
Delaware County	3	7.42	0	0.00	0	0.00
Dewey County	0	0.00	0	0.00	0	0.00
Ellis County	0	0.00	0	0.00	0	0.00
Garfield County	6	10.32	0	0.00	0	0.00
Garvin County	0	0.00	0	0.00	0	0.00
Grady County	1	1.96	0	0.00	0	0.00
Grant County	0	0.00	0	0.00	0	0.00
Greer County	0	0.00	0	0.00	0	0.00
Harmon County	0	0.00	0	0.00	0	0.00
Harper County	0	0.00	0	0.00	0	0.00
Haskell County	0	0.00	0	0.00	0	0.00
Hughes County	0	0.00	0	0.00	0	0.00
Jackson County	0	0.00	0	0.00	0	0.00
Jefferson County	0	0.00	0	0.00	1	16.08
Johnston County	0	0.00	0	0.00	0	0.00
Kay County	1	2.19	0	0.00	0	0.00
Kingfisher County	0	0.00	0	0.00	0	0.00
Kiowa County	0	0.00	0	0.00	0	0.00

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Tuberculosis		Tularemia		West Nile Virus	
County	Number	Rate	Number	Rate	Number	Rate
Latimer County	0	0.00	0	0.00	0	0.00
Le Flore County	0	0.00	0	0.00	0	0.00
Lincoln County	0	0.00	0	0.00	0	0.00
Logan County	1	2.62	0	0.00	0	0.00
Love County	0	0.00	0	0.00	0	0.00
McClain County	1	14.06	0	0.00	0	0.00
McCurtain County	16	107.25	0	0.00	0	0.00
McIntosh County	0	0.00	0	0.00	0	0.00
Major County	0	0.00	0	0.00	0	0.00
Marshall County	0	0.00	0	0.00	0	0.00
Mayes County	0	0.00	0	0.00	0	0.00
Murray County	0	0.00	0	0.00	0	0.00
Muskogee County	1	1.40	1	1.40	1	1.40
Noble County	0	0.00	0	0.00	0	0.00
Nowata County	0	0.00	1	9.32	0	0.00
Okfuskee County	0	0.00	0	0.00	0	0.00
Oklahoma County	23	3.25	2	0.28	3	0.42
Okmulgee County	0	0.00	0	0.00	0	0.00
Osage County	1	2.20	0	0.00	0	0.00
Ottawa County	2	6.28	0	0.00	1	3.14
Pawnee County	0	0.00	0	0.00	0	0.00
Payne County	5	6.39	0	0.00	0	0.00
Pittsburg County	0	0.00	0	0.00	0	0.00
Pontotoc County	0	0.00	0	0.00	0	0.00
Pottawatomie County	0	0.00	0	0.00	0	0.00
Pushmataha County	0	0.00	0	0.00	0	0.00
Roger Mills County	0	0.00	0	0.00	0	0.00
Rogers County	1	1.19	0	0.00	0	0.00
Seminole County	0	0.00	0	0.00	0	0.00
Sequoyah County	4	9.75	0	0.00	0	0.00
Stephens County	2	4.60	0	0.00	0	0.00
Texas County	3	14.79	0	0.00	0	0.00
Tillman County	0	0.00	0	0.00	0	0.00
Tulsa County	14	2.36	1	0.17	0	0.00
Wagoner County	1	1.45	0	0.00	0	0.00
Washington County	1	1.98	1	1.98	0	0.00
Washita County	0	0.00	0	0.00	0	0.00
Woods County	0	0.00	0	0.00	0	0.00
Woodward County	0	0.00	0	0.00	0	0.00
State of Oklahoma	102	2.80	7	0.19	10	0.27

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	Number	Rate	Number	Rate	Number	Rate
Adair County	69	316.35	6	27.51	*	*
Alfalfa County	4	70.96	*	*	*	*
Atoka County	51	348.00	9	61.41	*	*
Beaver County	10	190.55	*	*	*	*
Beckham County	103	487.32	14	66.24	*	*
Blaine County	21	165.89	*	*	*	*
Bryan County	168	418.86	23	57.34	*	*
Caddo County	97	334.21	10	34.45	*	*
Canadian County	202	190.42	50	47.13	4	3.77
Carter County	165	343.90	36	75.03	*	*
Cherokee County	200	437.32	40	87.46	*	*
Choctaw County	81	543.99	41	275.35	*	*
Cimarron County	*	*	*	*	*	*
Cleveland County	580	241.91	141	58.81	11	4.59
Coal County	7	122.36	*	*	*	*
Comanche County	1032	923.31	207	185.20	16	14.31
Cotton County	21	339.20	*	*	*	*
Craig County	51	337.03	8	52.87	*	*
Creek County	202	289.31	49	70.18	*	*
Custer County	64	242.31	14	53.01	*	*
Delaware County	91	225.11	*	*	*	*
Dewey County	5	113.92	*	*	*	*
Ellis County	9	226.64	*	*	*	*
Garfield County	271	465.90	43	73.93	4	6.88
Garvin County	56	205.53	9	33.03	*	*
Grady County	129	252.61	35	68.54	*	*
Grant County	4	89.89	*	*	*	*
Greer County	22	385.09	*	*	*	*
Harmon County	5	175.87	*	*	*	*
Harper County	6	182.37	*	*	*	*
Haskell County	24	197.50	*	*	*	*
Hughes County	33	242.20	9	66.06	*	*
Jackson County	115	455.70	20	79.25	*	*
Jefferson County	11	176.88	*	*	*	*
Johnston County	20	194.44	*	*	*	*
Kay County	66	144.64	9	19.72	*	*
Kingfisher County	28	195.80	4	27.97	*	*
Kiowa County	29	308.54	*	*	*	*

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Table Three. Reportable Diseases by County, Oklahoma, 2009^

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	Number	Rate	12	Rate	Number	Rate
Latimer County	35	331.41	5	47.34	*	*
Le Flore County	155	311.23	20	40.16	4	8.03
Lincoln County	74	230.15	11	34.21	*	*
Logan County	173	454.04	44	115.48	*	*
Love County	25	273.07	4	43.69	*	*
McClain County	62	871.77	15	210.91	*	*
McCurtain County	173	1159.60	47	315.03	4	26.81
McIntosh County	55	137.80	14	35.08	*	*
Major County	13	40.17	*	*	*	*
Marshall County	26	77.54	*	*	*	*
Mayes County	108	548.28	15	76.15	*	*
Murray County	23	179.91	*	*	*	*
Muskogee County	285	399.84	101	141.70	*	*
Noble County	21	188.02	6	53.72	*	*
Nowata County	20	186.41	*	*	*	*
Okfuskee County	29	259.58	7	62.66	*	*
Oklahoma County	4185	592.26	1738	245.96	158	22.36
Okmulgee County	149	379.92	48	122.39	*	*
Osage County	84	184.66	14	30.78	*	*
Ottawa County	106	332.82	14	43.96	*	*
Pawnee County	38	233.03	9	55.19	*	*
Payne County	344	439.45	51	65.15	*	*
Pittsburg County	157	348.00	22	48.76	*	*
Pontotoc County	121	327.04	47	127.03	*	*
Pottawatomie County	249	357.68	53	76.13	*	*
Pushmataha County	13	111.02	*	*	*	*
Roger Mills County	6	176.26	*	*	*	*
Rogers County	177	209.96	29	34.40	*	*
Seminole County	79	326.45	27	111.57	*	*
Sequoyah County	139	338.74	9	21.93	*	*
Stephens County	107	245.99	20	45.98	*	*
Texas County	26	128.19	*	*	*	*
Tillman County	19	240.54	*	*	*	*
Tulsa County	3367	568.77	1444	243.93	26	4.39
Wagoner County	109	158.06	29	42.05	*	*
Washington County	116	229.92	6	11.89	*	*
Washita County	12	102.49	*	*	*	*
Woods County	13	154.36	*	*	*	*
Woodward County	46	231.88	5	25.20	*	*
State of Oklahoma	14991	411.57	4661	127.97	256	7.03

^2009 rates illustrate county specific incidence rates per 100,000 population. Rates calculated by dividing the number of reported cases by the 2008 Census Bureau county population estimate and multiplying by 100,000

Oklahoma Public Health Laboratory Annual Report

Mission

The Public Health Laboratory implements and provides essential public health laboratory services to citizens of Oklahoma through a system of County Health Departments, Agency Programs, and Private Health Providers. The Public Health Laboratory participates and supports strategies designed to prevent disease, protect our citizens, and to improve the public's health status.

Primary Duties

- Provide analytical services for the State Department of Health, local government and Tribal units, health care practitioners, and private citizens;
- Specialized public health laboratory procedures and reference testing;
- Training, technical assistance, and consultation for private clinical laboratories of Oklahoma;
- Guidance and training for detection and identification of a terrorist event;
- Applied research and University instruction related to the public health mission of the Laboratory;
- Pharmacy services to County Health Departments.

Narrative:

Public Health Laboratory (PHL) Service of the Oklahoma State Department of Health has been in continuous operation since 1907. The PHL has a vital role in the detection of infectious disease outbreaks, patient diagnostic testing, and the tracking of disease trends in Oklahoma. In recent years, the PHL has been actively involved in developing rapid molecular methods for identifying possible agents of bioterrorism. These molecular methods have also been applied to the rapid diagnosis of infectious diseases and tests for inherited disorders in newborns.

In 2009, this service performed 644,818 analytical tests. The table below shows the testing volume for each laboratory section.

Laboratory	Test Number	Percent Tests
Newborn Screening	457,717	71%
Virology	67,158	10%
Immunology	69,339	11%
Molecular	34,198	5%
TB / Mycology	7,874	1%
Bacteriology / Parasitology	8,532	1%

Immunology/Serology Laboratory

The Immunology section supports the OSDH HIV/STD Service, as well as many other Oklahoma healthcare providers by performing human immunodeficiency virus (HIV) testing. In July 2010, the Immunology section will begin using a new and improved enzyme linked immunosorbant assay (ELISA) for HIV antibody screening while continuing to use the Western Blot for confirmation. Serological testing for the tick-borne diseases, Rocky Mountain spotted fever and *Ehrlichia chaffeensis,* is also performed in this section using an indirect fluorescent assay. Testing for West Nile virus and St. Louis Encephalitis, measles (Rubella), Hepatitis B Surface Antigen and Hepatitis C, and syphilis are also available through this section.

Microbiology/ Parasitology Laboratory

The Microbiology section works closely with the molecular diagnostic section to improve our reference services on bacterial identification. The use of DNA sequencing helps in the identification of extremely unusual bacterial isolates. In 2009, the microbiology section received 30 isolates that could not be ruled out as possible bioterrorism agents by Oklahoma sentinel clinical laboratories. Of these 30 referred isolates, 6 were identified as *Francisella tularensis*, a

select agent endemic in Oklahoma. The microbiology section tested 14 suspicious powders, none of which were positive for biological agents.

Enteric pathogens referred to the microbiology laboratory resulted in the detection of 28 local clusters and 55 matches to national foodborne outbreaks.

2009 saw a 16% increase in the number of specimens received for *Bordetella pertussis* and *Bordetella parapertussis* which resulted in 8% positivity rate.

In the winter of 2009, the microbiology section performed analysis on 199 water samples in an attempt to isolate *Escherichia coli* O111, the causative agent of the Northeastern Oklahoma GI Outbreak. No *Escherichia coli* O111 was found in any of these water samples. However, three different toxigenic *Escherichia coli* serotypes were found: O141, O179, and O113.

The implementation of shiga toxin testing in hospital laboratories statewide resulted in a 62% increase in the identification of toxin producing *Escherichia coli* non-O157 isolates.

Molecular Diagnostics Laboratory

The Molecular Biology section continues to perform a variety of rapid, accurate and sensitive tests for other sections within the Public Health Laboratory. These methods include real-time PCR for the detection of virulence factors *stx1* and *stx2* associated with toxigenic *Escherichia coli, Bordetella pertussis* and *B. parapertussis* detection, and seasonal influenza as well as 2009 influenza A H1N1 detection. Rapid detection of a variety of bioterrorism agents such as *Bacillus anthracis, Yersinia pestis, Brucella* species*, Francisella tularensis*, *Burkholderia mallei/pseudomallei*, Ricin toxin, and *Staphylococcus* enterotoxin B is also made possible due to our collaboration with CDC's Lab Response Network (LRN). Molecular offers rapid rule out detection for clinicians as well as law enforcement for bioterrorism isolates, clinical and environmental samples. Molecular methods have even replaced some traditional methods. In 2009, culturing of *B. pertussis* and *B. parapertussis* was replaced exclusively by real-time PCR.

The Molecular Diagnostics Laboratory is also an active participant in CDC's PulseNet organization. PulseNet is the standardized international molecular subtyping network, which uses Pulsed field gel electrophoresis (PFGE) to generate bacterial DNA patterns for foodborne pathogens. PulseNet allows all 50 states, several large municipalities as well as the Food and Drug Administration, 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. Molecular currently has three personnel certified to analyze and submit data to CDC's database. In 2009, the molecular section performed PFGE to over 2,800 isolates within a 4-day turn-around time as recommended by CDC for all *Salmonella, Shigella,* toxigenic *Escherichia coli* and *Listeria monocytogenes* isolates. Molecular personnel alerted epidemiologists about approximately 30 localized clusters of indistinguishable PFGE patterns within Oklahoma in 2009. Molecular also posted indistinguishable pattern matches to CDC for 55 national clusters. The PHL is the only PulseNet certified lab in Oklahoma.

Molecular personnel received seasonal influenza PCR training from CDC in early spring 2009 for its FDA approved IVD Influenza Assay. The PHL was the only lab in Oklahoma to receive training. The advanced training allowed Molecular personnel to be better prepared for the outbreak of 2009 influenza A H1N1. Because of the advanced training, this section was able to acquire the FDA Emergency Authorization Usage Swine Flu Assay much earlier than many other states. During 2009, the Molecular Section tested almost 4000 viral samples for influenza A (Swine-origin H1N1, seasonal H1, and H3) and influenza B by real-time PCR.

The Molecular section continues to collaborate with CDC, in addition to PulseNet, LRN and influenza surveillance. In 2009, personnel received training at CDC to implement sequencing of norovirus GI and GII for epidemiologic purposes. After completion of this course, Molecular personnel completed a norovirus certification set to become a

member of CaliciNet. CaliciNet monitors norovirus nomenclature and detects cluster of sequences, much the same as PFGE is used to detect clusters of bacterial DNA. This will supplement the real-time PCR assays the PHL currently has in place for the detection of norovirus GI and GII. The PHL also completed training for a newly revised bead based assay to serotype *Salmonella*. Eventually, this method may offer next day serotyping.

The PHL Molecular section continues to offer second tier cystic fibrosis transmembrane conductance regulator (CFTR) testing for our Newborn Screening section for over 1300 samples annually.

Newborn Screening Laboratory

The Newborn Screening section has expanded their panel of tests to include screening for over 40 disorders. With the addition of biotinidase deficiency screening in 2010, Oklahoma's newborn screening panel will include all 29 core conditions and 20 of the secondary target conditions listed in the recommended uniform screening panel of the Secretary's Advisory Committee on Heritable Disorders in Newborns and Children. The Newborn Screening laboratory screens all babies born in the state of Oklahoma. Without early identification and treatment, these disorders may result in chronic health problems, mental retardation, or death.

Tuberculosis/ Mycology Laboratory

The Mycobacteriology section analyzes samples from a variety of sources for the isolation and identification of *Mycobacterium tuberculosis* complex. In 2009, the Mycobacteriology laboratory processed over 7,000 patient specimens. Slightly over 23% of the specimens processed had *Mycobacterium* spp. isolated and 28% of the culture positive specimens were positive for *Mycobacterium tuberculosis*. The laboratory continues to use a high-pressure liquid chromatography (HPLC) system to identify organisms through the analysis of mycolic acid patterns. The use of the HPLC has decreased the time from growth detection to identification to one day. No new assays are coming on board in the immediate future; however, the laboratory continues to monitor technological trends and availability of new assays in mycobacteriology diagnostics. This laboratory also performs reference mycology testing. This section identifies yeasts and molds for clinical laboratories across the state. Presently, only fungal isolates, not patient specimens, can be accepted for identification due to fiscal constraints. The PHL readily accepts any dimorphic or suspected dimorphic submission. The laboratory provides confirmation capability for the select agent, *Coccidiodes immitis,* and all other systemic fungi.

Virology/ CT-GC Laboratory

The Virology section performs virus isolation and identification, by cell culture, on all common viral agents. This section participates yearly as a World Health Organization (WHO) collaborating laboratory by providing influenza isolates to assist in the determination of yearly vaccine strain selection and the efficacy of the vaccine. The Rabies laboratory continues to play a key role in the prevention and control of rabies in Oklahoma. It is the only laboratory in Oklahoma that provides rabies testing. In 2009, 3.9% of the specimens submitted were positive for the rabies virus, with skunks being the leading species.

This section also participates in the Infertility Prevention Project by testing for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC), using an amplified DNA assay. Urine samples from the juvenile detention centers, a high-risk population for CT/GC, are also tested using this assay. Early diagnosis of CT/GC leads to timely treatment, thereby reducing the possibility of complications and the risk of further transmission.

Laboratory Shipping and Receiving Section:

The Shipping and Receiving section of the Public Health Laboratory is responsible for receiving, delivering, and storing all equipment and laboratory supplies used by the Public Health Laboratory. This section also prepares and ships all of the enteric, parasite, TB, pertussis, gen probe, group B and virus isolation kits to all county health departments and private providers. The PKU forms used by all of the hospitals are housed in this section for shipment to the hospitals. Employees of this section are certified in the shipping and packaging of infectious substances. This allows the PHL to ship infectious substances to CDC and other locations in a correct and safe manner protecting the public from accidental releases of this type of agent.

Accessioning Section:

The Accessioning section receives incoming specimens from county health departments and private providers for testing in the Public Health Laboratory sections. Accessioning is responsible for determining acceptability of a specimen (according to the PHL Resource Manual criteria), assigning the appropriate laboratory number to the specimen, entering demographic information into the Laboratory Information System, centrifuging, and delivering the specimens to the appropriate laboratory.

QC/Media Prep:

The Quality Control (QC) section of this area performs quality control on all incoming commercial and prepared media used by the laboratories. The control and internal proficiency organisms are grown and sent to the laboratory for use. The Media Prep section prepares media and reagents for use in the laboratories and maintains the current stock of commercial media.

Field Laboratory Section:

The Public Health Laboratory is responsible for 95 testing sites. All sites continue to operate under a Provider-Performed Microscopy CLIA license. The Field Operations section provides technical consultation for testing procedures, quality systems, laboratory techniques, and equipment evaluation. Annual or semi-annual site visits (Quality Assurance Reviews) are conducted to evaluate and document county health department laboratory performance, and to make recommendations to improve the quality of testing. Training for the following tests is provided: wet preparation / KOH, hemoglobin, glucose, and urinanalysis. Remedial action (follow-up) visits and training in-services are also performed as needed. A Good Laboratory Practice Manual has been prepared and implemented to meet the recent federal requirements of CLIA. The manual also provides a quick reference for quality control and assurance guidelines for the county health departments. It also contains written procedures for the laboratory tests that are performed by the county health departments.

Laboratory Training/Outreach/Preparedness Section:

The Public Health Laboratory continues to work with its partners to reduce response time to bioterrorism, chemical terrorism, foodborne outbreaks and pandemic events. Partners include hospital laboratories and emergency departments, reference laboratories, hazmat technicians, National Guard Civil Support Team, and Communicable Disease Nurses.

Shipping and Packaging Training: The proper packaging, handling and transportation of laboratory specimens is regulated by federal departments and professional associations. Properly packaged laboratory specimens provide safety for the sending laboratory, the public during transportation and the receiving laboratory. The PHL trained 199 laboratorians from 59 hospitals, city/county health departments, and physician office laboratories in 2009.

Environmental Collection Training: The PHL trained seven teams of hazardous material technicians (totaling 84 techs) in the proper collection of environmental specimens. Training also included PHL protocols for field screening, transportation, documentation, chain-of-custody, and proper notification of an event. The PHL responded to 12 actual events, testing unknown powders collected and delivered by first responders in 2009. The PHL participated in training exercises with the 63rd National Guard Civil Support Team in responding to the discovery of clandestine biological laboratories.

Bioterrorism Proficiency Testing: The PHL successfully completed the College of American Pathologists (CAP) Laboratory Preparedness Exercise (LPX) bioterrorism proficiency tests as a testing laboratory twice in 2009. The PHL also partnered with CAP and participating Oklahoma sentinel laboratories to test referral and shipping protocols during the CAP bioterrorism surveys.

Chemical Terrorism Training: Seven hospital laboratories and emergency departments received on-site chemical terrorism training in 2009. Ninety-nine personnel were trained in specimen collection guidelines, PHL notification and

chain-of-custody requirements. The PHL is a Level 3 Laboratory Response Network-Chemical (LRN-C) laboratory. The PHL also successfully participated in the annually required LRN chemical Specimen, Collection, Packaging and Shipping (SCPaS) exercise.

Rule-Out and Refer (ROAR): A total of 18 hospital and reference laboratories participated in 2 select agent case studies delivered through the sentinel bioterrorism Secure Telecommunication and Terminal Package (STATPack) system. Laboratories were responsible for navigating the STATPack system and utilizing ROAR protocols to complete the studies. Oklahoma sentinel laboratories using PHL protocols referred 30 possible select agent isolates to the PHL for confirmatory testing.

Other Outreach Opportunities: Public Health Laboratory staff presented protocols, recommendations and capabilities to audiences that included Communicable Disease Nurses, sanitarians and OUHSC College of Public Health students. The Health Alert Network was used to communicate collection and transportation protocol changes with laboratory partners during the H1N1 pandemic.

Recent Accomplishments

- All county health departments can now access and print all completed laboratory reports for their patients;
- 90% of non-county health department submitters are receiving results via secure fax daily; and
- The PHL utilizes a courier system and a 24/7 emergency courier to transport specimens to the laboratory.
- Molecular personnel:
    - Successfully completed seasonal influenza PCR training from CDC in early Spring 2009 for the FDA approved IVD Influenza Assay, allowing the PHL to rapidly and accurately diagnose influenza throughout the state;
    - Are certified to analyze and submit data to the CDC PulseNet organization; and
    - Continue to train on all LRN protocols for detection of select agents.
- Preparedness activities were enhanced through:
    - Joint trainings;
    - Participation in exercises;
    - CAP surveys;
    - PHL initiated drills; and
    - Real events
- Foodborne work group was initiated with the Department of Agriculture in order to quickly identify and respond to foodborne outbreaks in the State of Oklahoma.
- TB / Mycology section provided TB testing for the state of Missouri.
- The PHL web page: (http://www.ok.gov/health/Disease_Prevention_Preparedness/Public_Health_Laboratory/) contains information on services, directory, laboratory preparedness, training, forms, shipping, and packaging.

Brucellosis

2009 Case Total	2	2009 Rate	0.05 per 100,000
2008 Case Total	0	2008 Rate	0.00 per 100,000

Brucellosis is a systemic bacterial disease of acute or insidious onset resulting from zoonotic transmission. Common symptoms include continued, intermittent or irregular fevers, headache, weakness, sweating, chills, arthralgia, depression, weight loss, and generalized aching.[1] Brucellosis primarily occurs in those who work with infected animals or tissues.[1] Consumption of raw milk from infected cattle, sheep, and goats is another important risk factor.[1] Brucellosis is caused by *Brucella* species, usually *B. abortus*, *B. melitensis*, *B. ovis*, *B. suis*, and rarely *B. canis.*[2] Isolated cases of *B. canis* have been reported in animal handlers with contact with dogs.[1] Brucellosis is a reportable disease in Oklahoma; two cases were reported during 2009 to the Oklahoma State Department of Health. This summary describes the clinical and exposure history collected during the case investigation.

During May 2009, the OSDH Acute Disease Service (ADS) Epidemiologist-on-call was notified by the Choctaw County Health Department regarding an adult (50-59 year age group) female, Choctaw County resident, hospitalized with a three week history of intermittent fevers and right lower quadrant pain. Other symptoms included anorexia, chills, fatigue, headache, malaise, sweating, weakness, diarrhea, vomiting, and weight loss. *Brucella* species was isolated from a blood specimen indicating brucellosis. The isolate was forwarded to a public health reference laboratory where *Brucella canis* was confirmed by reverse transcriptase polymerase chain reaction (RT-PCR).

Upon interview, the individual reported owning multiple dogs, one of which gave birth to a litter of puppies during March 2009. All of the puppies died within a few hours after birth. Serum was collected from two dogs by a local veterinarian for Brucella serologic testing; both dogs had elevated antibody levels for *Brucella canis*. The case's spouse, who assisted with the delivery of the puppies, also became ill with intermittent fevers, chills, and a cough approximately one week exposure to the puppies during delivery. Paired sera specimens collected from the spouse were negative for *Brucella* antibodies; however, the individual was placed on doxycycline based on clinical presentation and exposure history. This individual was classified as a probable case of brucellosis since he had a clinically compatible presentation and was epidemiologically linked to a confirmed case.

Healthcare providers should report suspected cases of brucellosis to the OSDH ADS for investigation and coordination of submitting clinical specimens for confirmatory testing. The treatment of choice for brucellosis is combination therapy with doxycycline and rifampicin or streptomycin for at least six weeks[1]. Relapse rates can be as high as 50% with monotherapy[1]. More information on brucellosis is available at the ADS website at http://ads.health.ok.gov/.

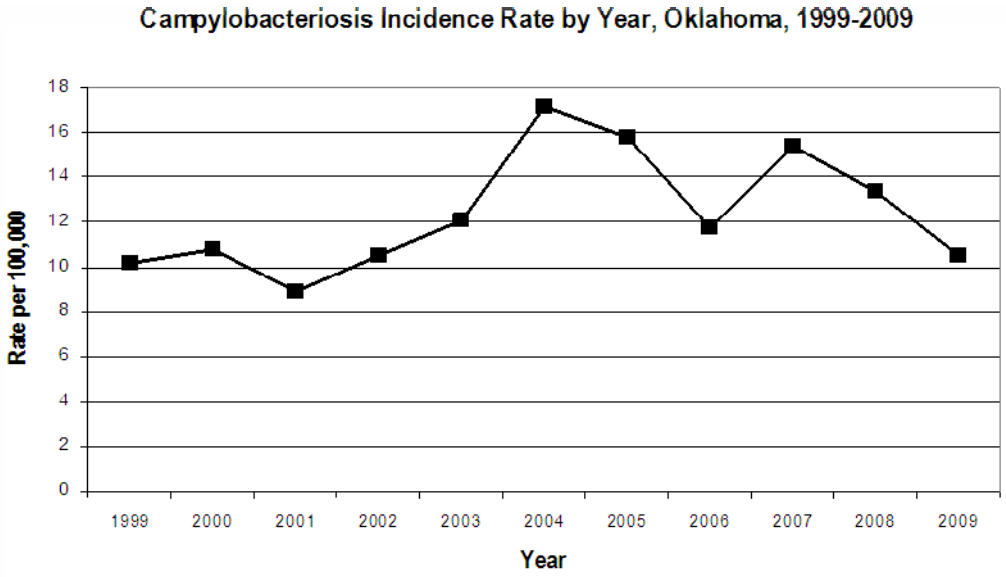
References:

[1]Heymann, David L., Editor. Control of Communicable Diseases Manual. 19th Edition. American Public Health Association, 2008.
[2] Corbel MJ Brucellosis: An overview. Emerg Infect Dis 1997;3:213–21

Campylobacteriosis

2009 Case Total	384	2009 Rate	10.5 per 100,000
2008 Case Total	486	2008 Rate	13.3 per 100,000

Campylobacteriosis is a diarrheal illness caused by *Campylobacter* species and is characterized by an acute onset of diarrhea, sometimes bloody, abdominal cramps, fever, malaise, nausea, and sometimes vomiting. In 2009, 384 cases of campylobacteriosis were reported in Oklahoma resulting in an incidence rate of 10.5 per 100,000. The number of cases reported in 2009 is a 21% decrease from the 486 cases reported in 2008. Of the 384 cases reported, 77 (16%) were identified during investigations conducted by county health department public health nurses as an ill contact to a confirmed case. Since 1999, the annual incidence rate (IR) of campylobacteriosis has steadily increased, ranging from 10.17 to 17.13 cases per 100,000. In the past three years, the incidence rate for campylobacteriosis has declined. A seasonal trend for campylobacteriosis was seen with the highest number of cases occurring during the months of May through August (N=218, 56.7%).



The age of cases ranged from 1 month to 90 years of age with a median age of 29 years. The highest IR by age group occurred among cases less than five years of age (29.3 per 100,000; N=78), followed by cases 5-9 years of age (14.1 per 100,000; N=35), and cases 40-44 years of age (12.6 per 100,000; N=29). In cases that reported one race, the highest IR occurred among cases that reported their race as Native Hawaiian or Pacific Islander (25.9 per 100,000; N=1), although only one case was reported in 2009. The second highest IR occurred among cases that reported their race as American Indian or Alaskan Native (11.7 per 100,000; N=34) followed by White (9.1 per 100,000; N=260), Asian (3.2 per 100,000; N=2) and African American (2.8 per 100,000; N=8). Forty-seven (12%) cases were hospitalized for campylobacteriosis, with no deaths due to this disease in 2009. The OSDH PHL received 118 isolates to confirm *Campylobacter* and serogroup identification representing 31% of the reported cases. Of these isolates, 78% were identified as *Campylobacter jejuni*, 17% as *C. jejuni* var. *doylei*, 4% as *C. coli*, 0.5% as *C. lari* and 0.5% as other.

The highest IR of cases occurred among residents of Tillman County (63.30 per 100,000; N=5). Other counties with high rates included Harper County (60.79 per 100,000; N=2) and Noble County (44.7 per 100,000; N=5).

Individuals reported symptoms of diarrhea (99%), abdominal cramps (82%), fever (72%), bloody diarrhea (39%), vomiting (42%), and mucus observed in stools (40%). Of the cases reported in 2009, 29 (10%) reported travel outside of the United States during the 10 days prior to their illness onset, 49 (17%) reported drinking water from a private well, 39 (10%) reported contact with cattle, and 8 (3%) reported consuming unpasteurized (raw) milk. One hundred and one (26%) cases were associated with a high-risk setting (child care setting, school, long term care facility, or food service establishment). No outbreaks due to *Campylobacter* were identified in Oklahoma during 2009.

Demographic Summary of Campylobacteriosis Cases, Oklahoma, 2009 (N=384)

	N (%)	Incidence Rate per 100,000
Gender		
Female	214 (56%)	9.1
Male	167 (44%)	11.9
Unknown	3 (0.8%)	-
Age		
Under 5	78 (20%)	29.3
5 – 9 years	35 (9%)	14.1
10 – 14 years	18 (5%)	7.5
15 – 19 years	18 (5%)	7.2
20 – 24 years	17 (4%)	6.3
25 – 29 years	29 (8%)	10.6
30 – 34 years	24 (6%)	10.7
35 – 39 years	18 (5%)	7.9
40 – 44 years	29 (8%)	12.6
45 – 49 years	27 (7%)	10.4
50 – 54 years	19 (5%)	7.6
55 – 59 years	16 (4%)	7.3
60 – 64 years	19 (5%)	10.2
65 + years	31 (8%)	6.3
Unknown	6 (2%)	-
Age	Median 29 years (range 1 month – 29 years)	
Race		
White	260 (68%)	9.1
American Indian or Alaska Native	34 (9%)	11.7
African American or Black	8 (2%)	2.8
Asian	2 (0.5%)	3.2
Native Hawaiian or Other Pacific Islander	1 (0.3%)	25.9
Two or More Races	10 (3%)	6.8
Unknown	69 (18%)	-
Hispanic Ethnicity	41 (11%)	14.7

Chlamydia

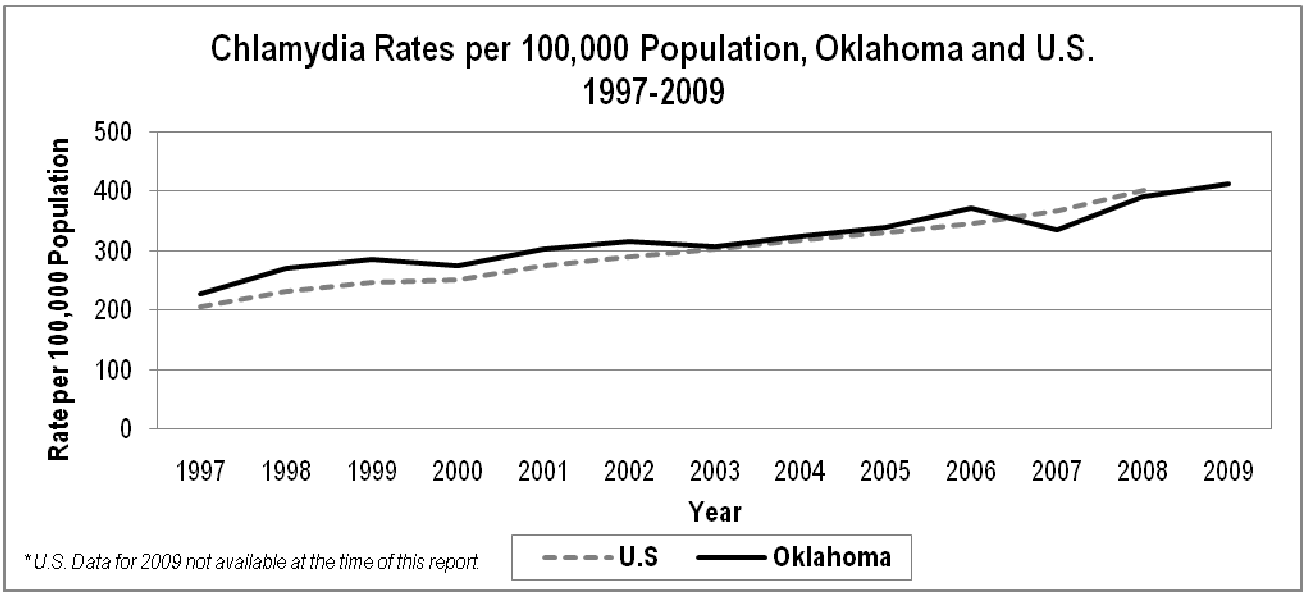
2009 Case Total	14,991	2009 Rate	412 per 100,000
2008 Case Total	14,173	2008 Rate	389 per 100,000

Chlamydia is the most commonly reported notifiable sexually transmitted disease (STD) in the United States and Oklahoma. Caused by the bacterium *Chlamydia trachomatis*, it is the most prevalent STD in Oklahoma accounting for 74% of reported STDs in Oklahoma for 2009. 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's eyes during a vaginal birth. The resulting ophthalmic infection can ultimately result in the infant's blindness. Men infected with chlamydia may have penile discharge while about 1%-25% of men infected are asymptomatic. Possible complications of male infections include epididymitis, infertility, and Reiter Syndrome (reactive arthritis). In men, receptive anal intercourse may result in chlamydial proctitis.

Oklahoma mandated chlamydia reporting in 1988, when 2,714 cases were reported. In 2009, a total of 14,991 cases were reported. The rate of chlamydia in Oklahoma increased 5.5% between 2008 and 2009, which follows a trend of increasing chlamydia morbidity in Oklahoma and the U.S. since 1997. Possible reasons for this increase could be better reporting, more sensitive diagnostic tests, or an actual increase in the disease. Oklahoma had an incidence rate of 412 per 100,000 in 2009 with 74% of the reported cases being female. Women go to the doctor more frequently than men due to yearly exams and pregnancy and could account for some of the substantial gap in the gender of reported chlamydia cases.

While Oklahoma county had the highest number of reported cases, Comanche county had the highest rate at 923 per 100,000, followed by Oklahoma county (592 per 100,000) and Tulsa county (569 per 100,000). Comanche county had a 27% increase between 2008 and 2009, while Oklahoma and Tulsa counties had rates similar to 2008. Chlamydia occurs in all ages, but age groups 15 to 19 years (2,143 per 100,000) and 20 to 24 years (2,110 per 100,000) had the highest rates among all the age groups. Although all age groups had an increase from 2008 to 2009, age group "less than 10 years old" had the highest rate increase at 5.1 per 100,000, 54% higher than 2008 (12 to 26 cases).

Hawaiian/Pacific Islanders had the highest rate among all racial groups of 1,657 per 100,000 but represented only 64 cases in 2009, a 47% increase from 2008. The Black/African American population had the second highest rate with a rate of 1,562 per 100,000; 7 times higher when compared to the White population (222 per 100,000). Native Americans had the third highest rate (513 per 100,000), which was 2.3 times higher than Whites. Hispanics had a rate of 448 per 100,000 in 2009, which represents a 24% increase from 2008.



Chlamydia Cases and Rates by Demographics for 2009, Oklahoma		
	Number (%)	Incidence Rate per 100,000
Gender *(N= 14,991)*		
Male	3,881 (25.9%)	215.75
Female	11,069 (73.8%)	600.43
Age Groups *(N= 14,991)*		
< 10 Years	26 (0.2%)	5.05
10 to 14	181 (1.2%)	75.69
15 to 19	5,397 (36%)	2,142.69
20 to 24	5,702 (38%)	2,110.28
25 to 29	2,362 (15.8%)	861.28
30 to 34	777 (5.2%)	346.85
35 to 39	314 (2.1%)	136.95
40 to 44	119 (0.8%)	51.84
45 TO 49	51 (0.3%)	19.59
> 50 Years	62 (0.4%)	5.40
Race *(N= 14,991)*		
American Indian/Alaska Native	1,495 (10%)	513.06
Asian	103 (0.7%)	164.09
Black/African American	4,531 (30.2%)	1,562.45
White	6,327 (42.2%)	222.30
Hawaiian/Pacific Islander	64 (0.4%)	1,656.74
Multiple Race	148 (1.0%)	99.89
Other	255 (1.7%)	N/A
Unknown	2,068 (13.8%)	N/A
Ethnicity *(N= 1,248)*		
Hispanic	1,248 (8.3%)	447.92

Cryptosporidiosis

2009 Case Total	141	2009 Rate	3.9 per 100,000
2008 Case Total	238	2008 Rate	6.5 per 100,000

One hundred forty-one cases of cryptosporidiosis were reported to the OSDH resulting in an incidence rate of 3.9 per 100,000. The number of cases reported in 2009 was a 40.8% decrease compared to the 238 cases reported during 2008. Of the 141 reported cases, 127 (90.1%) were laboratory-confirmed cases of cryptosporidiosis and 14 were symptomatic exposed contacts to a confirmed case identified during public health investigations conducted by county health department Communicable Disease Nurses. Among cases in 2009, predominant symptoms included diarrhea (96.9%, N=133), watery diarrhea (89.8%, N=128), abdominal cramps (85.2%, N=122), and weight loss (56.3%, N=112). The duration of diarrhea ranged from one day to 150 days with a median of 9.5 days; the median number of loose stools within a 24 period was 7 with a range from two to 24. Twenty-four cases were hospitalized and no deaths were reported.

The incidence rate of cryptosporidiosis in those under the age of 10 years of age (8.0 per 100,000 population) was twice the overall state rate. Twenty-one (14.8%) cases reported working in or attending a childcare setting. Fourteen (9.9%) cases reported out-of-state travel and 11 reported international travel to various countries including Mexico, Azerbaijan, Canada, Ethiopia, Sierra Leone, and the Dominican Republic. A seasonal trend was observed in 2009 with the majority of cases (54.6%) reporting a symptom onset during the months of July, August, and September. The highest incidence rates of cryptosporidiosis occurrence among residents of Carter (39.6 per 100,000) and Love Counties (32.8 per 100,000). No outbreaks of cryptosporidiosis were reported in Oklahoma in 2009. For more information about preventing cryptosporidiosis and other waterborne diseases, visit http://ads.health.ok.gov.

Summary Statistics Cryptosporidiosis in Oklahoma, 2009 (N=141)

	Number (%)	Rate/100,000
Gender (N=138)		
Female	76 (55.1%)	4.1
Male	62 (44.9%)	3.4
Age (median and range)	Median = 28 years Ranged: 4 months – 98 years	--
Age Groups (N=141)		
Less than 10 years	41 (29.1%)	8.0
10-19	11 (7.8%)	2.2
20-29	24 (17.0%)	4.4
30-39	16 (11.3%)	3.5
40-49	12 (8.5%)	2.4
50-59	9 (6.4%)	1.9
60-69	13 (9.2%)	3.9
70-79	8 (5.7%)	3.9
80 years of age and older	7 (5.0%)	5.0
Race (N=129)		
White	112 (86.8%)	3.9
Black or African American	10 (7.8%)	3.4
American Indian or Alaskan Native	4 (3.1%)	1.4
Asian	2 (1.6%)	3.2
Two or more Races	1 (0.7%)	0.7
Ethnicity (N=115)		
Hispanic	8 (7.0%)	2.9
Hospitalized (N=28)	24 (85.7%)	--

Ehrlichiosis

2009 Case Total	147	2009 Rate	4.0 per 100,000
2008 Case Total	121	2008 Rate	3.3 per 100,000

One hundred forty-six cases of ehrlichiosis were reported to the OSDH during 2009 resulting in an incidence rate of 4.0 per 100,000 population. The number of cases reported in 2009 is a 17% increase compared to the number of cases reported in 2008. There are two forms of human ehrlichiosis that primarily occur in the U.S., human monocytic ehrlichiosis (HME) and human granulocytic anaplasmosis (HGA). HME is the most common form of ehrlichiosis reported in Oklahoma. Eastern Oklahoma had higher incidence rates of ehrlichiosis due to its higher tick population. The counties with the highest rates of disease in 2009 were Pushmataha county (42.7 per 100,000), followed by Pittsburg county (26.6 per 100,000 population). The majority of the cases occurred during the warmer months of the year. All cases in Oklahoma were reported during the months of March through October. Thirty-eight percent of cases required hospitalization; one death due to ehrlichiosis was reported during 2009.

Sixty-three percent of cases occurred among males resulting in an incidence rate 1.7 times higher than the rate among females (refer to table below). Those who reported their race as Native American/Alaska Native had the highest incidence rates of disease at 9.27 per 100,000 population. This is almost 3 times higher than those who reported their race as white.

Serologic testing is the most widely available and frequently used laboratory method for diagnosis. It is important to test for both IgM and IgG antibody levels. Collection of acute (within a week of onset) and convalescent (2 to 4 weeks later) specimens are recommended for confirming the diagnosis by detection of a four-fold change in antibody titers. Treatment for ehrlichiosis should be initiated before lab confirmation, when there is high suspicion of tickborne illness, to reduce the severity of disease. Doxycycline is the primary drug of choice for the treatment of ehrlichiosis.[1]

Demographic and Clinical Summary of Reported Ehrlichiosis Cases, Oklahoma, 2009 (N=147)

	Frequency (%)	Rate/100,000
Gender		
Male	92 (63%)	5.11
Female	55 (37%)	2.93
Age	Median 44 Years (Range 4 months-87 Years)	--
Hospitalization	37 (25%)	--
Race		
White	90 (61%)	3.13
Native American/Alaska Native	27 (18%)	9.27
Black	4 (3%)	1.38
2 or more Races	5 (4%)	3.37
Unknown race	21(14%)	--
Symptoms		
Fever	147(100%)	--
Headache	104 (71%)	--
Myalgia	97 (66%)	--
Anorexia	83 (56%)	--
Rash	38 (26%)	--
Reported Exposures		
Exposed to a Wooded Area	101 (69%)	--
Tickbite	84 (58%)	--

[1]Heymann, M.D., Control of Communicable Diseases Manual 19th Edition, APHA, 2008. Ehrlichiosis, pp 212-215.

Shiga toxin producing *Escherichia coli* (STEC)

2009 Case Total	64	2009 Rate	1.76 per 100,000
2008 Case Total	135	2008 Rate	3.71 per 100,000

The most common serotype of Shiga toxin producing *E. coli* (STEC) reported nationally continues to be *E. coli* O157:H7.[1] Other less common serotypes are also reportable and the number reported yearly is rising. This increase may be partially due to more widely used laboratory tests that identify other serotypes of STEC beyond O157:H7. In 2009, 64 cases of STEC were reported to OSDH resulting in an incidence rate of 1.76 per 100,000 persons. This is a 53% decrease from the 135 cases reported in 2008. The higher number of cases that occurred during 2008 compared to 2009 can be attributed to additional cases associated with the *E. coli* O111 outbreak that occurred in northeastern Oklahoma during August and September 2008. Eighty-seven (64%) of the 135 cases reported during 2008 were associated with the *E. coli* O111 outbreak.

STEC cases in 2009 occurred among residents of 27 Oklahoma counties. The five counties with the highest incidence rates were Tillman County (25.3 per 100,000), Grant County (22.5 per 100,000), Jackson County (11.8 per 100,000), Custer County (11.4 per 100,000), and Mayes County (10 per 100,000). Cases ranged in age from 4 months to 71 years with a median of 10 years. The highest incidence rates occurred among males less than five years of age with an incidence of 10.3 per 100,000. The second highest incidence rates occurred among females less than five years of age (8.4 per 100,000). The highest incidence by racial background occurred among persons who reported their race as White (1.76 cases per 100,000).

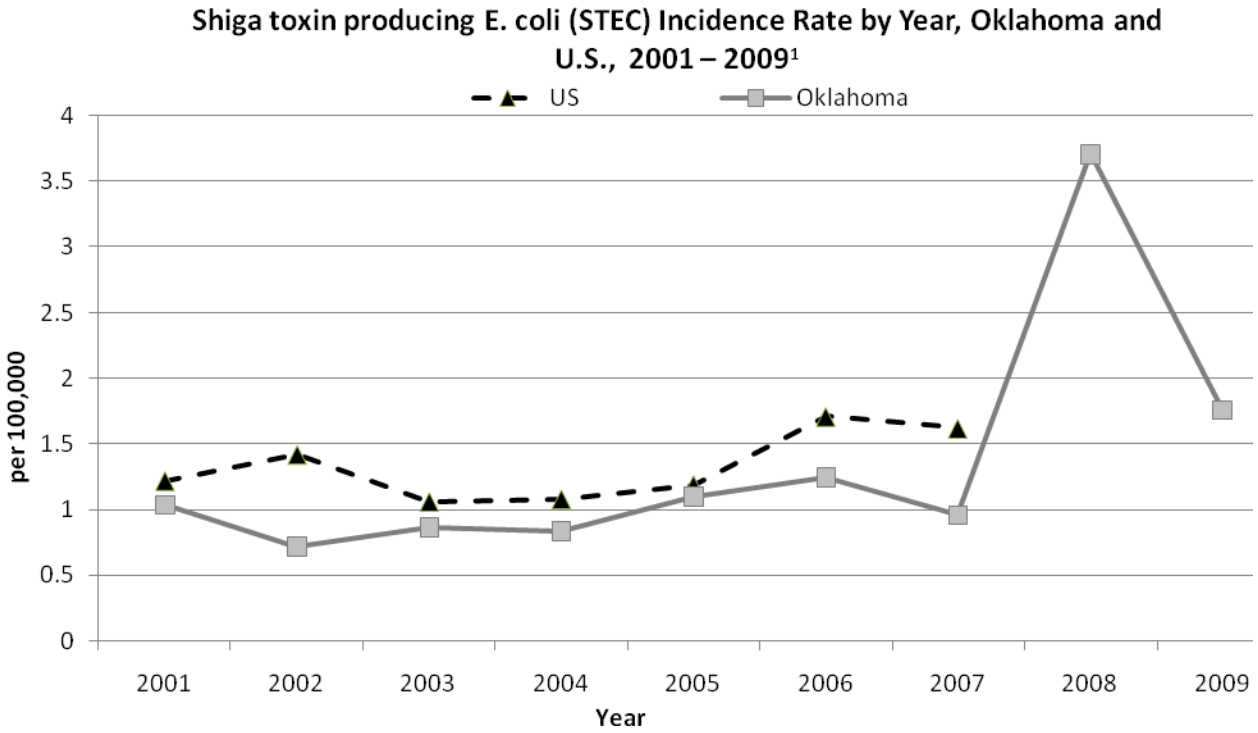
Demographic and Clinical Summary of STEC Cases, Oklahoma, 2009 (N=64)

	Number (%)	Incidence Rate per 100,000
Gender		
Female	30 (47%)	1.63
Male	34 (53%)	1.89
Age	Median 9.5 years (range 4 month – 71 years)	
Race		
White	50 (78%)	1.76
American Indian or Alaska Native	7 (11%)	2.4
African American or Black	1 (2%)	0.34
Two or More Races	3 (5%)	2.02
Unknown	3 (5%)	-
Hispanic Ethnicity	3 (5%)	1.08
Hospitalized	22 (34%)	-

[1] Centers for Disease Control and Prevention. [Summary of notifiable diseases—United States, 2007]. Published July 9, 2009 for MMWR 2007;56(No. 53):68.

The most common symptoms reported by STEC cases included diarrhea (98%), abdominal cramps (86%), bloody stools (63%), nausea (57%), and vomiting (47%). Twenty-two (34%) cases were hospitalized for their illness with the majority of hospitalizations occurring among cases less than 5 years of age (41%). Eleven (17%) cases developed hemolytic uremic syndrome (HUS) as a consequence of their illness.

All suspected STEC isolates are required to be forwarded to the OSDH PHL for confirmation and serogroup identification. In 2009, STEC isolates were forwarded to the OSDH PHL for 61 (95%) of 64 cases. Of the 61 isolates, 29 (45%) were confirmed *E. coli* O157:H7 and 32 (50%) were confirmed STEC non-O157.



*US Rates not available for 2008 and 2009

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Giardiasis

2009 Case Total	175	2009 Rate	4.80 per 100,000
2008 Case Total	172	2008 Rate	4.72 per 100,000

One hundred seventy-five cases of giardiasis were reported to the OSDH resulting in an incidence rate of 4.80 per 100,000. Of the 175 cases reported, 13 (7%) were epidemiologically linked cases identified during investigations conducted by the county communicable disease nurse. Unlike most other enteric diseases, which can have seasonal peaks, giardiasis infections occurred throughout the year with no seasonal trend observed. No outbreaks due to *Giardia* were identified in Oklahoma during 2009. Cases ranged in age from nine months to 91 years with a median age of 32 years. Children under the age of 5 had the highest incidence rate at 13.88 per 100,000 population (refer to table).

Giardiasis should be suspected when a patient experiences an illness characterized by chronic diarrhea, pale and greasy stools, and weight loss. Direct examination and identification of cysts or trophozoites in stool (ova and parasite test) is the most widely available and frequently used laboratory method for diagnosis. Because of intermittent shedding of the parasite, three negative specimens are needed to rule out the diagnosis.

Demographic and Clinical Summary of Reported Giardiasis Cases, Oklahoma, 2009 (N=175)

	Frequency (%)	Rate/100,000
Gender		
Male	88 (50%)	4.89
Female	87 (50%)	4.72
Age	(Range: 9 months-91 Years) Median= 32 Years	
Age groups		
Less than 5 years	37 (21%)	13.88
5-9	17 (10%)	6.85
10-19	14 (8%)	2.85
20-29	14 (8%)	2.57
30-39	15 (9%)	3.31
40-49	27 (15%)	5.51
50-59	23 (13%)	4.88
60 -69	18 (10%)	5.43
70+	10 (6%)	2.89
Hospitalized	25 (14%)	--
Race		
White	116 (66%)	4.08
Native American/Alaska Native	7 (4%)	2.40
Black/African American	10 (6%)	3.45
Asian	2 (1%)	3.19
Hawaiian/Pacific Islander	2 (1%)	51.77
Multi-Race	5 (3%)	3.37
Unknown	33 (19%)	--
Reported Symptoms		
Watery Diarrhea	92 (53%)	--
Abdominal Cramps	80 (46%)	--
Weight Loss	61 (35%)	--

Gonorrhea

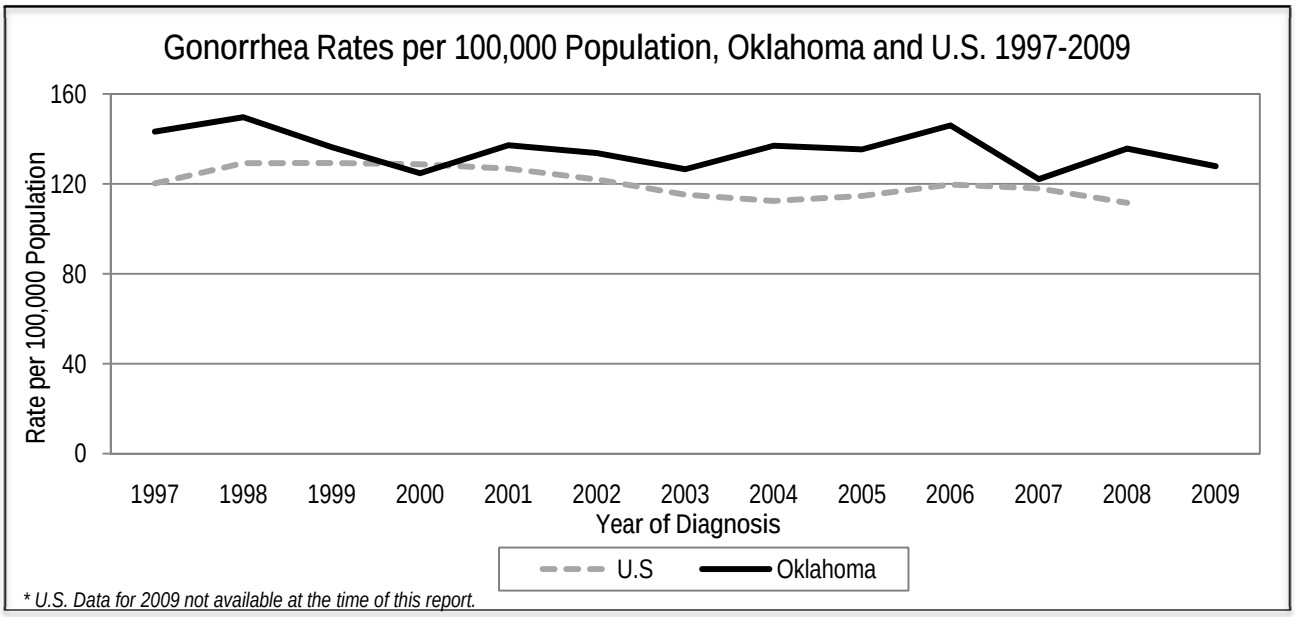
2009 Case Total 4,661 — 2009 Rate 128.0 per 100,000
2008 Case Total 4,945 — 2008 Rate 135.8 per 100,000

Gonorrhea is the second most prevalent sexually transmitted disease reported in Oklahoma after Chlamydia. Gonorrhea is caused by *Neisseria gonorrhea*, 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 eventually 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.

Oklahoma mandated gonorrhea reporting in 1943, when 4,715 cases were reported. Reported gonorrhea cases increased until 1982 when numbers started to slowly drop following a national decline due to the implementation of a national gonorrhea control program in the mid-1970s. In 2009, a total of 4,661 cases were reported in Oklahoma, approximately a 6% decrease from 2008, which follows a trend of relatively stable gonorrhea morbidity in Oklahoma and the U.S. since 1997. Oklahoma had an incidence rate of 128 per 100,000 in 2009 with 60% of the reported cases being female. In 1989, men made up the majority of gonorrhea cases in the U.S., but since 2002 women have made up the majority of cases. Oklahoma has followed a similar trend.

While Oklahoma county had the highest number of reported cases, Choctaw county had the highest rate at 275 per 100,000, followed by Oklahoma county (246 per 100,000) and Tulsa county (244 per 100,000). Choctaw County had a 44% rate increase between 2008 and 2009, while Oklahoma County decreased by 14% and Tulsa County increased by 2.6%. Gonorrhea occurs in all ages, but age groups 20 to 24 years (616 per 100,000) and 15 to 19 years (544 per 100,000) had the highest rates among all the age groups. Although most age groups had a rate decrease from 2008 to 2009, the 10 to 14 age group had the only rate increase at 21 per 100,000, 12% higher than 2008 (44 to 50 cases).

The Black/African American population had the highest rate among all racial groups with a rate of 869 per 100,000; 20 times higher when compared to the White population (43 per 100,000). Native Americans had the second highest rate (113 per 100,000) which was 2.6 times higher than Whites. Hawaiian/Pacific Islanders had a rate of 285 per 100,000 but represented only 11 cases in 2009, a 46% increase from 2008. Hispanics had a rate of 69 per 100,000 in 2009, which represents a 7.8% increase from 2008. The Black/African American population had the greatest decrease in gonorrhea rate, an 11.2% decrease from 2008.



Gonorrhea Cases and Rates by Demographics for 2009, Oklahoma		
	Number (%)	Incidence Rate per 100,000
Gender *(N= 14,991)*		
Male	1,861 (39.9%)	103.46
Female	2,793 (59.9%)	151.50
Age Groups *(N= 14,991)*		
< 10 Years	6 (0.1%)	1.17
10 to 14	50 (20.91%)	20.91
15 to 19	1,370 (29.4%)	543.91
20 to 24	1,664 (35.7%)	615.84
25 to 29	818 (17.5%)	298.28
30 to 34	363 (7.8%)	162.04
35 to 39	162 (3.5%)	70.66
40 to 44	93 (2.0%)	40.51
45 TO 49	54 (1.2%)	20.74
> 50 Years	81 (1.7%)	7.05
Race *(N= 14,991)*		
American Indian/Alaska Native	330 (7.1%)	113.25
Asian	19 (0.4%)	30.27
Black/African American	2,519 (54.0%)	868.64
White	1,216 (26.1%)	42.72
Hawaiian/Pacific Islander	11 (0.2%)	284.75
Multiple Race	70 (1.5%)	47.25
Other	55 (1.2%)	N/A
Unknown	441 (9.5%)	N/A
Ethnicity *(N= 1,248)*		
Hispanic	193 (4.1%)	69.27

Haemophilus influenzae Invasive Disease

2009 Case Total	92	2009 Rate	2.53 per 100,000
2008 Case Total	90	2008 Rate	2.47 per 100,000

Invasive *Haemophilus influenzae* (*H. flu*) disease is a reportable condition in Oklahoma, and all *H. flu* sterile-site isolates are required to be submitted to the OSDH Public Health Laboratory (PHL) for confirmation and serotype identification. Ninety-two cases of invasive *H. flu* were reported to the OSDH during 2009 resulting in an incidence rate of 2.53 per 100,000 population, a 2.2% increase from 2008. *H. flu* isolates are serotyped based on the presence of a capsule (serotype a-f) or absence of a capsule (non-typeable). Both capsulated and nonencapsulated isolates have the ability to cause severe disease. Seventy-six (83%) isolates were available for serotype identification by the PHL. Of the 76 isolates, 45 (59%) were non-typeable, 12 (16%) were serotype f, 6 (8%) were serotype e, 5 (7%) were serotype a, 4 (5%) were serotype b, 3 (4%) were serotype d and 1 (1%) was serotype c.

Cases of invasive *H. flu* in 2009 ranged in age from 1 day to 92 years with a median age of 63 years. The highest age-specific incidence rates per 100,000 population occurred among persons 80 years and older (refer to graph). Thirteen (14%) cases occurred among children less than five years of age, an age-specific incidence rate of 4.88 per 100,000 population. The highest race-specific incidence rate occurred among persons who reported their race as Black (3.45 per 100,000) followed by persons who reported their race as White (2.42 per 100,000). The highest proportion of cases occurred during the winter months, with 43 (47%) of cases occuring in January, February, November, and December.

When a case of Hib is identified, an investigation is immediately initiated to identify all close contacts less than 4 years of age to confirm age-appropriate Hib vaccination history and recommend chemophrophylaxis to susceptible contacts. Exposed children who are less than 4 years of age and are either unvaccinated or have not yet received the full primary series of the Hib vaccine are recommended by OSDH to receive chemoprophylaxis to eradicate carriage of the organism. A total of four cases were serotype b, two cases in children less than five, the first cases of *H. influenzae* type b (Hib) in children <5 years in Oklahoma since 1998.

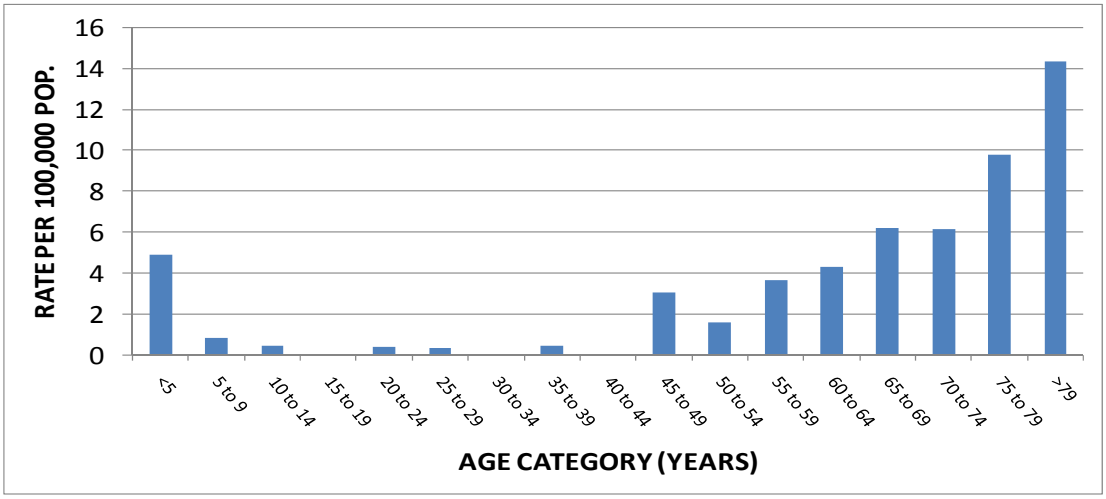
The first case of Hib was a 4 month-old male with a history of chronic lung disease and presented with apnea, sepsis, and pneumonia. The child had received one dose of Hib-containing vaccine at 2 months of age. Investigation identified two siblings, both current on Hib vaccine. No high-risk setting was identified, and antibiotic prophylaxis was not recommended for contacts of this case. The second case was a 2 month-old female found unresponsive and later expired. Hib was isolated from a blood specimen. She received her first dose of Hib containing vaccine 5 days prior to her death. Case investigation revealed a twin and older sibling in the household, with recent history of attending a child care setting. Post-exposure chemoprophylaxis was recommended for the household members since the twin was incompletely vaccinated, and a child care setting investigation was conducted to verify vaccination status of attendees <5 years of age and offer Hib vaccination for those eligible. Of the 20 other children who attended the childcare setting, one was undervaccinated for Hib and five had not received the recommended booster dose. The local county health department worked with parents and their physicians to provide Hib vaccination for these six children. No secondary cases were identified with either investigation.

Descriptive Summary of Reported *Haemophilus influenzae* Invasive Disease Cases, Oklahoma, 2009 (N=92)

	Frequency (%)	Rate/100,000
Gender		
Male	47 (51%)	2.61
Female	45 (49%)	2.44
Age	Median Age: 63 years (Range: 1 day – 92 years)	
Hospitalized for *H. flu*	57 (62%)	--
Deaths to *H. flu*	12 (13%)	--
Race		
White	69 (75%)	2.42
Black	10(11%)	3.45
American Indian	2 (2%)	0.69
Asian	1 (1%)	1.59
Two or more races	1 (1%)	0.67
Unknown race	9 (10%)	--
Hispanic Ethnicity	6 (7%)	2.15
Infection Types**		
Bacteremia/sepsis	87 (97%)	--
Meningitis	3 (5%)	--
Pneumonia	53 (58%)	--
Other Infection	3 (3%)	--
Cases <5 years of age	13 (14%)	4.88
Serotype b	2 (15%)	--

**Infection types not mutually exclusive

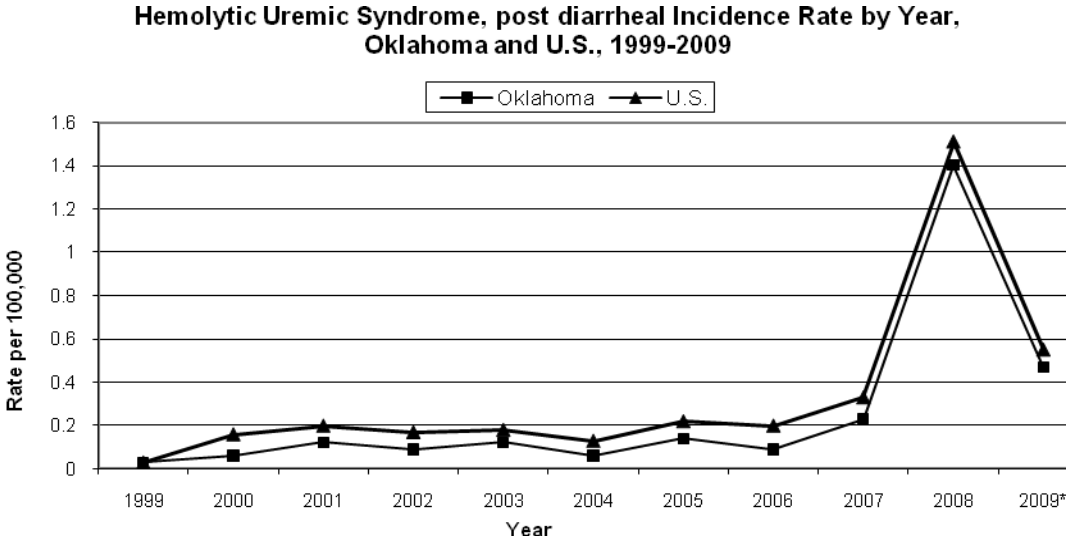
Incidence Rate of Reported Invasive *Haemophilus influenzae* Cases by Age Group, Oklahoma, 2009 (N=92)



Hemolytic Uremic Syndrome, post diarrheal

2009 Case Total	17	2009 Rate	0.47 per 100,000
2008 Case Total	51	2008 Rate	1.40 per 100,000

Hemolytic Uremic Syndrome (HUS) is a condition characterized by an acute onset of microangiopathic hemolytic anemia, renal injury and thrombocytopenia with the majority of HUS cases preceded by a diarrheal illness. In 2009, 17 cases of HUS were reported in Oklahoma with an incidence rate of 0.47. This is a 67% decrease from the 51 cases reported in 2008. HUS became a nationally notifiable disease in 2000 and since that time Oklahoma's incidence rate has been similar to the national incidence. The increase in the number of cases during 2008 was attributed to an *E. coli* O111 outbreak that occurred in northeastern Oklahoma in August and September of 2008.



* 2009 Preliminary Incidence Rate

Case-patient ages ranged from 12 months to 52 years of age with a median of 6 years. The highest incidence rate occurred among persons less than 5 years of age (3 per 100,000; N=8), followed by cases 5-9 years of age (1.6 per 100,000; N=4), and 15-19 years of age (0.79 per 100,000; N=2). The highest race-specific incidence rate occurred among persons who reported their race as Native American/Alaskan Native (0.69 per 100,000; N=2) followed by White (0.53 per 100,000; N=15). Hispanic ethnicity was not reported by any cases. The number of reported cases among males (0.50 per 100,000) and females (0.43 per 100,000) were similar. Cases occurred among residents of 14 Oklahoma counties.

Symptoms reported by cases included diarrhea (100%), abdominal cramps (94%), blood in stools (88%), vomiting (88%), and fever (71%). Sixteen (94%) of the 17 cases were hospitalized for HUS; hospitalization status was unknown for one case. Two cases died from HUS resulting in a case-fatality rate of 12%. Identification of HUS is made through evaluation of a combination of laboratory test results. Anemia with microangiopathic changes shown on a peripheral blood smear was documented for 15 (88%) of the cases. Of those with microangiopathic changes, schistocytes were most commonly seen (87%) compared to burr cells (26%) and helmet cells (27%). Hematuria was reported in 71% of cases; with proteinuria in 76% of cases. Additionally, elevated creatinine was documented for 94% of cases and thrombocytopenia in 100% of cases. An etiologic agent was identified in 8 (47%) of the 17 cases, which were *E. coli* O157:H7 and *E. coli* O111 with results confirmed by the OSDH PHL.

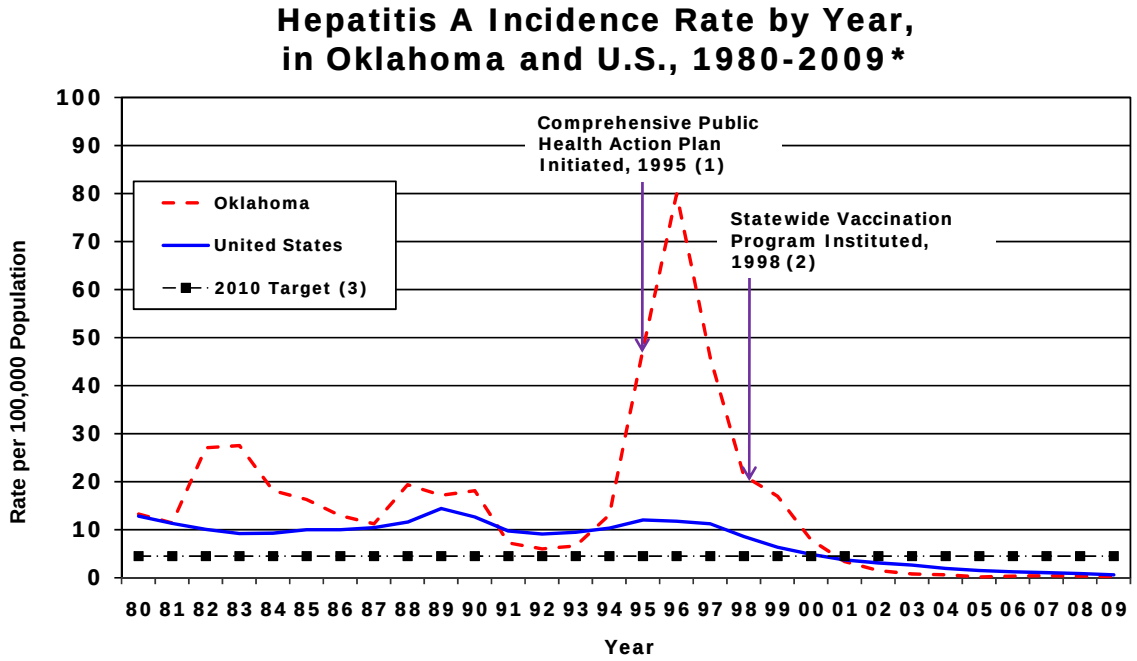
Hepatitis A

2009 Case Total	6	2009 Rate	0.16 per 100,000
2008 Case Total	13	2008 Rate	0.36 per 100,000

Since the Hepatitis A epidemic that took place in Oklahoma from 1995 through 1997, with the peak in 1996 of 2516 cases (rate = 79.99 per 100,000), the incidence of hepatitis A in the state has dramatically declined. The number of cases has been less than 20 per year since 2004; six cases were reported to OSDH in 2009 resulting in an incidence rate of 0.16 per 100,000 (refer to graph).

Two cases were associated with high-risk settings in 2009: one child care setting and one food service employee. No secondary cases were identified during the investigations. Three cases were hospitalized, and none of those expired. None of the seven cases had a history of hepatitis A vaccination.

A total of 15 close contacts were identified (median 3.5, range 0–6 per case) who did not have evidence of immunity through previous testing or history of vaccination, and therefore required post exposure prophylaxis (PEP). The county health departments provide PEP to those identified as close contacts to confirmed hepatitis A cases. In 2007, PEP guidelines were revised by the Advisory Committee on Immunization Practices (ACIP), limiting the use of immunoglobulin (IG) and expanding the use of the hepatitis A vaccine. For persons from 12 months to 40 years of age, the hepatitis A vaccine is now the preferred method of PEP. IG remains the recommended PEP for persons less than 12 months of age, greater than 40 years of age, and for those who are immunocompromised or who have chronic disease such as liver disease or other chronic medical conditions.[1]



[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.

* 2008 and 2009 U.S. data are provisional based on CDC, MMWR 2009;58:[1446-1469]

Hepatitis A should be considered in unvaccinated persons with hallmark symptoms of jaundice, very dark urine and/or clay-colored stools (refer to table for symptoms reported by cases), particularly those with recent exposure to high-risk regions through travel or residence. One case (17%) reported international travel during their exposure period.

A positive hepatitis A IgM titer indicates current infection, although false positive tests are common.[2] Healthcare providers should restrict testing for hepatitis A to those clients with clinical evidence of acute hepatitis A infection. Liver function tests are usually markedly elevated in confirmed cases. Of the five 2009 cases with known liver function test results, the median ALT was 1766 (range 101 – 4225), median AST of 1122 (range 82 – 3145), and median total bilirubin was 5.5 (range 0.2 – 16.8).

The hepatitis A vaccine is routinely recommended for individuals 2 years of age or older, and the two-dose regimen is required for entry into childcare or grade school in Oklahoma.

The CDC Travelers' Health website has recommendations regarding hepatitis A prevention for those traveling out of the US, and can be accessed at the website www.cdc.gov/travel/index.htm.

Demographic and Clinical Summary of Reported Hepatitis A Cases, Oklahoma, 2009 (N=6)

	Number (%)	Rate per 100,000
Gender		
Female	4 (67%)	0.22
Male	2 (33%)	0.11
Age	Median = 34 years (range: 28-60 years)	
Race (n = 5)		
White	3 (60%)	0.11
African American	0	-
American Indian or Alaska Native	1 (20%)	0.34
Asian	1 (20%)	1.59
Hispanic or Latino Ethnicity	1 (17%)	0.36
Hallmark symptoms (not exclusive)		
Jaundice (N = 6)	5 (83%)	-
Dark Urine (N = 6)	4 (67%)	-
Clay-colored stool (N = 5)	3 (60%)	-
Hospitalized for this disease	3 (50%)	-
Recent travel out of country	1* (17%)	-

* South Central Asia (Nepal)

References:

1. Centers for Disease Control and Prevention Update: Prevention of Hepatitis A After Exposure to Hepatitis A Virus and in International Travelers. Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2007;56:[1080-1084], available at http://www.cdc.gov/mmwr/PDF/wk/mm5641.pdf
2. 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).

Hepatitis B

2009 Case Total	122	2009 Rate	3.3 per 100,000
2008 Case Total	129	2008 Rate	3.7 per 100,000

Reported numbers of acute hepatitis B cases in Oklahoma decreased by 5.4% from 2008 to 2009. This is a decline for the second year in a row. Continuation of the Hepatitis Vaccine Initiative—a collaborative effort of the Oklahoma State Department of Health (OSDH), the Oklahoma Department of Corrections, and the Centers for Disease Control—may be a factor in the reduction of reported cases. The OSDH has also partnered with a metro area medical clinic for the homeless to provide combination hepatitis A/B vaccines to a high risk population.

Sixty-four of the 122 acute hepatitis B cases (52%) were males; fifty-eight (48%) were female. Racial breakdown as reported to the PHIDDO system is as follows: 79 whites (2.8 per 100,000), 24 American Indians and Alaska Natives (8.2 per 100,000), 6 Black or African Americans (2.1 per 100,000), 2 Asians (3.1 per 100,000), 1 Hawaiian/Other Pacific Islander (25.9 per 100,000) and 10 cases reported as Unknown race.

Sixty-four (52%) of the total number of acute cases reported a risk factor of 2 or more sexual partners. Thirty-eight of these 64 respondents reported >5 sexual partners.

Perinatal Hepatitis B

2009 Case Total	95
2008 Case Total	67

The Perinatal Hepatitis B Program identified 95 babies born to hepatitis B surface antigen positive women in Oklahoma in 2009. This is a 42 percent increase over last year's figure of 67 births. There are several likely explanations for this increase--better disease reporting as more laboratories are submitting their results electronically; a greater awareness of the disease; and an increase in persons from areas where the disease is endemic (ex: Sub-Saharan Africa and Southeast Asia).

According to Oklahoma's population demographics the CDC estimated that we should have had approximately 160 cases reported in 2009. We will likely see the number of deliveries to hepatitis B positive women continue to increase in the future. This may seem alarming but chronic cases of hepatitis B have remained fairly constant and the way to decrease the future number of patients with disease is to increase our awareness of this population and vaccinate infants appropriately.

The CDC recommends a "universal birth" dose policy for all delivery hospitals. Currently in Oklahoma we have 76 delivery hospitals and only 50% of them have a universal or a standing order for administration of hepatitis B vaccine to infants before discharge.

It is recommended that infants born to hepatitis B positive women be given hepatitis B immune globulin (HBIG) and hepatitis B vaccine within 12 hours of birth. Seventy-seven percent of babies born received both injections within 12 hours, eighty-five percent received both injections within 24 hours and ninety-two percent received both injections within 48 hours of birth. Fifty-two percent of infants had received HBIG and all three hepatitis B vaccines by 12 months of age. Twenty-one percent of the infants in the data base were serologically tested by 15 months of age.

The ages of the women who were hepatitis B surface antigen positive and who delivered infants ranged from 16 to 44 years. Fifty-eight percent of delivering women were between 30 and 40 years of age. Thirty-nine percent were between 20 and 30 years of age and three percent were under 20 years of age.

Hepatitis C

2009 Case Total	27	2009 Rate	0.7 per 100,000
2008 Case Total	21	2008 Rate	0.6 per 100,000

Hepatitis C can be either acute or chronic but the Centers for Disease Control and Prevention (CDC) currently collects only reports of acute hepatitis C infection. The acute form is a short-term illness that occurs within the first 6 months after a person is exposed to the hepatitis C virus (HCV) which causes hepatitis C. However, the disease can become chronic and people who received a blood transfusion before 1992 or past or current injection-drug users are at risk for chronic hepatitis C and should be screened for the disease. Chronic HCV infection progresses slowly over the course of 15-30 years and can lead to cirrhosis of the liver or liver cancer. Eight thousand to ten thousand deaths occur annually in the United States as a result of chronic HCV infection.

For 2009, confirmed cases of acute hepatitis C reported to the Oklahoma State Department of Health Hepatitis Program reflected a 29% increase, from 21 cases in 2008 to 27 cases in 2009. Based on the most current CDC data, 2007, Oklahoma's case rate (0.7 per 100,000) is above the national rate (0.3 per 100,000) for confirmed cases of acute hepatitis C. Eleven (41%) of the total cases were located in three large metropolitan counties—Oklahoma, Tulsa and Cleveland.

Cases of acute hepatitis C ranged in age from 18 years to 54 years. The highest number of cases, 12 (44%), occurred in the 25-34 year age group. Age groups of the remaining cases were as follows: one (3%) 18 years of age, two (7%) 20 to 24 years, seven (26%) 35 to 44 years, and five (19%) 45 to 54 years. There were 15 females (56%) and 12 males (44%) infected with confirmed acute hepatitis C. The confirmed acute hepatitis C cases broken down by race were: whites 20 (0.7 per 100,000), Native Americans 4 (1.4 per 100,000), and unknown race 3.

CDC states that "of the cases reported in 2007 for which information concerning exposures during the incubation period was available, the most common risk factor identified was IDU (48%). During 1998–2007, IDU was reported for an average of 44% of persons (range: 38%–54%)".[1] The risk factors most frequently reported in the 2009 Oklahoma cases were: IDU (52%), other drug use besides IDU (48%), tattoos (59%), and 2 or more sexual partners (37%). Eighteen (67%) of the cases reported at least 2 or more of the most frequently reported risk factors.

[1] Surveillance for Acute Viral Hepatitis—United States, 2007; MMWR, May 22, 2009/Vol.58/No.SS-3.

HIV/AIDS

2009 Case Total	312	2009 Rate	8.6 per 100,000
2008 Case Total	342	2008 Rate	9.4 per 100,000

HIV (Human Immunodeficiency Virus) is the virus that causes AIDS (Acquired Immune Deficiency Syndrome). AIDS is the result of a HIV infection. AIDS was first reported in the United States in 1981. In Oklahoma, AIDS as a syndrome became reportable in 1983 and HIV infection in 1988. The term AIDS applies to the most advanced stage of HIV infection.

HIV damages a person's body by destroying specific blood cells, called CD_4 positive T-lymphocytes (CD_4+ T cells), which are crucial to helping the body fight diseases. People living with HIV may appear and feel healthy for several years; however, even if they feel healthy, HIV is still affecting their bodies. AIDS is defined having HIV with fewer than 200 CD_4+ T cells per cubic milliliter of blood, and/or any one of 26 clinical opportunistic conditions which affect those with compromised immune systems. Before the development of highly active antiretroviral therapy (HAART), people with HIV could progress to AIDS in just a few years. Currently, people can live much longer, even decades, with HIV before they develop AIDS.

In Oklahoma, two cases of AIDS were first diagnosed in 1982 and two cases of HIV in 1984. At the end of 2009, an estimated 8,181 cases of HIV/AIDS had been diagnosed among residents of Oklahoma. A breakdown of these HIV/AIDS cases show 5,335 AIDS cases and 2,846 HIV cases. By 2009, 3,257 cases were known to have died leaving an estimated 4,924 cases of HIV/AIDS living with the infection with 2,441 (49.6%) AIDS cases and 2,483 HIV cases (50.4%). Of these cases, 5,320 (65%) were diagnosed among Whites, 1,703 (20.8%) among Black/African Americans, 469 (5.7%) among Hispanics, 42 (0.5%) among Asian/Hawaiian Pacific Islanders, and 522 (6.4%) among American Indian/Alaskan Natives. Persons who reported as belonging to two or more races accounted for 125 (1.5%) of the cases diagnosed.

The ratio of males to females diagnosed was 6:1 (85.3%; N=6,981 to 14.7%; N=1,200) respectively. Those reporting a risk of males having sex with males (MSM) represented 52.7% (4,311) of cases, while MSM and intravenous drug use (MSM/IDU) represented 10.5% (857). Over 11% reported a risk of intravenous drug use (IDU). About 11.2% (919) were exposed via heterosexual contact.

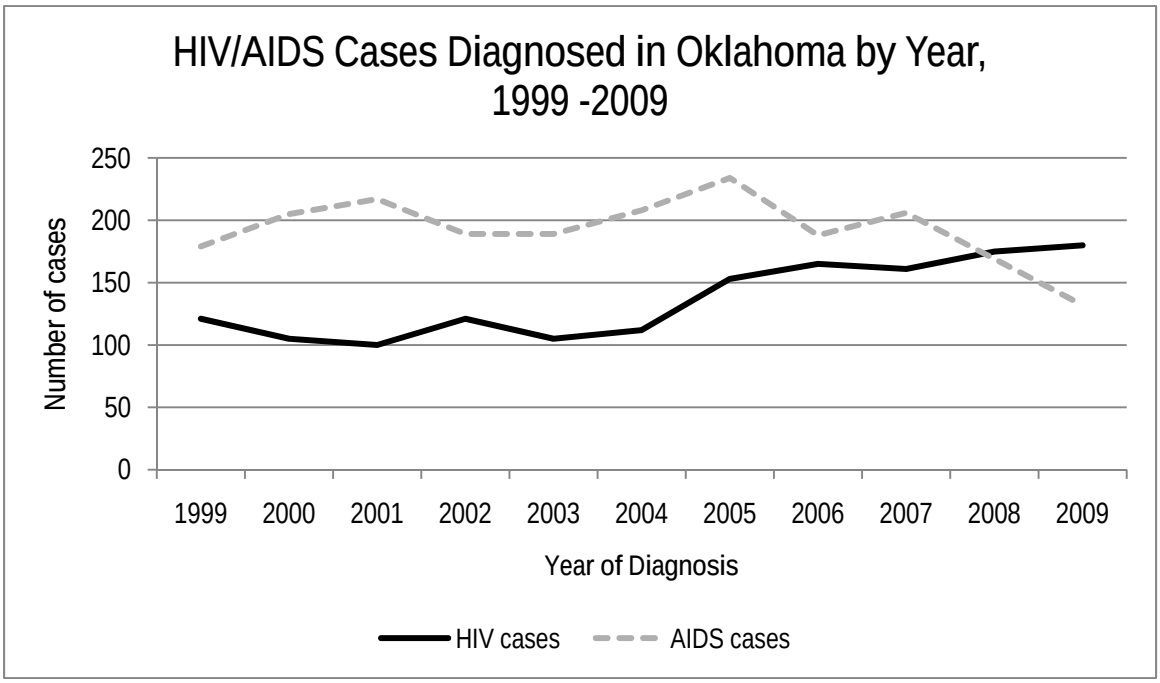
Among age groups, ages 30-39 years accounted for the largest proportion of cases (38.5%; 3,151), followed by 20-29 years with 31.3% (2,563). Teenagers 13-19 years of age accounted for a total of 2.7% (217) cases, while children under the age of 13 years accounted for 0.8% (64) of the 8,181 cases.

In 2009, 312 cases (HIV=180; AIDS=132) of HIV/AIDS were diagnosed in Oklahoma. This was a 9% decrease in the number of cases diagnosed since 2008. From 1999 to 2009 (11 years), 3,614 cases of HIV/AIDS have been diagnosed at an average of 329 cases per year with an average rate of 9.1 cases per 100,000 population per year. Although there has been approximately a 26% decrease in the number of newly diagnosed AIDS cases from 1999 to 2009, there has been a 49% increase in the number of newly diagnosed HIV cases.

Of the 312 cases diagnosed, males reported 255 cases with a rate of 14.2 per 100,000 population, while females reported 57 cases with a rate of 3.1 per 100,000 population. During 2009, three counties in Oklahoma accounted for about 61% of the cases— namely Oklahoma, Tulsa, and Cleveland counties with 32.7% (102), 68 (21.8%), and 20 (6.4%) respectively. Within the age groups, those of age 20-29 years accounted for 33.3% (104) of these cases; while 30-39 year olds accounted for 29.5% (92) cases, 40-49 year olds accounted for 19.9% (62), and 50-59 year olds accounted for 10.3% (32). Teenagers (ages 13-19 years) represented 5.8% (18) of the total cases diagnosed in 2009.

Among racial and ethnic groups, Blacks/African Americans had a rate of 33.2 cases per 100,000 population, Whites had a rate of 6.2 cases per 100,000 population, Hispanics had a rate of 11.1 cases per 100,000 population and American Indians /Alaskan Natives had 6.5 cases per 100,000 per population.

Of the 312 cases reported during 2009, 136 (43.6%) persons reported their risk as MSM and 11 (3.5%) reported their risk as MSM/IDU. Eighteen (5.8%) persons reported their risk as IDU only. Forty-four (14.1%) persons were infected through heterosexual contact. More than one quarter of those diagnosed in 2009 did not report a risk.



Influenza Surveillance Summary, 2009-2010

The Oklahoma State Department of Health (OSDH) has conducted sentinel surveillance activities year-round since 2007. The Oklahoma Viral Respiratory Illness Sentinel Surveillance System works 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 disseminate information on the circulating types and subtypes.

Twenty sentinel clinicians from 20 counties reported the number and age distribution of patients with influenza-like illness (ILI) via a secure, web-based ILI system. ILI was defined as a fever (100ºF [37.8ºC], oral or equivalent) AND cough or sore throat in the absence of a known cause other than influenza. Providers also reported the number of patients hospitalized due to ILI as well as the number of positive rapid antigen tests performed. Ten geographically distributed laboratories reported results of respiratory virus testing (viral culture, DFA, and/or rapid tests) on a weekly basis.

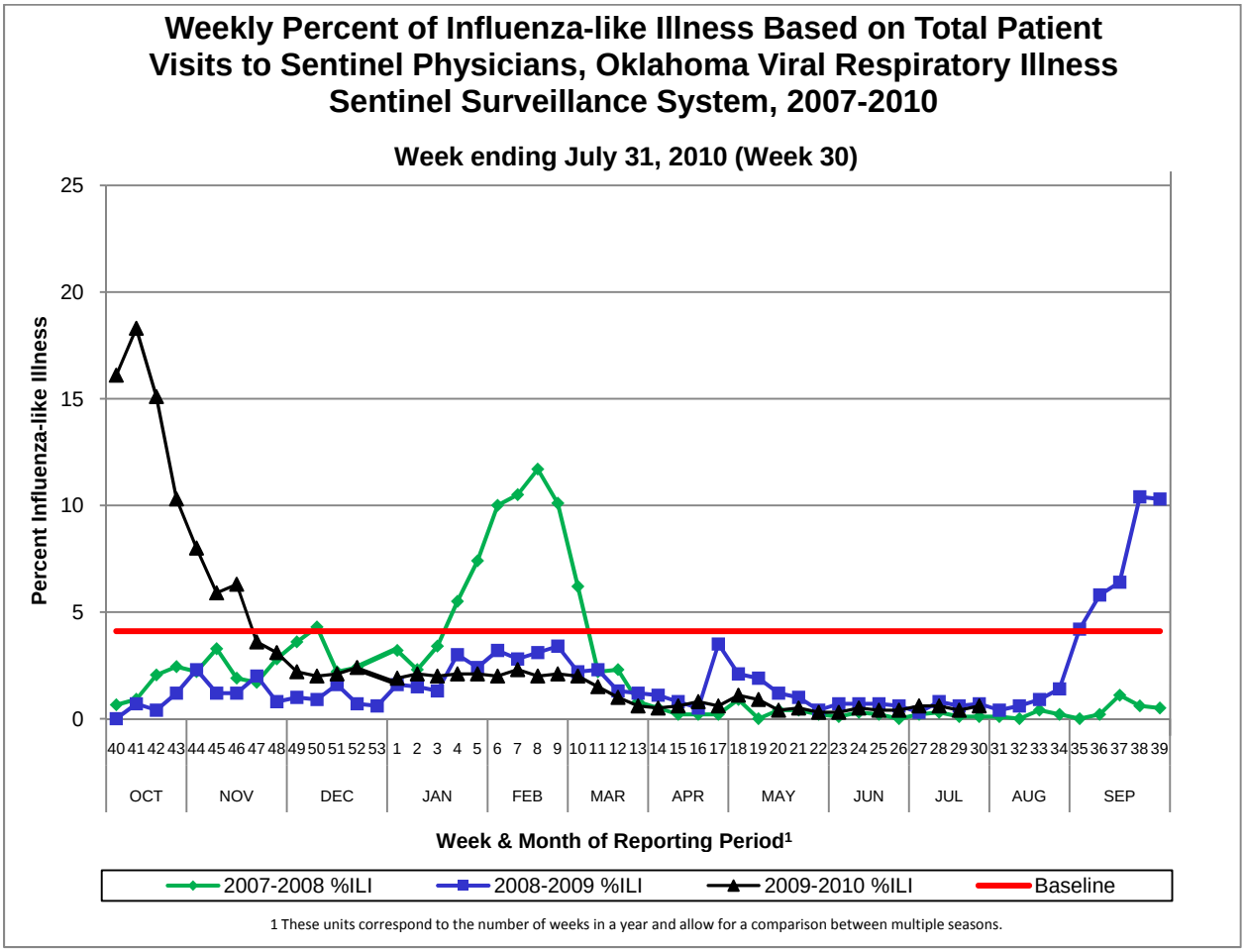
With emergence of the swine-origin influenza A (H1N1) strain in April of 2009, OSDH also monitored the occurrence of severe influenza disease during the pandemic season. To better describe the epidemiology of severe manifestations of influenza during a pandemic, the OSDH designated laboratory-confirmed influenza-associated hospitalizations and deaths among persons of all ages statewide as reportable conditions from September 1, 2009 through August 31, 2010. The epidemiology of outpatient visits due to ILI, influenza-associated hospitalizations, and deaths were used to guide public health prevention and control measures. This influenza surveillance article describes both ILI sentinel surveillance and severe influenza surveillance data collected during the 2009-2010 pandemic season.

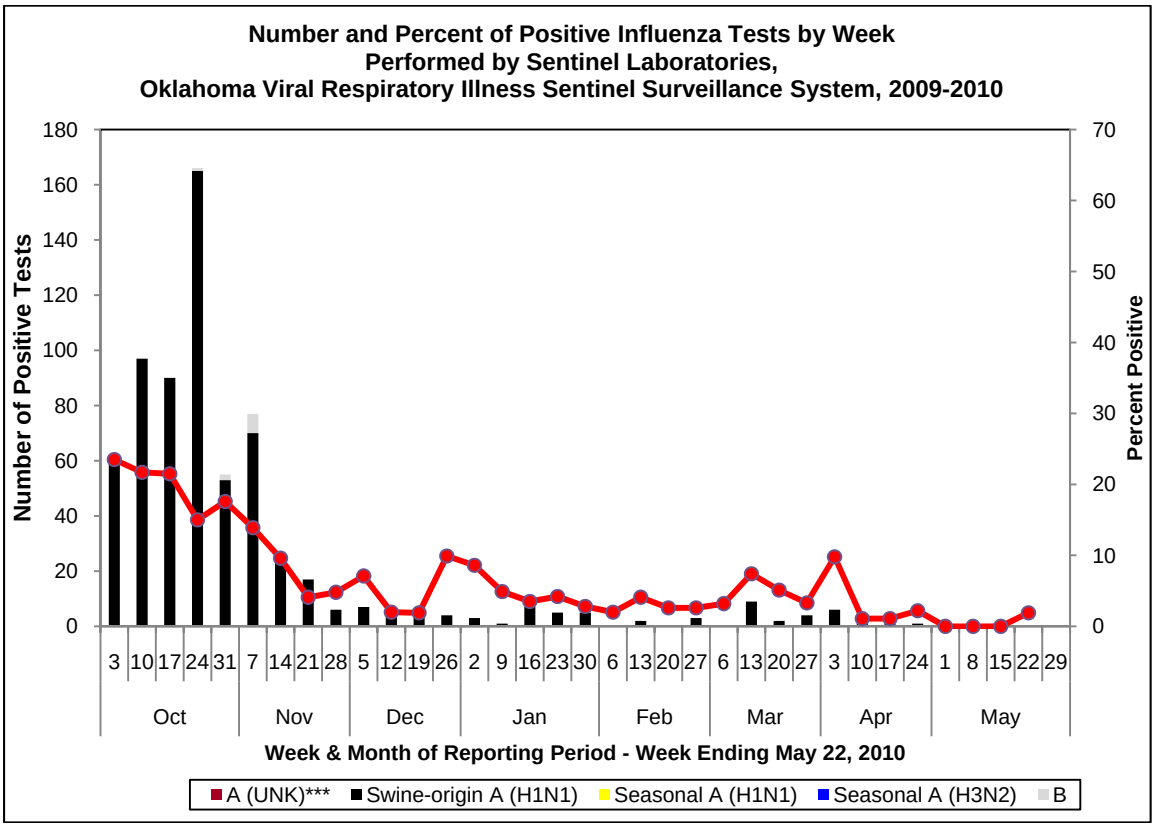
Influenza activity in Oklahoma typically occurs during winter months and peaks in February each year. However, the emergence of the swine-origin influenza A (H1N1) strain in April 2009 influenza resulted in a continued circulation of influenza throughout summer months of 2009 and an early peak of outpatient ILI activity during October 2009. From May 30, 2009 to October 3, 2009, the range of the percentage of patient visits due to ILI reported by sentinel providers was 0.4% (15/3704) to 10.3% (354/3430). During this same time period, the proportion of positive influenza tests performed at sentinel laboratories ranged from 0.0 (0/45) during week ending July 11 to 13.5% (37/275) during week ending August 29. Peak influenza activity occurred from early to mid-October with 18.3% (643/3515) of outpatient visits reported by sentinel physicians due to ILI during week ending October 17 and 23.5% (224/943) of the specimens testing positive for influenza at sentinel laboratories during week ending October 3.

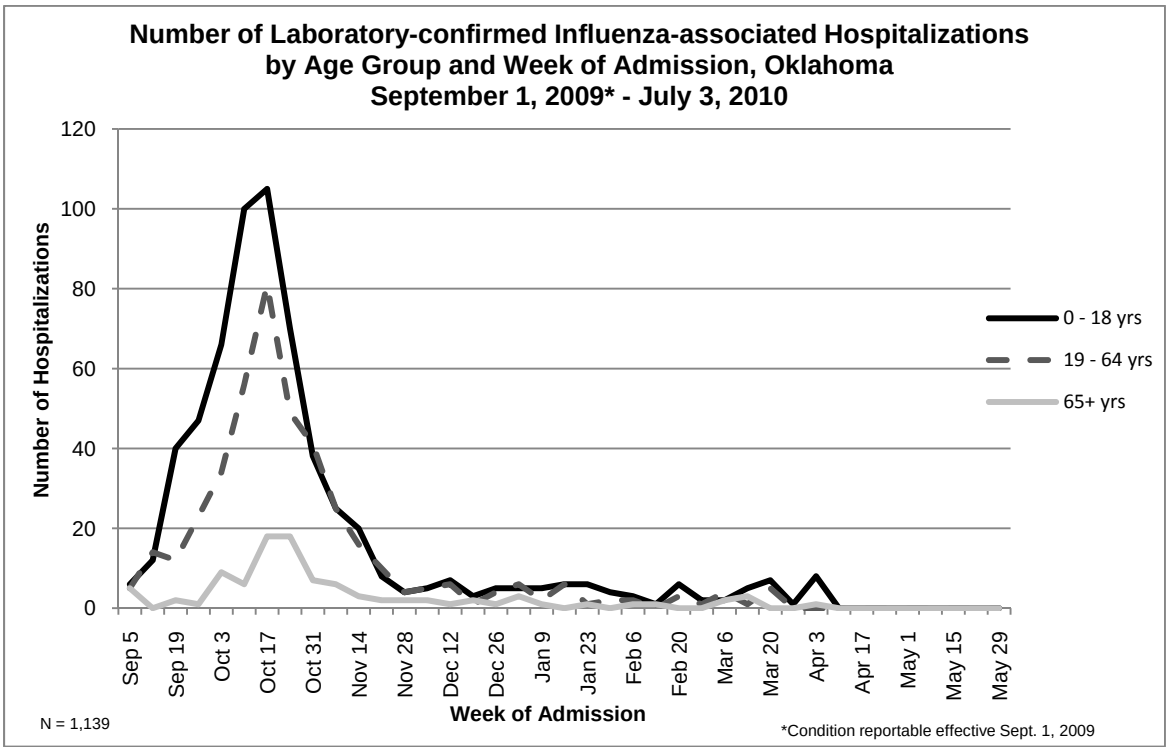
Beginning in April 2009, OSDH enhanced surveillance for swine-origin influenza A (H1N1) cases by encouraging clinicians to submit specimens to the PHL based on ILI symptoms and travel or exposure history. From April 27, 2009 through August 31, 2009, the PHL performed real-time polymerase chain reaction (RT-PCR) on 1,603 respiratory specimens. Of those 1,603 specimens tested by RT-PCR, 695 (43.4%) were positive for influenza. Of the 695 influenza positive specimens, 573 (82.4%) were determined to be swine-origin influenza A (H1N1), 54 (7.8%) influenza B, 47 (6.8%) seasonal influenza A (H1), and 21 (3.0%) seasonal influenza A (H3). Beginning September 1, 2009, OSDH revised influenza specimen submission criteria to focus testing of specimens collected from patients with history of acute febrile respiratory illness and was hospitalized, pregnant, a healthcare worker involved in direct patient care, employee or resident of residential care facility, and suspected deaths due to influenza. From September 1, 2009 through May 29, 2010, the PHL performed real-time PCR testing on 1,758 respiratory specimens. Of the 1,758 specimens tested by RT-PCR, 1,015 (57.7%) were positive for influenza. Of the 1,015 influenza positive specimens, 1,003 (98.8%) were determined to be swine-origin influenza A (H1N1), 11 (1.1%) influenza B, and 1 seasonal influenza A (H3) (0.1%). The proportion of positive influenza tests peaked at 86.1% (62/72) during week ending October 3, 2009.

From September 1, 2009 through July 3, 2010, 1,159 influenza-associated hospitalizations were reported among Oklahomans resulting in an incidence rate of 31.8 per 100,000. Seven hospitalizations were reported during the first

week of statewide surveillance (week ending September 5, 2009) and continued to increase until activity peaked with 182 hospitalizations reported during week ending October 17; a steady decline was observed following the peak in activity during mid-October. The frequency of influenza-associated hospitalization by week was similar to outpatient ILI activity with both peaks occurring during mid-October. The age-specific incidence rate per 100,000 population of influenza-associated hospitalizations was highest for children less than 5 of age (125.7) and children 5–18 years of age (43.1) compared to adults 19–24 years of age (21.2), 25–49 years of age (16.8), 50–64 years of age (23.2), and 65 years of age and older (20.6). Of the 1,159 reports, 170 (14.6%) patients were admitted to the intensive care unit (ICU). Seventy-one (6.1%) hospitalizations occurred among women who were pregnant. Forty-three influenza-associated deaths were identified since surveillance began September 1, 2009. Ages of mortalities ranged from 3 months to 87 years with a median of 50 years. Reported deaths have been among individuals in the following age groups: 10 were children less than 19 years of age; 12 were adults 25- 49 years of age; 10 were adults 50-64 years of age; and 11 were an adults 65 years and older.




Number and Percent of Positive Influenza Tests by Week
Performed by Sentinel Laboratories,
Oklahoma Viral Respiratory Illness Sentinel Surveillance System, 2009-2010
Number of Positive Tests
Percent Positive
180
160
140
120
100
80
60
40
20
0
70
60
50
40
30
20
10
0
3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 6 13 20 27 3 10 17 24 1 8 15 22 29
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Week & Month of Reporting Period - Week Ending May 22, 2010
A (UNK)***
Swine-origin A (H1N1)
Seasonal A (H1N1)
Seasonal A (H3N2)
B


Number of Laboratory-confirmed Influenza-associated Hospitalizations
by Age Group and Week of Admission, Oklahoma
September 1, 2009* - July 3, 2010
Number of Hospitalizations
120
100
80
60
40
20
0
0 - 18 yrs
19 - 64 yrs
65+ yrs
Sep 5
Sep 19
Oct 3
Oct 17
Oct 31
Nov 14
Nov 28
Dec 12
Dec 26
Jan 9
Jan 23
Feb 6
Feb 20
Mar 6
Mar 20
Apr 3
Apr 17
May 1
May 15
May 29
Week of Admission
N = 1,139
*Condition reportable effective Sept. 1, 2009

Legionellosis

2009 Case Total	10	2009 Rate	0.27 per 100,000
2008 Case Total	11	2008 Rate	0.45 per 100,000

In 2009, 10 cases of legionellosis were reported in Oklahoma resulting in an incidence rate of 0.27 per 100,000. The number of cases reported in 2009 is a 9 % decrease from the 11 cases reported in 2008. Since 1999, the annual incidence rate of legionellosis has steadily increased, ranging from 0.14 to 0.70 cases per 100,000 peaking in 2004 due to an outbreak. In 2009, lab tests were performed via bronchial culture (1%), sputum culture (2%), and urine antigen testing (70%). No outbreaks of legionellosis were identified in Oklahoma during 2009.

Cases occurred among residents of 6 Oklahoma counties. The highest rate of cases occurred in Ottawa County (3.14 per 100,000; N=1), McClain County (3.09 per 100,000; N=1), and Muskogee County (1.40 per 100,000; N=1). The cases ranged from 2 years of age to 69 years of age with a mean age of 45.5 years. The highest incidence rate occurred in cases 65-69 years of age (1.38 per 100,000; N=2) followed by cases 45-49 years of age (I0.77 per 100,000; N=2), and 60-64 years of age (0.54 per 100,000; N=1).

Seven of the cases were hospitalized for legionellosis (70%) with one case being possibly nosocomial (12.50%). One case died due to legionellosis resulting in a case-fatality rate of 10%. Of the cases reported in 2009, 1 (14.29%) reported exposure at a group gathering, 2 (28.57%) reported travel outside of the state during the incubation period of their illness, and 1 (14.29%) reported exposure to a respiratory device filled with tap water such as a nebulizer or humidifier.

Demographic and Clinical Summary of Reported Legionellosis Cases, Oklahoma, 2009 (N=10)		
	Number (%)	Rate/100,000
Gender		
Male	5 (50%)	0.28
Female	5 (50%)	0.27
Race		
African American/Black	1 (10%)	0.34
White	8 (80%)	0.28
Unknown	1 (10%)	-
Ethnic Group		
Hispanic or Latino	1 (10%)	0.36
Not Hispanic or Latino	4 (40%)	0.12
Unknown	5 (50%)	-
Symptoms		
Cough	8 (88.89)	-
Fever	10 (100)	-
Headache	5 (62.50%)	-
Malaise	8 (88.89%)	-
Myalgia	6 (66.67)	-
Chills	5 (71.43)	-
Chest Pain	5 (55.56)	-
Comorbidity		
Pneumonia	10 (100%)	-
Corticosteroid	2 (57.14)	-
Transplant Recipient	1(14.29)	-

Listeriosis

2009 Case Total	8	2009 Rate	0.22 per 100,000
2008 Case Total	7	2008 Rate	0.19 per 100,000

Listeriosis is an uncommon but serious infection caused by the bacteria *Listeria monocytogenes*. Although most listeriosis infections involve mild illnesses not requiring medical care, *Listeria* is responsible for approximately 2,500 of the estimated 76 million foodborne illnesses and an estimated 500 deaths per year in the U.S.[1] Pregnant women are about 20 times more likely than healthy adults to acquire the disease. In pregnancy, the infection can be passed to the fetus and in some cases cause premature delivery, infection of the newborn, or stillbirth. Newborns, rather than the mothers, experience the serious effects of infection during pregnancy; the case-fatality rate is 20-30% in infants born alive and the occurrence of abortion and stillbirth increases the overall mortality rate to more than 50%.[2] Other specific groups at increased risk include persons with weakened immune systems such as those with cancer, diabetes, kidney disease, AIDS, those who take glucocorticosteroid medications, and the elderly.

In Oklahoma, 8 cases of listeriosis were reported to OSDH resulting in an incidence rate that was higher than the previous five-year (2004 – 2008) rate of 0.13 per 100,000 population. *Listeria* was isolated from blood for five cases (63%), and in one case each from cerebrospinal fluid (13%), pleural fluid (13%) and amniotic fluid (13%). Two cases were linked: one was the newborn of an infected adult female (both survived). Investigation of these cases did not identify an exposure source.

Most cases of listeriosis are sporadic; however, outbreaks due to consumption of contaminated food have been identified. Prompt reporting of cases can help in the early detection of an outbreak, identification of the sources of infection, and prevention of additional cases. The Communicable Disease Reporting Rules (OAC 310: Chapter 515) require that *Listeria* isolates grown from sterile sites (e.g. blood, cerebrospinal fluid, etc.) be sent to the OSDH-Public Health Laboratory (PHL) for confirmation and identification. The PHL then performs pulsed-field gel electrophoresis (PFGE) to identify subtypes. This information is shared confidentially through PulseNet, a national electronic database coordinated through the Centers for Disease Control and Prevention (CDC). The CDC and participating laboratories monitor the database for clusters of PFGE patterns, which are then further investigated to detect common exposures. This program assists in detection of outbreaks of many diseases each year, even when affected persons are geographically separated, facilitating faster investigation and implementation of control measures. When a food item is implicated in an illness caused by *Listeria*, actions are taken to confirm the association and to remove the implicated food from further consumption.

Summary of Reported Listeriosis Cases, Oklahoma, 2009 (N =8)

	Number (%)	Rate/100,000
Gender		
Female	4 (50%)	0.22
Male	4 (50%)	0.22
Age	Median = 67 years (range: 1 day – 90 years)	
Race (N = 7)		
White	6 (85.7%)	0.21
American Indian/Alaska Native	1 (14.3%)	0.34
Hispanic Ethnicity	0	-
Hospitalization	8 (100%)	-
Deaths	2 (20%)	-

1 Mead PS, Slutsker L, Dietz V, McCaig LF, Bresee JS, Shapiro C, Griffin PM, Tauxe RV. Food related illness and death in the United States. Emerg Infect Dis. 1999 Sep-Oct;5(5):607-25. Review.
2 Mandell, Douglas, and Bennett's principles and practice of infectious diseases / [edited by] Gerald L. Mandell, John E. Bennett, Raphael Dolin.-6th ed. p. 2478-2483.

Lyme Disease

2009 Case Total	2	2009 Rate	0.05 per 100,000
2008 Case Total	2	2008 Rate	0.05 per 100,000

Lyme disease is a tick-borne illness caused by the bacterium *Borrelia burgdorferi* and can be identified by erythema migrans (EM) in 60%-80% of clients. For public health surveillance, the EM lesion must be 5 cm in diameter to be considered a case of Lyme disease. Annular erythematous lesions occurring within several hours of a tick bite represent hypersensitivity reactions and do not qualify as an EM lesion. Other symptoms that may occur intermittently are fatigue, fever, headache, stiff neck, arthralgia, or myalgia. Transmission occurs via a "black-legged" tick bite. In 2009, two cases of Lyme disease were confirmed in Oklahoma resulting in an incidence rate of 0.05 per 100,000 persons. The two cases were residents of Comanche and Payne Counties.

Neither case died from Lyme disease; however, one case was hospitalized for the disease. Both cases presented with arthralgia, fatigue, headache, malaise, and myalgia. Case one reported experiencing a fever, erythema migrans >= 5 cm, and anorexia. Case two reported experiencing arthritis with periodic joint swelling, severe sweating, blurred vision, and localized pain in the hip. Case one reported travel to Pennsylvania one month prior to symptom onset, exposure to a wooded or tick-infested area, and being bitten by a tick. Case two did not travel but did report exposure to a wooded or tick-infested area and being bitten by a tick 3 to 32 days prior to symptom onset.

Laboratory evidence for Lyme disease is based on a positive culture for *B. burgdorferi*, two-tier testing using IFA or ELISA and then Western immunoblot, and single-tier IgG immunoblot seropositivity.

Demographic and Clinical Summary of Reported Lyme Disease Cases, Oklahoma, 2009 (N=2)

		Number (%)	Incidence Rate per 100,000
Gender	Female	1 (50%)	0.05
	Male	1 (50%)	0.06
Age		Median 19 years (range 5-33)	
Race	White	1 (50%)	0.04
	Unknown	1 (50%)	-
Hispanic Ethnicity		0 (50%)	-
	Unknown	1 (50%)	-
Hospitalized		1(50%)	-

Malaria

2009 Case Total	2	2009 Rate	0.05 per 100,000
2008 Case Total	5	2008 Rate	0.14 per 100,000

Only two cases of malaria were reported to the Oklahoma State Department of Health in 2009. Both occurred following travel to endemic countries, and not taking approved prophylaxis. Both cases (100%) reported traveling to Africa (Camaroon and Burkina Faso/Ivory Coast) during their exposure periods. Since 2001, the majority of reported cases in Oklahoma had a history of traveling to Africa (70.4%) or Asia (14.1%) during their exposure period (refer to table).

Neither of the two cases in 2009 reported taking malaria prophylaxis; however one did report taking a medication purchased in Africa after arriving there. Sale of counterfeit medications for malaria prophylaxis have been reported in other countries, supporting that arrangements for malaria prophylaxis should be made prior to traveling, and that the medications should be purchased in the US. The CDC Travelers' Health website has recommendations regarding malaria prophylaxis and other travel-related diseases at http://www.cdc.gov/travel.

Malaria can be a severe, potentially fatal disease (particularly when caused by *Plasmodium falciparum*) and treatment should be initiated as soon as possible. It should be considered in persons experiencing fever of unknown origin, chills, and/or flu-like illness, with recent travel to a high-risk area, especially international travelers, immigrants, adoptees, military personnel, and international visitors.

Most clinical labs are capable of performing preliminary identification. Specimens are required to be sent to the OSDH Public Health Laboratory (PHL) for confirmatory testing and speciation. Thick and thin slides prestained with Giemsa or Giemsa-Wright stain are required for examination. Specimens for the two reported cases in 2009 were submitted to the OSDH PHL for confirmation: one was identified as *Plasmodium falciparum* and one was identified as *Plasmodium vivax*.

Demographic and Clinical Summary of Reported Malaria Cases, Oklahoma, 2009 (N = 2)

	Number (%)	Incidence Rate per 100,000
Gender		
Male	1 (50%)	0.06
Female	1 (50%)	0.05
Age	Median 27.5 years (range 22 – 33 years)	
Race		
Black	2 (100%)	0.69
Hispanic Ethnicity	0	--
Hospitalized	0	--
Died due to malaria	0	--
Travel history		
Africa	2 (100%)	--

World Region of Malaria Acquisition Reported by Oklahoma Cases, 2001-2009 (N=71)

Region	**Number (%)**
Africa	50 (70.4%)
Asia	10 (14.1%)
Central America	1 (1.4%)
Oceania	1 (1.4%)
South America	1 (1.4%)
Unknown	8 (11.3%)

Meningococcal Invasive Disease

2009 Case Total	17	2009 Rate	0.47 per 100,000
2008 Case Total	17	2008 Rate	0.47 per 100,000

Meningococcal disease incidence continued on a downward trend in the state and in the nation in 2009. The number of reported cases of meningococcal disease in the state were the same as in 2008. Age-specific incidence rates indicate the highest rates occurred among persons under 10 years, followed by those 80 years and older (see table). In 2009, 16 (94%) cases were hospitalized, and one death occurred due to meningococcal disease, resulting in a case fatality rate of 6%.

Laboratory specimens are required to be forwarded to the OSDH Public Health Lab for confirmation of the causative organism, *Neisseria meningitidis*, and for serogroup identification. Serogroups B (44%) and Y (38%) accounted for the greatest proportion of isolates for which serogroup testing was performed. Although three cases were associated with child care settings, no secondary cases occurred in these settings.

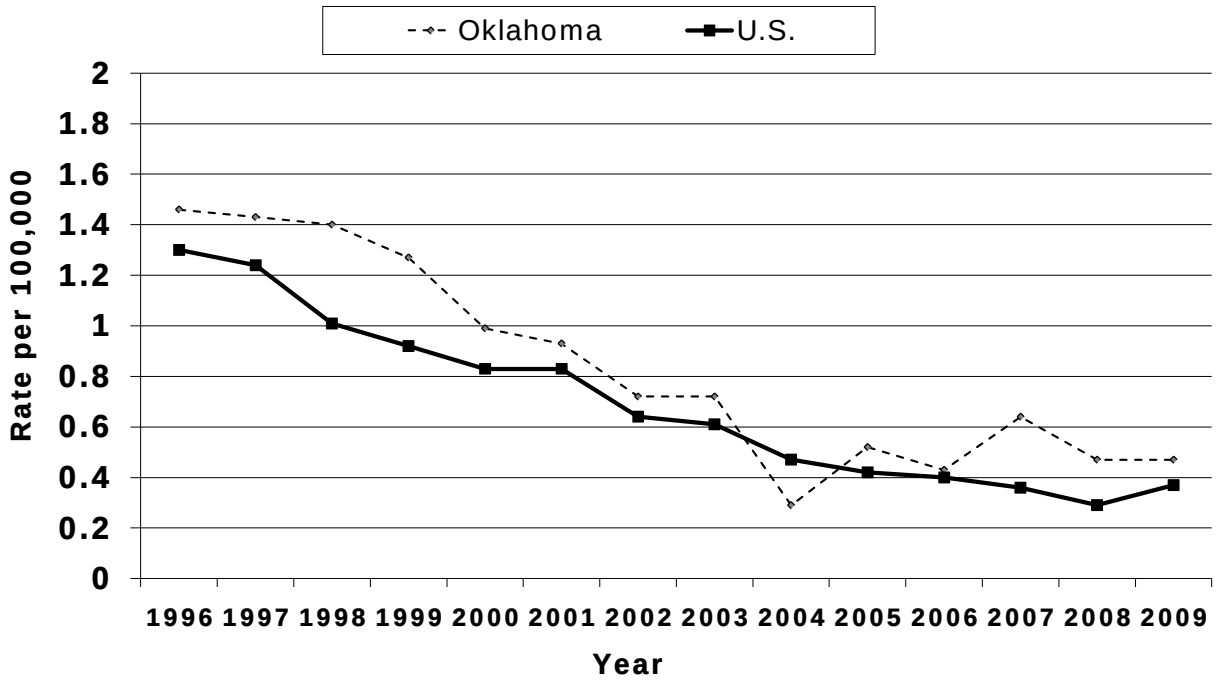
Demographic and Clinical Summary of Reported Meningococcal Invasive Disease Cases, Oklahoma 2009

	Number (%)	Incidence Rate per 100,000
Gender (N = 17)		
Male	9 (52.94%)	0.50
Female	8 (47.06%)	0.43
Ages (N= 17)	Median = 23 years (range: 2 months - 91 years)	
<10 years	7	1.36
10-19 years	0	-
20-29 years	2	0.37
30-39 years	1	0.22
40-49 years	2	0.41
50-59 years	1	0.21
60-69 years	2	0.60
70-79 years	1	0.49
≥80 years	1	0.72
Race (N= 16)		
White	14 (82%)	0.49
African American or Black	0	-
American Indian or Alaska Native	2 (12%)	0.69
Hispanic Ethnicity (N= 15)	1	
Specimen source		
Blood	7 (41%)	-
Cerebrospinal Fluid	10 (59%)	-
Serogroup (N = 16)		
Group B	7 (44%)	-
Group Y	6 (38%)	-
Group W-135	1 (6)	-
Group C	0	-
Nongroupable	2 (13%)	-

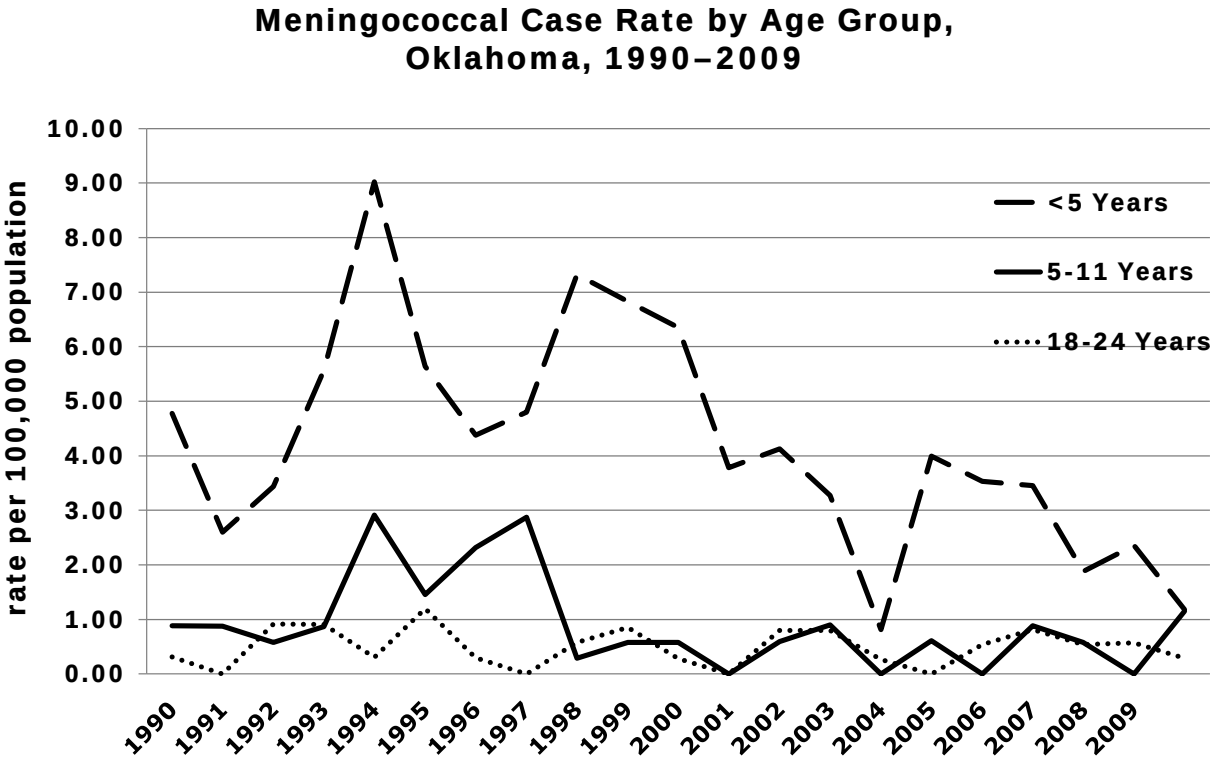
Neisseria meningitidis is an immediately notifiable disease. Suspicion or diagnosis of meningococcal invasive disease must be immediately reported to the OSDH per the Oklahoma Disease Reporting Rules (Oklahoma Administrative Code 310:515). The state health department immediately investigates reported meningococcal disease cases to identify close contacts, and to facilitate prophylaxis for persons identified as having high risk exposures, although secondary cases are extremely rare. Two hundred and sixty contacts (median 7, range 1 – 61 per case) were identified and recommended to receive prophylaxis in 2009. One case had 61 contacts requiring prophylaxis, and involved an employee of a child care setting. This case was due to serogroup B, which is not included in the meningococcal vaccine.

A tetravalent (serogroups A,C,Y,W-135) meningococcal conjugate vaccine (MCV4) is licensed for persons aged 2–55 years. In 2007, the Advisory Committee on Immunization Practices (ACIP) revised recommendations for routine use of MCV4 to include children ages 11–12 years at the preadolescent vaccination visit and adolescents aged 13–18 years at the earliest opportunity. MCV4 also is recommended for college freshmen living in dormitories and other populations aged 2–55 years at increased risk for meningococcal disease.[1,2] Beginning with the 2004-2005 academic year, Oklahoma became one of the few states with a mandated vaccination law requiring public or private post-secondary educational institutions to provide information on the risks associated with meningococcal disease and the risks and benefits of vaccination to students who plan to reside in on-campus housing.

Meningococcal Disease Incidence Rate by Year, Oklahoma and U.S., 1996 – 2009*



* 2008 and 2009 U.S. data is provisional based on CDC, MMWR 2009;58:[1446-1469]



References:

1. CDC. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7), available at http://www.cdc.gov/mmwr/pdf/rr/rr5407.pdf
2. CDC. Notice to readers: revised recommendations of the Advisory Committee on Immunization Practices to vaccinate all persons aged 11–18 years with meningococcal conjugate vaccine. MMWR 2007;56:794–5, available at http://www.cdc.gov/mmwr/PDF/wk/mm5614.pdf

Pertussis

2009 Case Total	117	2009 Rate	3.2 per 100,000
2008 Case Total	100	2008 Rate	2.8 per 100,000

In 2009, 117 cases of *Bordetella pertussis,* or "whooping cough," were reported in Oklahoma, a 17% increase from 2008. Sixty-three (54%) cases were laboratory confirmed by polymerase chain reaction (PCR) and/or isolation of the *Bordetella pertussis* bacterium. Of those, 18 (29%) were confirmed by both culture and PCR, 27 (43%) by PCR only, and 18 (29%) by culture only. Fifty-four cases were classified as "probable" pertussis reports based on exposure to a confirmed case or clinical description supportive of pertussis. Of the 54, 25 (46%) were epidemiologically-linked symptomatic contacts identified by the county health department communicable disease nurse (CDN) during case investigations, 19 (35%) were probable cases with laboratory results that are not considered confirmatory (i.e. direct fluorescent antibody [DFA] or serology), and 10 (19%) cases met the clinical case definition no laboratory testing.

Pertussis occurs in persons of all ages, but disproportionately affects children less than one year. In 2009, ages of reported cases ranged from 7 days to 77 years; median age of cases was 6 years. Children less than one year of age accounted for 38% of cases resulting in an age-specific incidence rate of 79.2 per 100,000 infants. The incidence rate of pertussis among infants was substantially higher than all other age groups (refer to graph). Sixty-six percent of reported pertussis cases among infants were hospitalized for pertussis. No deaths due to pertussis were reported in 2009.

A clinical case of pertussis is a cough illness lasting ≥2 weeks plus one of the following: paroxysmal coughs, post-tussive vomiting, or inspiratory whoop. Cases reported a cough duration that ranged from 14 days to 132 days with median cough duration of 40 days. Symptoms characteristic of pertussis experienced by cases included paroxysms or coughing fits (98%), vomiting after paroxysms (69%), and an inspiratory whoop (55%). Most symptoms experienced by infants were similar to other ages, which included cough (100%), paroxysms (95%), and post-tussive vomiting (73%). Unlike adults and other children, infants also experienced apnea (63%) and cyanosis (65%). No seasonal distribution of pertussis was identified in 2009.

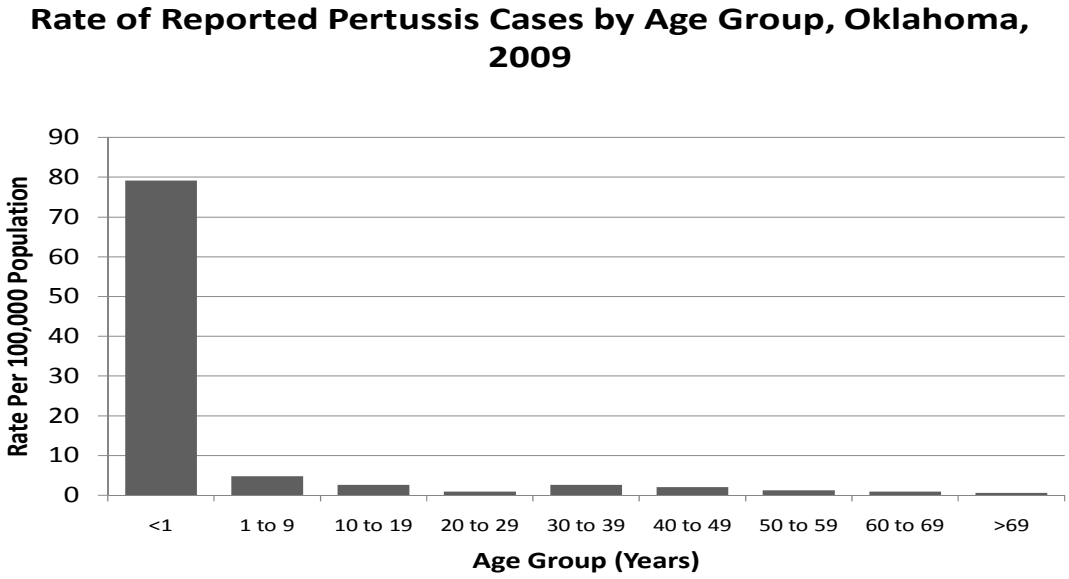
Pertussis cases were identified throughout the state with the highest rates occurring among residents of Kingfisher County (N=4, 28 per 100,000) and Nowata County (N=3, 28 per 100,000). County health department public health personnel conduct investigations of pertussis to identify close contacts that are recommended to receive post-exposure prophylaxis (PEP) to prevent develop of illness and continued transmission. In 2009, a total of 331 exposed contacts (median=2, range 0-22 contacts) of cases were recommended to receive PEP. Twenty-six cases were associated with a high-risk setting such as a childcare center, school, or healthcare setting.

Pertussis vaccine is recommended for all children beginning at two months of age with the primary 3-dose series followed by a booster vaccination at 12-15 months of age. An adolescent vaccine (Tdap) is recommended for persons 10-64 years of age and should replace one booster dose of Td. This dose is especially important for persons who reside in a household or may have contact with persons at highest risk of developing disease.

Descriptive Summary of Reported Pertussis Cases, All Ages, Oklahoma, 2009 (N=117)

	Frequency (%)	Rate/100,000
Gender		
Male	52 (44%)	2.89
Female	65 (56%)	3.53
Age	Median Age: 6 years (Range: 7 Days – 77 years)	
Hospitalized for pertussis	31	--
Deaths to Pertussis	0	--
Race*		
White	89 (81%)	3.13
Black	6 (5%)	2.07
Asian	5 (5%)	7.97
American Indian or Alaska Native	7 (6%)	2.40
Persons reporting 2 or more races	3 (3%)	2.02
Hispanic Ethnicity**	11 (11%)	3.95

*Race unknown for 7 persons
**Ethnicity unknown for 16 persons



Q Fever

2009 Case Total	2	2009 Rate	0.05 per 100,000
2008 Case Total	3	2008 Rate	0.08 per 100,000

Q fever can present as an acute febrile disease caused by *Coxiella burnetii* and is characterized by an onset of chills, retrobulbar headache, weakness, malaise, and severe sweats. Chronic Q fever is an infection that persists for more than six months. Chronic Q fever may present as endocarditis and can occur in people with antecedent valvular disease. Transmission occurs through airborne dissemination of *Coxiellae* in dust from areas contaminated by placental tissues, birth fluids, and excreta of infected animals. Transmission may also occur via direct contact with infected animals and other contaminated materials.

In 2009, two cases of Chronic Q fever were reported in Oklahoma resulting in an incidence rate of 0.05 per 100,000 persons. Neither case died from Q fever; however, both cases were hospitalized for the disease. Both cases presented with intermittent fever, chills, and a headache. Case one reported experiencing abdominal pain, dyspnea, lightheadedness, weight loss, and hepatic disease with ascites. Case two reported experiencing arthralgia, confusion, fatigue, malaise, myalgia, unexplained night sweats and anorexia. The comorbidities for case one were diabetes, atrial fibrillation, and hemochromatosis. This case reported having a prior diagnosis of Q fever not treated in the past and past exposure to sheep and goats. Case two had comorbidities of endocarditis and valvular heart disease and reported visiting a family member that lived near goats.

Laboratory diagnosis for Q fever is made by serological evidence of a fourfold change in IgG specific antibody titer to *C. burnetii* phase II antigen by IFA between paired serum samples, detection of *C. burnetii* by PCR, demonstration of *C. burnetii* in a clinical specimen by immunohistochemical methods, or isolation of *C. burnetii* from clinical specimen by culture. Both cases were laboratory confirmed by IgG Phase I and Phase II EIA/ELISA testing.

Demographic and Clinical Summary of Q Fever Cases, Oklahoma, 2009 (N=2)

	Number (%)	Incidence Rate per 100,000
Gender		
Female	1 (50%)	0.05
Male	1 (50%)	0.06
Age	Median 57 years (range 46-68)	
Race		
American Indian or Alaska Native	1 (50%)	0.34
Unknown	1 (50%)	-
Hispanic Ethnicity	0 (50%)	-
Unknown	1 (50%)	-
Hospitalized	2 (100%)	-

Animal Rabies

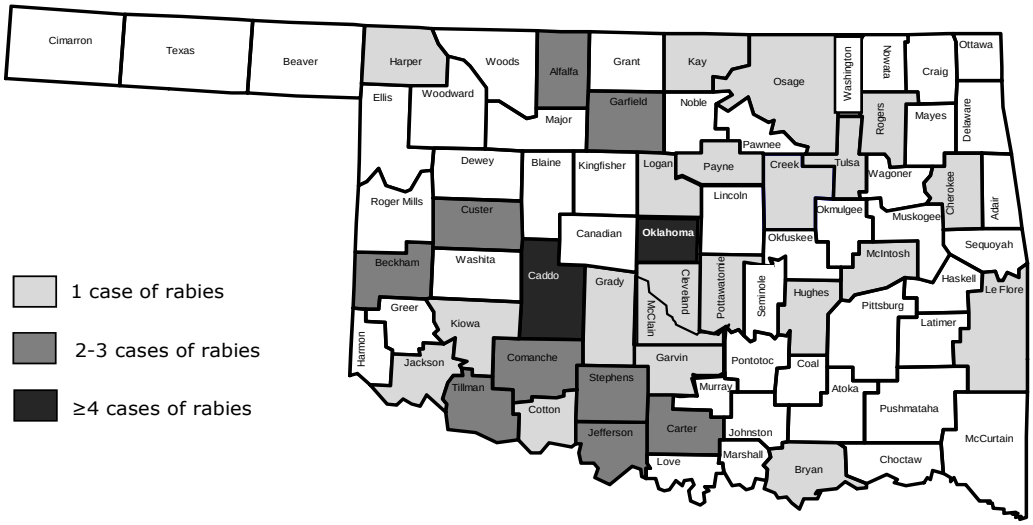
2009 Case Total	49
2008 Case Total	42

The number of rabid animals in Oklahoma during 2009 slightly increased to 49 confirmed cases compared to 42 cases in 2008. Animal rabies activity in Oklahoma tends to follow a cyclical trend with increases or activity peaks occurring approximately every six to eight years, the most recent peak in 2003 with 204 positive rabid animals by laboratory testing. Rabies commonly produces a seasonal trend, with most cases occurring in the spring and summer months. In 2009, over 50% of cases occurred April through August. In 2009, an increase in bat rabies occurred with 12 (25%) of the 49 rabies test-positive animals being bats compared to 1 (2.3%) of 42 rabies cases in 2008. Ten (83%), of the 12 rabid bats were identified in August and September. The geographic distribution of the 2009 bat rabies clustered in the central and eastern counties in Oklahoma. Cherokee, Cleveland, Creek, Kay, McIntosh, Oklahoma, Osage, Payne, Pottawatomie, Rogers, and Tulsa Counties each had confirmed bat rabies in 2009. No bat rabies was reported from the western part of the state in 2009. Generally, the geographic distribution of animal rabies is spread across the state of Oklahoma; in 2009, 31 counties were the origin of at least one animal that tested positive for rabies.

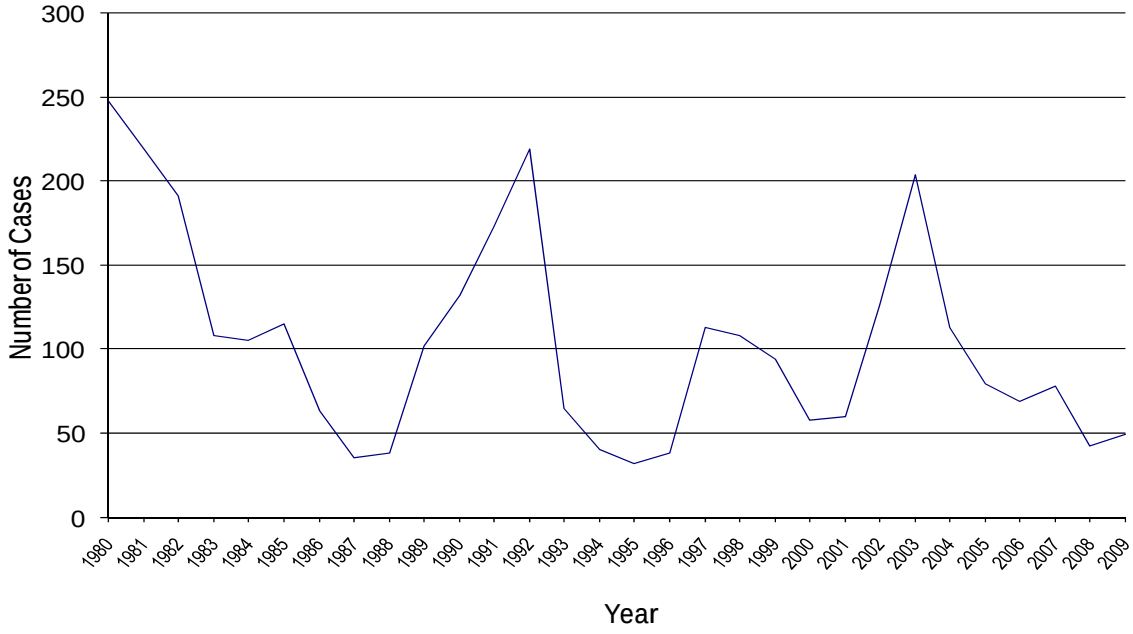
When an animal tests positive for rabies or the result is inconclusive, an epidemiologist in the Acute Disease Service (ADS) of the Oklahoma State Department of Health (OSDH) initiates a thorough investigation of potentially exposed animals and humans. Recommendations for human post exposure prophylaxis (PEP) and/or requirements for animal quarantine or euthanasia are made based upon the findings of the investigation. Exposure to rabies virus usually results from the bite of a rabid animal, but may also occur by mucous membrane or broken skin contact with the rabid animal's neural tissue, cerebrospinal fluid or saliva. A total of 86 animals were identified as exposed to a confirmed rabid animal. Of the exposed animals, 12 (14%) were current and properly vaccinated by a licensed veterinarian and therefore, only required to receive a booster dose of the rabies vaccine along with a 45-day observation period on the owner's property. Of the 74 exposed pets that were not currently vaccinated, owners of 4 (5%) elected placement in a six-month quarantine under the supervision of a licensed veterinarian, and owners of 70 (95%) chose to have the animal euthanized. In 2009, a total of 160 humans were assessed for exposure to a confirmed rabid animal, with 31 (19%) recommended to receive PEP. Human rabies PEP should be sought through the person's health care provider, and is not provided through Oklahoma state or county health departments. Human rabies is rare in the United States, with most human rabies cases associated with rabid bats, whereas in developing countries dogs are the most common reservoir and vector species[i]. Human rabies prophylaxis is nearly 100% effective, and human fatalities in the US due to rabies occur in people who fail to seek medical assistance, or were unaware of their exposure. The last case of human rabies in Oklahoma occurred in 2004 and was associated with an organ transplant. Prior to this incident, the most recent human rabies case in Oklahoma was in 1981. Consultation regarding animal bites and the PEP series is available by contacting the Epidemiologist-on-Call at (405) 271-4060.

In the event that an animal is suspected to be rabid, the OSDH Public Health Laboratory (PHL) is the only lab in the state of Oklahoma with the capability of testing the animal. In 2009, the OSDH PHL tested a total of 1281 animals for rabies. Of these, 1207 (94%) were negative, 24 had unsatisfactory results due to a crushed or decomposed head, and the remaining 50 were positive for rabies[ii]. In Oklahoma, skunks are a common vector for rabies virus and historically have been more likely to test positive for rabies. Of 45 skunks tested for rabies in Oklahoma in 2009, 20 (44%) tested positive. In 2009 percent positivity for bats was also high; of the 55 bats tested for rabies in 2009, 12 (22%) tested positive. In contrast, only one of 617 dogs (0.16%), seven of 369 cats (1.90%), six of 59 cattle (10.17%), three of 29 horses (10.34%), and one of 3 foxes (33.3%) tested positive for rabies. For questions regarding testing, please consult the OSDH PHL at (405) 271-5070.

County Location of Animal Rabies in Oklahoma January 1 through December 31, 2009 (N=49)



Number of Confirmed Animal Rabies Cases in Oklahoma
1980 - 2009



[i] CDC. Imported Human Rabies—California, 2008. MMWR 2009; 58(26):713-716.
[ii] One rabies case in 2009 was submitted from an Arkansas resident.

Rocky Mountain Spotted Fever

2009 Case Total	342	2009 Rate	9.32 per 100,000
2008 Case Total	267	2008 Rate	7.33 per 100,000

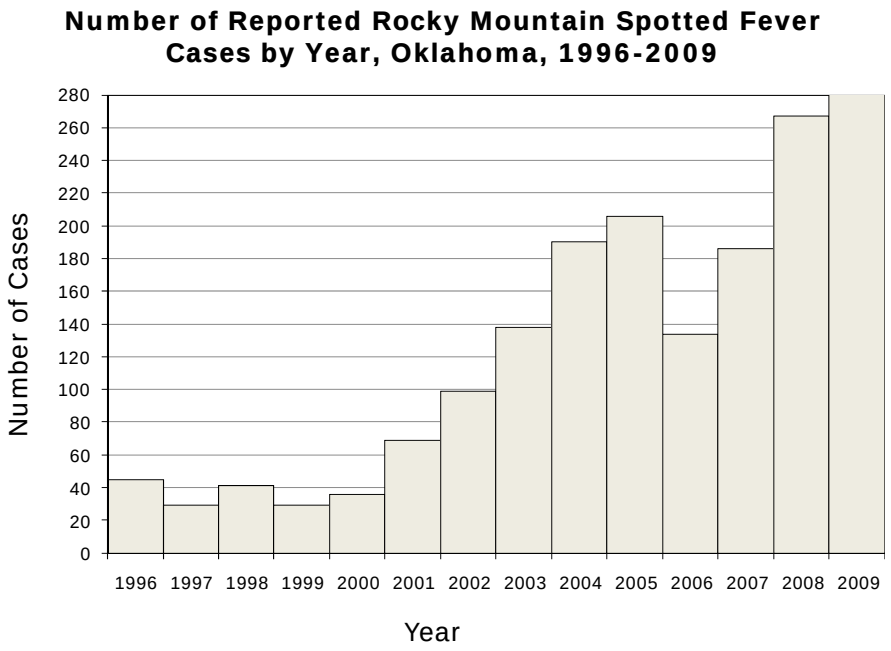
In 2009, Oklahoma reported the highest incidence of Rocky Mountain spotted fever (RMSF) during the past 14 years (refer to figure), and remains one of the states with the highest annual incidence rate in the United States. The Centers for Disease Control and Prevention reports that Oklahoma and North Carolina together alone represent 35% of the cases reported in the United States.[1] Eastern Oklahoma has higher rates of disease due to its more favorable tick habitat. Counties with the highest incidence rates in 2009 were Latimer (152 per 100,000) and Pushmataha (103 per 100,000); refer to figure two below for the geographic distribution of cases. The seasonal distribution of RMSF peaks during the warmer months with the majority of the cases reported from April through September.

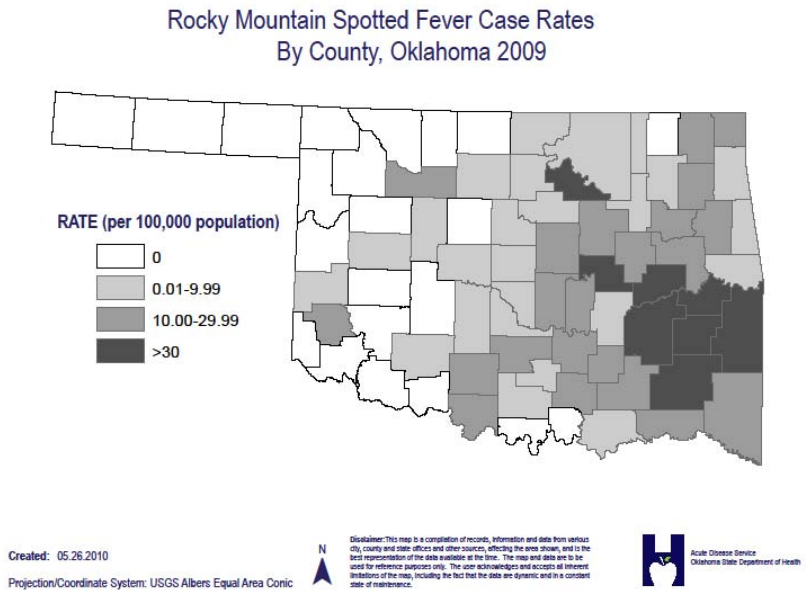
The age of RMSF cases ranged from 2 years to 83 years with a median age of 44 years. Overall, the rate among males was 1.8 times higher than that of females. The highest rates of RMSF occurred among person who reported their race Native Hawaiian/Pacific Islander (51.8 per 100,000) followed by Native American/Alaska Native (32.3 per 100,000), which 5.6 and 3.5 times higher respectively than the overall 2009 rate in Oklahoma.

Serologic testing is the most widely available and frequently used laboratory method for diagnosis. A four-fold change in titer between acute (within a week of onset) and convalescent (2 to 4 weeks later) specimens confirms the diagnosis. A single specimen is generally not diagnostic of acute infection since it may indicate past exposure. Treatment for RMSF should be initiated before laboratory confirmation, when there is high suspicion of tickborne illness, to reduce the severity of disease. The recommended antibiotics for treatment are tetracyclines, usually doxycycline. [2]

Demographic and Clinical Summary of Reported Rocky Mountain Spotted Fever Cases, Oklahoma, 2009 (N=342)

	Frequency (%)	Rate/100,000
Gender		
Male	218(64%)	12.1
Female	124(36%)	6.7
Age	Median: 44 years (Range: 2 year - 83 years)	
Hospitalization	65 (19%)	--
Deaths	1 Death	--
Race		
White	196(57%)	6.9
African American	3(1%)	1.0
Native American / Alaska Native	94(28%)	32.3
Native Hawaiian/Pacific Islander	2(1%)	51.8
2 or more races	11(2%)	7.4
Unknown race	36(11%)	--
Hispanic Ethnicity	9 (3%)	3.2
Symptoms		
Fever	336(98%)	--
Headache	275(80%)	--
Malaise	266 (78%)	--
Myalgia	248(73%)	--
Chills	217(63%)	--
Rash	127(37%)	--
Reported Exposures		
Exposure to wooded area	227(66%)	--
History of tick bite	215(63%)	--





1. Centers for Disease Control and Prevention Website, http://www.cdc.gov/ticks/diseases/rocky_mountain_spotted_fever/statistics.html
2. Heymann, M.D., Control of Communicable Diseases Manual 19th Edition, APHA, 2008. Ehrlichiosis, pp 521-523.

Salmonellosis

2009 Case Total 657 — 2009 Rate 18.0 per 100,000
2008 Case Total 901 — 2008 Rate 24.7 per 100,000

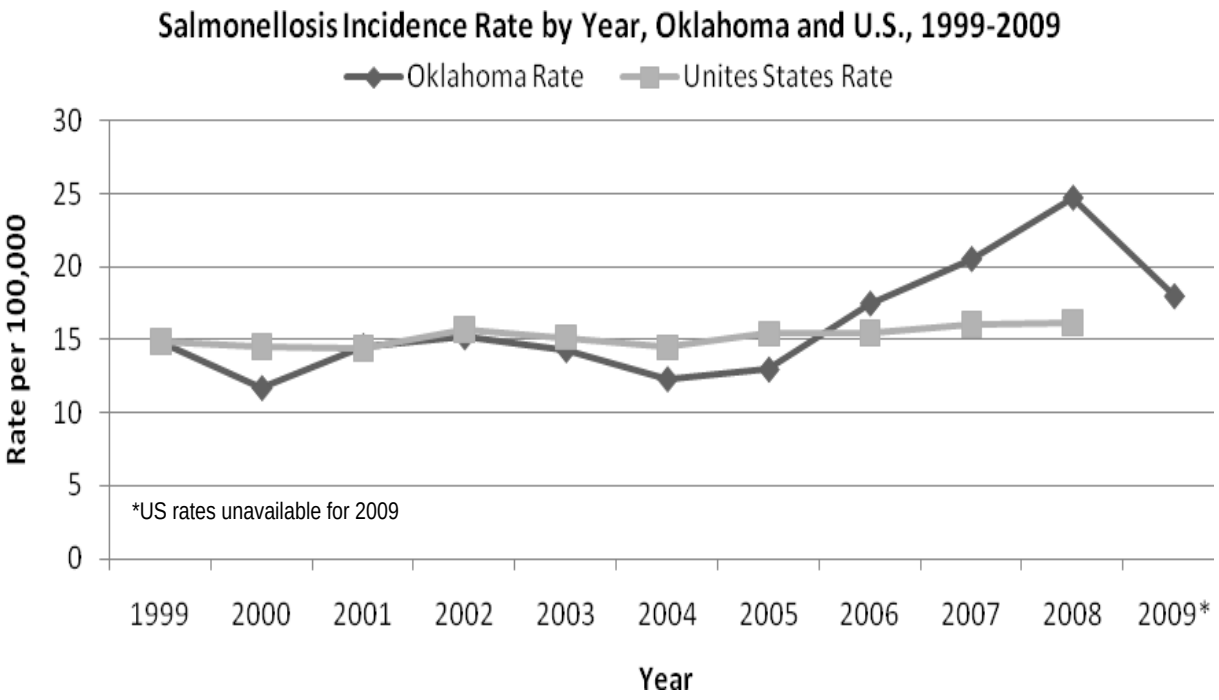
The incidence rate of reported salmonellosis cases during 2009 decreased 27% from the 2008 incidence rate, marking the first decrease in the incidence of reported *Salmonella* cases since 2004. Of the 657 cases reported, 33 (5%) were not laboratory confirmed, but were identified by the county health department Communicable Disease Nurse (CDN) as ill contacts to confirmed cases during case investigations. Each year, a seasonal trend for salmonellosis is observed; during 2009, the highest number of cases occurred from June through September.

Cases ranged in age from one day to 93 years with a median of 28 years of age. Of the 148 individuals hospitalized for salmonellosis, the number of days for hospitalization ranged from 1 to 35 days. Symptoms reported by individuals included diarrhea (94%), abdominal cramps (81%), fever (69%) and blood in stools (37%). Among potential exposures or sources of infection gathered during investigation, the four most common exposures reported by cases included direct contact with animals (5%), either domestic (dogs, cats or reptiles) or agricultural, consumption of undercooked eggs (10%), preparing or consuming raw or undercooked ground beef (7%), and preparing or consuming raw or undercooked poultry (7%).

Clinical isolates of *Salmonella* species identified by laboratories are required to be submitted to the OSDH Public Health Laboratory (PHL). These referred isolates are confirmed, serotyped, and analyzed using pulsed field gel electrophoresis (PFGE), generating patterns that are stored in a national database maintained by the CDC for the purpose of identifying multistate outbreaks. The OSDH PHL confirmed *Salmonella* and serotyped 587 isolates in 2009. Forty-five different serotypes were identified, with the top five serotypes in 2009 being Typhimurium (19%), Newport (17%), Enteritidis (10%), Paratyphi B variant L Tartrate + (8%) and Litchfield (3%).

In 2009, a *Salmonella* outbreak occurred in Oklahoma Country involving 24 Oklahoma residents. Twenty-one individuals were culture-confirmed cases with indistinguishable PFGE patterns. Investigation implicated an Oklahoma County restaurant; however, a specific food item associated with illness was not identified. Several multistate *Salmonella* outbreaks occurred during 2009 involving Oklahoma residents. One was a multistate outbreak of *S*. Typhimurium; 714 cases from 46 states were due to this outbreak including four Oklahoma cases. An epidemiologic investigation implicated consumption of a wide variety of peanut butter-containing products; all products were produced with peanut butter or peanut paste supplied by a single plant owned by the Peanut Corporation of America. Public health investigation resulted in the recall of more than 2,800 peanut-containing products produced by a wide variety of companies.

Another multistate outbreak involving an Oklahoma resident was due to *S*. Montevideo; 272 cases from 42 states were linked to this outbreak including one Oklahoma resident. An epidemiologic investigation conducted by state public health officials and CDC determined consumption of black and red pepper used on Italian style meats was associated with development of illness. Results from the public health investigation prompted a trackback investigation by the Food & Drug Administration and United States Department of Agriculture and a recall of several Italian style meat products coated with red and black pepper.



Demographic and Clinical Summary of Salmonellosis Cases, Oklahoma, 2009 (N=657)

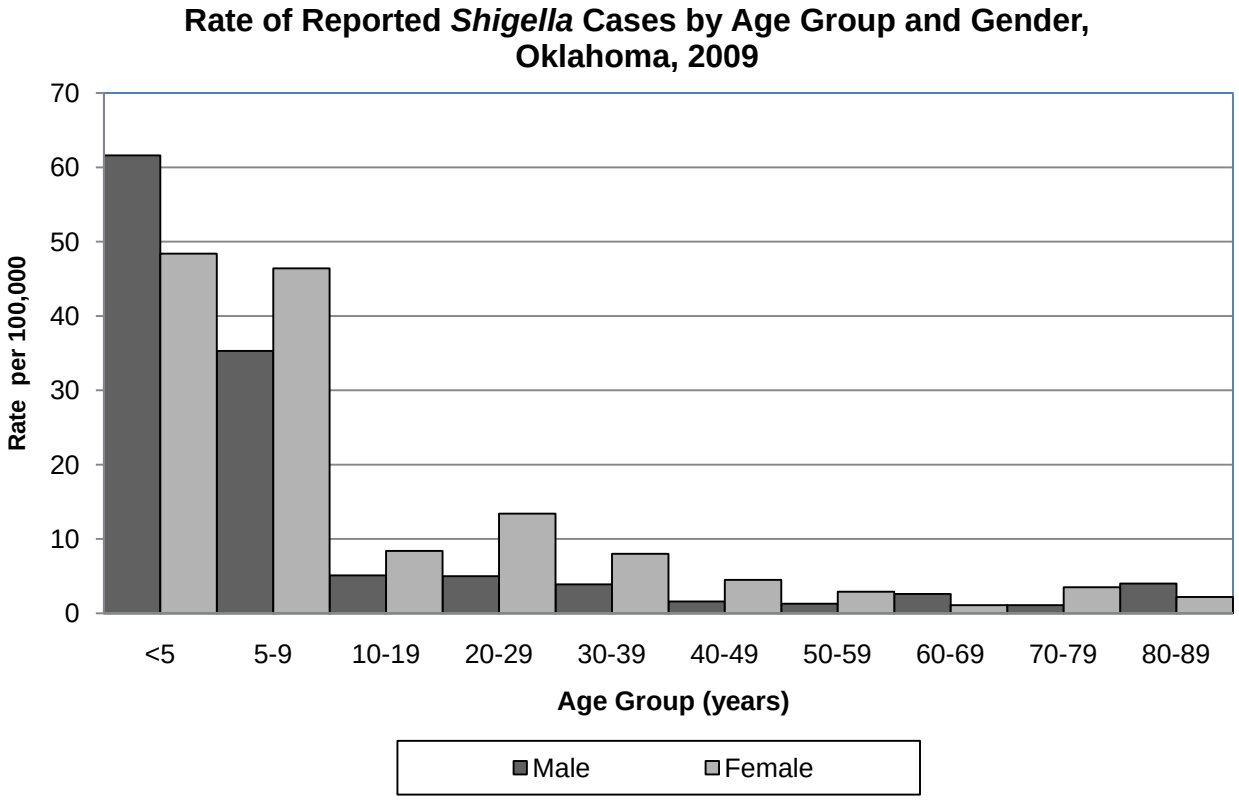
	N (%)	Incidence Rate per 100,000
Gender		
Female	353 (54%)	19.2
Male	304 (46%)	16.9
Age	Median 28 years (range 1 day – 93 years)	
Race		
White	492 (75%)	17.3
American Indian or Alaska Native	47 (7%)	16.1
African American or Black	36 (6%)	12.4
Asian	2 (0.3%)	3.2
Native Hawaiian or Other Pacific Islander	1 (0.2%)	25.9
Two or More Races	17 (3%)	11.5
Hispanic Ethnicity	46 (7%)	16.5
Hospitalized	148 (23%)	-
	Median 4 days (range 1 – 35 days)	

Shigellosis

2009 Case Total	399	2009 Rate	10.9 per 100,000
2008 Case Total	234	2008 Rate	6.4 per 100,000

Three hundred ninety-nine cases of shigellosis were reported to the OSDH during 2009 resulting in an incidence rate of 10.9 per 100,000 population. The number of cases in 2009 represented a 71% increase compared to 2008. Of the 399 cases, 298 (75%) were laboratory-confirmed cases and 101 (25%) were epidemiologically linked cases identified during investigations conducted by county health department Communicable Disease Nurses. Two hundred forty-six *Shigella* isolates were forwarded to the OSDH Public Health Laboratory for confirmation and speciation; 230 (94%) were identified as *Shigella sonnei,* 12 (5%) were *S. flexneri*, 3 (1.6%) were *S. dysenteriae* and 1 (0.4%) was *S. boydii*.

Shigellosis is typically a mild, self-limiting enteric disease. Among cases reported during 2009, predominant symptoms included diarrhea (98%), abdominal cramps (87%), fever (69%) and nausea (62%). The duration of diarrhea ranged from one day to 48 days with a median of 5 days; the median number of loose stools within a 24 period was 10 with a range from two to 100. The rate of disease among children less than 10 years of age (48.4 per 100,000) was four times greater than the overall incidence rate. Fifty-four percent (N=214) of cases reported an association with a high-risk setting. Of those 214 cases, 93 (43%) were associated with a childcare center. Of the 93 associated with a childcare setting, 88 were attendees and five were employees.



Descriptive Summary of Reported Shigellosis Cases, Oklahoma, 2009 N=399

	Number (%)	Rate/100,000
Gender (N=397)		
Female	218 (55%)	11.8
Male	179 (45%)	10
Age (years): Median and range	Median = 6 years (40 days – 87 years)	
Race (N=367)		
White	247 (67%)	8.7
Black or African American	68 (19%)	23.4
American Indian or Alaska Native	26 (7%)	8.9
Asian	3 (1%)	4.8
Hawaiian or Native Pacific Islander	2 (1%)	51.8
Two or more Races	21 (6%)	14.2
Ethnicity (N=344)		
Hispanic	42 (12%)	15.1
Hospitalized (N=390)	33 (8.5%)	--

Streptococcus, Group A Invasive Disease

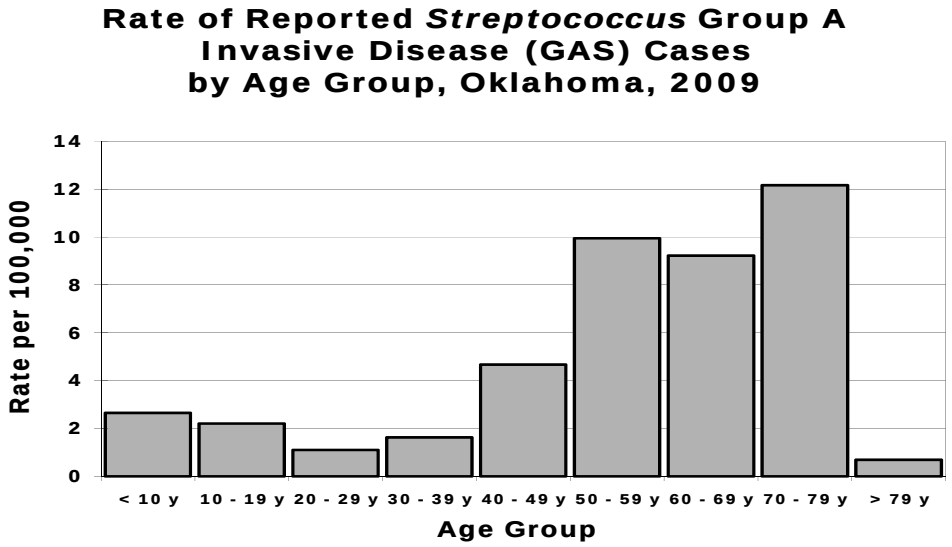
2009 Case total	158	2009 Rate	4.34 per 100,000
2008 Case total	138	2008 Rate	3.79 per 100,000

Invasive group A streptococcal (GAS) infections may manifest as several clinical presentations, such as pneumonia, bacteremia in association with cutaneous infections (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.

In 2009, the number of cases reported to OSDH increased by 14%. The most common primary presentation was bacteremia/sepsis (133 cases, 58.6%). Following in order of frequency were pneumonia (34 cases, 15%), cellulitis (29 cases, 12.8%), abscess [not skin] (13 cases, 5.7%), necrotizing fasciitis (9 cases, 4%), septic arthritis (3 cases, 1.3%), meningitis (2 cases, 0.9%), and endometriosis, osteomyelitis, otitis media and peritonitis (1 case each, 0.4%). More than one presentation occurred in 64 cases (41%). Necrotizing fasciitis is one of the most remarkable presentations of GAS due to the rapidity of progression and high rate of mortality. Of the nine cases of necrotizing fasciitis, one (11%) expired.

Summary of Reported Invasive *Streptococcus* Group A Cases, Oklahoma, 2009 (N =158)

	Number (%)	Rate/100,000
Gender (N= 158)		
Female	81 (51.3%)	4.39
Male	77 (48.7%)	4.28
Age	Median = 54 years (range: 1 month – 96 years)	
Race (N = 149)		
White	120 (80.5%)	4.22
Black	16 (10.7%)	5.52
American Indian/Alaska Native	8 (5.4%)	2.75
Native Hawaiian/Pacific Islander	2 (1.3%)	51.77
Asian	1 (0.7%)	1.59
More than one race reported	2 (1.37%)	1.35
Hispanic Ethnicity (N = 88)	8 (9.1%)	2.87
Hospitalization (N = 147)	101 (68.7%)	--
Deaths	12 (7.6%)	--



Invasive *Streptococcus pneumoniae,* Children <5 Years

2009 Case Total	63	2009 Rate	23.6 per 100,000
2008 Case Total	76	2008 Rate	28.5 per 100,000

Invasive *Streptococcus pneumoniae* (IPD) in children less than 5 years of age became reportable in Oklahoma in 2000. In 2009, the incidence of IPD in child less than 5 years of age decreased 17% compared to 2008. Unlike most years where the highest percentage of cases occurs during the winter months, no seasonal distribution was seen in 2009. Two deaths occurred among reported cases of IPD resulting in a case-fatality rate of 3.2%. Neither of the deaths had underlying conditions noted in their medical records, and one was age-appropriately vaccinated with the conjugate pneumococcal vaccination at time of illness onset.

A vaccine is currently available to help prevent invasive pneumococcal disease by the seven most common types of pneumococcal bacteria and is licensed for children less than 59 months of age. PCV7 should be given to children at 2, 4, and 6 months of age with a booster dose at 12-15 months of age, and is a required vaccine to attend a child care setting in Oklahoma.

Summary Statistics, IPD children <5, Oklahoma 2009 (N=63)

	Frequency (%)	Rate/100,000*
Gender		
Male	35 (56%)	25.7
Female	28 (44%)	21.5
Age*	Median= 1.5 years (range: 7 days – 4 years)	
Hospitalization for *S. pneumoniae*	35 (55%)	--
Deaths	2 (3.2%)	--
Race*		
White	38 (60%)	20
Black	7 (11%)	27.1
American Indian	4 (6%)	15.3
Asian	1 (1.6%)	23.3
Native Hawaiian/Pacific Islander	1 (1.6%)	248.8
Two or more races only	2 (3%)	9.9
Unknown	10 (16%)	--
Hispanic Ethnicity*	10 (16%)	25.2
Infection Types+		
Bacteremia/sepsis	54 (86%)	--
Meningitis	6 (10%)	--
Pneumonia	17 (27%)	--
Otitis Media	11 (17%)	
Other	2 (3%)	
Current PCV7 Vaccination, age-appropriate^	24 (41%)	--

*Age-specific and race-specific incidence rate per 100,000 population based on the number of children less than 5 years of age in Oklahoma.

+Infection types not mutually exclusive

^Of those with known vaccination status (N=59)

Early Syphilis

2009 Case Total	256	2009 Rate	7.0 per 100,000
2008 Case Total	212	2008 Rate	5.8 per 100,000

Syphilis is a genital ulcerative sexually transmitted disease (STD) caused by the bacteria *Treponema pallidum.* Syphilis is transmitted from person to person through direct contact with a syphilis lesion. Lesions primarily occur on the external genitalia such as the penis, and in the vagina or rectum; but may also occur in the mouth or on the lips. Syphilis transmission usually occurs 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. Many people have no symptoms for years, yet remain at risk for complications if not treated. There are three stages of syphilis infection: primary, secondary, and tertiary. During primary syphilis infection an ulcer (called chancre ["shan-ker"]) typically appears within 2-6 weeks after exposure, but could take up to 3 months to appear. These chancres usually disappear within a few weeks whether treated or not. Symptoms of secondary syphilis are a rash of flat, red lesions anywhere on the body (including the palms of the hands and soles of the feet), along with broad-based papules (lumps or warts) in warm, moist sites. Mucous patches or snail-track ulcers (sores) can develop in the mouth, appearing from 3-6 weeks after the chancre develops. Flu-like symptoms can also occur during secondary syphilis. Up to 30% of individuals with untreated syphilis may develop tertiary syphilis many years after the initial infection. Lesions during the final stage of syphilis can cause serious damage to the spinal cord (neurosyphilis), cause blindness, heart disease, mental illness, and even death. In this article, early syphilis is defined as a case of primary, secondary or early latent syphilis.

The rate of syphilis in Oklahoma increased 17.1% between 2008 and 2009, which follows a trend of increasing syphilis morbidity in Oklahoma and the U.S. since 2004. However, there has been an overall decrease since 1997 in Oklahoma and the U.S. Oklahoma had an incidence rate of 7 per 100,000 in 2009 with 60.9% of the reported cases being male. Oklahoma County had the highest number of reported cases along with the highest rate at 22.4 per 100,000, 3.2 times higher than the state rate. Comanche County had the second highest rate (14.3 per 100,000) followed by McCurtain County (11.9 per 100,000). The Comanche County rate increased 69% from 2008, the highest increase of all the counties in Oklahoma.

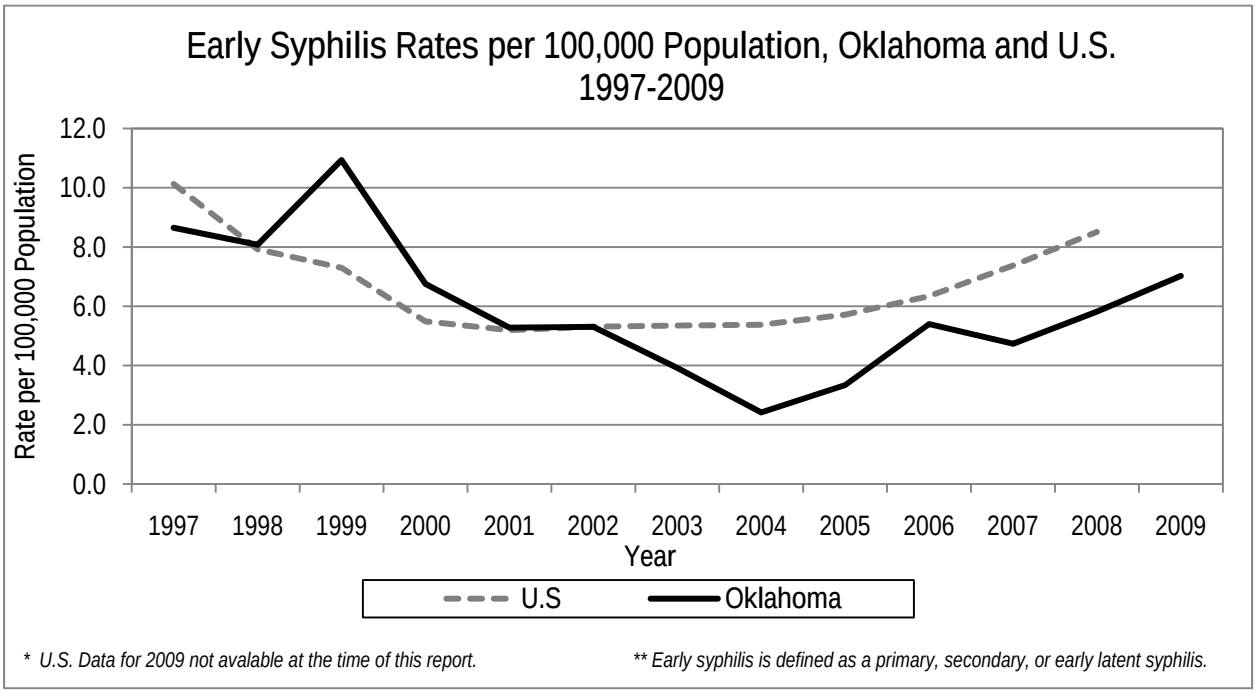
Among age groups, ages 20 to 24 years had the highest rate at 22.6 per 100,000 followed by ages 25 to 29 years at 18.9 per 100,000. Most age groups had an increase from 2008 to 2009 with the 35 to 39 age group having the highest rate increase, 34% higher than 2008 (21 to 32 cases). The Black/African American population had the highest rate among all racial groups with a rate of 42.4 per 100,000, 11.6 times higher when compared to the White population (3.65 per 100,000). Native Americans had the second highest rate (5.83 per 100,000), 1.6 times higher than Whites. Hispanics had a rate of 8.97 per 100,000 which represents a 4% decrease from 2008. Black/African Americans had the highest rate increase from 2008 (30%) while Native Americans had the biggest decrease (-11.8%). All other racial groups represented less than 5% of the total reported cases in Oklahoma.

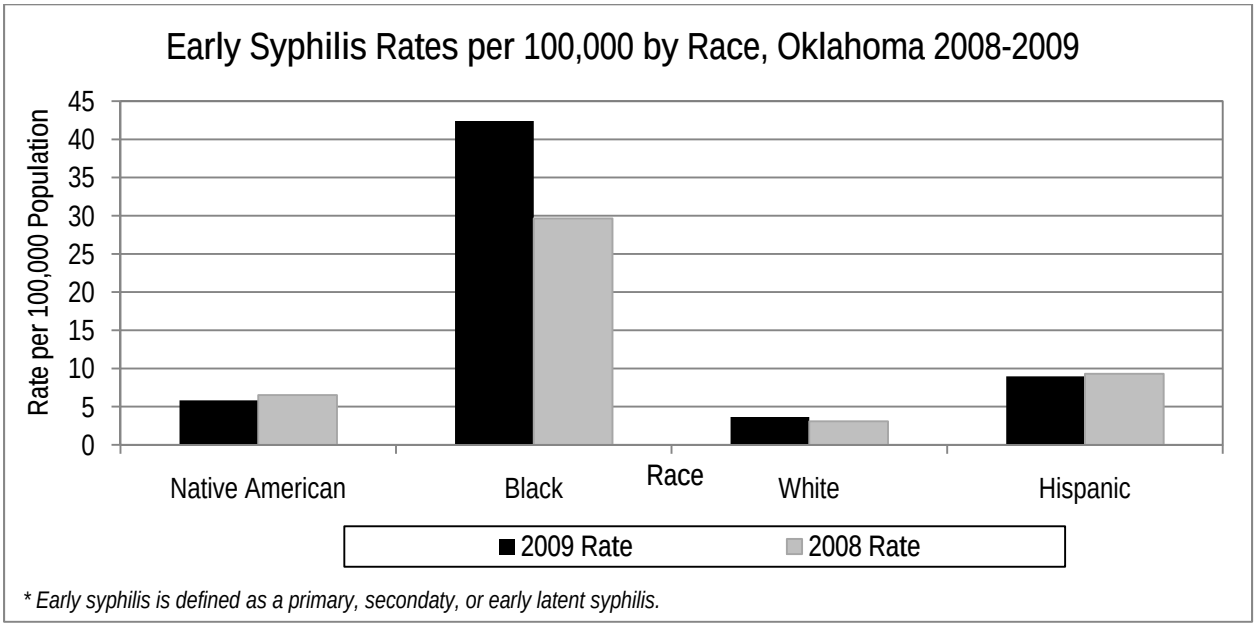
Syphilis Outbreak among Teens

During 2009, Oklahoma experienced a syphilis outbreak in Oklahoma County. In March of 2009, three high school students between the ages of 15 to 17 were reported to the Oklahoma City County Health Department with early syphilis. Within days, another 17 year old was reported with primary syphilis in the central Oklahoma area. Upon further investigation, the reporting county health department nurse stated her county had seen a few cases of early syphilis among teens the previous week.

By July of 2009, there were a total of 33 cases in the outbreak. Twenty-one of these cases were diagnosed as early latent syphilis with 7 secondary syphilis cases, 1 primary syphilis case, and 1 late latent syphilis case. The majority (58%) of the cases were among males. Blacks accounted for 70% of the outbreak, followed by Whites (30%) and Hispanics (12%). Although the first outbreak cases were among 15-17 year olds, the outbreak age ranged from 14 to 45 years of age with a median age of 21 years.

Heterosexual contact was identified as the only risk activity for 46% of those involved in the outbreak. Men who have sex with men accounted for 27% of the outbreak cases. The additional 27% had a risk identified as a combination of heterosexual contact, sex while intoxicated or high, anonymous sex, or bisexual female.





Early Syphilis Cases and Rates by Demographics for 2009, Oklahoma		
	Number (%)	Incidence Rate per 100,000
Gender *(N= 256)*		
Male	156 (60.9%)	8.67
Female	100 (39.1%)	5.42
Age Groups *(N= 256)*		
< 10 Years	**	**
10 to 14	**	**
15 to 19	24 (9.4%)	9.53
20 to 24	61 (23.8%)	22.58
25 to 29	52 (20.3%)	18.96
30 to 34	32 (12.5%)	14.28
35 to 39	32 (12.5%)	13.96
40 to 44	24 (9.4%)	10.46
45 TO 49	14 (5.5%)	5.38
> 50 Years	17 (6.6%)	1.48
Race *(N= 256)*		
American Indian/Alaska Native	17 (6.6%)	5.83
Asian	**	**
Black/African American	123 (48.0%)	42.41
White	104 (40.6%)	3.65
Hawaiian/Pacific Islander	**	**
Multiple Race /Other	**	**
Unknown	**	**
Ethnicity *(N= 25)*		
Hispanic	25 (9.8%)	8.97

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Tuberculosis

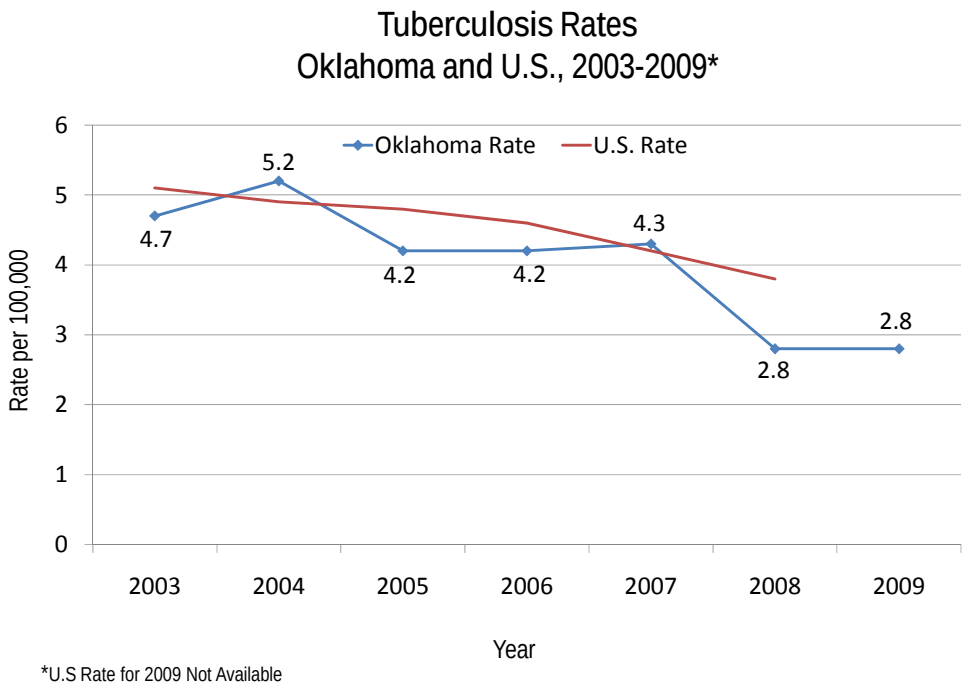
2009 Case Total	102	2009 Rate	2.8 per 100,000
2008 Case Total	100	2008 Rate	2.8 per 100,000

Tuberculosis (TB) is often considered a disease of the past. Nearly one-third of the world's total population, or about two billion people, are infected with the bacteria that cause TB. Each year, approximately 9 million people around the world develop TB. Through public health efforts of timely case diagnosis, contact investigation, administration of therapy, prevention, and education, the United States has seen a steady decline of TB.

Oklahoma has followed the national downward trend of tuberculosis (refer to TB graph). In 2009, 102 cases of active tuberculosis were reported. Fifty-three percent of the 2009 TB cases were culture confirmed (refer to TB case report table). No multidrug resistant cases were identified in 2009. Persons 45-64 years of age represented the highest rate of illness at 4.1 per 100,000 population followed by children 0-4 years of age at 3.8 per 100,000 population (refer to TB case report by age and race table). Persons who reported their race to be Native Hawaiian/Pacific Islanders represented the highest rate of disease of 129.4, followed by Asians at 19.1 per 100,000 population. Some races may be under represented as race is self-reported and one can report more than one race.

Although the rate of TB has declined, TB remains a public health concern in Oklahoma. Prevention, early diagnosis and treatment can make the difference in health issues and keeping communities and families healthy. Persons diagnosed with active TB must comply with an intensive course of treatment. Oklahoma uses directly observed therapy (DOT), through which a health care provider is assigned to physically observe the patient take doses of TB medication, to help patients adhere to their treatment plan.

For information about TB disease and testing, contact the OSDH Acute Disease Service, TB Division at 405-271-4060, visit this Web site: www.health.ok.gov or contact your local county health department.



*U.S Rate for 2009 Not Available

Tuberculosis Cases Report, Oklahoma 2003-2009

Year	2003	2004	2005	2006	2007	2008	2009
Tuberculosis Cases	163	178	144	144	149	100	102
AGE							
0-4	11 (7%)	14 (8%)	12 (8%)	8 (6%)	12 (8%)	12 (12%)	10(10%)
5--14	1 (1%)	10 (6%)	7 (5%)	3 (2%)	9 (6%)	1 (1%)	7(7%)
15-24	16 (10%)	24 (13%)	7 (5%)	9 (6%)	11 (7%)	8 (8%)	7(7%)
25-44	51 (31%)	50 (28%)	40 (28%)	36 (25%)	36 (24%)	29 (29%)	23(22%)
45-64	52 (32%)	54 (30%)	53 (37%)	56 (39%)	60 (40%)	32 (32%)	38(37%)
65-Over	32 (20%)	27 (15%)	25 (17%)	32 (22%)	21 (14%)	18 (18%)	17(17%)
RACE							
American Indian/Alaska Native	33 (20%)	36 (20%)	32 (22%)	22 (15%)	30 (20%)	19 (19%)	13(13%)
Asian	16 (10%)	20 (11%)	14 (10%)	20 (10%)	8 (5%)	7 (7%)	12(12%)
Black	27 (17%)	32 (18%)	21 (15%)	22 (15%)	22 (15%)	23 (23%)	13(13%)
Native Hawaiian/Pacific Islander	0	0	0	0	5 (3%)	6 (6%)	5(5%)
White	87 (53%)	88 (50%)	70 (49%)	79 (55%)	84 (56%)	45 (45%)	51(50%)
Multiple Races	0	2 (1%)	7 (4%)	1 (.7%)	--	--	7(7%)
Hispanic***	18 (11%)	29 (32%)	21 (15%)	25 (17%)	25 (17%)	13 (13%)	16(16%)
SPECIAL POPULATIONS							
Foreign Born	37 (23%)	37 (21%)	35 (24%)	39 (27%)	38 (26%)	30 (30%)	20(20%)
Univ. Students	8 (5%)	5 (3%)	2 (1%)	5 (3%)	2 (1%)	1 (1%)	0
Homeless	7 (4%)	9 (5%)	13 (9%)	8 (6%)	7 (5%)	8 (8%)	6 (6%)
Nursing Homes	5 (3%)	5 (3%)	5 (3%)	8 (6%)	4 (3%)	5 (5%)	4 (4%)
AIDS/TB	10 (6%)	4 (2%)	10 (7%)	6 (4%)	5 (3%)	3 (3%)	1 (1%)
Prisoners	6 (4%)	11 (6%)	8 (6%)	7 (5%)	2 (1%)	2 (2%)	2 (2%)
BACTERIOLOGY							
Resistance To INH	9 (5.6%)	1 (1%)	5 (5%)	3 (2%)	0	3 (3%)	4 (4%)
MDR-TB	1 (.8%)	0 (N/A)	1 (1%)	0 (N/A)	0	0	0
Culture Positive for MTB	126 (77%)	109 (61%)	93 (65%)	73 (51%)	91 (61%)	80 (80%)	54 (53%)

***Persons of Hispanic ethnicity may be represented in other races

Tuberculosis Case Rates by Age and Race, Oklahoma 2003-2009

Year	2003	2004	2005	2006	2007	2008	2009
Oklahoma Case Rate*	4.7	5.2	4.2	4.2	4.3	2.8	2.8
U.S. Case Rate*	5.1	4.9	4.8	4.6	4.2	3.8	NA
AGE**							
0-4	5/100,000	6/100,000	5/100,000	3/100,000	5/100,000	4.6/100,000	3.8/100,000
5--14	1/100,000	2/100,000	1/100,000	.6/100,000	2/100,000	0.2/100,000	1.4/100,000
15-24	3/100,000	5/100,000	1/100,000	2/100,000	2/100,000	1.5/100,000	1.3/100,000
25-44	5/100,000	5/100,000	4/100,000	4/100,000	4/100,000	3.0/100,000	2.4/100,000
45-64	7/100,000	7/100,000	7/100,000	7/100,000	8/100,000	3.5/100,000	4.1/100,000
65+	7/100,000	6/100,000	5/100,000	7/100,000	5/100,000	3.7/100,000	3.5/100,000
RACE**							
American Indian/Alaska Native	12/100,000	13/100,000	12/100,000	8/100,000	11/100,000	6.7/100,000	4.5/100,000
Asian	34/100,000	43/100,000	30/100,000	43/100,000	17/100,000	11.2/100,000	19.1/100,000
Black	9/100,000	12/100,000	8/100,000	8/100,000	8/100,000	8.0/100,000	4.5/100,000
Native Hawaiian/ Pacific Islander	0	0	0	0	210/100,000	164.3/100,000	129.4/100,000
White	3/100,000	3/100,000	3/100,000	3/100,000	3/100,000	1.6/100,000	1.8/100,000
Multiple Races	0	1/100,000	4/100,000	.6/100,000	--	--	4.7/100,000
***Hispanic	10/100,000	16/100,000	7/100,000	13/100,000	14/100,000	5.0/100,000	5.7/100,000

*Rate is 100,000 per population
**Race and Age calculations using census data
***Persons of Hispanic ethnicity may be represented in other races.

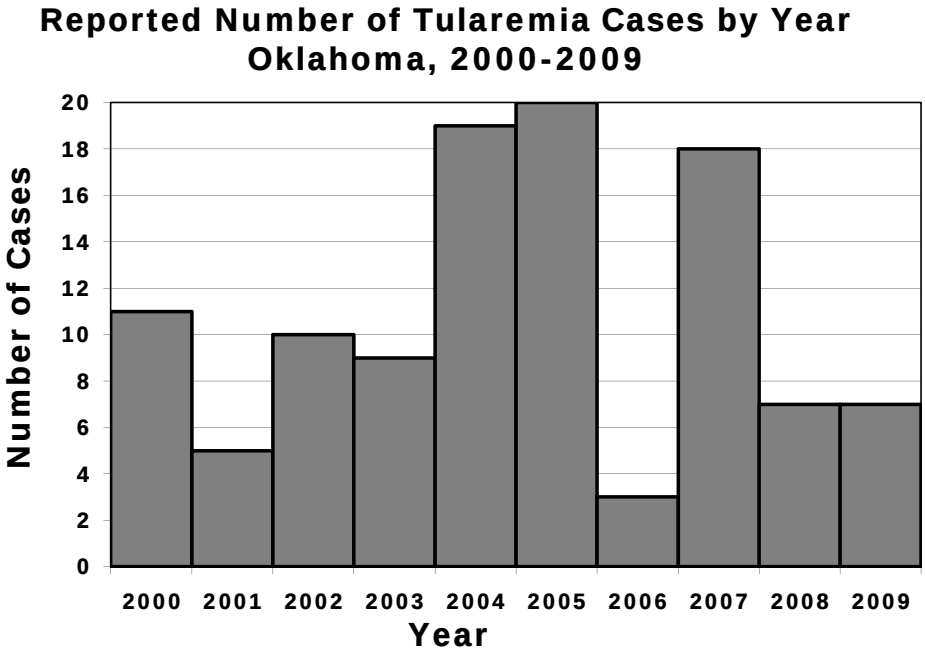
Tularemia

2009 Case Total	7	2009 Rate	0.19 per 100,000
2008 Case Total	7	2008 Rate	0.19 per 100,000

Although tularemia is endemic in Oklahoma, *Francisella tularensis* is classified as a bioterrorism agent and is therefore an immediately notifiable disease. Epidemiologists from the Acute Disease Service investigate all cases upon receipt to identify the source of exposure and evaluate for case clustering or outbreaks. In 2009, 7 cases were reported to the Oklahoma State Department of Health. There are many different presentations of tularemia. Of the reported cases in 2009, 6 individuals experienced symptoms consistent with ulceroglandular disease and one experienced symptoms characterized as a typhoidal syndrome. Although trends in disease are not understood entirely, weather changes do affect tick survival. While cases are reported throughout the year, all of the reported cases in 2009 had onset of symptoms from May through October. Among cases, commonly reported symptoms include fever, chills, swollen lymph nodes, fatigue, nausea, vomiting, ulcers, and headache. Sporadic case investigations are important for surveillance activities and provide an opportunity for patient education on tick bite prevention and the safe handling of animals.

Demographic and Clinical Summary of Reported Tularemia Cases, Oklahoma, 2009 (N=7)

	Frequency (%)	Rate/100,000
Gender		
Male	3 (43%)	0.17
Female	4 (57%)	0.22
Age	Median= 14 Years (Range 5- 78 Years)	--
Hospitalized	5 (71%)	--
Deaths	0	--
Race		
White	6 (86%)	0.18
More than one race	1 (14%)	0.34
Geographical Distribution		
Cleveland	1 (14%)	0.42
Muskogee	1 (14%)	1.40
Nowata	1 (14%)	9.32
Oklahoma	2 (30%)	0.28
Tulsa	1 (14%)	0.17
Washington	1 (14%)	1.98
Exposures		
Tickbite	0 (0%)	--
Tick Infested Woody Area	4 (57%)	--
Animal Bite	1 (14%)	


Reported Number of Tularemia Cases by Year
Oklahoma, 2000-2009
Number of Cases
20
18
16
14
12
10
8
6
4
2
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year

Typhoid Fever

2009 Case Total	2	2009 Rate	0.05 per 100,000
2008 Case Total	3	2008 Rate	0.08 per 100,000

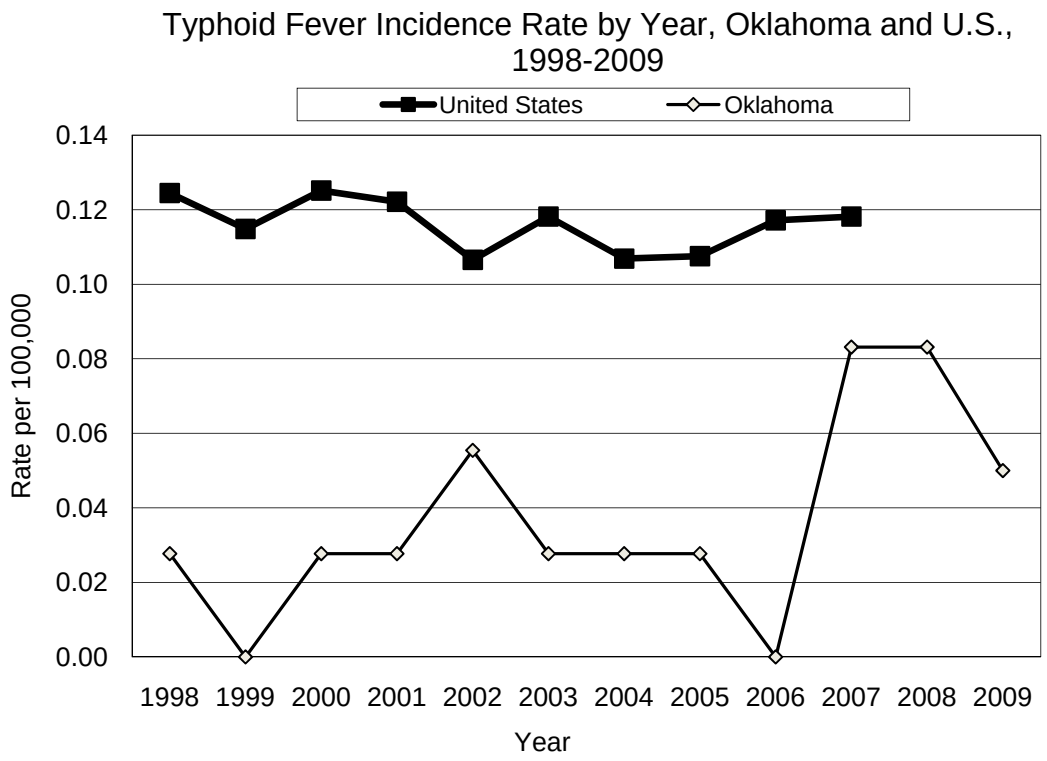
Typhoid fever is an immediately notifiable condition. The Oklahoma State Department of Health immediately investigates reported typhoid fever cases to identify potential exposures; determine if the person works in or attends a high-risk setting such patient care, child care, or a food establishment in order to implement control measures to prevent continued spread; and identify symptomatic contacts to determine if secondary cases have occurred. Two cases of typhoid fever were reported during 2009 resulting in an incidence rate of 0.05 per 100,000. The number of cases in 2009 were higher than the previous 10-year period (1999-2008) in Oklahoma where a median number of one case was reported annually. From 1998 to 2007, the median number of reported cases in the United States was 361 cases (range: 322 - 434 cases) resulting in an average annual incidence rate of 0.12 per 100,000 US population.

While uncommon in the United States, typhoid fever is prevalent in underdeveloped countries causing an estimated 22 million cases and 200,000 related deaths each year around the world.[1] The majority of typhoid fever cases in the United States are the result of importation from endemic countries. In 2009, both cases reported in Oklahoma residents had history of travel to endemic areas during their exposure period; cases reported traveling to Cameroon and the Marshall Islands. Transmission occurs when people consume contaminated food items or water. One of the infected individuals consumed fresh fruit and raw fish. This client reported attending an event in the Marshall Islands where over half of the attendees became ill with diarrheal illness. Ages of the two cases were 22 years and 58 years. The two cases reported their race as African American or Black and Native Hawaiian or Other Pacific Islander and neither reported Hispanic ethnicity.

Typhoid fever is characterized by a gradual onset of fever, headache, malaise, anorexia, splenomegaly, and non-productive cough. Both cases reported fever, abdominal pain, nausea, non-productive cough and diarrhea. Both infected individuals had *S. typhi* sepsis and were hospitalized for a mean duration of six days.

People infected with typhoid fever who work in high-risk settings are required to have three negative stool samples collected at least 24 hours apart and 48 hours after last use of antibiotics prior to returning to work. Both cases reported working in direct patient care in long-term care settings. Communicable Disease Nurses at the Oklahoma and Garfield County Health Departments provided enteric kits to the infected individuals and testing was performed at the Public Health Laboratory.

A vaccine is available for typhoid fever and is recommended for travelers to areas where the disease is endemic or for household members of known carriers. However, the vaccine efficacy is quite low ranging from 51% to 77% and avoidance of high-risk foods such as those items that have not been fully cooked is advised.[2] One case reported receiving the typhoid vaccine five years prior to developing symptoms. A booster dose of the vaccine is recommended every two years to travelers to endemic areas.[2] The Centers for Disease Control and Prevention traveler's health website at http://www.cdc.gov/travel/ has useful information for individuals traveling to areas where typhoid fever is a concern.



[1] CDC. Coordinating Center for Infectious Diseases / Division of Bacterial and Mycotic Disease. Typhoid Fever. July 21, 2009.

[2] CDC. Typhoid Immunization Recommendations of the Advisory Committee on Immunization Practices (ACIP). Vol. 43. No. RR-14. December 9, 1994

West Nile Virus

2009 Case Total	10	2009 Rate	0.3 per 100,000
2008 Case Total	9	2008 Rate	0.3 per 100,000

Since national surveillance began 10 years ago, there have been a total of 29,683 human cases of West Nile (WN) disease with 1,163 deaths reported in the United States. In 2009, a total of 722 human cases of WN disease were reported to the Centers for Disease Control and Prevention by 47 states representing a 93% decrease from national peak activity in 2003 with 9,862 human cases. The highest number of cases was reported from Texas (115), California (112), and Colorado (103). Three hundred and twenty-five cases of WN disease were reported in Oklahoma from 2002-2009 with the highest incidence occurring in 2007 (3.0 per 100,000) followed by 2003 (2.3 per 100,000).
The 2009 statewide incidence of human WN disease was 10 cases of WN Fever or WN neuroinvasive disease (0.3 per 100,000) was unchanged from the previous season. For the second consecutive year, the incidence of WN disease was the lowest since it was identified in Oklahoma in 2002.

The counties with the highest cumulative seven year rates were Texas (143.0 per 100,000), Cimarron (117.4 per 100,000), and Beaver (114.3 per 100,000). In 2009, reported cases were distributed across 7 counties with Jefferson (16.1 per 100,000), Choctaw (6.7 per 100,000), and Carter (4.2 per 100,000) having the highest incidence rates per 100,000 population. By gender, seven (70%) case patients were male; eight (80%) were white, one was an American Indian and race was unknown for one. Dates of symptom onset ranged from July 16 to September 28, 2009. The highest incidence rate of WN disease was in those 70 years of age and older (2.9 per 100,000); age range of all cases was 33–78 years.

While persons of any age may develop symptoms of disease, those over the age of 50 are at greater risk of developing WN neuroinvasive disease. From 2002-2009, the cumulative incidence rate of WN disease in adults 50 years of age and older was 17.0 per 100,000 population. Since 2002, 200 hospitalizations (61.5%) and 204 neuroinvasive disease cases (62.7%) were reported. Twenty deaths due to WN disease have occurred with one fatality in 2009 resulting in a seven year cumulative fatality rate of 6.2. In 2009, neuroinvasive disease comprised 80% (8) of reported WN cases. Hypertension and cardiovascular disease have been identified as independent risk factors for developing WN neuroinvasive disease. Seven (70%) case patients reported hypertension and four (40%) reported cardiovascular disease.

Since 2002, the majority of case patients developed WN disease in August (41.5%, N=135) and September (32.9%, N=107) with the earliest onset date occurring in March 2003. Typically, WN disease in Oklahoma has a seasonal pattern with most human cases occurring between July and October. In 2009, onset dates of illness spanned from mid-July to late September and with peaks in August and September.

Due to the risk of WN virus transmission through contaminated blood products, blood collection facilities routinely perform nucleic acid amplification testing (NAT) to screen donors for WN viremia. Donations from all NAT-positive donors are excluded. From 2002-2009, 79 viremic blood donors were reported. Four viremic Oklahoma blood donors were reported in 2009 as compared to one in 2008. One viremic blood donor developed WN disease. In 2009, none of the WN cases reported wearing insect repellent. Personal protection measures such as regular use of an insect repellent containing DEET, Picaridin, Oil of Lemon Eucalyptus (PMD) or IR3535 are the only WN disease prevention methods available.