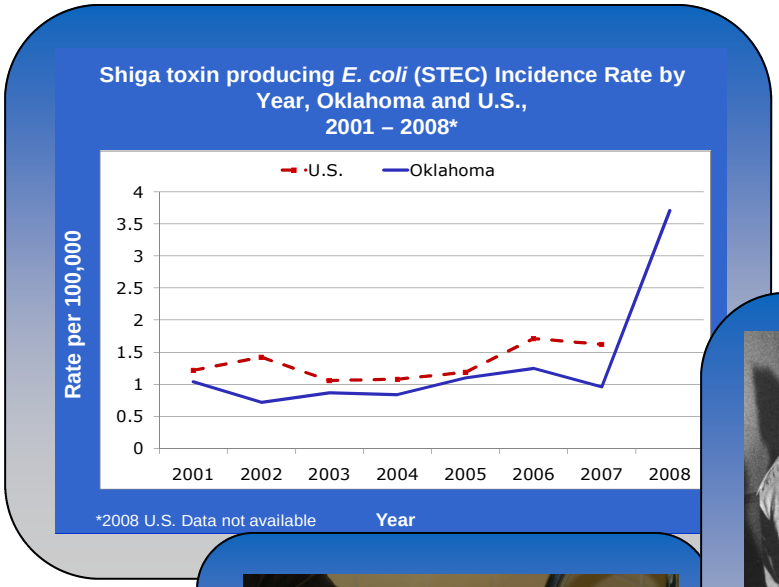
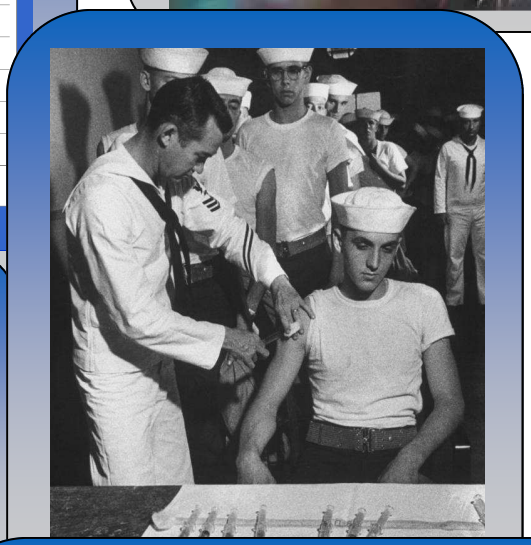
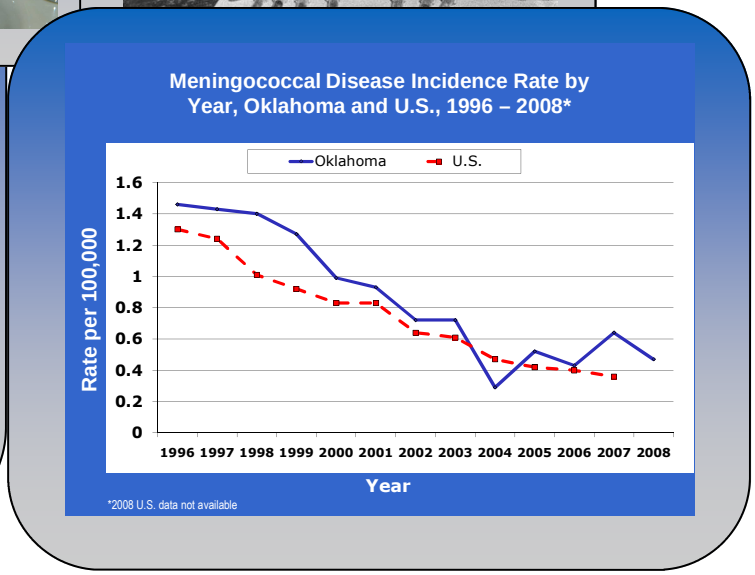
2008 Annual Summary of Infectious Diseases







Oklahoma State Department of Health

Creating a State of Health

The Annual Summary of Infectious Diseases is issued by the Oklahoma State Department of Health, as authorized by Terry Cline, Ph.D., Commissioner of Health, Oklahoma State Department of Health. Docutech printed 2,500 copies in August 2009 at a cost of $4,950.00.

Executive Summary
2008 Annual Summary of Infectious Diseases

Title 63 OS §1-502 and §1-503 as well as Title 310 OAC Chapter 505 require that healthcare providers and laboratories report cases of certain communicable diseases to the Oklahoma State Department of Health (OSDH). This allows the surveillance, investigation, and control of the spread of disease in the population by public health personnel. Several service areas of the OSDH as well as the county health departments are charged with this important action. Infectious diseases continue despite significant public health achievements in disease prevention and control. Following are a few important infectious disease events for 2008.

Cases of Shiga toxin producing *Escherichia coli* (STEC) increased fourfold compared to 2007. This notable increase can be partially attributed to a large *E. coli* O111 outbreak that occurred in northeastern Oklahoma in August and September of 2008. Two-thirds of the 135 cases were associated with the *E. coli* O111 outbreak. Excluding the outbreak-related cases, there was still a 45% increase in STEC cases from 2007. This increase may be partially due to more widely used laboratory tests that identify other serotypes of STEC beyond O157:H7, thus enhancing our surveillance for STEC-related illnesses in Oklahoma.

The incidence rate of salmonellosis increased 28% from 2007 to 2008, continuing a four-year trend of increase in the incidence of reported *Salmonella* cases. Recent increases in salmonellosis can be partly attributed to the continued submission of *Salmonella* isolates to the OSDH Public Health Laboratory for serotyping and pulsed-field gel electrophoresis (PFGE), a molecular method of DNA fingerprinting to identify outbreaks.

During 2008, OSDH collaborated with state and federal health officials on several multistate outbreak investigations. One was a nationwide outbreak of *Salmonella* Saintpaul, which was the largest culture-confirmed foodborne disease outbreak identified in the U.S. in the past decade. Raw produce, specifically raw tomatoes, raw jalapeno peppers and raw serrano peppers were determined to be associated with this outbreak. Thirty-eight cases occurred in Oklahomans.

Oklahoma's incidence of vectorborne diseases such as Rocky Mountain spotted fever and ehrlichiosis continue to occur at rates higher than national levels. The incidence rates of Rocky Mountain spotted fever and ehrlichiosis in Oklahoma was 10 time higher and 4 times higher than the Unites States incidence rates in 2008 respectively. In general, the highest incidence of both diseases was in the eastern part of the state.

The year 2008 was also marked by successes in infectious disease control. Public health investigations and management of exposed contacts resulted in a 32% decline in the incidence of tuberculosis. Despite this public health achievement in reducing the burden of tuberculosis in Oklahoma, TB continues to require significant public health resources in early diagnosis, treatment, and medical management of contacts.

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 how your county compared to the state. Additional statistical summaries of reportable diseases in Oklahoma and resources on disease reporting are available on the OSDH website at http://www.ok.gov/health.

2008 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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TITLE 310. OKLAHOMA STATE DEPARTMENT OF HEALTH
CHAPTER 515. COMMUNICABLE DISEASE AND INJURY REPORTING
EFFECTIVE 6/25/2009

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

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

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

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

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

"VISA" means vancomycin intermediate *Staphylococcus aureus*.

"VRSA" means vancomycin resistant *Staphylococcus aureus*.

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

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

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

The following diseases must be reported by any health practitioner or laboratory personnel to the OSDH 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 OSDH Disease Reporting Manual.

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

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

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

(1) **Infectious diseases.** Reports of infectious diseases and conditions listed in this subsection must be 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 OSDH Disease Reporting Manual.

(A) Acid Fast Bacillus (AFB) positive smear.
(B) AIDS (Acquired Immunodeficiency Syndrome).
(C) Arboviral infections (West Nile virus, St. Louis encephalitis virus, Eastern equine encephalitis virus, Western equine encephalitis virus, Powassan virus, California serogroup virus).
(D) Brucellosis (*Brucella* spp.).
(E) Campylobacteriosis *(Campylobacter* spp.).
(F) Congenital rubella syndrome.
(G) Cryptosporidiosis (*Cryptosporidium* spp.).
(H) Cyclosporiasis (*Cyclospora cayetanensis*).
(I) Dengue Fever.
(J) *E. coli O157, O157:H7,* or a Shiga toxin producing *E. coli* (STEC infections).
(K) Ehrlichiosis (*Ehrlichia* or *Anaplasma* spp.).
(L) Giardiasis (*Giardia lamblia*).
(M) Hantavirus pulmonary syndrome.
(N) Hemolytic uremic syndrome, postdiarrheal.
(O) Hepatitis B. If HBsAg+, anti-HBc-IgM+, HBeAg+, or HBV DNA+ then report results of the entire hepatitis panel.
(P) Hepatitis C. 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.
(Q) Human Immunodeficiency Virus (HIV) infection.

(R) Influenza associated pediatric mortality
(S) Legionellosis (*Legionella* spp.).
(T) Leptospirosis (*Leptospira interrogans)*.
(U) Listeriosis (*Listeria monocytogenes*).
(V) Lyme disease (*Borrelia burgdorferi*).
(W) Malaria (*Plasmodium* spp.).
(X) Mumps.
(Y) Pertussis (*Bordetella pertussis*).
(Z) Psittacosis (*Chlamydophia psittaci*).
(AA) Q Fever (*Coxiella burnetti*).
(BB) Rocky Mountain Spotted Fever (*Rickettsia rickettsii*).
(CC) Rubella.
(DD) Salmonellosis (*Salmonella* spp.).
(EE) Shigellosis (*Shigella* spp.).
(FF) *Staphylococcus aureus* with reduced susceptibility to vancomycin (VISA or VRSA).
(GG) *Streptococcus*, group A invasive disease.
(HH) *Streptococcus pneumoniae* invasive disease, in persons less than 5 years of age.
(II) Syphilis (*Treponema pallidum*).
(JJ) Tetanus (*Clostridium tetani*).
(KK) Trichinellosis (*Trichinella spiralis*).
(LL) Tuberculosis (*Mycobacterium tuberculosis*).
(MM) Unusual disease or syndrome.
(NN) *Vibrio* spp. infections including cholera.
(OO) 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, 1979 - 2008

Disease	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Botulism (Foodborne)	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
Botulism (Infant)	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0
Brucellosis	8	10	8	8	6	7	5	0	5	3	4	1	2	1	0	0
Campylobacteriosis	0	15	56	116	*212	216	305	288	252	212	223	247	205	267	199	187
Chlamydia	0	0	0	0	0	0	0	0	0	0	0	0	*5714	5220	4886	3784
Cholera	0	0	0	0	0	1	0	0	0	1	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	0	81	27	11	14	11	12	6	8	0	1	1
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	0	1	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	0	6	4	0	5	8	*13
Ehrlichiosis	0	0	0	0	0	0	0	0	23	14	1	1	3	8	0	0
Giardiasis	3	6	171	249	*269	372	340	265	207	264	229	214	211	188	262	252
Gonorrhea	13754	13844	15909	16021	15230	13088	13005	12572	9657	7411	6846	6464	6546	6432	4855	4935
Haemophilus influenzae , Invasive Disease (Total)	86	101	97	120	*179	240	303	290	244	236	154	134	76	33	45	44
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	0	0	0	2	*13	39	6	3	0	0	0	78	33	3	1	4
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	280	403	344	821	833	548	491	390	338	580	501	588	273	217	206	395
Hepatitis B	171	226	256	358	354	208	256	240	250	209	221	183	198	174	193	129
Hepatitis C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Influenza Associated Pediatric Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Legionellosis	0	0	7	13	*12	19	24	24	32	20	26	15	24	12	14	7
Leprosy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Leptospirosis	0	2	0	0	4	0	1	0	0	0	0	1	0	0	0	0
Listeriosis	3	0	1	3	0	1	10	20	17	14	17	16	6	8	12	11
Lyme Disease	0	0	0	0	0	0	0	0	3	9	16	20	23	25	20	111
Malaria	13	15	8	8	9	14	8	12	5	11	8	10	9	5	5	9
Measles	42	776	6	30	1	9	1	41	4	8	73	88	0	12	0	0

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1979 - 2008

Disease	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Meningococcal Invasive Disease	38	33	47	33	39	30	41	38	40	27	29	21	16	18	36	52
Mumps	0	0	0	0	0	0	0	0	102	295	184	74	15	20	11	*13
Pertussis	37	30	3	10	348	248	209	149	173	72	54	48	48	53	60	19
Plague	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Poliomyelitis	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Psittacosis	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0
Q Fever	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Rabies (Animal)	288	246	219	191	108	104	111	62	35	38	102	132	173	219	65	40
Rabies (Human)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Rocky Mountain spotted fever	60	77	101	89	221	137	103	110	86	103	60	68	95	111	46	36
Rubella	24	8	4	3	1	0	2	0	6	1	1	1	2	0	1	4
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	30	19	22	38	20	18	29	199	16	11	20	37	28	13	87	73
Streptococcus pyogenes (Group A), Invasive disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salmonellosis	396	404	424	516	613	445	474	512	474	500	446	441	481	368	320	444
Shigellosis	300	267	470	440	241	220	301	256	166	233	236	510	192	252	472	200
St. Louis Encephalitis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syphilis	422	427	479	593	571	532	538	489	552	479	375	589	596	709	636	399
Tetanus	2	1	2	1	0	2	1	1	1	1	2	0	0	1	1	1
Trichinellosis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Tuberculosis	352	333	381	335	331	262	264	267	250	277	218	243	206	216	209	261
Tularemia	13	24	44	36	35	24	22	19	27	17	8	10	12	10	16	4
Typhoid Fever	1	9	5	4	3	5	2	3	6	0	1	3	3	0	1	3
Vibrio spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibrio parahaemolyticus	0	0	0	0	0	0	3	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

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1979 - 2008

Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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	0	1	0	0	0
Botulism (Infant)	0	0	0	0	1	0	1	0	0	0	1	0	0	0
Brucellosis	1	1	0	0	0	1	0	1	0	0	1	2	1	0
Campylobacteriosis	289	281	247	241	320	361	308	362	417	591	544	405	530	486
Chlamydia	5050	7371	7566	9378	8737	9346	10622	10732	10983	10371	12957	13206	12529	14759
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	0	1	1	1
Cryptosporidiosis	12	10	12	7	14	*30	16	16	24	22	46	56	216	238
Cyclosporiasis	0	0	0	0	0	0	0	*0	0	0	0	2	0	0
Dengue Fever	0	0	0	1	0	0	0	*0	1	0	2	0	3	2
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*	16	14	13	26	41	19	36	25	30	29	38	43	33	135
Ehrlichiosis	0	0	0	2	12	*12	24	13	36	49	96	47	106	121
Giardiasis	206	159	152	148	152	96	0	85	145	166	200	167	172	172
Gonorrhea	5652	4897	4840	4225	4291	5236	4818	4624	4543	4543	5031	5170	4827	5207
Haemophilus influenzae , Invasive Disease (Total)	33	31	33	35	47	^46	48	53	52	67	74	78	93	90
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	3	0	1	1	0	^0	0	0	0	0	0	0	0	0
Hantavirus	0	1	0	0	0	*0	1	0	0	0	0	0	0	0
Hemolytic Uremic Syndrome, post diarrheal	0	0	0	0	1	*2	4	3	4	2	5	3	8	51
Hepatitis A	1497	2516	1441	667	534	271	116	52	29	19	6	11	13	13
Hepatitis B	176	60	63	169	185	179	115	111	73	80	59	96	152	129
Hepatitis C	1	8	10	23	13	*13	6	21	6	7	14	19	49	21
Influenza Associated Pediatric Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	*2
Legionellosis	8	16	4	18	6	5	7	5	10	24	10	10	9	11
Leprosy	0	0	0	0	1	*0	1	0	0	0	0	1	0	0
Leptospirosis	0	0	0	0	1	0	0	1	0	0	0	0	1	0
Listeriosis	11	5	9	19	12	*8	2	9	3	4	4	5	2	7
Lyme Disease	57	34	45	12	8	1	0	0	0	3	0	0	1	2
Malaria	1	3	9	4	2	10	5	12	4	10	12	11	10	5
Measles	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Table One. Number of Reported Cases of Communicable Diseases, Oklahoma, 1979 - 2008

Disease	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Meningococcal Invasive Disease	49	46	45	44	40	34	32	25	24	10	18	15	23	17
Mumps	1	4	3	4	5	3	0	3	2	1	2	11	7	1
Pertussis	47	21	60	36	40	60	43	135	106	122	125	64	58	100
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	0	4	0	*0	0	0	0	0	0	0	0	0
Q Fever	0	0	0	0	0	0	0	0	0	1	3	0	2	3
Rabies (Animal)	32	38	113	107	94	58	60	126	204	113	79	69	78	42
Rabies (Human)	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Rocky Mountain spotted fever	48	45	30	39	29	37	69	99	138	190	206	135	187	267
Rubella	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Staphylococcus aureus , Vancomycin intermediate	0	0	0	0	0	0	0	0	0	0	0	0	*1	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	48	19	22	26	45	38	58	67	81	52	48	73	77	76
Streptococcus pyogenes (Group A), Invasive disease	0	8	3	1	12	*28	49	56	99	73	132	125	87	138
Salmonellosis	471	520	392	501	468	404	503	524	494	425	448	604	709	901
Shigellosis	266	305	293	712	560	131	148	717	1078	724	936	196	162	234
St. Louis Encephalitis	0	0	0	0	0	0	1	*0	0	0	0	0	0	0
Syphilis	489	398	275	264	347	245	185	183	141	88	73	193	150	203
Tetanus	0	1	2	0	0	0	1	0	0	0	0	1	0	0
Trichinellosis	0	1	0	0	0	*0	0	0	0	0	0	0	0	0
Tuberculosis	237	201	211	198	208	154	194	190	163	178	144	144	149	100
Tularemia	7	4	5	5	7	11	7	10	9	19	20	3	18	7
Typhoid Fever	1	0	3	1	0	1	1	2	1	1	1	0	3	3
Vibrio spp.	3	1	0	9	1	0	0	1	*1	0	3	1	2	5
Vibrio parahaemolyticus	0	0	0	0	0	0	0	0	*0	0	1	0	0	1
Vibrio vulnificus	0	0	0	0	0	1	0	1	*0	1	1	0	0	0
West Nile Virus	0	0	0	0	0	0	0	*17	79	22	33	48	107	9

*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 1979 - 2008*

Disease	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
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)	0.04	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
Botulism (Infant)	0.00	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
Brucellosis	0.31	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
Campylobacteriosis	0.00	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
Chlamydia	0.00	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
Cholera	0.00	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
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	0.00	2.68	0.89	0.36	0.46	0.36	0.40	0.19	0.25	0.00	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	0.00	0.03	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	0.00	0.20	0.13	0.00	0.16	0.25
Ehrlichiosis	0.00	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
Giardiasis	0.12	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
Gonorrhea	537.4	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
Haemophilus influenzae , Invasive Disease (Total)	3.36	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
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	0.00	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
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	10.94	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
Hepatitis B	6.68	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
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	0.00	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
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	0.00	0.06
Leptospirosis	0.00	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
Listeriosis	0.12	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
Lyme Disease	0.00	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
Malaria	0.51	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
Measles	1.64	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

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1979 - 2008*

Disease	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Meningococcal Invasive Disease	1.48	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
Mumps	0.00	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
Pertussis	1.45	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
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	0.03	0.00	0.00
Poliomyelitis	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
Psittacosis	0.04	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
Q Fever	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	0.00
Rabies (Human)	0.04	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
Rocky Mountain spotted fever	2.34	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
Rubella	0.94	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
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	12.91	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
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	15.47	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
Shigellosis	11.72	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
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	16.49	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
Tetanus	0.08	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
Trichinellosis	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
Tuberculosis	13.75	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
Tularemia	0.51	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
Typhoid Fever	0.04	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
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	0.00	0.10	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

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1979 - 2008*

Disease	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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)	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Botulism (Infant)	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Brucellosis	0.00	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.03	0.06	0.03	0.00
Campylobacteriosis	5.94	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
Chlamydia	120.3	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	405.2
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	0.00	0.03	0.03	0.03
Cryptosporidiosis	0.03	0.38	0.32	0.38	0.22	0.45	0.87	0.46	0.46	0.70	0.64	1.33	1.62	6.26	6.53
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	0.06	0.00	0.00
Dengue Fever	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.09	0.05
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*	0.41	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
Ehrlichiosis	0.00	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
Giardiasis	8.01	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
Gonorrhea	156.9	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	143.0
Haemophilus influenzae , Invasive Disease (Total)	1.40	1.05	0.99	1.05	1.11	1.49	1.33	1.39	1.54	1.51	1.94	2.14	2.26	2.70	2.47
Haemophilus influenzae , Invasive Disease, type b, <5 yrs	1.77	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
Hantavirus	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	0.00	0.00
Hemolytic Uremic Syndrome, post diarrheal	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.12	0.09	0.12	0.06	0.14	0.09	0.23	1.40
Hepatitis A	12.56	47.59	79.99	45.81	21.20	16.98	7.85	3.36	1.51	0.84	0.55	0.17	0.32	0.38	0.36
Hepatitis B	4.10	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
Hepatitis C	0.00	0.03	0.25	0.32	0.73	0.41	0.38	0.17	0.61	0.17	0.20	0.41	0.55	1.42	0.58
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	0.05
Legionellosis	0.22	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
Leprosy	0.00	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
Leptospirosis	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00
Listeriosis	0.35	0.35	0.16	0.29	0.60	0.38	0.23	0.06	0.26	0.09	0.12	0.12	0.14	0.06	0.19
Lyme Disease	3.53	1.81	1.08	1.43	0.38	0.25	0.03	0.00	0.00	0.00	0.09	0.00	0.00	0.03	0.05
Malaria	0.29	0.03	0.10	0.29	0.13	0.06	0.29	0.14	0.35	0.12	0.29	0.35	0.32	0.29	0.14
Measles	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

Table Two. Incidence Rate per 100,000 Oklahoma Population of Reported Communicable Diseases, Oklahoma 1979 - 2008*

Disease	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Meningococcal Invasive Disease	1.65	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
Mumps	0.41	0.03	0.13	0.10	0.13	0.16	0.09	0.00	0.09	0.06	0.03	0.06	0.32	0.20	0.03
Pertussis	0.60	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
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	0.00	0.13	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	0.00	0.03	0.09	0.00	0.06	0.08
Rabies (Human)	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
Rocky Mountain spotted fever	1.14	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
Rubella	0.13	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.03	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	32.23	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
Streptococcus pyogenes (Group A), Invasive disease	0.00	0.00	0.25	0.10	0.03	0.38	0.81	1.42	1.62	2.87	2.12	3.83	3.62	2.52	3.79
Salmonellosis	14.12	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
Shigellosis	6.36	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
St. Louis Encephalitis	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	0.00	0.00
Syphilis	12.68	15.55	12.65	8.74	8.39	11.03	7.10	5.36	5.30	4.09	2.55	2.12	5.59	4.35	5.57
Tetanus	0.03	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
Trichinellosis	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
Tuberculosis	8.30	7.53	6.39	6.71	6.29	6.61	4.46	5.62	5.51	4.72	5.16	4.17	4.17	4.32	2.75
Tularemia	0.13	0.22	0.13	0.16	0.16	0.22	0.32	0.20	0.29	0.26	0.55	0.58	0.09	0.52	0.19
Typhoid Fever	0.10	0.03	0.00	0.10	0.03	0.00	0.03	0.03	0.06	0.03	0.03	0.03	0.00	0.09	0.08
Vibrio spp.	0.00	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
Vibrio parahaemolyticus	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	0.03
Vibrio vulnificus	0.00	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
West Nile Virus	0.00	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

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

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Campylobacteriosis		Cryptosporidiosis		*E. coli* O157:H7 and other STEC		Ehrlichiosis	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	10	45.85	0	0.00	0	0.00	4	18.34
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	7	133.38	0	0.00	0	0.00	0	0.00
Beckham County	6	28.39	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	2	4.99	0	0.00	0	0.00	0	0.00
Caddo County	3	10.34	0	0.00	0	0.00	0	0.00
Canadian County	17	16.03	4	3.77	2	1.89	1	0.94
Carter County	3	6.25	5	10.42	0	0.00	0	0.00
Cherokee County	9	19.68	1	2.19	4	8.75	2	4.37
Choctaw County	3	20.15	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	14	5.84	70	29.20	2	0.83	3	1.25
Coal County	1	17.48	0	0.00	0	0.00	0	0.00
Comanche County	2	1.79	14	12.53	2	1.79	0	0.00
Cotton County	1	16.15	0	0.00	0	0.00	0	0.00
Craig County	3	19.83	0	0.00	0	0.00	4	26.43
Creek County	7	10.03	1	1.43	3	4.30	5	7.16
Custer County	4	15.14	1	3.79	1	3.79	0	0.00
Delaware County	6	14.84	0	0.00	7	17.32	6	14.84
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	14	24.07	1	1.72	2	3.44	0	0.00
Garvin County	2	7.34	1	3.67	0	0.00	0	0.00
Grady County	3	5.87	8	15.67	2	3.92	0	0.00
Grant County	1	22.47	0	0.00	0	0.00	0	0.00
Greer County	0	0.00	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	0	0.00	0	0.00	0	0.00	0	0.00
Haskell County	2	16.46	3	24.69	0	0.00	1	8.23
Hughes County	2	14.68	0	0.00	0	0.00	1	7.34
Jackson County	11	43.59	5	19.81	1	3.96	0	0.00
Jefferson County	0	0.00	0	0.00	0	0.00	0	0.00
Johnston County	3	29.17	0	0.00	0	0.00	0	0.00
Kay County	11	24.11	0	0.00	0	0.00	0	0.00
Kingfisher County	1	6.99	0	0.00	0	0.00	0	0.00
Kiowa County	2	21.28	1	10.64	0	0.00	0	0.00

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	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	3	28.41
Le Flore County	3	6.02	0	0.00	0	0.00	5	10.04
Lincoln County	7	21.77	0	0.00	2	6.22	0	0.00
Logan County	2	5.25	9	23.62	0	0.00	0	0.00
Love County	0	0.00	2	21.85	0	0.00	0	0.00
McClain County	3	42.18	25	351.52	2	28.12	1	14.06
McCurtain County	5	33.51	0	0.00	1	6.70	2	13.41
McIntosh County	0	0.00	0	0.00	0	0.00	0	0.00
Major County	0	0.00	0	0.00	0	0.00	0	0.00
Marshall County	0	0.00	0	0.00	0	0.00	1	2.98
Mayes County	14	71.07	0	0.00	21	106.61	5	25.38
Murray County	1	7.82	2	15.64	1	7.82	0	0.00
Muskogee County	14	19.64	3	4.21	1	1.40	5	7.01
Noble County	3	26.86	0	0.00	0	0.00	0	0.00
Nowata County	0	0.00	0	0.00	1	9.32	1	9.32
Okfuskee County	3	26.85	0	0.00	0	0.00	2	17.90
Oklahoma County	128	18.11	44	6.23	2	0.28	11	1.56
Okmulgee County	7	17.85	1	2.55	3	7.65	2	5.10
Osage County	1	2.20	2	4.40	2	4.40	1	2.20
Ottawa County	6	18.84	0	0.00	0	0.00	3	9.42
Pawnee County	2	12.26	2	12.26	0	0.00	0	0.00
Payne County	9	11.50	0	0.00	4	5.11	3	3.83
Pittsburg County	10	22.17	0	0.00	2	4.43	11	24.38
Pontotoc County	3	8.11	1	2.70	0	0.00	1	2.70
Pottawatomie County	12	17.24	2	2.87	3	4.31	1	1.44
Pushmataha County	0	0.00	1	8.54	0	0.00	2	17.08
Roger Mills County	0	0.00	0	0.00	0	0.00	0	0.00
Rogers County	11	13.05	0	0.00	11	13.05	4	4.74
Seminole County	8	33.06	0	0.00	1	4.13	0	0.00
Sequoyah County	4	9.75	1	2.44	0	0.00	3	7.31
Stephens County	10	22.99	7	16.09	0	0.00	0	0.00
Texas County	7	34.51	0	0.00	0	0.00	0	0.00
Tillman County	0	0.00	0	0.00	1	12.66	0	0.00
Tulsa County	43	7.26	21	3.55	42	7.09	18	3.04
Wagoner County	8	11.60	0	0.00	6	8.70	2	2.90
Washington County	2	3.96	0	0.00	2	3.96	5	9.91
Washita County	2	17.08	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	2	10.08	0	0.00	1	5.04	0	0.00
State of Oklahoma	486	13.34	238	6.53	135	3.70	121	3.32

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Giardiasis		*Haemophilus influenzae* , invasive		Hepatitis A		Hepatitis B	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	0	0.00	0	0.00	0	0.00	1	4.58
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	4	27.29
Beaver County	1	19.05	0	0.00	0	0.00	0	0.00
Beckham County	3	14.19	0	0.00	0	0.00	2	9.46
Blaine County	0	0.00	0	0.00	0	0.00	1	7.90
Bryan County	1	2.49	0	0.00	0	0.00	1	2.49
Caddo County	1	3.45	3	10.34	0	0.00	0	0.00
Canadian County	5	4.71	1	0.94	0	0.00	1	0.94
Carter County	2	4.17	0	0.00	0	0.00	1	2.08
Cherokee County	0	0.00	0	0.00	0	0.00	1	2.19
Choctaw County	1	6.72	0	0.00	0	0.00	2	13.43
Cimarron County	2	78.25	0	0.00	0	0.00	0	0.00
Cleveland County	13	5.42	4	1.67	3	1.25	3	1.25
Coal County	0	0.00	0	0.00	0	0.00	1	17.48
Comanche County	2	1.79	5	4.47	1	0.89	3	2.68
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	2	13.22
Creek County	3	4.30	5	7.16	0	0.00	4	5.73
Custer County	1	3.79	0	0.00	0	0.00	0	0.00
Delaware County	1	2.47	2	4.95	0	0.00	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	3	5.16	1	1.72	0	0.00	3	5.16
Garvin County	1	3.67	1	3.67	0	0.00	2	7.34
Grady County	2	3.92	1	1.96	0	0.00	1	1.96
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	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	0	0.00	1	30.40
Haskell County	1	8.23	0	0.00	0	0.00	1	8.23
Hughes County	1	7.34	1	7.34	0	0.00	0	0.00
Jackson County	3	11.89	0	0.00	0	0.00	0	0.00
Jefferson County	0	0.00	0	0.00	0	0.00	0	0.00
Johnston County	0	0.00	1	9.72	0	0.00	2	19.44
Kay County	0	0.00	1	2.19	0	0.00	0	0.00
Kingfisher County	0	0.00	3	20.98	0	0.00	0	0.00
Kiowa County	0	0.00	0	0.00	0	0.00	0	0.00

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Giardiasis		*Haemophilus influenzae* , invasive		Hepatitis A		Hepatitis B	
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	0	0.00	0	0.00	0	0.00	2	4.02
Lincoln County	0	0.00	5	15.55	0	0.00	1	3.11
Logan County	0	0.00	2	5.25	0	0.00	2	5.25
Love County	1	10.92	0	0.00	0	0.00	0	0.00
McClain County	4	56.24	1	14.06	0	0.00	0	0.00
McCurtain County	0	0.00	0	0.00	0	0.00	0	0.00
McIntosh County	3	7.52	3	7.52	0	0.00	2	5.01
Major County	0	0.00	0	0.00	0	0.00	0	0.00
Marshall County	0	0.00	0	0.00	0	0.00	1	2.98
Mayes County	0	0.00	2	10.15	0	0.00	1	5.08
Murray County	1	7.82	1	7.82	0	0.00	1	7.82
Muskogee County	1	1.40	0	0.00	0	0.00	3	4.21
Noble County	2	17.91	1	8.95	0	0.00	1	8.95
Nowata County	1	9.32	0	0.00	0	0.00	1	9.32
Okfuskee County	1	8.95	1	8.95	0	0.00	3	26.85
Oklahoma County	38	5.38	17	2.41	8	1.13	28	3.96
Okmulgee County	3	7.65	0	0.00	0	0.00	4	10.20
Osage County	0	0.00	0	0.00	0	0.00	1	2.20
Ottawa County	5	15.70	1	3.14	0	0.00	2	6.28
Pawnee County	3	18.40	1	6.13	0	0.00	0	0.00
Payne County	6	7.66	1	1.28	0	0.00	1	1.28
Pittsburg County	2	4.43	3	6.65	0	0.00	2	4.43
Pontotoc County	2	5.41	1	2.70	0	0.00	0	0.00
Pottawatomie County	2	2.87	2	2.87	0	0.00	8	11.49
Pushmataha County	3	25.62	2	17.08	0	0.00	0	0.00
Roger Mills County	0	0.00	0	0.00	0	0.00	0	0.00
Rogers County	7	8.30	3	3.56	0	0.00	2	2.37
Seminole County	2	8.26	0	0.00	0	0.00	4	16.53
Sequoyah County	1	2.44	0	0.00	0	0.00	1	2.44
Stephens County	2	4.60	0	0.00	0	0.00	0	0.00
Texas County	0	0.00	0	0.00	0	0.00	0	0.00
Tillman County	0	0.00	0	0.00	0	0.00	0	0.00
Tulsa County	25	4.22	10	1.69	1	0.17	17	2.87
Wagoner County	5	7.25	1	1.45	0	0.00	2	2.90
Washington County	1	1.98	3	5.95	0	0.00	0	0.00
Washita County	1	8.54	0	0.00	0	0.00	0	0.00
Woods County	0	0.00	0	0.00	0	0.00	0	0.00
Woodward County	2	10.08	0	0.00	0	0.00	2	10.08
State of Oklahoma	172	4.72	90	2.47	13	0.36	129	3.54

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	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	1	4.58	11	50.43
Alfalfa County	0	0.00	0	0.00	0	0.00	0	0.00
Atoka County	0	0.00	0	0.00	0	0.00	3	20.47
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	0	0.00
Blaine County	0	0.00	0	0.00	0	0.00	0	0.00
Bryan County	0	0.00	0	0.00	1	2.49	2	4.99
Caddo County	0	0.00	0	0.00	0	0.00	1	3.45
Canadian County	0	0.00	0	0.00	3	2.83	2	1.89
Carter County	0	0.00	0	0.00	0	0.00	4	8.34
Cherokee County	0	0.00	0	0.00	0	0.00	0	0.00
Choctaw County	0	0.00	0	0.00	0	0.00	1	6.72
Cimarron County	0	0.00	2	78.25	0	0.00	0	0.00
Cleveland County	1	0.42	1	0.42	1	0.42	9	3.75
Coal County	0	0.00	0	0.00	0	0.00	0	0.00
Comanche County	1	0.89	0	0.00	1	0.89	1	0.89
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	0	0.00	1	1.43	2	2.86
Custer County	0	0.00	0	0.00	1	3.79	0	0.00
Delaware County	1	2.47	0	0.00	2	4.95	7	17.32
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	0	0.00	1	1.72	0	0.00	1	1.72
Garvin County	0	0.00	2	7.34	0	0.00	2	7.34
Grady County	1	1.96	0	0.00	2	3.92	4	7.83
Grant County	0	0.00	0	0.00	0	0.00	0	0.00
Greer County	2	35.01	0	0.00	0	0.00	0	0.00
Harmon County	0	0.00	0	0.00	0	0.00	1	35.17
Harper County	0	0.00	0	0.00	0	0.00	0	0.00
Haskell County	1	8.23	0	0.00	0	0.00	8	65.83
Hughes County	0	0.00	0	0.00	0	0.00	3	22.02
Jackson County	0	0.00	0	0.00	2	7.93	0	0.00
Jefferson County	0	0.00	0	0.00	0	0.00	1	16.08
Johnston County	0	0.00	0	0.00	0	0.00	0	0.00
Kay County	1	2.19	0	0.00	0	0.00	0	0.00
Kingfisher County	0	0.00	0	0.00	2	13.99	1	6.99
Kiowa County	0	0.00	0	0.00	0	0.00	0	0.00

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	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	7	66.28
Le Flore County	1	2.01	0	0.00	0	0.00	33	66.26
Lincoln County	0	0.00	0	0.00	4	12.44	9	27.99
Logan County	1	2.62	1	2.62	0	0.00	2	5.25
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	4	56.24
McCurtain County	0	0.00	0	0.00	2	13.41	6	40.22
McIntosh County	1	2.51	0	0.00	0	0.00	4	10.02
Major County	0	0.00	0	0.00	1	3.09	0	0.00
Marshall County	0	0.00	0	0.00	0	0.00	2	5.96
Mayes County	1	5.08	0	0.00	0	0.00	0	0.00
Murray County	0	0.00	0	0.00	0	0.00	1	7.82
Muskogee County	0	0.00	0	0.00	5	7.01	8	11.22
Noble County	0	0.00	0	0.00	0	0.00	2	17.91
Nowata County	0	0.00	0	0.00	0	0.00	0	0.00
Okfuskee County	0	0.00	0	0.00	0	0.00	1	8.95
Oklahoma County	4	0.57	6	0.85	25	3.54	15	2.12
Okmulgee County	0	0.00	0	0.00	0	0.00	5	12.75
Osage County	0	0.00	0	0.00	1	2.20	0	0.00
Ottawa County	1	3.14	0	0.00	2	6.28	7	21.98
Pawnee County	0	0.00	0	0.00	2	12.26	2	12.26
Payne County	0	0.00	0	0.00	1	1.28	3	3.83
Pittsburg County	0	0.00	0	0.00	2	4.43	17	37.68
Pontotoc County	0	0.00	0	0.00	0	0.00	11	29.73
Pottawatomie County	0	0.00	0	0.00	1	1.44	5	7.18
Pushmataha County	0	0.00	0	0.00	0	0.00	13	111.02
Roger Mills County	0	0.00	0	0.00	0	0.00	0	0.00
Rogers County	0	0.00	0	0.00	2	2.37	4	4.74
Seminole County	0	0.00	0	0.00	1	4.13	5	20.66
Sequoyah County	0	0.00	0	0.00	1	2.44	5	12.19
Stephens County	0	0.00	0	0.00	2	4.60	2	4.60
Texas County	0	0.00	0	0.00	0	0.00	1	4.93
Tillman County	0	0.00	0	0.00	0	0.00	0	0.00
Tulsa County	4	0.68	3	0.51	26	4.39	21	3.55
Wagoner County	0	0.00	0	0.00	2	2.90	3	4.35
Washington County	0	0.00	0	0.00	1	1.98	0	0.00
Washita County	0	0.00	0	0.00	0	0.00	0	0.00
Woods County	0	0.00	0	0.00	0	0.00	0	0.00
Woodward County	0	0.00	1	5.04	2	10.08	2	10.08
State of Oklahoma	21	0.58	17	0.47	100	2.74	267	7.33

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Salmonellosis		Shigellosis		Streptococcus, group A invasive		*S. pneumoniae* , invasive, < 5 yrs.	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Adair County	10	45.85	0	0.00	0	0.00	0	0.00
Alfalfa County	0	0.00	0	0.00	0	0.00	0	0.00
Atoka County	0	0.00	0	0.00	0	0.00	0	0.00
Beaver County	2	38.11	0	0.00	0	0.00	0	0.00
Beckham County	14	66.24	0	0.00	0	0.00	1	4.73
Blaine County	0	0.00	0	0.00	1	7.90	0	0.00
Bryan County	5	12.47	0	0.00	0	0.00	1	2.49
Caddo County	8	27.56	0	0.00	0	0.00	0	0.00
Canadian County	43	40.54	0	0.00	2	1.89	3	2.83
Carter County	15	31.26	6	12.51	1	2.08	0	0.00
Cherokee County	3	6.56	10	21.87	0	0.00	2	4.37
Choctaw County	0	0.00	2	13.43	0	0.00	0	0.00
Cimarron County	1	39.12	0	0.00	0	0.00	0	0.00
Cleveland County	55	22.94	4	1.67	8	3.34	5	2.09
Coal County	1	17.48	0	0.00	0	0.00	0	0.00
Comanche County	20	17.89	0	0.00	3	2.68	2	1.79
Cotton County	1	16.15	0	0.00	0	0.00	0	0.00
Craig County	4	26.43	0	0.00	1	6.61	0	0.00
Creek County	15	21.48	14	20.05	5	7.16	1	1.43
Custer County	12	45.43	5	18.93	0	0.00	1	3.79
Delaware County	10	24.74	0	0.00	1	2.47	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	12	20.63	1	1.72	2	3.44	1	1.72
Garvin County	9	33.03	0	0.00	2	7.34	1	3.67
Grady County	14	27.42	2	3.92	0	0.00	2	3.92
Grant County	1	22.47	0	0.00	0	0.00	0	0.00
Greer County	1	17.50	0	0.00	0	0.00	0	0.00
Harmon County	3	105.52	0	0.00	0	0.00	0	0.00
Harper County	5	151.98	0	0.00	0	0.00	0	0.00
Haskell County	5	41.15	0	0.00	0	0.00	0	0.00
Hughes County	2	14.68	0	0.00	2	14.68	0	0.00
Jackson County	13	51.51	0	0.00	1	3.96	0	0.00
Jefferson County	1	16.08	0	0.00	0	0.00	0	0.00
Johnston County	0	0.00	0	0.00	0	0.00	0	0.00
Kay County	10	21.91	1	2.19	1	2.19	0	0.00
Kingfisher County	10	69.93	2	13.99	0	0.00	0	0.00
Kiowa County	4	42.56	0	0.00	0	0.00	0	0.00

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Salmonellosis		Shigellosis		Streptococcus, group A invasive		*S. pneumoniae* , invasive, < 5 yrs.	
County	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Latimer County	1	9.47	0	0.00	1	9.47	0	0.00
Le Flore County	23	46.18	0	0.00	0	0.00	0	0.00
Lincoln County	23	71.53	1	3.11	0	0.00	1	3.11
Logan County	19	49.87	1	2.62	0	0.00	0	0.00
Love County	2	21.85	2	21.85	0	0.00	0	0.00
McClain County	11	154.67	0	0.00	2	28.12	1	14.06
McCurtain County	7	46.92	0	0.00	1	6.70	0	0.00
McIntosh County	2	5.01	1	2.51	0	0.00	0	0.00
Major County	4	12.36	0	0.00	1	3.09	1	3.09
Marshall County	3	8.95	0	0.00	1	2.98	1	2.98
Mayes County	7	35.54	0	0.00	1	5.08	0	0.00
Murray County	1	7.82	0	0.00	2	15.64	0	0.00
Muskogee County	15	21.04	5	7.01	2	2.81	1	1.40
Noble County	3	26.86	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	4	35.80	0	0.00	0	0.00	0	0.00
Oklahoma County	167	23.63	63	8.92	49	6.93	17	2.41
Okmulgee County	1	2.55	1	2.55	0	0.00	1	2.55
Osage County	12	26.38	1	2.20	1	2.20	1	2.20
Ottawa County	5	15.70	0	0.00	2	6.28	3	9.42
Pawnee County	3	18.40	0	0.00	0	0.00	1	6.13
Payne County	18	22.99	11	14.05	4	5.11	1	1.28
Pittsburg County	6	13.30	1	2.22	0	0.00	0	0.00
Pontotoc County	12	32.43	3	8.11	2	5.41	2	5.41
Pottawatomie County	19	27.29	0	0.00	1	1.44	1	1.44
Pushmataha County	3	25.62	0	0.00	0	0.00	0	0.00
Roger Mills County	1	29.38	0	0.00	0	0.00	0	0.00
Rogers County	29	34.40	3	3.56	1	1.19	1	1.19
Seminole County	8	33.06	0	0.00	0	0.00	0	0.00
Sequoyah County	5	12.19	19	46.30	0	0.00	0	0.00
Stephens County	20	45.98	0	0.00	2	4.60	0	0.00
Texas County	11	54.23	2	9.86	0	0.00	0	0.00
Tillman County	0	0.00	1	12.66	0	0.00	0	0.00
Tulsa County	116	19.60	64	10.81	29	4.90	19	3.21
Wagoner County	19	27.55	8	11.60	2	2.90	2	2.90
Washington County	5	9.91	0	0.00	2	3.96	1	1.98
Washita County	2	17.08	0	0.00	2	17.08	1	8.54
Woods County	2	23.75	0	0.00	0	0.00	0	0.00
Woodward County	2	10.08	0	0.00	0	0.00	0	0.00
State of Oklahoma	901	24.72	234	6.42	138	3.79	76	2.09

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Tuberculosis		Tularemia		West Nile Virus	
County	Number	Rate	Number	Rate	Number	Rate
Adair County	0	0.00	1	4.58	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	0	0.00	0	0.00	0	0.00
Blaine County	0	0.00	0	0.00	0	0.00
Bryan County	2	4.99	0	0.00	0	0.00
Caddo County	1	3.45	0	0.00	1	3.45
Canadian County	2	1.89	0	0.00	0	0.00
Carter County	0	0.00	0	0.00	1	2.08
Cherokee County	0	0.00	0	0.00	0	0.00
Choctaw County	0	0.00	0	0.00	0	0.00
Cimarron County	0	0.00	0	0.00	0	0.00
Cleveland County	4	1.67	0	0.00	0	0.00
Coal County	0	0.00	0	0.00	0	0.00
Comanche County	6	5.37	0	0.00	1	0.89
Cotton County	0	0.00	0	0.00	0	0.00
Craig County	1	6.61	0	0.00	0	0.00
Creek County	2	2.86	0	0.00	0	0.00
Custer County	0	0.00	0	0.00	0	0.00
Delaware County	1	2.47	0	0.00	0	0.00
Dewey County	2	45.57	0	0.00	0	0.00
Ellis County	0	0.00	0	0.00	0	0.00
Garfield County	8	13.75	0	0.00	0	0.00
Garvin County	1	3.67	0	0.00	0	0.00
Grady County	0	0.00	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	1	8.23	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	1	16.08	0	0.00	0	0.00
Johnston County	0	0.00	0	0.00	0	0.00
Kay County	0	0.00	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

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	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	1	2.01	0	0.00	1	2.01
Lincoln County	0	0.00	0	0.00	0	0.00
Logan County	0	0.00	0	0.00	1	2.62
Love County	0	0.00	0	0.00	0	0.00
McClain County	1	14.06	0	0.00	0	0.00
McCurtain County	2	13.41	0	0.00	0	0.00
McIntosh County	1	2.51	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	1	5.08	0	0.00	0	0.00
Murray County	0	0.00	0	0.00	0	0.00
Muskogee County	2	2.81	0	0.00	0	0.00
Noble County	0	0.00	0	0.00	0	0.00
Nowata County	0	0.00	0	0.00	0	0.00
Okfuskee County	1	8.95	0	0.00	0	0.00
Oklahoma County	28	3.96	3	0.42	0	0.00
Okmulgee County	0	0.00	0	0.00	0	0.00
Osage County	0	0.00	0	0.00	0	0.00
Ottawa County	0	0.00	0	0.00	0	0.00
Pawnee County	0	0.00	0	0.00	0	0.00
Payne County	1	1.28	0	0.00	0	0.00
Pittsburg County	4	8.87	0	0.00	1	2.22
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	1	8.54
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	1	4.13	0	0.00	0	0.00
Sequoyah County	1	2.44	0	0.00	0	0.00
Stephens County	0	0.00	0	0.00	0	0.00
Texas County	1	4.93	0	0.00	0	0.00
Tillman County	1	12.66	0	0.00	0	0.00
Tulsa County	19	3.21	3	0.51	1	0.17
Wagoner County	0	0.00	0	0.00	0	0.00
Washington County	2	3.96	0	0.00	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	1	5.04
State of Oklahoma	100	2.74	7	0.19	9	0.25

^2008 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, 2008^

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	Number	Rate	Number	Rate	Number	Rate
Adair County	76	348.45	4	18.34	*	*
Alfalfa County	*	*	*	*	*	*
Atoka County	32	218.36	4	27.29	*	*
Beaver County	4	76.22	*	*	*	*
Beckham County	67	316.99	19	89.89	*	*
Blaine County	35	276.48	13	102.69	*	*
Bryan County	153	381.46	22	54.85	*	*
Caddo County	102	351.43	31	106.81	*	*
Canadian County	234	220.59	43	40.54	*	*
Carter County	192	400.18	53	110.46	*	*
Cherokee County	172	376.10	38	83.09	*	*
Choctaw County	91	611.15	24	161.18	*	*
Cimarron County	*	*	*	*	*	*
Cleveland County	639	266.52	169	70.49	3	1.25
Coal County	13	227.23	*	*	*	*
Comanche County	771	689.80	249	222.77	*	*
Cotton County	18	290.74	5	80.76	*	*
Craig County	30	198.26	5	33.04	*	*
Creek County	177	253.50	35	50.13	*	*
Custer County	59	223.38	4	15.14	*	*
Delaware County	107	264.69	6	14.84	*	*
Dewey County	*	*	*	*	*	*
Ellis County	3	75.55	*	*	*	*
Garfield County	213	366.19	48	82.52	*	*
Garvin County	77	282.60	25	91.75	*	*
Grady County	123	240.86	32	62.66	*	*
Grant County	3	67.42	*	*	*	*
Greer County	28	490.11	3	52.51	*	*
Harmon County	4	140.70	*	*	*	*
Harper County	6	182.37	*	*	*	*
Haskell County	31	255.10	5	41.15	*	*
Hughes County	35	256.88	9	66.06	*	*
Jackson County	134	530.99	24	95.10	*	*
Jefferson County	20	321.60	*	*	*	*
Johnston County	23	223.60	*	*	*	*
Kay County	83	181.89	16	35.06	*	*
Kingfisher County	18	125.87	5	34.97	*	*
Kiowa County	18	191.51	*	*	*	*

Table Three. Reportable Diseases by County, Oklahoma, 2008^

	Chlamydia		Gonorrhea		Syphilis (Total Early)	
County	Number	Rate	12	Rate	Number	Rate
Latimer County	34	321.94	14	132.56	*	*
Le Flore County	147	295.17	38	76.30	*	*
Lincoln County	69	214.60	*	*	*	*
Logan County	164	430.42	*	*	*	*
Love County	20	218.46	3	32.77	*	*
McClain County	58	815.52	11	154.67	*	*
McCurtain County	159	1065.76	81	542.93	*	*
McIntosh County	84	210.46	15	37.58	*	*
Major County	9	27.81	*	*	*	*
Marshall County	33	98.41	3	8.95	*	*
Mayes County	85	431.52	7	35.54	*	*
Murray County	18	140.80	*	*	*	*
Muskogee County	467	655.18	143	200.62	*	*
Noble County	15	134.30	*	*	*	*
Nowata County	11	102.53	*	*	*	*
Okfuskee County	20	179.02	5	44.75	*	*
Oklahoma County	4361	617.17	2108	298.32	123	17.41
Okmulgee County	138	351.87	35	89.24	*	*
Osage County	78	171.47	24	52.76	*	*
Ottawa County	126	395.62	7	21.98	*	*
Pawnee County	30	183.97	3	18.40	*	*
Payne County	284	362.80	38	48.54	*	*
Pittsburg County	125	277.07	27	59.85	*	*
Pontotoc County	137	370.28	7	18.92	*	*
Pottawatomie County	260	373.48	52	74.70	*	*
Pushmataha County	20	170.79	4	34.16	*	*
Roger Mills County	5	146.89	3	88.13	*	*
Rogers County	155	183.87	16	18.98	*	*
Seminole County	116	479.34	37	152.89	*	*
Sequoyah County	110	268.07	8	19.50	*	*
Stephens County	106	243.69	27	62.07	*	*
Texas County	18	88.74	*	*	*	*
Tillman County	29	367.14	3	37.98	*	*
Tulsa County	3208	541.91	1475	249.16	30	5.07
Wagoner County	118	171.11	64	92.81	*	*
Washington County	90	178.39	25	49.55	*	*
Washita County	15	128.11	3	25.62	*	*
Woods County	12	142.48	*	*	*	*
Woodward County	30	151.22	3	15.12	*	*
State of Oklahoma	14759	404.98	5207	142.88	203	5.57

*Confidentiality concerns restrict releasing data for counties in Oklahoma that have less than 3 cases

Oklahoma Public Health Laboratory Annual Report

Mission

The Oklahoma State Public Health Laboratory shall implement and provide essential public health laboratory services to State and County Health Departments, Agency Programs, and Private Health Providers consistent with the public health goals of the Oklahoma State Board of Health.

Primary Duties

- 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 protection mission of the Laboratory;
- Pharmacy services to State County Health Departments.

Narrative:

The Oklahoma State Department of Health, Public Health Laboratory (PHL) Service has been in continuous operation since 1907, when the Oklahoma Legislature authorized funds for a state PHL. This laboratory has had 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 laboratory has been very actively involved in developing rapid molecular methods for identifying possible agents of bioterrorism. These methods have also been applied to the rapid diagnosis of infectious diseases and tests for inherited newborn metabolic diseases.

The current laboratory facility was built in 1972 and increasing governmental requirements for containment of hot pathogens, safety of personnel and the public, laboratory of sophistication have slowed to some degree the progress of the PHL. The pursuit of molecular methods for more rapid and sensitive diagnostics along with the newly available automated equipment necessary to handle high volume testing has caused problems for the PHL in terms of space and containment of very infective agents. The Public Health Laboratory Service though continues to evolve into a state-of–the-art laboratory for Oklahoma. As the State PHL, this laboratory must remain at the cutting edge of diagnostic testing in order to provide the testing, reference, and training services for the citizens of Oklahoma. This remains the most important goal for the PHL in 2008. This goal supports the Agency mission of protecting, promoting and enhancing the health of the citizens of Oklahoma.

In 2008, this service performed 586,558 analytical tests. The number though does not include the critical activities of pre-analytical (accessioning) and post-analytical (result reporting) sections for each submitted specimen. The table below shows the testing volume for each laboratory section.

Laboratory	Test Number	Percent Tests
Newborn Screening	416,156	71%
Virology	70,145	11%
Immunology	67,895	12%
Molecular	15,326	3%
TB/Mycology	5,560	1%
Bacteriology/Parasitology	11,476	2%

Newborn Screening Laboratory

The newborn screening section has added mass spectrometry instrumentation that gives the laboratory the technical capacity to perform several new tests to detect additional metabolic disorders. This section has made significant progress in 2008 towards addition and validation of newborn metabolic screening tests. Plans have been made to increase the screening test panel from the current 8 disorders to over 40 metabolic disorders. The expansion contract for software, reagents & equipment was awarded in October 2007. On site expansion meetings began in December 2007. Delivery dates for equipment and software were finalized. All new test validation was completed in May 2009.

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 2008, the Immunology section began using a newer enzyme linked immunoassay (EIA) for HIV antibody screening and for the Western Blot confirmation. Testing for West Nile virus, measles, hepatitis B and C, syphilis, and tick-borne diseases are also available through this section.

Virology/ CT-GC Laboratory

The virology section participates yearly as a World Health Organization (WHO) Collaborating Laboratory for isolation and identification of influenza viruses. The laboratory assists the WHO by providing the viral strain characterization of all Oklahoma influenza isolates in order to help in the determination of each year's vaccine strain selection for an effective vaccine. The virology laboratory collaborated with the Molecular laboratory in the implementation of the Oklahoma Pandemic Influenza Management Plan. 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 able to routinely test for animals rabies. In 2008, 4.0% of the animal specimens received were positive for the rabies virus. The leading rabies positive species were skunks. The section also participated in the Infertility Prevention Project by testing for *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, using an amplified DNA assay. Urine samples from the juvenile detention centers, a high-risk population, were also tested using this assay.

Tuberculosis/ Mycology Laboratory

The Mycobacteriology section analyzes samples from a variety of sources for the isolation and identification of *Mycobacterium tuberculosis* complex. In 2008, the Mycobacteriology laboratory processed over 5,000 patient specimens. Slightly over 18% of the specimens processed had *Mycobacterium* spp. isolated and 7.0% of the 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.

Bacteriology/ Parasitology Laboratory

The Microbiology section has begun working with the molecular diagnostic section to improve our bacterial identification reference service through the application of molecular methods to perform DNA sequencing to help in the identification of extremely unusual bacterial isolates. The microbiology section received 32 isolates referred because they could not be ruled out as possible bioterrorism agents by Oklahoma sentinel clinical laboratories. Of these 32 referred isolates, 3 were identified as *Francisella tularensis*. The microbiology section tested 11 letters with suspicious powders that were received by Chase Banks located throughout the state for bioterrorism agents.

Additionally, the United States Postal Inspection Service requested that our laboratory test 2 letters related to this incident that were from other states.

This section also saw a 15% increase in *Salmonella species* isolates received in 2008. This increase resulted in the detection of 31 local clusters and 40 matches to national outbreaks. 2008 also saw a 5% increase in specimens positive for *Bordetella pertussis*. In the fall of 2008, the microbiology section performed analysis on human and environmental samples associated with the Northeastern Oklahoma GI Outbreak. The causative agent *Escherichia coli* O111 was isolated and identified within 72 hours of receiving the first specimens. As a result of this outbreak, the microbiology section assisted numerous hospitals statewide in developing the capacity to detect the presence of shiga-toxin in stool specimens. The microbiology and parasitology section successfully completed all external proficiency tests with perfect scores including for BT agents.

Molecular Diagnostics Laboratory

In 2008, molecular personnel received additional Pulse Field Gel Electrophoresis (PFGE) certifications from CDC PulseNet program for *Listeria monocytogenes* and *Campylobacter* spp. processing and analysis. Certification allows the direct access to CDC's National PulseNet database in Atlanta that allows the rapid detection of local, national, and international foodborne outbreaks. With the addition of these 2 new certifications, Oklahoma PHL now has real-time access to 5 databases of enteric pathogens. In addition to *Listeria* and *Campylobacter,* molecular personnel have been certified for *Salmonella, Shigella* and *E. coli* analysis since 1999.

In 2008, the molecular section continued new collaborations with the CDC for new methodologies. In an effort to supplement traditional *Salmonella* serotyping that uses antisera, the CDC began trial testing of molecular serotyping methods. The PHL was selected along with 4 other state PHLs to participate in the external evaluation of molecular methods for identification of serotype in *Salmonella* using Luminex platform. This methodology incorporates microsphere technology to detect *Salmonella* antigens specific for certain serotypes. We have also evaluated multi-locus variable number tandem repeat assays (MLVA) to complement PFGE for *E. coli* O157:H7 and *Salmonella enteritidis* serotype Enteritidis.

The molecular laboratory also continued a *Streptococcus pneumoniae* serotyping project in conjunction with the CDC and OSDH Acute Disease Service. This project uses a multiplex polymerase chain reaction (PCR) to detect 32 of the most frequently encountered invasive *S. pneumoniae* serotypes found in U.S. population-based surveillance of children less than 5 years of age.

Laboratory Training Section

The Public Health Laboratory's training outreach to hospitals continues to grow. In 2008, the PHL focused on 2 key areas of training:

Shipping and Packaging Training The proper packaging of laboratory specimens is now regulated by federal departments and professional associations. Properly packaged laboratory specimens provide safety for the sending laboratory, the public during transportation and the receiver. The PHL conducted 15 trainings in 2008 for 173 laboratorians from 67 hospitals, county health departments, and physician office laboratories.

Environmental Collection Training The PHL is the testing laboratory in Oklahoma when it is suspected that an environmental substance is contaminated with a biological.

Recent Accomplishments

The number of submitters who receive their results electronically continues to grow. The Public Health Laboratory (PHL) uses an automated faxing process and a network system, PHOCIS, to report results to the majority of its submitters.

Testing capabilities have also increased at the PHL. Over the last year, both the Newborn Screening and Molecular sections have added tests.

- Amino acid, fatty acid and organic acid tests have been added (40 tests) to provide greater coverage of newborn genetic disorder screening.
- Identifying cystic fibrosis mutations through molecular methods significantly improved result turn-around-times and allowed earlier treatment start dates.
- Oklahoma's PHL continues to be a leader in pulse field gel electrophoresis for food borne illnesses. Turn-around-times for results consistently met and exceeded national standards for *salmonella*, *shigella*, *E. coli* and *listeria*. PFGE is also a vital diagnostic service the OSDH offers to hospitals for characterization of hospital-acquired infections such as MRSA and pseudomonas.
- Lastly, the molecular section continues to adopt the preliminary and confirmatory testing advances mandated by the Laboratory Response Network (LRN) for suspect bioterrorism specimens.

Preparedness activities were enhanced through:

- Joint trainings,
- Participation in exercises,
- CAP surveys,
- PHL initiated drills, and
- Real events

Deficiencies were identified; solutions were developed and implemented to provide a more efficient response to future all-hazard events

Our partners in the above preparedness activities included:

- Federal Bureau of Investigation (FBI),
- United States Postal Service inspectors,
- National Guard Civil Support Team (CST),
- Emergency Preparedness Response Service of OSDH,
- Homeland Security,
- State and local law enforcement and
- Hazmat teams

The PHL has initiated the development of a laboratory continuity of operations plan (COOP) that ensures notification of staff in order to continue services during times of disasters and outbreaks.

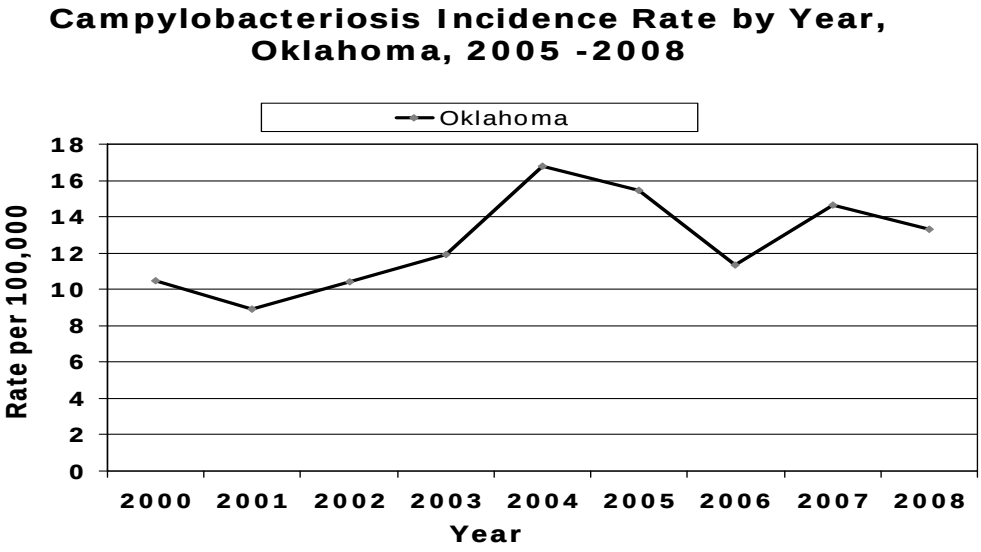
Campylobacteriosis

2008 Case Total	486	2008 Rate	13.3 per 100,000
2007 Case Total	530	2007 Rate	15.4 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 2008, 486 cases of campylobacteriosis were reported in Oklahoma, an 8% decrease from the 530 cases reported in 2007. Of the 486 cases reported, 57 (12%) were identified during investigations conducted by county health department public health nurses as an ill contact to a confirmed case. Since 2000, the annual incidence rate (IR) of campylobacteriosis has steadily increased, ranging from 8.9 to 16.8 cases per 100,000 peaking in 2004 with 591 cases (refer to graph). A seasonal trend for campylobacteriosis was seen with the highest number of cases occurring during the months of June through September (N=259, 53%).

The highest rate of cases occurred in Beaver County (IR=133.4 per 100,000, N=7) with 5 of the cases occurring within one family. Other counties with high rates included Adair County (IR=45.9, N=10) and Jackson County (IR=43.6, N=11). Of the cases reported in 2008, 17 (3.5%) reported travel outside of the United States during the incubation period of their illness, 40 (8.2%) reported drinking water from a private well, 39 (8%) reported visiting, working, or living on a farm, 23 (4.7%) reported contact with cattle, and 18 (3.7%) reported consuming unpasteurized (raw) milk. Ninety-five (19.5%) cases were associated with a high-risk setting (childcare setting, school, long term care facilities, food service, etc.). No outbreaks due to *Campylobacter* were identified in Oklahoma in 2008.

The age range of cases was from 10 days to 87 years with a median of 28 years of age. When the cases are grouped by age, the highest IR is in children less than ten years of age (29.3 per 100,000). The incidence rate per 100,000 population for males was higher (15.7) than females (10.9) in 2008. Cases who report Hispanic or Latino ethnicity have a higher IR (16.2 per 100,000) than those cases who were not Hispanic or Latino (10.5 per 100,000). In cases that reported one race, the highest IR was for Native Hawaiian or other Pacific Islander (25.9 per 100,000) although only one case was reported in 2008. Individuals who reported their race as White had the second highest IR (13.2) followed by American Indians or Alaskan Natives (12.4), African Americans (4.1) and Asians (IR = 1.6). Eighty-one (17%) cases were hospitalized for campylobacteriosis, with no deaths due to this disease in 2008. The OSDH PHL received 303 isolates to confirm *Campylobacter* and serotype serogroup identification in 2008 representing 62% of the reported cases. Of these isolates, 64% were identified as *Campylobacter jejuni*, 18% as *C. jejuni* var. *doylei*, 6.3% as *C. coli*, and 12% were non-viable.



Cryptosporidiosis

2008 Case Total	238	2008 Rate	6.5 per 100,000
2007 Case Total	216	2007 Rate	6.3 per 100,000

Two hundred thirty-eight cases of crytosporidiosis were reported to the OSDH resulting in an incidence rate of 6.5 per 100,000. The number of cases reported in 2008 was a 9% increase compared to the 216 cases reported during 2007. Among cases in 2008, predominant symptoms included diarrhea (99.5%, N=237), abdominal cramps (89.1%, N=189), watery diarrhea (85.8%, N=176) and weight loss (64.8%, N=151). The duration of diarrhea ranged from one day to 180 days with a median of 10 days; the median number of loose stools within a 24 period was 6 with a range from one to 60. The incidence rate of cryptosporidiosis in those under the age of 10 (16.3 per 100,000 population) was between 1.6 and 13.6 times greater than across all other age groups (refer to table). Twenty-five (11%) cases reported working in or attending a childcare setting.

A seasonal trend was observed in 2008 with the majority of cases (69%) reporting a symptom onset during the months of August and September. The highest incidence rates of cryptosporidiosis were in McClain (77.2 per 100, 000 population) and Cleveland Counties (29.2 per 100,000 population) accounting for 39.9% of cases statewide. Investigations conducted by the OSDH and county health departments determined cases in these counties reported swimming in several public and private swimming pools or splash pads located in Cleveland County. Public bathing place inspections were conducted and educational materials regarding prevention of diarrheal illnesses were provided to public pool operators. For more information about preventing cryptosporidiosis and other waterborne diseases, visit http://ads.health.ok.gov.

Summary Statistics Cryptosporidiosis in Oklahoma, 2008

	Number (%)	Rate/100,000
Gender (N=238)		
Female	134 (56.3%)	5.6
Male	104 (43.7%)	5.6
Age (median and range)	Median = 18.5 years Ranged: 5 months – 83 years	--
Age Groups		
Less than 10 years	84 (35.3%)	16.3
10-19	48 (20.1%)	9.8
20-29	39 (16.3%)	7.2
30-39	30 (12.6%)	6.6
40-49	17 (7.1%)	3.5
50-59	6 (2.5%)	1.3
60 years or older	13 (6.7%)	1.2
Race (N=226)		
White	203 (89.8%)	7.1
Black or African American	8 (3.5%)	2.8
American Indian or Alaskan Native	11 (4.8%)	3.8
Asian	1 (0.4%)	1.6
Two or more Races	3 (1.3%)	2.0
Ethnicity (N=219)		
Hispanic	16 (7.3%)	5.7
Hospitalized (N=238)	20 (8.4%)	--

Dengue Fever

2008 Case Total	2	2008 Rate	0.05 per 100,000
2007 Case Total	3	2007 Rate	0.09 per 100,000

Dengue fever is a reportable condition in Oklahoma. Dengue fever is endemic in most of the countries in the tropics including those in Southeast Asia, Central America, and Western Africa. Cases of dengue fever are generally acquired outside of the US (imported or travel-associated), but autochthonous cases have been identified in Texas near the Mexico border as recently as the summer of 2005.

Dengue fever is transmitted through the bite of an infected mosquito. Differential diagnosis includes chikungunya, other arboviral infections, influenza, measles, rubella, malaria and other systemic febrile illness. Symptoms include fever, intense headache, myalgia, arthralgia, eye pain, vomiting and a generalized maculo-papular rash.

In 2008, 4,681 cases of dengue hemorrhagic fever and 24 cases of dengue fever were reported from the countries in the English-, French- and Dutch- speaking Caribbean. In Oklahoma, two cases of dengue fever were reported in persons who had visited the Caribbean in 2008. This article summarizes the epidemiologic, clinical and laboratory information from the investigation of Oklahoma's two cases.

Case One: The first reported case of dengue fever in an Oklahoma resident was a 50 year-old female from Woodward County. The individual visited St. Barthelemy Island in the Caribbean during February 2008. One day after returning to Oklahoma, the individual developed a fever, a macular rash, anorexia, diarrhea, myalgia, nausea and vomiting. The rash covered her extremities as well the palms of her hands and the soles of her feet. Additional symptoms were dehydration and bilateral neuropathy in all extremities. The patient presented to an area emergency department for evaluation where dengue fever was suspected based on clinical history and recent travel to the Caribbean. Dengue fever was confirmed by the detection of IgM antibodies.

Case Two: The second reported case of dengue fever in an Oklahoma resident was a 54 year-old female from Tulsa County. The individual visited St. Maarten during November 2008 for seven days. Two days after returning to Oklahoma, the individual developed a fever (max measured temperature = 102°F), retro-orbital pain, anorexia, backaches, chills, headaches, myalgia and severe fatigue. Approximately five days after symptom onset, the patient developed a macular rash on all areas of her body that lasted approximately three days; a petechial rash then developed on her ankles that lasted five days. The patient was evaluated by a physician five days after symptom onset where dengue fever was suspected based on clinical and travel history. IV fluids were administered and the patient was sent home with instructions for management of symptoms. Dengue fever was confirmed by serologic testing where IgM antibodies were detected. During the case investigation conducted by the Acute Disease Service, the patient recalled receiving several mosquito bites on at least one occasion during her trip to St. Maarten.

Prevention of dengue fever may be achieved by routine use of an insect repellent containing 20-30% DEET (N, N-diethyl-m-toluamide) when visiting or residing in an endemic area along with sleeping indoors with screened windows or mosquito netting protection. Neither case reported wearing insect repellent or taking precautions to prevent mosquito bites. The CDC Division of Vectorborne Infectious Diseases website has recommendations, news and updates for travelers and clinicians regarding dengue fever at http://www.cdc.gov/NCIDOD/DVBID/dengue.

Ehrlichiosis

2008 Case Total	121	2008 Rate	3.3 per 100,000
2007 Case Total	106	2007 Rate	3.1 per 100,000

One hundred twenty-one cases of ehrlichiosis were reported to the OSDH during 2008 resulting in an incidence rate of 3.3 per 100,000 population. The number of cases reported in 2008 is a 14% increase compared to the number of cases reported in 2007. 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 were Latimer county (28.41 per 100,000), followed by Craig county (26.43 per 100,000), then Pittsburg county (24.38 per 100,000 population). The majority of the cases reported occurred during the warmer months of the year. Eighty-eight percent of reported cases in Oklahoma occurred during the months of May through September. Thirty-eight percent of cases required hospitalization; no deaths due to ehrlichiosis were reported in 2008.

Serologic testing is the most widely available and frequently used laboratory method for diagnosis. It is important to collect both IgM and IgG antibody titer levels. Collections of acute (within a week of onset) and convalescent (2 to 4 weeks later) specimens are important to evaluate titer changes and confirm diagnosis. A single specimen is generally not diagnostic of an acute infection and may indicate past exposure. Diagnosis is confirmed by 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, 2008, (N=121)

	Frequency (%)	Rate/100,000
Gender		
Male	74 (61%)	4.11
Female	47 (39%)	2.55
Age	Median 38 Years (Range 11 months-79 Years)	--
Hospitalization	46 (38%)	--
Race		
White	89 (75%)	3.13
Native Hawaiian/Pacific Islander	1 (1%)	25.89
Native American/Alaska Native	20 (17%)	6.86
Asian	1 (1%)	1.59
2 or more Races	7 (6%)	4.72
Symptoms		
Fever	119 (98%)	--
Headache	99 (85%)	--
Myalgia	95 (83%)	--
Anorexia	83 (75%)	--
Rash	48 (42%)	--
Reported Exposures		
Exposed to a Wooded Area	98 (88%)	--
Tickbite	76 (78%)	--

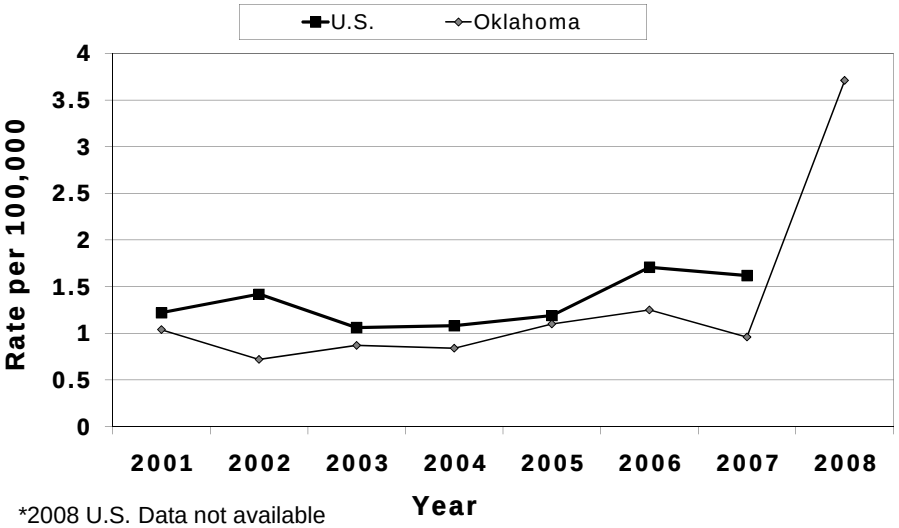
1. Heymann, M.D., Control of Communicable Diseases Manual 19th Edition, APHA, 2008. Ehrlichiosis, pp 212-215.

Shiga toxin producing *Escherichia coli* (STEC)

2008 Case Total	135	2008 Rate	3.71 per 100,000
2007 Case Total	33	2007 Rate	0.96 per 100,000

The most common serotype of Shiga toxin producing *E. coli* (STEC) reported nationally continues to be *E. coli* O157:H7. 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. One hundred and thirty-five STEC cases were reported in Oklahoma for 2008. This is a 409% increase from the 33 cases reported in 2007. This notable increase can be partially attributed to a large *E. coli* O111 outbreak that occurred in northeastern Oklahoma in August and September of 2008. Eighty-seven of the 135 cases (64.4%) were associated with the *E. coli* O111 outbreak. Without the outbreak-related cases, there was still a 45% increase in STEC cases from 2007. The large outbreak began in late August of 2008 and health alert networks were sent to healthcare providers and laboratories across northeastern Oklahoma to notify them of the outbreak and request that testing for a STEC be considered in a patient presenting with symptoms consistent with a STEC infection. Additionally, multiple labs across the state added the testing capacity for STEC beyond O157:H7. The supplementary laboratory capacity may explain the higher number of reported STEC cases in 2008. The 2008 incidence rate for Oklahoma was 3.71 cases per 100,000 persons.

Shiga toxin producing *E. coli* (STEC) Incidence Rate by Year, Oklahoma and U.S., 2001 – 2008*

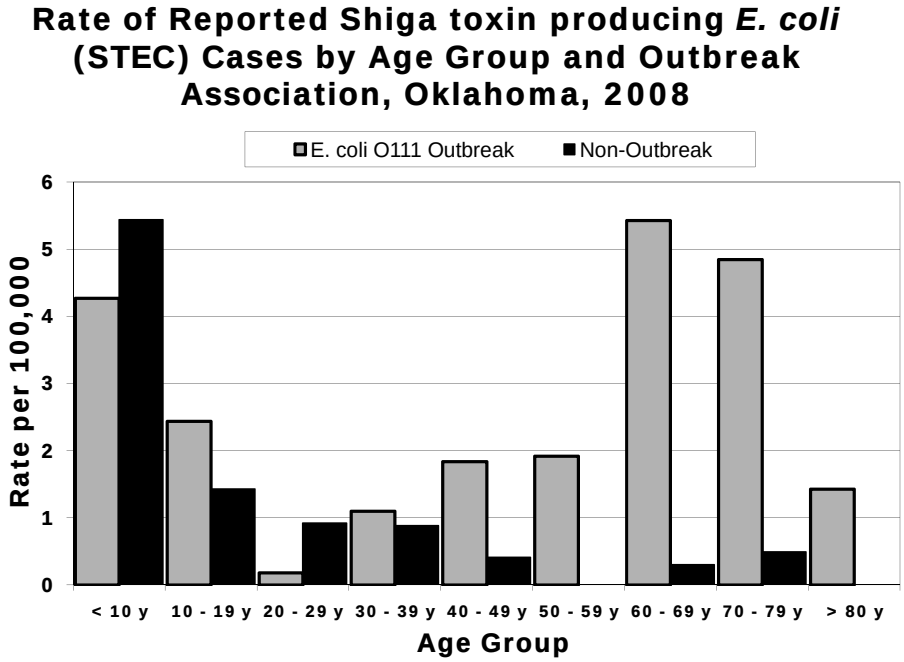


*2008 U.S. Data not available

Non-outbreak related STEC cases in 2008 were residents of 26 counties across Oklahoma. Outbreak cases were residents of eleven counties all located in northeast Oklahoma, with the majority (75.9%) from Rogers, Mayes and Tulsa counties. Beyond the outbreak, no other geographic clustering was noted.

Cases ranged from less than one year old to 88 years with a median of 18 years. Fifty-four percent of cases were female. The highest incidence rates occurred in males less than ten years of age with an incidence of 10.23 per 100,000 persons. Females less than ten followed closely behind the males with an incidence of 9.17 per 100,000. When cases were stratified by outbreak association, the incidence rate for cases not associated with the E. coli O111 outbreak was highest in children less than ten years and was 3.8 times higher than the incidence for any other age group. For outbreak related cases, incidence rate in children less than ten was still high with a rate of 4.27 cases per

100,000 persons; however, the 60 – 69 and 70 – 79 year age groups had higher rates with 5.43 and 4.85 cases per 100,000, respectively.



The highest incidence by racial background occurred in the American Indian and Alaska Native population with an incidence of 5.49 cases per 100,000 persons. Incidence for the white population is 3.83 cases per 100,000. Only one case reported race as black or African American corresponding to an incidence rate of 0.34 per 100,000. One case reported race as American Indian or Alaska Native and white. Hispanic ethnicity was reported by three cases corresponding to an incidence of 1.08 per 100,000 as compared to non-Hispanic cases with an incidence of 2.91 per 100,000.

Symptoms included abdominal cramps (87.7%), bloody diarrhea (68.7%), nausea (65.6%), fever (48.4%), and vomiting (44.3%). Fifty-six cases (41.5%) were hospitalized for their illness with the majority of hospitalizations in cases less than 20 years of age (54%) or female (57%). Twenty (14.8%) cases developed hemolytic uremic syndrome (HUS) as a consequence of their illness; of which *E. coli* O157:H7 was isolated in four cases and *E. coli* O111:NM in the other 16.

Of the 135 STEC cases in 2008, 102 were confirmed and the other 33 were epidemiologically linked to a confirmed case. All suspect STEC isolates are required to be forwarded to the OSDH PHL for confirmation. In 2008, 61 (59.8%) of the STEC cases were due to infection with E. coli O111:NM. E. coli O157:H7 was isolated in 26 cases (25.5%) and eight additional less common serotypes were identified in the remaining confirmed STEC isolates. Nationally, O157:H7 continues to be the most commonly reported serotype.[1]

In August of 2008, OSDH was notified of an increase in children being admitted to a northeast Oklahoma hospital with severe hemorrhagic diarrhea. Upon investigation, exposure to a popular buffet style restaurant was noted. Outbreak case definitions were established to identify persons associated with the outbreak. The case definition included categories for confirmed, probable and suspect cases. In all, 341 outbreak cases were identified, of which 70 were hospitalized, and one case died. Only confirmed and probable cases are reported to CDC yearly and referenced in this summary.

[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.

Giardiasis

2008 Case Total	172	2008 Rate	4.72 per 100,000
2007 Case Total	172	2007 Rate	4.98 per 100,000

One hundred seventy-two cases of giardiasis were reported to the OSDH resulting in an incidence rate of 4.72 per 100,000. Of the 172 cases reported, 12 (7%) were epidemiologically linked cases identified during the investigation conducted by the county communicable disease nurse. No geographical differences in disease incidence were notable for giardiasis in Oklahoma. Unlike most other enteric diseases, which have seasonal peaks during the summer months, giardiasis infections occurred throughout the year with no seasonal trend observed. No outbreaks due to *Giardia* were identified in Oklahoma during 2008. Cases ranged in age from less than one year to 108 years with a media age of 25 years. Children under the age of 5 had the highest incidence rate at 14.26 per 100,000 population of disease in 2008 (refer to table).

Giardiasis should be suspected when a patient displays with an infection of the small intestine especially associated with chronic diarrhea, pale and greasy stools, and weight loss. The most common symptoms reported by cases were diarrhea (91%), abdominal cramps (73%), and malaise (62%). 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, 2008 (N=172)

	Frequency (%)	Rate/100,000
Gender		
Male	91 (53%)	5.05
Female	81 (47%)	4.39
Age	Median= 25 Years (Range <1-108 Years)	--
Age groups		
Less than 5 years	38 (24%)	14.26
5-9	18 (11%)	7.25
10-19	11 (7%)	2.24
20-29	17 (11%)	3.12
30-39	18 (11%)	3.97
40-49	16 (10%)	3.27
50-59	20 (13%)	4.24
60 -69	9 (6%)	2.71
70+	10 (6%)	2.89
Hospitalized	20 (12%)	--
Race		
White	128 (74%)	4.50
Native American/Alaska Native	16 (9%)	5.49
Black/African American	8 (5%)	2.76
Asian	1 (1%)	1.59
Multi-Race	4 (2%)	2.70
Reported Symptoms		
Diarrhea	149 (91%)	--
Cramps	104 (73%)	--
Malaise	86 (62%)	--
Bloating	75 (57%)	--
Fever	51 (34%)	--

Haemophilus influenzae Invasive Disease

2008 Case Total	90	2008 Rate	2.47 per 100,000
2007 Case Total	93	2007 Rate	2.70 per 100,000

Invasive *Haemophilus influenzae* (*H. flu)* disease is 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 cases of invasive *H. flu* were reported to the OSDH during 2008 resulting in an incidence rate of 2.47 per 100,000 population. *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. Of the 90 isolates, 49 (54%) were non-typeable, 11 (12%) were serotype e, 10 (11%) were serotype f, 6 (7%) were serotype a, 1 (1%) was serotype c, and 4 (4%) were serotype b. Isolates for nine (10%) cases were not available for serotype identification by the PHL.

Cases of invasive *H. flu* in 2008 ranged in age from 1 day to 90 years with a median age of 71 years. The highest age-specific incidence rates per 100,000 population was seen among persons 70 years and older (refer to graph). Seven (7.8%) cases occurred among children less than five years of age, none were serotype b.

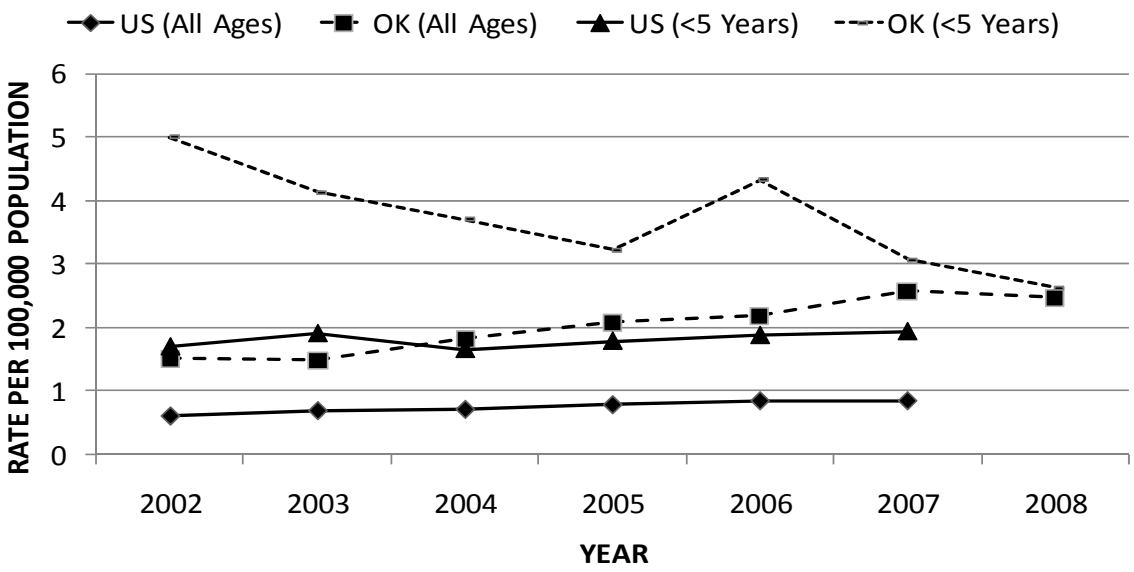
When a case of *Haemophilus influenzae* type b (Hib) is identified, an active contact investigation commences to locate all close contacts less than 5 years of age to confirm age-appropriate Hib vaccination history. Recommendations for chemoprophylaxis are made for all the case's exposed contacts if a child is less than 5 years of age who is unvaccinated or incompletely vaccinated with Hib vaccine is identified. All four Hib cases reported in 2008 were over the age of 40 years. Investigations conducted by county health department public health nurses determined none of the close contacts were less than 4 years of age; therefore, post-exposure chemoprophylaxis was not recommended.

Descriptive Summary of Reported *Haemophilus influenzae* Invasive Disease Cases, Oklahoma, 2008 (N=90)

	Frequency (%)	Rate/100,000
Gender		
Male	36 (40%)	2.00
Female	54 (60%)	2.93
Age	Median Age: 71 years (Range: 1 day – 90 years)	
Hospitalized for *H. flu**	61 (73%)	--
Deaths to *H. flu***	14 (56%)	--
Race		
White	69 (77%)	2.42
Black	9 (10%	3.10
American Indian	5 (6%)	1.72
Other	0	--
Two or more races	1 (1%)	0.67
Unknown race	6 (7%)	--
Hispanic Ethnicity	1 (1%)	0.36
Infection Types***		
Bacteremia/sepsis	86 (96%)	
Meningitis	2 (2%)	
Pneumonia	51 (58%)	
Other Infection	4 (4%)	
Cases <5 years of age	7 (7.8%)	2.63
Serotype B	0	--

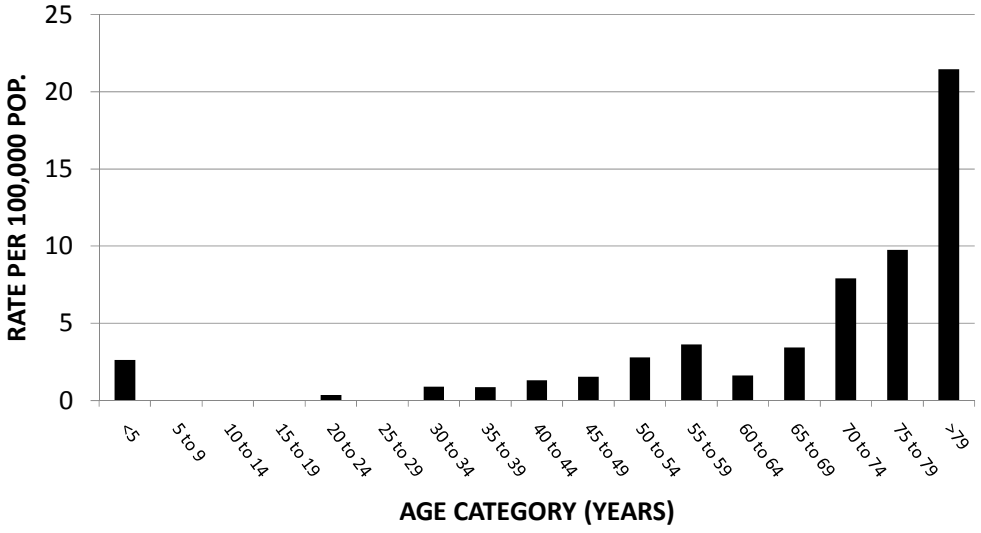
*Number hospitalized for *H. flu* out of those hospitalized (N=83)
**Number died from *H. flu* of those who died (N=25)
***Infection types not mutually exclusive

Invasive *Haemophilus influenzae* Incidence Rate by Year and Age, Oklahoma and U.S., 2002-2008*



*2008 data not available for US

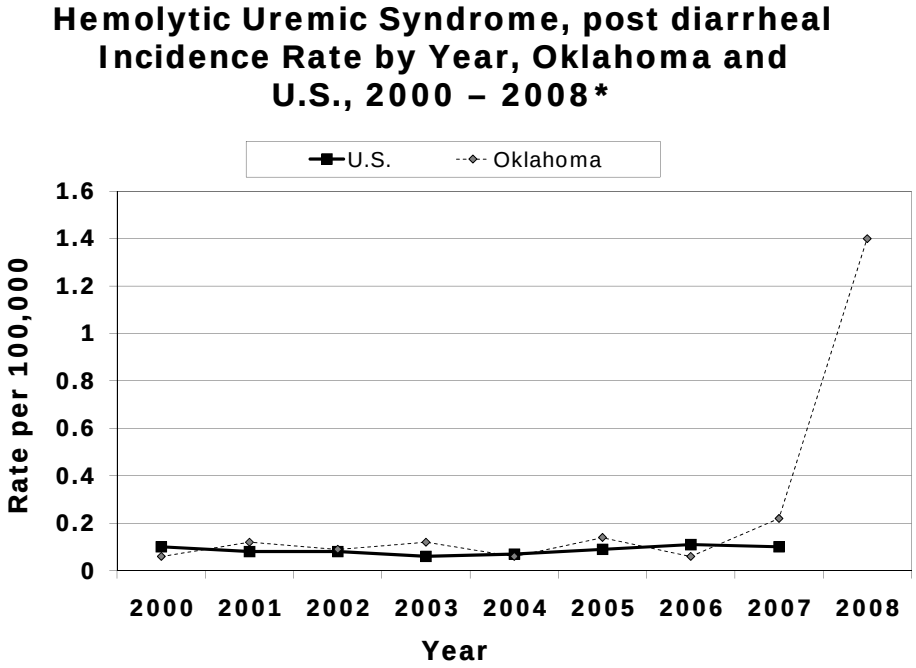
Incidence Rate of Reported Invasive *Haemophilus influenzae* Cases by Age Group, Oklahoma, 2008 (N=90)



Hemolytic Uremic Syndrome, post diarrheal

2008 Case Total	51	2008 Rate	1.40 per 100,000
2007 Case Total	8	2007 Rate	0.23 per 100,000

Oklahoma experienced a sharp increase in the number of post diarrheal Hemolytic Uremic Syndrome (HUS), cases reported in 2008 compared with previous years. Fifty-one cases were reported correlating to an increase of over 600 percent from 2007. HUS became a reportable condition in Oklahoma in 2001 and since that time two to eight cases have been reported yearly. The increase in the number of 2008 cases can largely be attributed to an *E. coli* O111 outbreak that occurred in northeastern Oklahoma in August and September of 2008. Eleven cases were not attributable to the *E. coli* O111 outbreak thus, if outbreak-related cases were set aside, there was still a 38% increase in the number of 2008 cases as compared to 2007.



*2008 US data not available

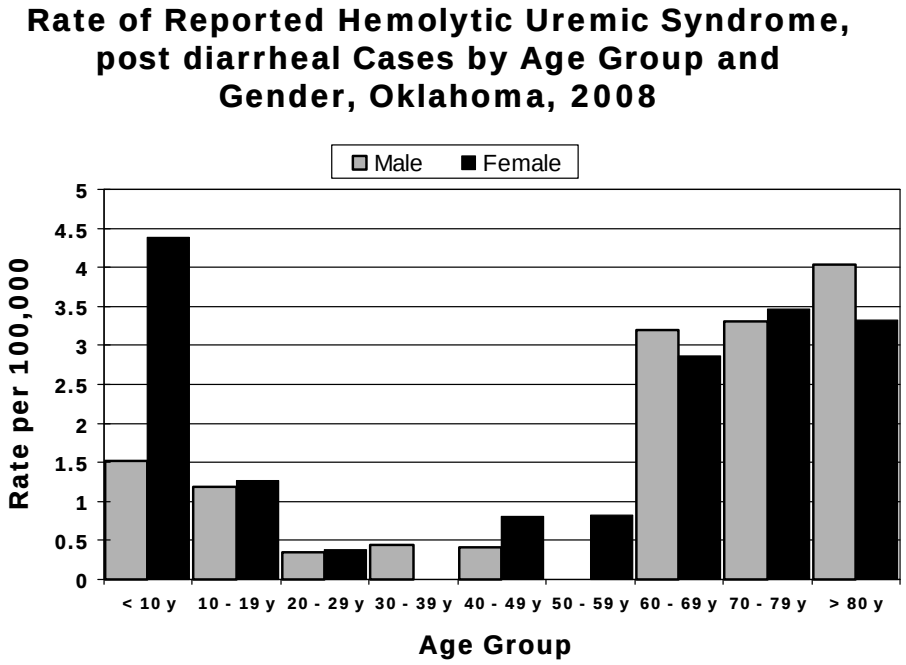
In August of 2008, OSDH was notified of an increase in children being admitted to a northeast Oklahoma hospital with severe hemorrhagic diarrhea. Upon investigation, exposure to a popular buffet style restaurant was noted. In all, 341 cases of *E. coli* O111 were identified, of which 70 were hospitalized, and one case died. A HUS case definition was established for outbreak cases. While 40 cases met the CDC case definition for HUS and were thus reported to the CDC and are reflected in this summary, 25 of the cases met a more stringent case definition established for this outbreak, which required thrombocytopenia. A HUS case was identified in one child who had no exposure to the restaurant, but was a sibling to a child who had eaten at the restaurant.

Non-outbreak related cases occurred sporadically across the state with one to two cases in nine counties. One case reported travel during the incubation period to another county; otherwise the ten other cases had no travel history documented during the investigation. Outbreak related cases were residents of ten northeastern Oklahoma counties with Tulsa and Mayes counties having the highest number of cases.

Case-patient ages ranged from one year to 88 years with a median of 45 years. Sixty-one percent of cases were female. The highest incidence occurred in the females under the age of ten with a rate of 4.4 per 100,000 persons. Higher incidence rates were also noted in males and females over the age of 60 years. The higher incidence rates in these groups may be attributed to outbreak-related cases. The analysis of the outbreak showed an increased risk of

developing disease for females as compared to males. Additionally, the rates by age group did not follow the national pattern in that the highest rates were not always in children less than 5 years of age.[1]

The highest incidence rate for race occurred in the Native American population. Seven cases (13.7%) reported Native American for race corresponding to an incidence rate of 2.40 per 100,000. White race was reported by the other 44 cases with an incidence rate of 1.55 per 100,000. Hispanic ethnicity was reported by two cases with a rate 0.72 compared to an incidence rate of 1.25 for Non-Hispanics.



All HUS cases in 2008 were hospitalized. The length of hospitalization ranged from one to 45 days with a median of eleven days. One death was reported in a previously healthy 26-year-old male who was also associated with the outbreak. 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 26 (51%) of the cases. Of those with microangiopathic changes, schistocytes were most commonly seen (96.2%) followed by burr cells (42.3%) and then helmet cells (23.1%). Hematuria was reported in 76.5% of cases; likewise, proteinuria was also seen in 76.5% of cases. Additionally, elevated creatinine was documented for 68.6% of cases and thrombocytopenia in 62.8% of cases.

Of the cases not associated with the outbreak, an etiologic agent was identified in four (36%) of the eleven cases, which was *E. coli* O157:H7with results confirmed by the OSDH PHL. A case control study of ten medical centers in the United States looked at persons with sporadic *E. coli* O157:H7 infections to assess for risk factors associated with development of HUS. The investigators reported that approximately eight percent of *E. coli* O157:H7 cases will progress to HUS.[2] In Oklahoma in 2008, four of 32 (12.5%) *E. coli* O157:H7 cases also developed HUS.

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[1] Centers for Disease Control and Prevention. [Summary of notifiable diseases—United States, 2007]. Published July 9, 2009 for MMWR 2007;56(No. 53):10-11,35.

[2] Slutsker L, Ries AA, Maloney K, et al. A nationwide case-control study of *Escherichia coli* O157:H7 infection in the United States. J Infect Dis 1998;177:962–6.

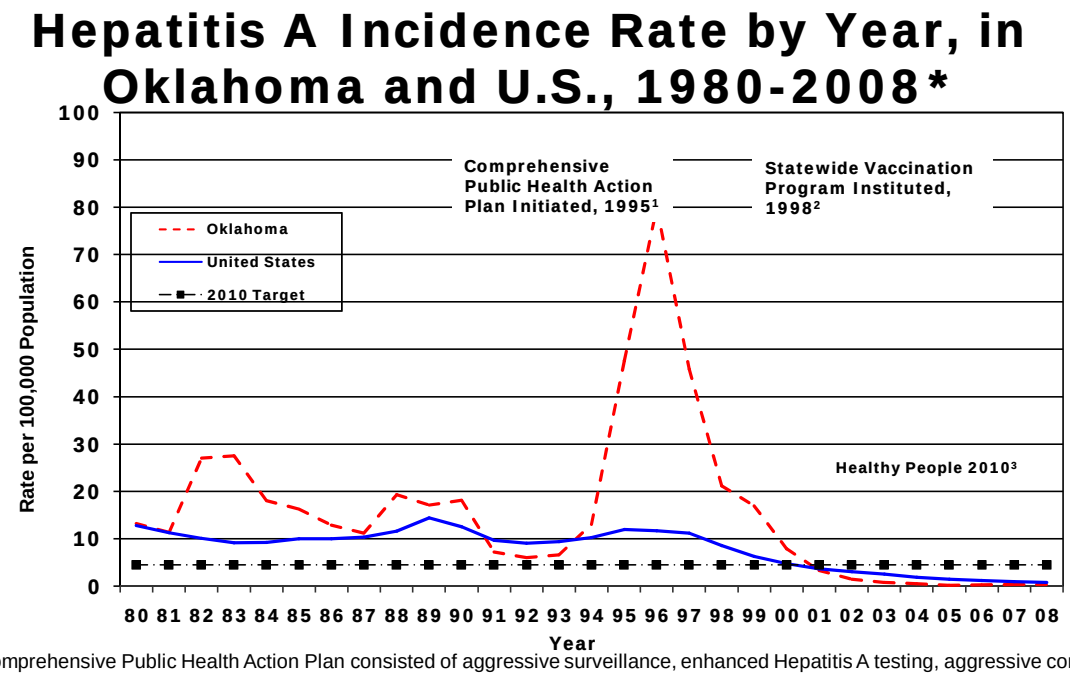
Hepatitis A

2008 Case Total	13	2008 Rate	0.36 per 100,000
2007 Case Total	13	2007 Rate	0.38 per 100,000

Since the Oklahoma Hepatitis A epidemic that took place 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, and no outbreaks were identified in 2008 (refer to graph).

Cases that are associated with high-risk settings such as child care settings, food establishments and patient care settings are excluded from working during their infectious period. Three cases were associated with high-risk settings in 2008: two (unrelated) patient care providers and one resident of a homeless shelter, but no secondary cases occurred. None of the 13 cases had a history of hepatitis A vaccination, and none expired.

A total of 19 close contacts were identified (median 1, range 1 – 5 per case) that required post exposure prophylaxis (PEP) because they did not have evidence of immunity through previous testing or history of vaccination. The county health departments provide PEP to those identified as close contacts to confirmed hepatitis A cases. New PEP guidelines were released in 2007 by the Advisory Committee on Immunization Practices, which limited the use of immunoglobulin (IG) and expanded the use of the hepatitis A vaccine. For persons between 12 months and 40 years of age, the hepatitis A vaccine is the preferred method of PEP. It is still recommended to use IG for 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 liver disease.[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 U.S. data provisional based on CDC, MMWR 2008;57:1420-1431

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. Three (23%) cases 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 limit testing for hepatitis A to those clients with evidence of acute hepatitis A infection. Liver function tests are usually markedly elevated in confirmed cases. All of the 2008 cases had elevated liver function tests with a median ALT of 1867 (range 400 – 6082), and a median AST of 1866 (range 132 – 4841). The median total bilirubin was 8 (range 0.4 – 17).

The hepatitis A vaccine is 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 http://www.cdc.gov/travel/index.htm.

Demographic and Clinical Summary of Reported Hepatitis A Cases, Oklahoma, 2007 (N=13)

	Number (%)	Rate per 100,000
Gender		
Female	8 (61.5%)	0.43
Male	5 (38.5%)	0.28
Age	Median = 45 years (range: 24-61 years)	
Race		
White	10 (76.9%)	0.35
African American	1 (7.7%)	0.34
American Indian or Alaska Native	1 (7.7%)	0.34
Asian	1 (7.7%)	1.59
Ethnicity		
Hispanic or Latino	0	-
Not Hispanic or Latino	12 (92.3%)	0.36
Unknown	1 (7.7%)	-
Hallmark symptoms (not exclusive)		
Dark Urine	12 (92.3%)	-
Jaundice	10 (76.9%)	-
Clay-colored stool	6 (46.2%)	-
Hospitalized for this disease:	5 (35.7%)	-
Recent travel out of country	3*	-

* Eastern Europe (1), Caribbean/Central America (1), South Central Asia (1)

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).

Malaria

2008 Case Total	5	2008 Rate	0.14 per 100,000
2007 Case Total	10	2007 Rate	0.29 per 100,000

Five cases of malaria were reported to the Oklahoma State Department of Health in 2008. Diagnosed malaria cases in Oklahoma each were a result of travel to endemic countries: four (80%) cases reported traveling to Africa (Uganda [2], Nigeria [1], and Sudan [1]) and one (20%) to South America during their exposure periods. Since 2001, the majority of reported cases in Oklahoma had a history of traveling to Africa (70%) or Asia (15%) during their exposure period (refer to table). Among the five cases reported in 2008, three (60%) reported taking malaria prophylaxis; however two of these took an unknown medication that was purchased abroad. One case described taking doxycycline as recommended. 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 five reported cases in 2008 were submitted to the OSDH PHL for confirmation: four (80%) were identified as *Plasmodium falciparum* while one (20%) was identified as *Plasmodium vivax*.

Demographic and Clinical Summary of Reported Malaria Cases, Oklahoma, 2008 (N = 5)

	Number (%)	Incidence Rate per 100,000
Gender		
Male	4 (80%)	0.22
Female	1 (20%)	0.05
Age	Median = 43 years (range: 32 – 51 years)	
Race (N=4)		
White	2 (50%)	0.07
Black	2 (50%)	0.69
Hispanic Ethnicity	0	--
Hospitalized	4 (80%)	--
Died due to malaria	0	--
Travel history		
Africa	4 (80%)	--
South America	1 (20%)	--

World Region of Malaria Acquisition Reported by Oklahoma Cases, 2001-2008 (N=69)

Region	Number (%)
Africa	48 (69.6%)
Asia	10 (14.5%)
Central America	1 (1.5%)
Oceania	1 (1.5%)
South America	1 (1.5%)
Unknown	8 (11.6%)

Meningococcal Invasive Disease

2008 Case Total	17	2008 Rate	0.47 per 100,000
2007 Case Total	23	2007 Rate	0.67 per 100,000

Meningococcal disease incidence continues on a downward trend in the state and in the nation. Reported cases of meningococcal disease in the state decreased 35% from 2007. Age-specific incidence rates indicate the highest rates occurred among persons over 80, followed by those less than 20 years old (refer to graph). In 2008, 16 (94%) cases were hospitalized, and five deaths occurred due to meningococcal disease, resulting in a case fatality rate of 29%.

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 (23.5%) and Y (23.5%) accounted for the greatest proportion of isolates for which a serogroup was confirmed.

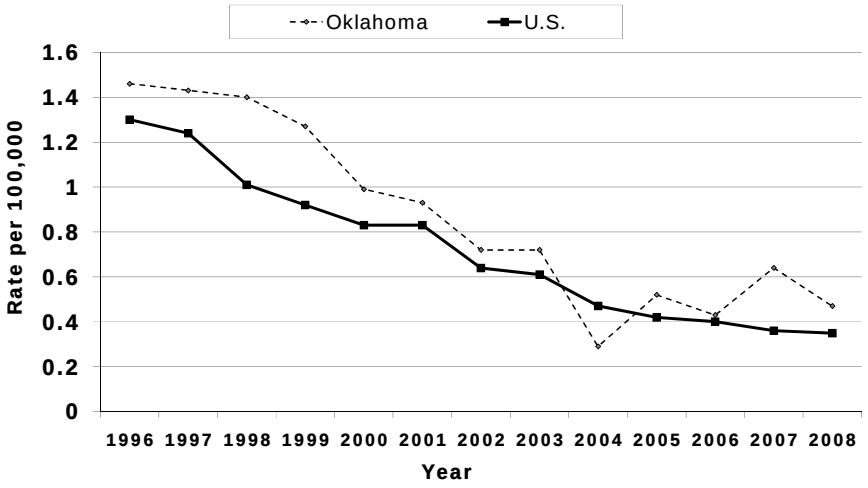
Demographic and Clinical Summary of Reported Meningococcal Invasive Disease Cases, Oklahoma, 2008

	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 = 23.5 years (range: 7 months - 86 years)	
<10 years	4	0.78
10-19 years	4	0.81
20-29 years	1	0.18
30-39 years	1	0.22
40-49 years	1	0.20
50-59 years	2	0.42
60-69 years	1	0.30
70-79 years	2	0.97
80+ years	1	0.72
Race (N=15)		
White	12 (80%)	0.42
African American or Black	2 (13.33%)	0.69
American Indian or Alaska Native	1 (1.67%)	0.34
Hispanic Ethnicity (N=13)	1 (7.69%)	0.36
Specimen source		
Blood	8 (47.08%)	-
Cerebrospinal Fluid	8 (47.08%)	-
Tissue	1 (5.88%)	-
Serogroup		
Group B	4 (23.53%)	-
Group Y	4 (23.53%)	-
Group C	3 (17.65%)	-
Group W-135	1 (5.88%)	-
Nongroupable	5 (29.41%)	-

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 contacts, and to facilitate prophylaxis for persons having high risk exposures, although secondary cases are extremely rare. Two hundred and nine contacts (median 5.5, range 0 – 135 per case) were identified and recommended to receive prophylaxis in 2008. One case had 135 contacts, and involved an unvaccinated college student who lived in a group setting. This case was due to serotype Y, which is included in the meningococcal vaccine.

A tetravalent (serotypes 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 – 2008*



*2008 U.S. data provisional based on CDC, MMWR 2008;57:1420-1431

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

2008 Case Total	100	2008 Rate	2.8 per 100,000
2007 Case Total	58	2007 Rate	1.7 per 100,000

In 2008, 100 cases of *Bordetella pertussis,* or "whooping cough," were reported in Oklahoma, a 72% increase from 2007. Fifty-six (56%) cases were laboratory confirmed by polymerase chain reaction (PCR) and/or isolation of the *Bordetella pertussis* bacterium. Of those, 32 (57%) were confirmed by both culture and PCR, 19 (34%) by PCR only, and 5 (9%) culture only. Thirteen cases were epidemiologically-linked symptomatic contacts identified by the county health department communicable disease nurse (CDN) during case investigations, and 31 were probable cases with no confirmatory (i.e. direct fluorescent antibody (DFA) or serology) laboratory testing.

Pertussis occurs in persons of all ages, but disproportionately affects those children less than one year. In 2008, ages of reported cases ranged from 4 days to 63 years; however the median age of cases was 1 year. Children less than one year of age accounted for almost 49% of cases resulting in an age-specific incidence rate of 88.15 per 100,000 infants. The incidence rate of pertussis among infants was significantly higher than all other age groups (refer to graph). Ninety-five percent of reported pertussis cases among infants were hospitalized for pertussis. No deaths due to pertussis were reported in 2008.

Pertussis is characterized by a prolonged cough lasting several weeks to months. Cases reported a cough duration that ranged from 5 days to 245 days with median cough duration of 35 days. Symptoms characteristic of pertussis experienced by cases included paroxysms or coughing fits (91%), vomiting after paroxysms (67%), and an inspiratory whoop (66%). Most symptoms experienced by infants were similar to other ages which included cough (100%), paroxysms (92%), and inspiratory whoop (65%). Unlike adults and other children, infants also experienced apnea (59%) and cyanosis (61%). No seasonal distribution of pertussis was identified in 2008.

Pertussis cases were identified throughout the state with the highest rates occurring in Major County (14.1/100,000), Kingfisher County (14/100,000), Lincoln County (12.4/100,000) and Pawnee County (12.3/100,000). 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 control continued transmission. In 2008, a total of 282 close contacts (median=1, range 0-21 contacts) of cases were recommended to receive PEP. Twenty-two cases were associated with a high-risk setting such as a childcare center, school, or doctor's office.

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 11-64 years of age and should replace one booster dose of Td. This dose is especially important in for persons who reside in a household or may have contact with persons at highest risk of developing disease.

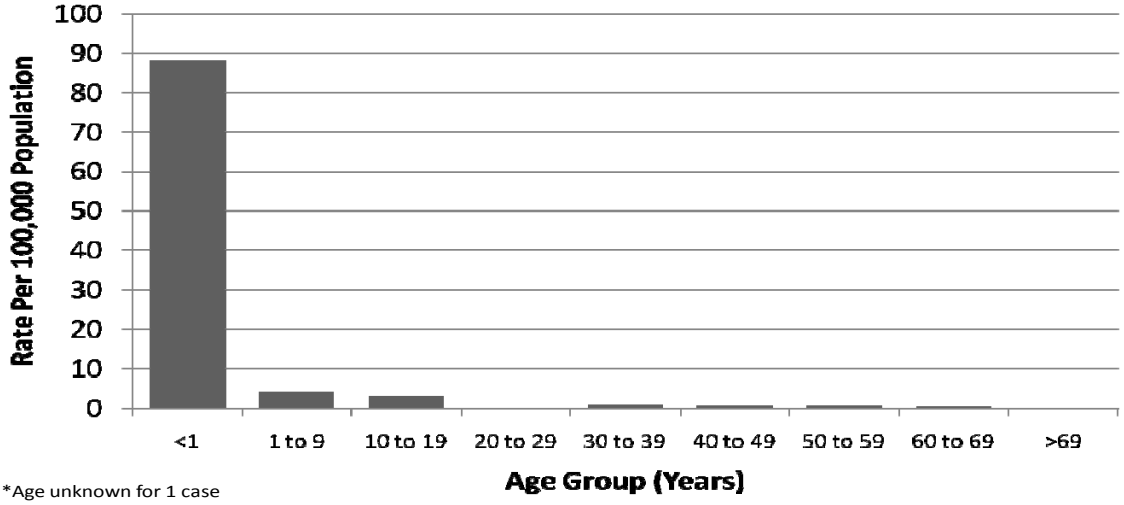
Descriptive Summary of Reported Pertussis Cases, All Ages, Oklahoma, 2008 (N=100)

Total Cases	Frequency (%)	Rate/100,000
Gender		
Male	42 (42%)	2.33
Female	58 (58%)	3.15
Age	Median Age: 1 year (Range: 4 Days – 63 years)	
Hospitalized for Disease	41 (41%)**	--
Deaths to Pertussis	0	--
Race		
White	75 (75%)	2.64
Black	2 (2%)	0.69
American Indian or Alaska Native	9 (9%)	3.09
Persons reporting 2 or more races	8 (8%)	5.40
Unknown	6 (6%)	--
Hispanic Ethnicity	11 (11%)	3.95
Symptoms†		
Cough	100 (100%)	--
Duration of Cough	Median Cough Duration: 35 days (Range: 5 days – 245 days)	
Paroxysms	91 (91%)	--
Post-tussive vomiting	67 (67%)	--
Inspiratory whoop	66 (66%)	--

Frequency of Symptoms Experienced by Reported Pertussis Cases
Among Children Less Than One Year Old, 2008 (N=49)

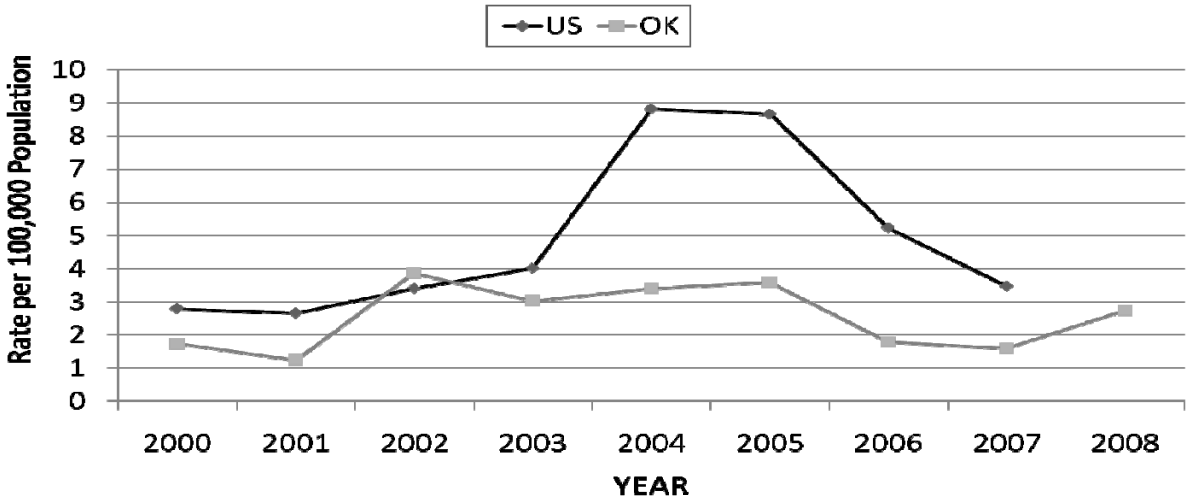
Cases <1 year of age	Frequency (%)
Symptoms	
Cough	49 (100%)
Duration of Cough	Median Cough Duration: 35 days (Range: 5 days – 245 days)
Paroxysms	45 (92%)
Apnea	29 (59%)
Post-tussive vomiting	32 (65%)
Inspiratory whoop	32 (65%)
Cyanosis	30 (61%)
Age-Appropriately Vaccinated (N=20)	15 (75%)

Rate of Reported Pertussis Cases by Age Group, Oklahoma, 2008*



*Age unknown for 1 case

Incidence Rate of Pertussis Cases, United States and Oklahoma, 2000-2008*



*2008 data unavailable for US

Animal Rabies

2008 Case Total	42
2007 Case Total	78

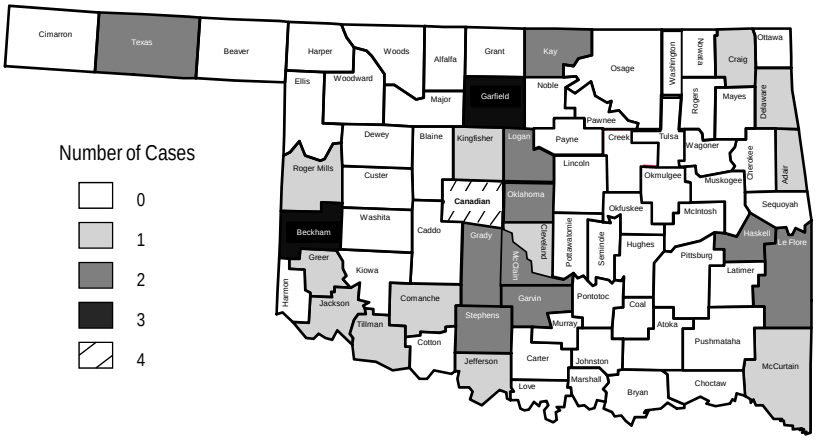
The number of rabid animals in Oklahoma during 2008 decreased to 42 confirmed cases compared to 78 cases in 2007. Sixty-nine percent (29/42) of the rabies diagnoses were in skunks. Animal rabies activity in Oklahoma tends to follow a cyclical trend with increases or activity peaks occurring approximately every six to eight years. The most recent peak was in 2003 when 204 animals were identified as rabid by laboratory testing. Since 2003, animal rabies incidence has steadily declined with the exception of a small increase in 2007. Rabies incidence also has a seasonal trend with most cases occurring in the spring and summer months. In 2008, 62% of cases occurred in March through August.

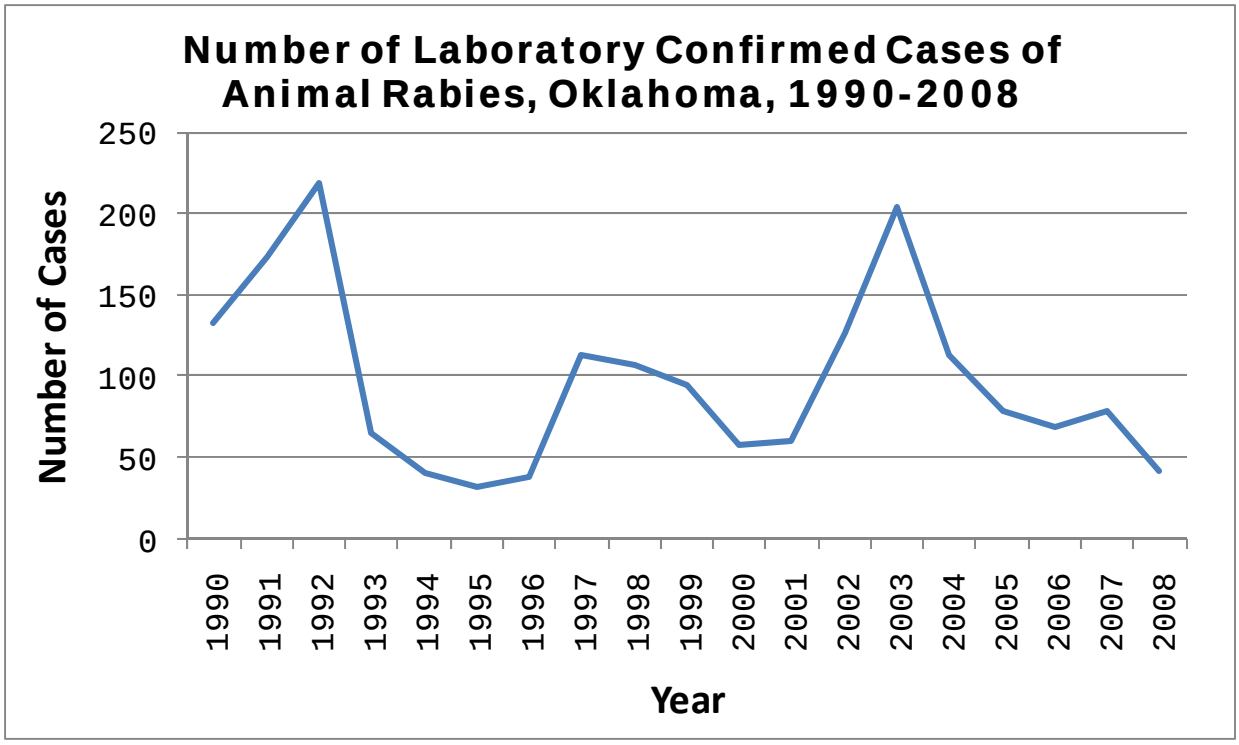
The risk of animal rabies is present throughout the state of Oklahoma, but multi-focal geographic clustering is frequently observed and varies from year to year. Counties with the highest number of cases in 2008 were Canadian (4), Beckham (3), and Garfield (3). Ten counties had two cases and 11 counties had one animal that tested positive for rabies.

When an animal tests positive for rabies or the laboratory 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. In 2008, 61 animals and 12 humans were deemed exposed to rabid animals. 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. Of the exposed animals, 14 (23%) were 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 47 exposed pets that were not currently vaccinated, owners of 6 (13%) elected placement in a six-month quarantine under the supervision of a licensed veterinarian, and owners of 41 (87%) chose to have the animal euthanized. All persons who are assessed as having potential exposure to rabies are advised to seek rabies PEP through a health care provider. Consultation regarding animal bites and the PEP series is available by contacting the epidemiologist-on-call at (405) 271-4060.

The OSDH Public Health Laboratory (PHL) tested a total of 1151 animals for rabies in 2008. Of these, 1084 (94%) were negative, 23 had unsatisfactory results due to a crushed or decomposed head, and the remaining 44 were positive for rabies[i]. In Oklahoma, skunks are more likely to test positive for rabies because the south central skunk rabies virus variant is the enzootic strain of rabies virus in the state. Of 58 skunks tested in 2008, 50% (29) tested positive. In contrast, only two of 539 dogs (0.4%), two of 357 cats (0.6%), one of 27 bats (3.7%), six of 49 cattle (12.2%), one of 23 horses (4.4%), and one of 3 bobcats (33.3%) tested positive for rabies. 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[ii]. 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. In the event that an animal is suspected to be rabid, the OSDH PHL is the only lab in the state of Oklahoma with the capability of testing the animal. For questions regarding testing, please consult the OSDH PHL at (405) 271-5070.

County Location of Animal Rabies in Oklahoma, 2008





[i]Two rabies cases in 2008 were reported to other states through interstate notification.
[ii] CDC. Imported Human Rabies—California, 2008. MMWR 2009; 58(26):713-716.

Rocky Mountain spotted fever

2008 Case Total	267	2008 Rate	7.3 per 100,000
2007 Case Total	187	2007 Rate	5.4 per 100,000

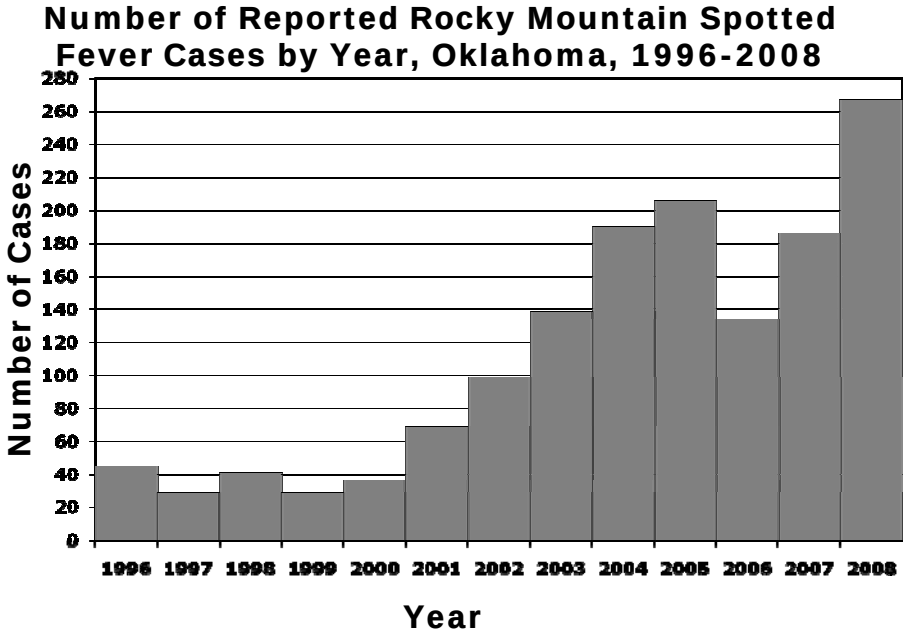
In 2008, Oklahoma reported the highest incidence of Rocky Mountain spotted fever (RMSF) during the past 13 years, and remains one of the highest reporting states in the United States. The Centers for Disease Control and Prevention reports that Oklahoma and North Carolina together alone represent 35% of the cases reported in the United States[2]. Eastern Oklahoma has higher rates of disease due to its more favorable tick habitat. Counties with the highest incidence rates in 2008 were Roger Mills (117.51 per 100,000), Pushmataha (111.02 per 100,000), Latimer (66.28 per 100,000), and LeFlore (66.26 per 100,000). The seasonal distribution of RMSF peaks during the warmer months. Ninety-one percent of the cases reported in 2008 occurred during April through September (refer to cases by month graph).

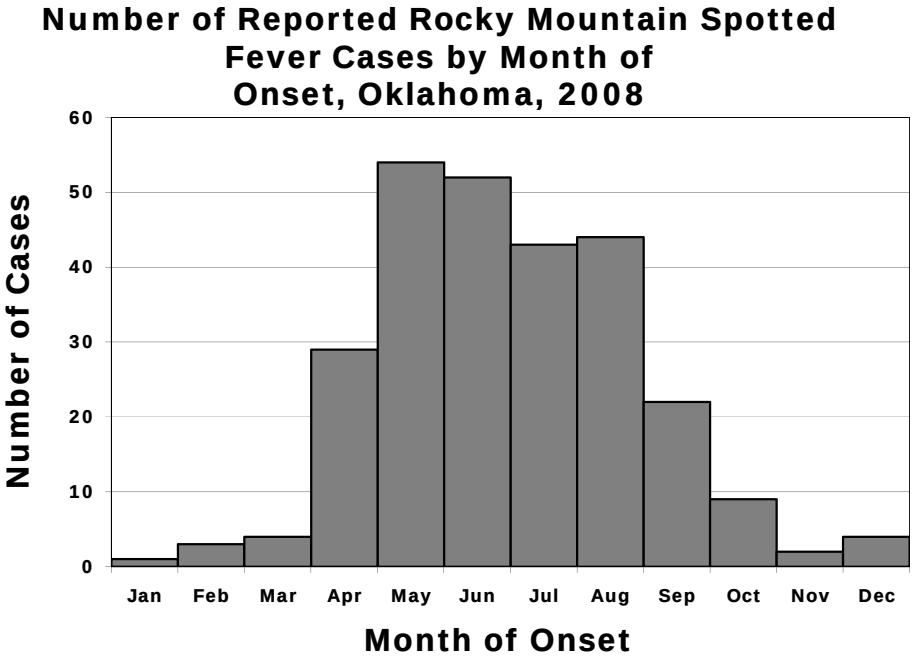
The age of RMSF cases ranged from 1 year to 108 years with a median age of 46 years. The highest incidence occurred in those 50-59 then 60-69 years old with a combined rate of 11.31 per 100,000 population. Overall, the rate among males was 1.65 times higher than that of females. The highest rates of RMSF were in the Native Hawaiian/Pacific Islander (55.77 per 100,000) followed by Native American/Alaska Native population (25.74 per 100,000), which are higher, 7.5 and 3.5 respectively, than the overall 2008 rate in Oklahoma of 7.33 per 100,000 population.

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 [1].

Demographic and Clinical Summary of Reported Rocky Mountain Spotted Fever Cases, Oklahoma, 2008 (N=267)

	Frequency (%)	Rate/100,000
Gender		
Male	172(%)	9.56
Female	95(%)	5.15
Age	Median: 46 years (Range: 1 year -108 years)	
Hospitalization	52 (20%)	--
Deaths	No Deaths	--
Race		
White	152(61%)	5.34
African American	3(1%)	1.03
Native American / Alaska Native	75(30%)	25.74
Native Hawaiian/Pacific Islander	2(<1%)	51.77
2 or more races	19(8%)	12.82
Hispanic Ethnicity	4	1.44
Symptoms		
Fever	263(99%)	--
Headache	225(65%)	--
Malaise	231 (52%)	--
Chills	201(61%)	--
Myalgia	214(64%)	--
Rash	110(42%)	--
Reported Exposures		
Exposure to wooded area	222(68%)	--
History of tick bite	165(79%)	--





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

Salmonellosis

2008 Case Total	901	2008 Rate	24.7 per 100,000
2007 Case Total	709	2007 Rate	20.6 per 100,000

The rate of salmonellosis in Oklahomans increased 27.6% between 2007 and 2008, marking a four-year trend of increases in the incidence of reported *Salmonella* cases. Of the 901 cases reported, 78 (9%) 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 noted, with the highest number of cases occurring between June and September in 2008.

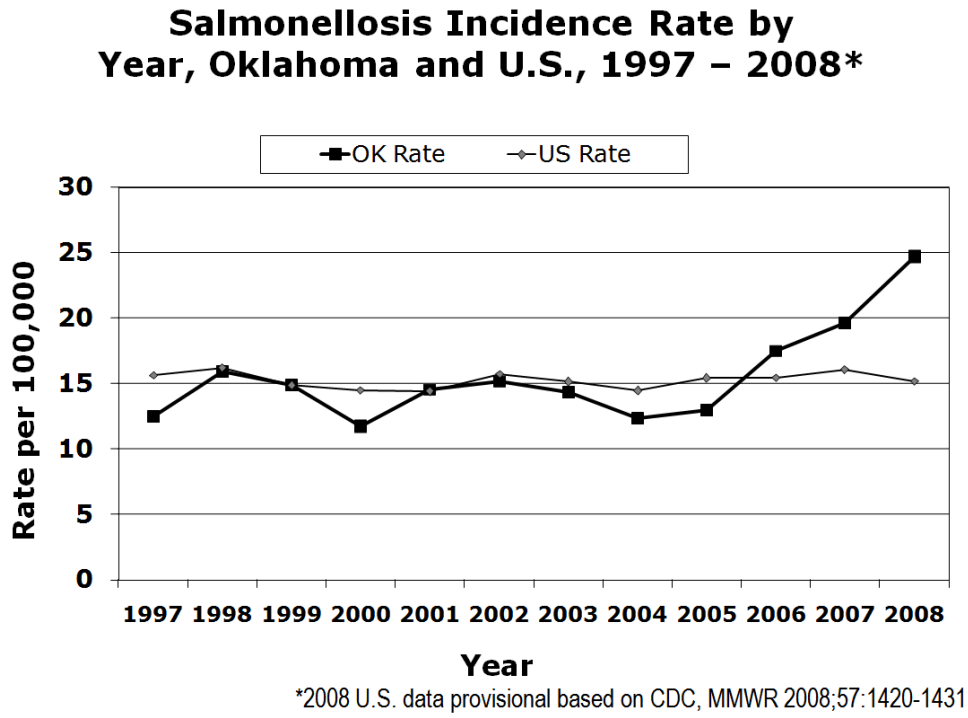
The age range of cases was from 11 days to 102 years with a median of 27 years of age. When the cases are grouped by age, the highest incident rate occurs in children under 10 years (incidence rate = 63.94 per 100,000). One death was reported due to salmonellosis in 2008, which occurred in a 90 year old individual. Though rare, hospitalizations and deaths due to salmonellosis are reminders that although it is usually a self-limiting disease, severe cases do occur.

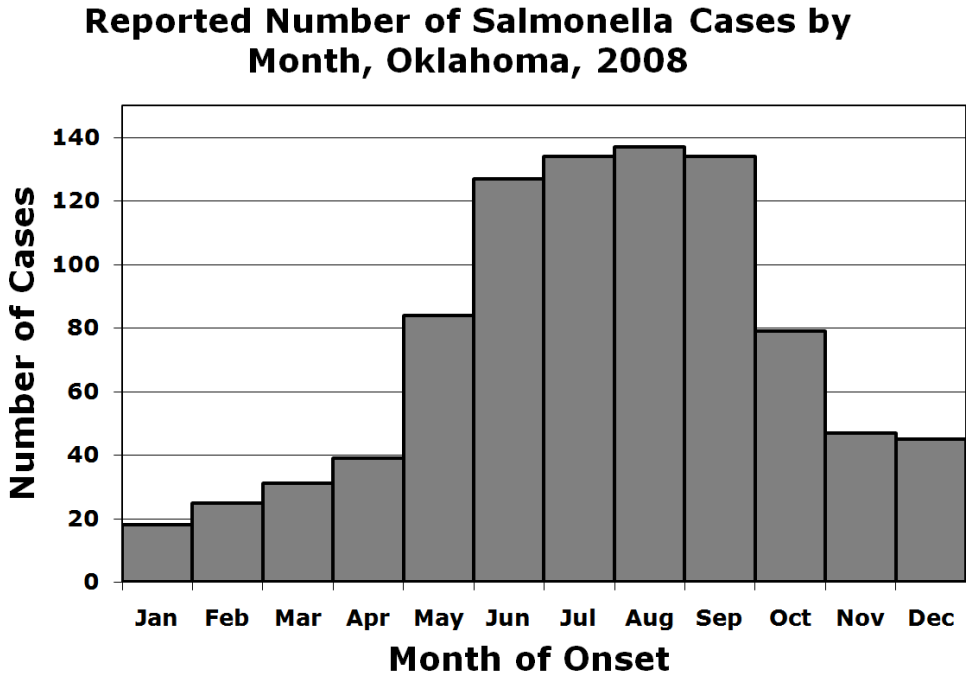
Clinical isolates of *Salmonella* species identified by laboratories are required to be submitted to the OSDH Public Health Laboratory (PHL). These referred isolates are confirmed, serotyped, and analyzed using pulsed-field gel electrophoresis (PFGE), generating distinct patterns that are stored in a national database maintained by the CDC for the purpose of identifying multistate outbreaks. Two noteworthy *Salmonella* outbreaks involved Oklahomans in 2008. One was a nationwide outbreak of *Salmonella* Saintpaul, which was the largest culture-confirmed foodborne disease outbreak identified in the U.S. in the past decade.[1] Of the 1442 ill persons described in the referenced publication, 38 were Oklahomans. Raw produce, specifically raw tomatoes, raw jalapeno peppers and raw serrano peppers were determined to be associated with this outbreak. A regional outbreak of *Salmonella* Braenderup occurred in association with a restaurant in Texas, and seven Oklahomans were culture-confirmed cases with indistinguishable pulsed-field gel electrophoresis patterns compared to the outbreak strain who reported having eaten at that establishment.

The OSDH PHL confirmed *Salmonella* and serotyped 787 isolates in 2008. Forty-seven different named serotypes were identified, with the top five serotypes in 2008 being Newport (194 cases, 24.7% of typed isolates), Typhimurium (134 cases, 17%), Paratyphi B (56 cases, 7.1%), Enteriditis (52 cases, 6.6%) and Saintpaul (49 cases, 6.2%).

Demographic and Clinical Summary of Reported *Salmonella* Disease Cases, Oklahoma, 2008 (N = 901)

	Number (%)	Incidence Rate per 100,000
Gender (N = 898)		
Female	457 (50.9%)	24.8
Male	441 (49.1%)	24.5
Age	Median 27.63 years (range 11 days – 102 years)	
Race (N= 858)		
White	728 (84.8%)	25.6
American Indian or Alaska Native	56 (6.5%)	19.2
African American or Black	32 (3.7%)	11
Asian	5 (0.6%)	8
Native Hawaiian or Other Pacific Islander	5 (0.6%)	129.4
Two or more races reported	32 (3.7%)	21.6
Hispanic Ethnicity (N=792)	81 (10.2%)	29.1
Hospitalized	188 (20.9%)	-





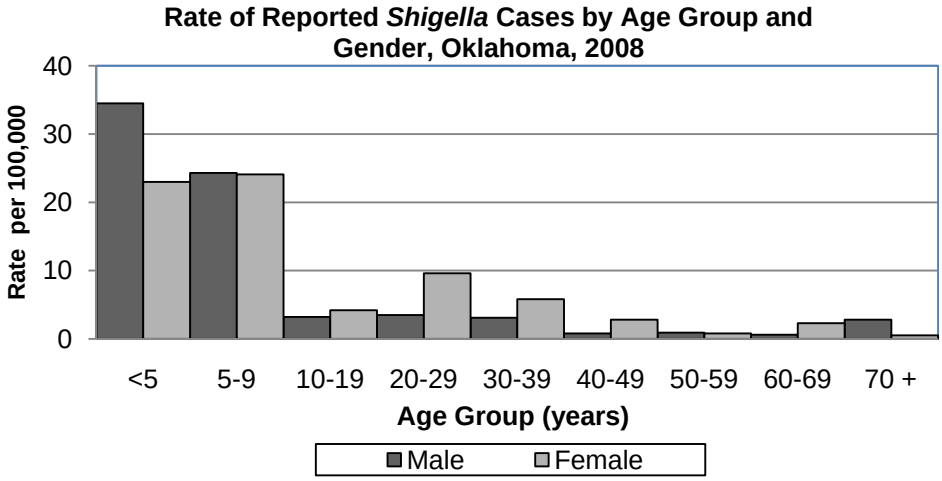
[1]Centers for Disease Control and Prevention. Outbreak of *Salmonella* Serotype Saintpaul Infections Associated with Multiple Raw Produce Items — United States, 2008. MMWR 2008;57:929-934, available a http://www.cdc.gov/mmwr/PDF/wk/mm5734.pdf

Shigellosis

2008 Case Total	234	2008 Rate	6.4 per 100,000
2007 Case Total	162	2007 Rate	4.7 per 100,000

Two hundred thirty-four cases of shigellosis were reported to the OSDH during 2008 resulting in an incidence rate of 6.4 per 100,000 population. The number of cases in 2008 represented a 44% increase compared to 2007. Of the 234 cases reported, 178 (76%) were laboratory-confirmed cases and 56 (44%) were epidemiologically linked cases identified during investigations conducted by county health department communicable disease nurses. One hundred sixty-six *Shigella* isolates were forwarded to the OSDH Public Health Laboratory for confirmation and speciation; 87% (N=144) were speciated as *Shigella sonnei,* 9% (N=15) were *S. flexneri*, and 1% (N=1) was *S. boydii*.

Shigellosis is typically a mild, self-limiting enteric disease. Among cases reported during 2008, predominant symptoms included diarrhea (97.8%), abdominal cramps (90.6%), fever (83.4%) and nausea (65.8%). The median duration of diarrhea was 5 days with a range of one to 34 days. The rate of disease in those under 10 years of age (26.6 per 100,000) was four times greater than the overall incidence rate. Forty-four percent (N=102) of cases reported an association with a high-risk setting. Of those 102 cases, 43% were associated with a childcare center with 44 attendees and two employees.



Descriptive Summary of Reported Shigellosis Cases, Oklahoma, 2008

	Number (%)	Rate/100,000
Gender (N=234)		
Female	121 (51.6%)	6.6
Male	113 (48.4%)	6.8
Age (years): Median and range	Median = 2 years (23 days – 82 years)	--
Race (N=212)		
White	140 (66%)	4.9
Black or African American	30 (14.1%)	10.4
Asian	2 (9.4%)	3.2
Hawaiian or Native Pacific Islander	3 (14.5%)	77.7
Two or more Races	14 (6.6%)	9.5
Ethnicity (N=217)		
Hispanic	52 (44.4%)	18.7
Hospitalized (N=234)	37 (16%)	--

Streptococcus, Group A Invasive Disease

2008 Case total	138	2008 Rate	3.8 per 100,000
2007 Case Total	87	2007 Rate	2.5 per 100,000

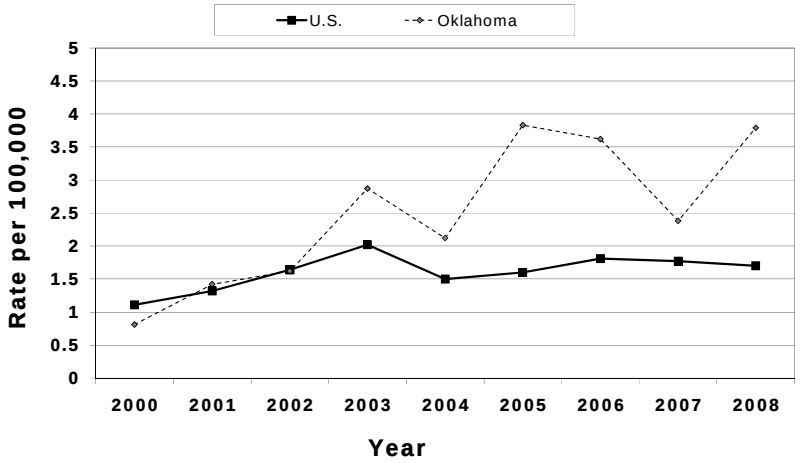
Invasive group A streptococcal (GAS) infections may manifest as several clinical presentations, such as pneumonia, bacteremia in association with cutaneous infection (e.g., cellulitis, erysipelas, or infection of a surgical or nonsurgical wound), deep soft-tissue infection (e.g., myositis or necrotizing fasciitis), meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (i.e., puerperal fever), neonatal sepsis, and nonfocal bacteremia.

In 2008, the number of cases reported to OSDH increased by 60%. The most common presentation was bacteremia/sepsis (129 cases, 93.5%). Following in order of frequency were cellulitis (34 cases, 24.6%), pneumonia (28 cases, 20.3%), necrotizing fasciitis (5 cases, 3.62%), meningitis (5 cases, 3.62%), abscess (not skin, 5 cases, 3.62%), septic arthritis (3 cases, 2.17%) and otitis media (1, 0,7%), and septic abortion (1, 0.7%). More than one presentation occurred in 67 (49%) cases. Necrotizing fasciitis is one of the most remarkable presentations due to the rapidity of progression, and high rate of mortality. Of the five cases of necrotizing fasciitis in 2008, one (20%) expired.

Summary of Reported Streptococcus Group A Cases, Oklahoma, 2007 (N = 86)

	Number (%)	Rate/100,000
Gender		
Male	74 (53.62%)	4.11
Female	64 (46.38%)	3.47
Age	Median = 54 years (range: 9 days – 102 years)	
Race (N=133)		
White	98 (73.68%)	3.44
Black	18 (13.5%)	6.21
American Indian/Alaska Native	11 (8.27%)	3.78
Asian	3 (2.26%)	4.78
More than one race reported	3 (2.26%)	2.02
Hispanic Ethnicity (N = 78)		
Hispanic/Latino	6 (7.69%)	2.15
Hospitalization (N = 124)	104 (83.87%)	--
Deaths (N = 129)	19 (14.73%)	--

Invasive *Streptococcus*, Group A Invasive Disease Incidence Rate by Year, Oklahoma and U.S., 2000-2008*



*2008 U.S. data provisional based on CDC, MMWR 2008;57:1420-1431

Invasive *Streptococcus pneumoniae,* Children <5 Years

2008 Case Total	76	2008 Rate	28.5 per 100,000
2007 Case Total	77	2007 Rate	29.5 per 100,000

Invasive *Streptococcus pneumoniae* (IPD) in children less than 5 years of age became reportable in Oklahoma in 2000. Since 2006, IPD in children <5 has averaged 75 cases per year (refer to graph for annual incidence rates). The seasonal distribution of reported IPD cases is similar to the respiratory illness season with 45% (N=34) of cases with symptoms onsets from January through March during 2008. In 2008, 5 deaths occurred among reported cases of IPD resulting in a case-fatality rate of 6.6%. Of the 5 deaths, 3 had underlying conditions, which included heart defects, myeloid hyperplasia of the bone marrow, prematurity, history of pneumonia, and asthma. Two IPD deaths were current on their pneumococcal vaccination based on age and the date of illness onset.

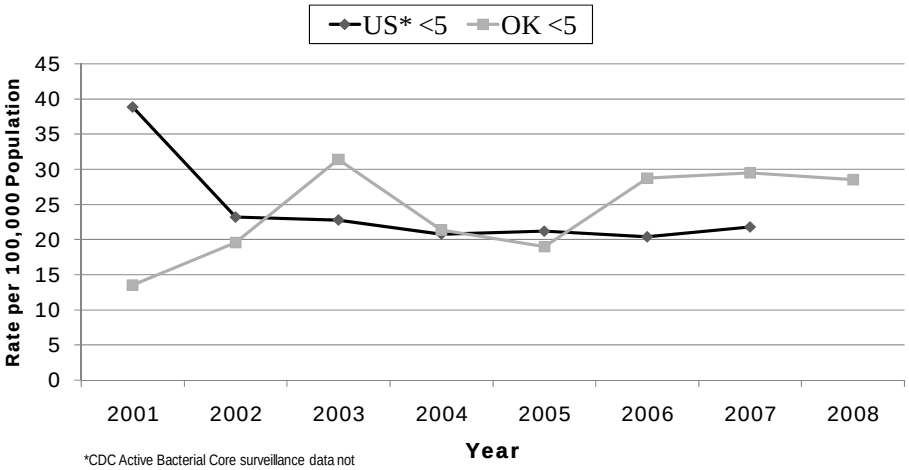
A vaccine is currently available to help prevent invasive pneumococcal disease by the 7 most common types of pneumococcal bacteria and is licensed for children less than 59 months of age. PCV7 should be given to children at 2, 4, 6, months of age with a booster dose at 12-15 months of age, and is a required vaccine to attend child care in Oklahoma.

Descriptive Summary of Reported IPD Cases in Children <5 Years, Oklahoma 2008 (N=76)

	Frequency (%)	Rate/100,000*
Gender		
Male	43 (57%)	31.55
Female	33 (43%)	25.34
Age	Median= 1 year (range: 1 day – 4 years)	
Hospitalization	47(62%)	--
Deaths	5 (7%)	--
Race		
White	39 (51%)	20.56
Black	12 (16%)	46.48
American Indian	8 (11%)	30.67
Asian	2 (3%)	46.59
Two or more races only	3 (4%)	14.80
Unknown	12 (16%)	--
Hispanic Ethnicity	7 (9%)	17.65
Infection Types		
Bacteremia/sepsis	71 (93%)	--
Meningitis	10 (14%)	--
Pneumonia	38 (50%)	--
Current PCV7 Vaccination Age-appropriate^	24 (69%)	--

*Age-specific incidence rate per 100,000 population based on the number of children less than 5 years of age in Oklahoma.
^Of those with known vaccination status (N=35).

Incidence Rate of Invasive *Streptococcus pneumoniae* Children <5 Years, by Year, Oklahoma and US, 2001-2008



*CDC Active Bacterial Core surveillance data not available for 2008

Tuberculosis

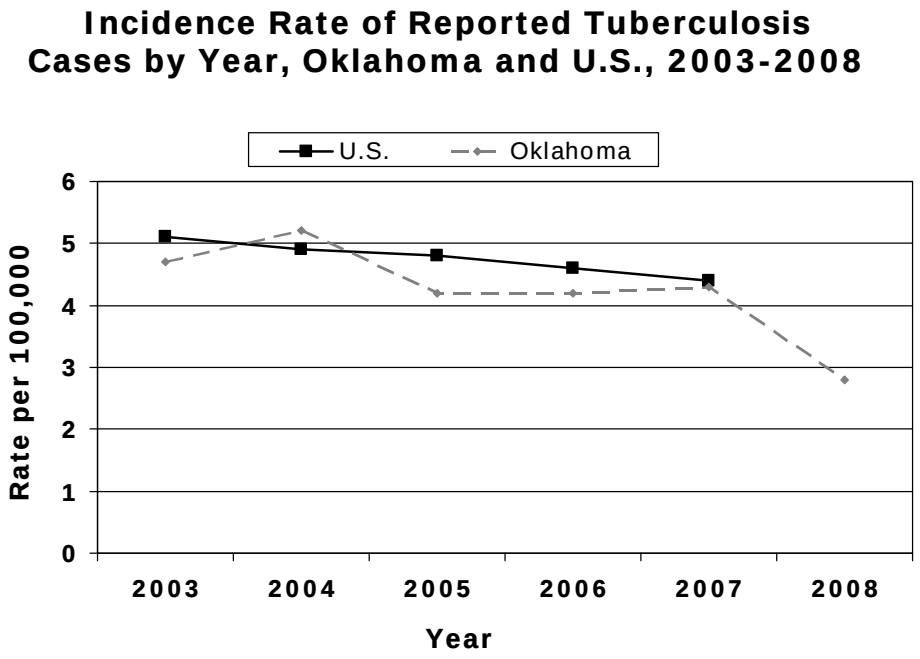
2008 Case Total	100	2008 Rate	2.8 per 100,000
2007 Case Total	149	2007 Rate	4.3 per 100,000

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 become sick with 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 trend dropping from 149 cases reported with active tuberculosis disease in 2007 to 100 persons in 2008. Eighty percent of the reported cases of tuberculosis in 2008 were culture confirmed. No multidrug resistant cases were identified in 2008. Persons under 5 years of age represented the highest rate of illness at 4.6 per 100,000 population. Native Hawaiian/Pacific Islanders followed by Asians represented the highest rates of disease with rates of 164.3 and 11.2 per 100,000 population respectively.

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. TB disease is treated and cured through a strict regimen in administering the medication, which takes at least six months to properly treat. Oklahoma uses directly observed therapy (DOT), through which a health care provider is assigned to physically observe the patient take doses of TB medication. This helps the patient to effectively adhere to a 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.



Tuberculosis Trends in Oklahoma, 2003-2008

	2003	2004	2005	2006	2007	2008
# of Oklahoma Cases	163	178	144	144	149	100
Oklahoma Case Rate*	4.7	5.2	4.2	4.2	4.3	2.8
U.S. Case Rate*	5.1	4.9	4.8	4.6	4.2	NA
AGE						
0-4	11 (7%) 5/100,000	14 (8%) 6/100,000	12 (8%) 5/100,000	8 (6%) 3/100,000	12 (8%) 5/100,000	12 (12%) 4.6/100,000
5-14	1 (1%) 1/100,000	10 (6%) 2/100,000	7 (5%) 1/100,000	3 (2%) .6/100,000	9 (6%) 2/100,000	1 (1%) 0.2/100,000
15-24	16 (10%) 3/100,000	24 (13%) 5/100,000	7 (5%) 1/100,000	9 (6%) 2/100,000	11 (7%) 2/100,000	8 (8%) 1.5/100,000
25-44	51 (31%) 5/100,000	50 (28%) 5/100,000	40 (28%) 4/100,000	36 (25%) 4/100,000	36 (24%) 4/100,000	29 (29%) 3.0/100,000
45-64	52 (32%) 7/100,000	54 (30%) 7/100,000	53 (37%) 7/100,000	56 (39%) 7/100,000	60 (40%) 8/100,000	32 (32%) 3.5/100,000
65-Over	32 (20%) 7/100,000	27 (15%) 6/100,000	25 (17%) 5/100,000	32 (22%) 7/100,000	21 (14%) 5/100,000	18 (18%) 3.7/100,000
RACE**						
American Indian/Alaska Native	33 (20%) 12/100,000	36 (20%) 13/100,000	32 (22%) 12/100,000	22 (15%) 8/100,000	30 (20%) 11/100,000	19 (19%) 6.7/100,000
Asian	16 (10%) 34/100,000	20 (11%) 43/100,000	14 (10%) 30/100,000	20 (10%) 43/100,000	8 (5%) 17/100,000	7 (7%) 11.2/100,000
Black	27 (17%) 9/100,000	32 (18%) 12/100,000	21 (15%) 8/100,000	22 (15%) 8/100,000	22 (15%) 8/100,000	23 (23%) 8.0/100,000
Native Hawaiian or Pacific Islander	0 0	0 0	0 0	0 0	5 (3%) 210/100,000	6 (6%) 164.3/100,000
White	87 (53%) 3/100,000	88 (50%) 3/100,000	70 (49%) 3/100,000	79 (55%) 3/100,000	84 (56%) 3/100,000	45 (45%) 1.6/100,000
Mixed	0 0	2 (1%) 1/100,000	7 (4%) 4/100,000	1 (.7%) .6/100,000	-- --	-- --
Hispanic	18 (11%) 10/100,000	29 (32%) 16/100,000	21 (15%) 7/100,000	25 (17%) 13/100,000	25 (17%) 14/100,000	13 (13%) 5.0/100,000
SPECIAL POPULATIONS						
Foreign Born	37 (23%)	37 (21%)	35 (24%)	39 (27%)	38 (26%)	30 (30%)
Univ. Students	8 (5%)	5 (3%)	2 (1%)	5 (3%)	2 (1%)	1 (1%)
Homeless	7 (4%)	9 (5%)	13 (9%)	8 (6%)	7 (5%)	8 (8%)
Nursing Homes	5 (3%)	5 (3%)	5 (3%)	8 (6%)	4 (3%)	5 (5%)
AIDS/TB	10 (6%)	4 (2%)	10 (7%)	6 (4%)	5 (3%)	3 (3%)
Prisoners	6 (4%)	11 (6%)	8 (6%)	7 (5%)	2 (1%)	2 (2%)
BACTERIOLOGY						
Resistance To INH	9 (5.6%)	1 (1%)	5 (5%)	3 (2%)	0	3 (3%)
MDR-TB	1 (.8%)	0 (N/A)	1 (1%)	0 (N/A)	0	0
Culture Positive for MTB	126 (77%)	109 (61%)	93 (65%)	73 (51%)	91 (61%)	80 (80%)

*Rate per 100,000 calculated using U.S. Census Population Estimates

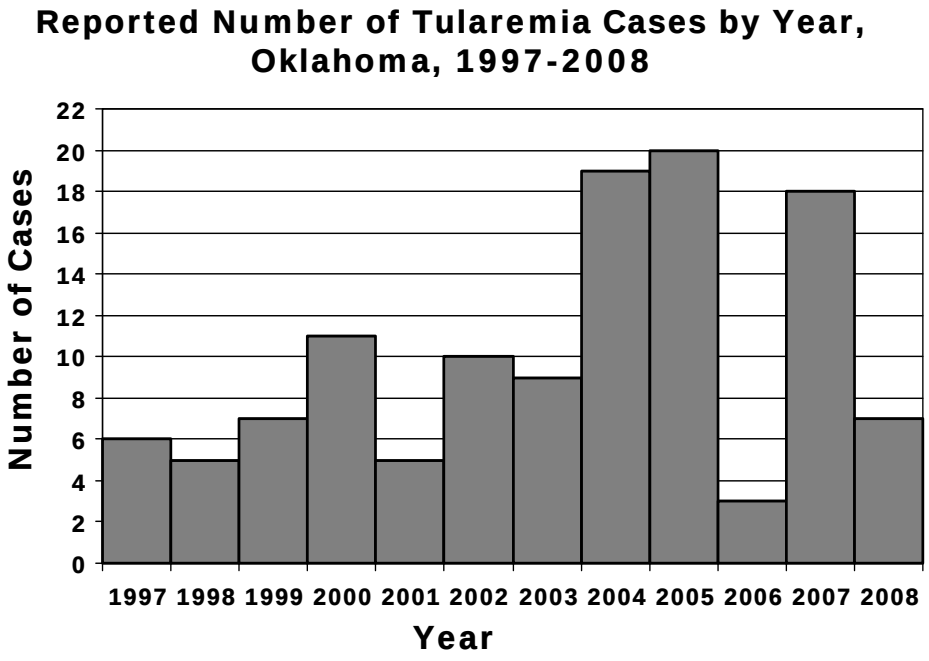
Tularemia

2008 Case Total	7	2008 Rate	0.19 per 100,000
2007 Case Total	18	2007 Rate	0.52 per 100,000

Although tularemia is naturally 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 2008, 7 cases were reported to the Oklahoma State Department of Health. There are many different presentations of tularemia. Of the reported cases in 2008, 5 presented with ulceroglandular, 1 typhoidal and 1 pneumonic as primary infections. Although trends in disease are not understood entirely, weather changes do affect tick survival. While cases are reported throughout the year, 100% of the reported cases in 2008 had onset of symptoms from May through July. Among cases, commonly reported symptoms include fever, chills, 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, 2007 (N=18)

	Frequency (%)	Rate/100,000
Gender		
Male	5 (71%)	0.28
Female	2 (29%)	0.11
Age	Median= 51Years (Range 12- 87 Years)	--
Hospitalized	5 (71%)	--
Deaths	No Deaths	--
Race		
White	5 (71%)	0.18
Native American/Alaska Native	1 (14%)	0.34
Black/African American	1 (14%)	0.34
Geographical Distribution		
Adair	1 (14%)	4.58
Oklahoma	3 (43%)	0.42
Tulsa	3 (43%)	0.51
Exposures		
Tickbite	4 (80%)	--
Wood Exposure	6 (86%)	--


Reported Number of Tularemia Cases by Year, Oklahoma, 1997-2008
Number of Cases
0
2
4
6
8
10
12
14
16
18
20
22
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008
Year

Typhoid Fever

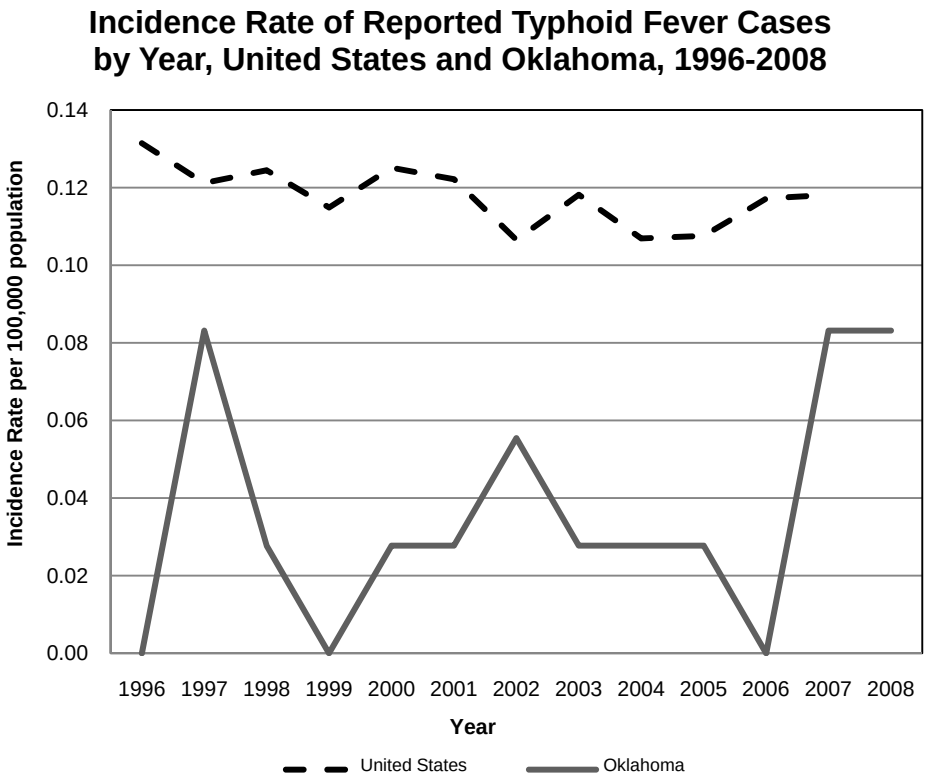
2008 Cases	3	2008 Rate	0.08 per 100,000
2007 Cases	3	2007 Rate	0.09 per 100,000

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 case works in or attends a high-risk setting such as a patient care provider, childcare employee or attendee, or foodhandler in order to implement control measures to prevent continued spread; and identify symptomatic contacts to determine if secondary cases have occurred from exposure to a confirmed case. Three cases of typhoid fever were reported during 2008 resulting in an incidence rate of 0.08 per 100,000. The number of cases in 2008 is higher than the previous 10-year period (1998-2007) in Oklahoma where an average of one case was reported annually. From 1998 to 2007, the average number of reported cases in the United States was 358 cases (range: 321 - 552 cases) resulting in an average annual incidence rate of 0.13 per 100,000 US population.

While uncommon in the United States, typhoid fever is a common disease 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. All three cases reported in Oklahoma residents had a history of travel to typhoid fever endemic areas during their exposure period; cases report traveling to India, Pakistan and Mexico. The median age of the three cases reported in 2008 was 40 years with a range from 17 years to 81 years. Two of the three cases reported their race as Asian (incidence rate = 2 per 100,000 population) and one case reported Hispanic or Latino ethnicity (incidence rate = 0.4 per 100,000 population).

Typhoid fever is characterized by a gradual onset of fever, headache, malaise, anorexia, splenomegaly and non-productive cough. All cases reported fever, nausea, vomiting and diarrhea. *Salmonella typhi (S. typhi)* may cause chronic gall-bladder infections and result in long-term carriage. *S. typhi* was isolated in gall bladder tissue from a case with a prior history of typhoid fever who presented with symptoms of gall bladder failure. *S. typhi* was found in blood from the other two cases. There were two hospitalizations with a median stay of 9.5 days; no deaths due typhoid fever were reported in 2008. The number of contacts per case ranged from one to eight with a median of 4.5 contacts, none of which developed symptoms. None of the three reported cases or their contacts was associated with a high-risk setting.

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 is not 100% effective and avoidance of high-risk foods is still advised. None of the three cases were knowledgeable of their typhoid fever vaccination history. 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.

West Nile Virus

2008 Case Total	9	2008 Rate	0.3 per 100,00
2007 Case Total	107	2007 Rate	3.1 per 100,000

Since national surveillance began nine years ago, there have been a total of 28,961 human cases of West Nile (WN) disease with 1,130 deaths reported in the United States. In 2008, a total of 1,356 human cases of WN disease were reported to the Centers for Disease Control and Prevention (CDC) by 46 states representing a 63% decrease in cases as compared to 2007. Most of the 2008 WN virus activity was seen in the southwestern states with the highest number of cases reported from California (445), Arizona (115) and Mississippi (65). Oklahoma was one of 21 states that reported less than 10 cases. The statewide incidence of human WN disease was 9 cases of WN Fever or WN neuroinvasive disease (0.2 per 100,000) resulting in a sharp (91.5%) decrease over the previous season. This also marked the lowest annual incidence of WN disease since it was identified in Oklahoma in 2002.

Oklahoma originally received 18 reports of positive West Nile virus IgM test results but only 50% of them were reported as cases following a multi-state investigation of a faulty commercial WN virus IgM ELISA test kit. The kits were distributed to four labs in the U.S. from July through September of 2008. The Oklahoma State Department of Health worked with the CDC to notify healthcare providers who submitted specimens for testing during the specified time frame. If the initial specimen was unavailable, efforts were made to collect a second specimen to be retested at the OSDH Public Health Laboratory or CDC Arbovirus Laboratory using a different method. Of nine Oklahomans who had positive WN IgM test results with the implicated kit, seven (68%) were determined to be false positive results. In October, the manufacturer voluntarily recalled two lots of the kits.

Reported cases were distributed across 9 counties with Pushmataha (8.5 per 100,000), Woodward (5 per 100,000) and Caddo (3.4 per 100,000) having the highest incidence rates per 100,000 population. By gender, six (66%) case patients were female; seven (78%) were white, one was African American, and one was an American Indian. Dates of symptom onset ranged from April 29 to October 21, 2008. The highest incidence rate of WN disease was in those 80 years of age and older (1.4 per 100,000); age range of all cases was 14 –84 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. Neuroinvasive disease comprised 44% (4) of reported WN cases.

Typically, WN disease in Oklahoma has a seasonal pattern with most human cases occurring between July and October. This general trend was not seen in 2008 with cases identified primarily during the spring and only sporadically thereafter. Increased WN activity has been associated with above average high temperatures followed by a period of drought. As reported by the National Climatic Data Center, both the average high temperature and precipitation in Oklahoma was below normal from June to August 2008. This weather pattern may in part account for the drop in WN disease in 2008.

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. One viremic Oklahoma blood donor was reported in 2008 as compared to 18 in 2007. In 2008, only 11% of WN cases reported wearing insect repellent. Until a WN vaccine becomes available, 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 availabable.