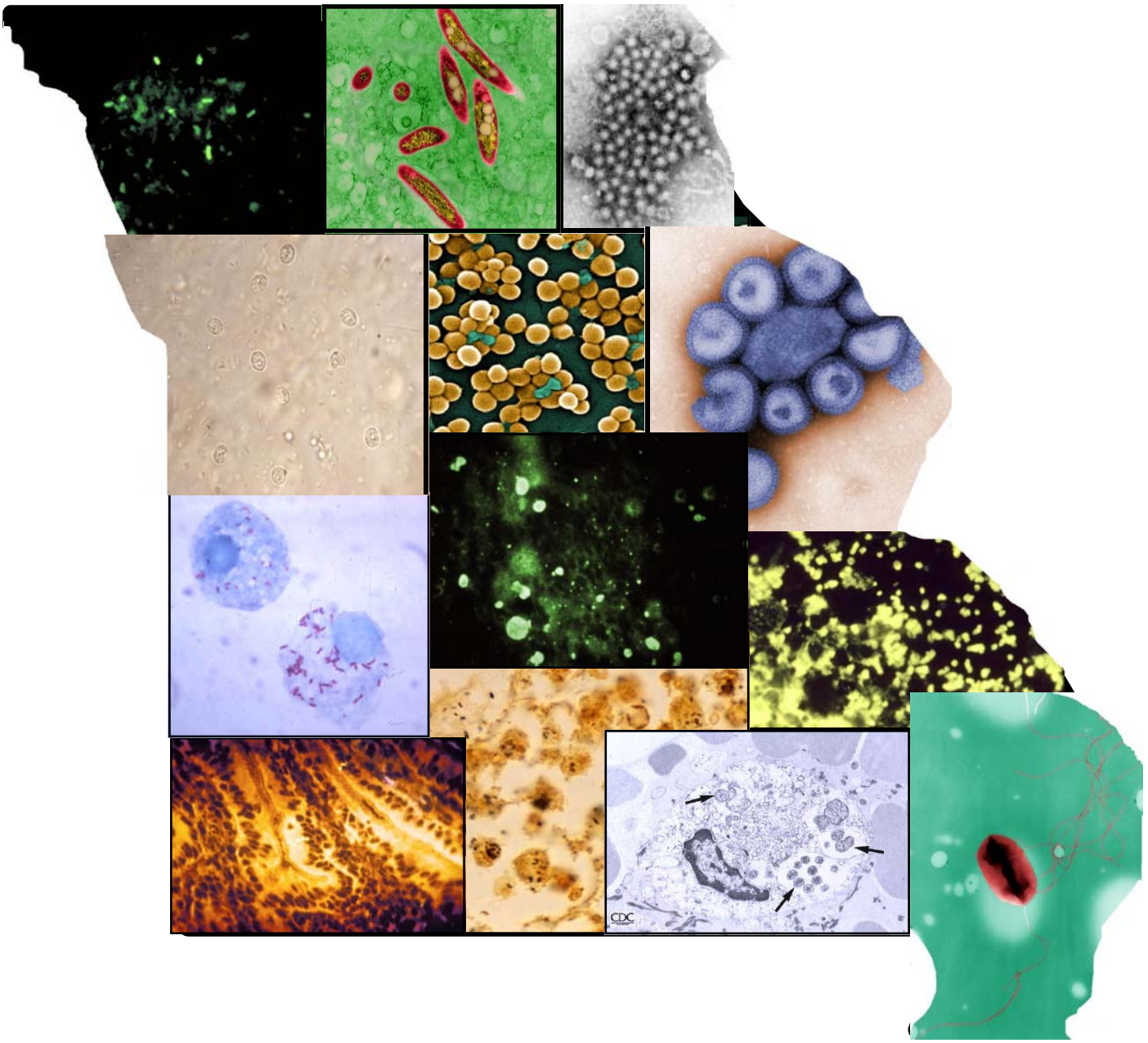
2007 Annual Report

Bureau of Communicable Disease Control and Prevention



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Acknowledgements

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Communicable Disease Surveillance 2007 Annual Report

Note: This report does **not** include a summary of sexually transmitted diseases, hepatitis (except hepatitis A), HIV, or environmental conditions.

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We thank our reviewers, Scott Clardy, Section Administrator, Kristi Campbell, Deputy Section Administrator, Brian Quinn, Public Information Administrator, and Dr. Sarah Patrick, State Epidemiologist, for their thorough review and helpful comments.

We would like to acknowledge the contribution of CDC's informative and knowledgeable public health web sites.

Table of Contents

Missouri Profile

Population (2007)	**5,878,415**	**Percent of Total Population**			
Urban	69.4%	(Based on 2000 census)		**Live Births**	81,883
Rural	30.6%	(Based on 2000 census)		**Deaths**	53,937

Sex	**Population**		**Race**	**Population**	**Percent of Total Population**
Male	2,871,022	48.8%	White	5,018,394	85.9%
Female	3,007,393	51.2%	Black	695,672	11.9%
			Other	128,647	2.2%

Age Group	**Population**		**District**	**Population**	
<1	81,883	1.4%	Central	635,111	10.8%
1-4	311,294	5.3%	Eastern	2,230,178	37.9%
5-14	776,051	13.2%	Northwest	1,532,133	26.1%
15-24	813,974	13.8%	Southeast	464,293	7.9%
25-39	1,163,527	19.8%	Southwest	1,016,700	17.3%
40-64	1,943,315	33.1%			
65+	788,371	13.4%			

Leading Causes of Death*:	**Number of Deaths Reported**	**Percent of Total Deaths Reported**
Heart disease	14,237	26.4%
Cancer	12,354	22.9%
Cerebrovascular disease (stroke)	3,226	6.0%
Chronic lower respiratory disease	3,070	5.7%
Unintentional injuries	2,929	5.4%
Alzeheimer's disease	1,682	3.1%
Diabetes	1,435	2.7%
Pneumonia and Influenza	1,312	2.4%

*Not all causes of death are listed.

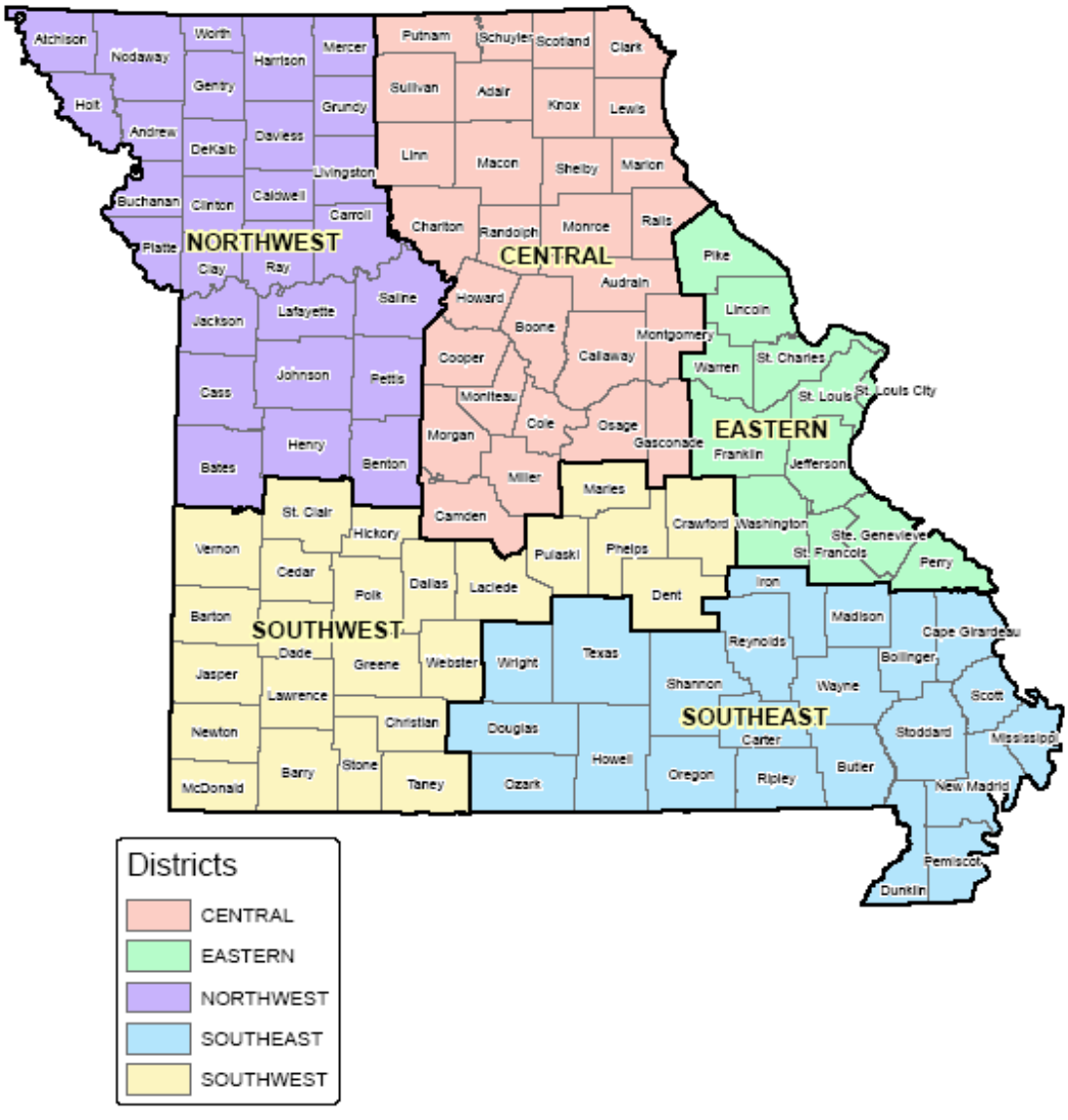
Data Provided by: Public Health Practice & Administrative Support Section, Bureau of Health Informatics, Department of Health and Senior Services.

Missouri is 69,697 square miles with slightly more than half of the population living in the two major cities, St. Louis and Kansas City, and their surrounding counties. Jefferson City is the capital. The state has 114 counties. The major flows of traffic within the state are from the east to west along the Missouri valley and southward along the Mississippi.

Although agriculture has remained important as an income-producing activity, services, manufacturing, and wholesale and retail trade have forged ahead since World War II. Manufacturing is led by the production of aerospace and transportation equipment, followed by the processing of food and the production of chemicals. Missouri also hosts the headquarters of the world's largest brewing company. Recreation and tourism have surpassed agriculture in economic importance, with more than seven million tourists a year visiting Branson's celebrity theaters and attractions.

"Missouri." Encyclopedia Britannica 2006. Encyclopedia Britannica Premium Service, 8 June 2006.

Missouri Disease Investigation / Emergency Response Districts



Source:
Missouri Department of Health and Senior Services

ITSD
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HealthRegions.mxd
9-6-2006

Introduction

The mission of the Bureau of Communicable Disease Control and Prevention (BCDCP) is to protect Missouri's citizens and visitors from the threats of infectious disease through the surveillance, investigation, prevention, and control of more than 80 communicable diseases and conditions of public health importance. The BCDCP, working with the local public health agencies (LPHAs), evaluates and responds to these reportable conditions as well as newly identified (SARS or monkeypox) and re-emerging infectious disease threats (pandemic influenza).

The services and activities provided by BCDCP include:

- monitoring communicable disease through data collection, analysis, and dissemination;
- coordinating and/or investigating communicable diseases and emerging disease cases (e.g., TB, pandemic influenza, monkeypox, SARS) to implement controls to prevent additional cases;
- assuring rapid response to public health emergencies, disease outbreaks, and natural disasters including bioterrorism events;
- providing consultation, assistance, and recommendations to local public health agencies, physicians, laboratories and others regarding changes to communicable disease reporting requirements and control measures for communicable diseases of public health importance;
- providing education and training on communicable diseases for public health professionals;
- providing information on infectious diseases to local public health jurisdictions, the medical community, and to the general public through press releases, interviews with the news media, pamphlets, reports, the Health Alert Network, the Department of Health and Senior Services (DHSS) web site and the CDCP ListServe.

The above services and activities are included in the Department of Health and Senior Services (DHSS) rule for the **Reporting of Communicable, Environmental and Occupational Diseases**, 19 CSR 20-20.020. The BCDCP covers all diseases and conditions that are not addressed by the Bureau of HIV, STD and Hepatitis, or the Bureau of Environmental Epidemiology. Information and statistics for HIV, STD, and Hepatitis can be found by clicking on the bureau name. Data used in this report were gathered from disease and condition reports made by medical providers, laboratories, hospitals, local public health agencies, and others.

The information collected through 19 CSR 20-20.020 flows from the local public health jurisdictions to DHSS and on to the national Centers for Disease Control and Prevention (CDC). Data are linked to the national level through the CDC's National Electronic Telecommunications Surveillance System (NETSS). This information is critical for two reasons:

1. It enables public health agencies to act quickly to prevent the spread of disease and,
2. It provides an overall picture of disease trends at the local, state and national levels. Analyzing these trends allows us to target resources where they are most needed and to assess our effectiveness in preventing and controlling disease.

Introduction

There are limitations to the data provided in this report for the following reasons:

- sick people do not always seek healthcare; and,
- healthcare providers and others do not always recognize, confirm, or report notifiable conditions.

Therefore, reported cases may represent only a fraction of the actual burden of disease.

We are pleased to provide the following summary of the data reported in calendar year 2007. In addition to the contributors listed on the previous page, we would like to recognize the staff of our State Public Health Laboratories and the thousands of people in local health departments, clinics, hospitals and clinical laboratories throughout Missouri whose disease reports and efforts constitute the basis for this document. Without vigilant reporting of disease, targeted and effective prevention and control measures cannot be implemented.

While this report was compiled by the Missouri Department of Health and Senior Services, you should keep in mind that most of the public health workforce is in city or county health departments. Therefore, much of the work is at that level. The state, county, and city health departments and their private-sector partners work to promote health, protect against illness and injury, and render public health services to all people in Missouri.

A table of all reported notifiable diseases is located **here**. Where spatial analysis and use of Geographic Information Systems (GIS) was useful, maps have been provided to depict the data. Hyperlinks to additional information are included throughout the document.

We hope that you find this report informative and useful.

Harvey L. Marx, Jr.
Chief, Bureau of Communicable Disease Control and Prevention

"Without health there is no happiness. An attention to health, then, should take the place of every other object. — Thomas Jefferson, 1787

We invite your questions and comments on this report, "Communicable Disease Surveillance 2007 Annual Report".

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Executive Summary

A number of communicable diseases are reportable in the State of Missouri because of the potential for significant impact on the public's health. It is the job of local and state public health, in conjunction with our many partners (not limited to health care providers, laboratorians, school officials, child care givers, and elected officials) to put forth our best effort to control disease within the Show-Me State, and sometimes even beyond its borders. In 2007, Missouri's public health responded to more than 42,000* cases of communicable conditions reported to the Department of Health and Senior Services (DHSS) and Local Public Health Agencies (LPHAs). In 2007, international distribution of foods, enhanced awareness of certain diseases globally, along with many other factors contributed to communicable disease morbidity.

The Missouri State Public Health Laboratory (SPHL) completed the monumental task of moving all equipment and offices to a new building in July of 2007. The relocation process did not interfere with the SPHL's ability to provide diagnostic and analytical testing services. In 2007, between the main laboratory in Jefferson City (both old and new homes), and the two branch laboratories in Mount Vernon and Poplar Bluff, SPHL scientists performed 3,028,384 analyses in support of many diverse public health programs and also conducted specialized procedures as a reference laboratory. Not unlike some of the scenarios presented on the popular television series, "CSI", the work at SPHL often contributes to investigations that have serious and far-reaching implications. SPHL identified 22 salmonellosis cases that were part of a multi -state outbreak associated with the consumption of a commercially-produced frozen food product. By performing pulse field gel electoresis (PFGE) studies on stool specimens from salmonellosis patients, SPHL laboratorians were able to determine that the bacteria's "DNA fingerprint" in the Missouri cases was indistinguishable from the outbreak strain (known as *Salmonella I 4,5,12:i:-*).

In addition to the specialized work going on at SPHL, the 2007 salmonella outbreak kept LPHA disease investigators busy. A great deal of time was devoted to interviewing the Missouri cases to collect epidemiological information as part of a larger study conducted by the Centers for Disease Control and Prevention (CDC). Ultimately, through the hard work of many Missouri public health specialists, a brand of frozen pot pies was successfully identified as the likely exposure source.

Many other infectious disease outbreaks demanded the use of Missouri's public health resources. Noroviruses caused numerous outbreaks in settings such as nursing homes, schools and child care centers. The greater St. Louis area endured a region-wide shigellosis outbreak associated with child care facilities for the second year in a row. Additionally, an outbreak of Enterovirus in an Eastern Missouri community required a complex and labor-intensive response from local and state public health officials as they investigated the source and provided information to the concerned public.

* The figure "more than 42,000" refers to all reportable communicable diseases that are monitored by the Bureau of Communicable Disease Control and Prevention. This does not include sexually transmitted diseases, HIV/AIDS, Hepatitis B (acute and chronic), Hepatitis C (acute and chronic) and conditions that are not infectious. Separate reports are available from DHSS for these diseases/conditions.

Executive Summary

Illnesses spread from fecally-contaminated sources often create a lot of work for public health officials in Missouri, even when the actual number of cases does not exceed the outbreak threshold. For example, incidence of both *E. coli* O157:H7 and Hemolytic Uremic Syndrome remained above the nationally reported rates for 2007 and exceeded the five-year median (Missouri). Cryptosporidiosis incidence also remained at an elevated level in 2007 when compared to previous years. Although no outbreaks of this disease were reported, many cases had exposure to recreational water sources and thus required extensive investigation and significant effort to prevent additional cases in public swimming pools and water parks. Efforts to curb disease in 2008 include the development of an alert system to notify recreational water workers of cryptosporidiosis outbreaks in their areas.

Warmer weather not only draws many Missourians (as well as visitors to the Show Me state) to recreational water, but also increased participation in other outdoor activities such as hiking, camping and yard work. With exposure to grasses and other types of vegetation comes an increased risk for tick bites, and the possibility of contracting a tick-borne illness. The 2007 state-wide incidence of tularemia, a disease already known to be endemic in Missouri, was significantly higher than the national average over the past five years. Ehrlichiosis and Rocky Mountain Spotted Fever (RMSF) case reports skyrocketed in 2007 to 222 and 315, respectively (with rates per 100,000 population exceeding previous years for both diseases). Tragically, ehrlichiosis claimed the lives of two previously healthy children last year. The premature death of these young Missourians, along with increased disease incidence, emphasizes the need to continue to promote awareness of tick-borne illness among the public and the health care community.

Bites from animals other than arthropods also increase with the onset of spring, and subsequent public health investigations often indicate that testing for rabies is prudent. In 2007, over 3000 wild or domestic animals were tested for rabies at SPHL. Although the 38 positive test results (and corresponding 1.3% positivity rate) is a lower count than the figures reported in 2006 (66 and 2.5%, respectively) and the five-year median, the decrease is most likely due to normal fluctuations in rabies prevalence in reservoir animal populations. In short, the rabies virus is endemic in several species of wild animals in Missouri (including skunks and bats), and public health specialists need to remain vigilant in both surveillance and control efforts.

Tuberculosis surveillance in 2007 led to the reporting of over 100 actively infectious cases and almost 4,000 latent infections in the State of Missouri (representing a slight increase from 2006). Investigations for infected close contacts of active tuberculosis cases were conducted in several diverse settings, including a factory, an elementary school, and a college campus. In an effort to improve tuberculosis surveillance among college students, Missouri's Tuberculosis Control Program staff provided training to representatives from many universities and colleges on developing their own tuberculosis screening programs. Tuberculosis testing is not required for a student visa. The threat posed by multi-drug resistant forms of tuberculosis is genuine; public health officials and their partners must continue the fight to control the spread of this disease in Missouri, the United States, and worldwide.

Executive Summary

Another reportable respiratory illness of significance, seasonal influenza, kept state and local public health workers busy, as in previous years. The number of influenza cases reported in 2007 (30,978) exceeded annual counts reported over the past two decades, and the number of reported outbreaks in schools and nursing homes was also higher when compared to previous years (which is partly due to wide availability of rapid testing to health care providers). Influenza continues to be a major contributor to morbidity and mortality, and imposes a large economic burden on Missouri every year.

An emerging bug presented a new challenge to public health in 2007: Methicillin-Resistant Staphylococcus Aureus (MRSA). Concerns about MRSA from the public (expressed on a national level) prompted the Missouri Department of Health and Senior Services (under the direction of the Governor) to launch a state-wide campaign to provide basic, useful information about the bacteria. This effort included the development of a website with information about the conditions caused by staphylococcal organisms in general, how transmission occurs and how to prevent and treat infection in schools, child care centers, and in the general community.

Another reportable disease that necessitated a lot of emphasis on education last year is Hepatitis C. As reported, chronic Hepatitis C incidence in Missouri has continued to increase over the past six years. Public health officials have focused their efforts on: encouraging health care practitioners to test patients with risk factors for Hepatitis C; providing education on preventing transmission of the disease; and providing information about treatment options and on lifestyle choices that promote liver health (for those who are infected).

State and local public health officials in Missouri continued work on maintaining and enhancing emergency preparedness and response capabilities throughout 2007. Several drills (statewide and local) designed to exercise the emergency response system were conducted in 2007, with scenarios ranging from Katrina-like events that would involve mass casualties and large-scale evacuation (such as an earthquake along the New Madrid fault) to infectious disease outbreaks (like a pandemic influenza). Surveillance for outbreaks and other public health events continues with the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) with an increased number of users trained to use the system in 2007. Additionally, as part of their regular practice, disease investigators promptly and thoroughly investigated cases of illness classified as potential bioterrorism agents, even if the disease occurs naturally in this part of the country (like tularemia).

The following report provides a summary of Missouri's experience with reportable, communicable diseases in 2007. The reader who is interested in "just the facts" will find that he or she can quickly glean from the data tables a sense of what happened in the past year from a general perspective. For those who would like more detailed information, please check out the disease narratives to learn more about several conditions of public health significance. We would like to thank the 114 local public health agencies in Missouri, and all others who worked hard to collect the information presented in this report. We hope that you find this report informative, interesting and, above all, useful.

Executive Summary

Disease Outbreaks

The BCDCP maintains a database and provides on-site and technical assistance to the LPHA's on reported outbreaks. We review outbreaks for lessons learned and any new information on disease reservoirs, modes of transmission, control strategies and provide data to CDC for national analysis.

Diseases and Conditions	Number of Outbreaks	Diseases and Conditions	Number of Outbreaks
Gastrointestinal		**Vaccine Preventable**	
Acute Gastrointestinal Illness - etiology unknown	27	Chickenpox	16
Acute Gastrointestinal Illness and Acute Respiratory Illness	1	Pertussis	2
Acute Gastrointestinal Illness and Shigellosis	1	**Total**	**18**
Campylobacteriosis	1		
Ciguatoxin	1	**Respiratory**	
Clostridium difficile	2	Acute Respiratory Illness	2
Cryptosporidiosis	2	Influenza and Influenza-like Illness	2
E. coli O157:H7	1	**Total**	**4**
Giardiasis	1		
Norovirus	13	**Other**	
Salmonellosis	2	Enterovirus viral meningitis Echovirus 18	1
Shigellosis	11	Erythema Infectiosum (Fifth Disease)	6
Unknown Causative Agent	1	Hand-foot-and-mouth disease	5
Total	**64**	Methicillin-resistant Staphylococcus aureus	2
		Scabies	8
		Staphylococcus aureus	1
		Total	**23**
	Total Outbreaks	**109**	

Diseases of Note

There are several notable decreasing and increasing disease trends as reflected in the 15 year report.

Decreasing Trends:

- Cryptosporidiosis, with 214 cases reported in 2007, decreased 24% from the 2006 total of 283 cases reported. However, the 2007 total is 174% above the 5-year median of 78. For additional information on cryptosporidiosis, click here.
- Rabies, animal, with 38 cases reported in 2007, decreased 42% from the 66 cases reported in 2006. It has also decreased 36% from the 5-year median of 59 cases. For additional information on rabies, animal, click here.

Increasing Trends and Significant Increases:

- Shigellosis, with 1276 cases reported in 2007, increased 94% from the 658 cases reported in 2006. However, the 2007 total is 259% above the 5-year median of 355 cases. For additional information on shigellosis, click here.
- Tularemia, with 35 cases reported in 2007, increased 150% from 14 cases reported in 2006. However, the 2007 total is only a 30% increase from the 5-year median of 27 cases. For additional information on tularemia, click here.

Section A - Communicable Disease Surveillance

Comparative Statistics, Reported Diseases, Missouri 2007

Reportable Diseases & Conditions entered into the Missouri Health Surveillance Information System (MOHSIS)	Case Count 2007	5-Year First Quartile	5-Year Median	5-Year Third Quartile	% Change from 5-Year Median	Rate per 100,000
Adult Respiratory Distress Syndrome (ARDS)	1	0	0	0	N/A	0
Animal Bites	5,348	4,410	4,533	4,952	18.00%	91.5
Brucellosis	2	1	1	1	100.00%	0
Campylobacteriosis	722	655	686	714	5.20%	12.4
Chlamydia	23,308	18,750	21,319	22,371	9.30%	398.9
Coccidioidomycosis	9	1	1	3	800.00%	0.2
Creutzfeldt-Jakob Disease (CJD)	3	2	2	3	50.00%	0.1
Cryptosporidiosis	214	52	78	246	174.40%	3.7
Dengue Fever	5	0	0	1	N/A	0.1
E Coli Shiga Toxin Positive	72	21	23	26	213.00%	1.2
E. Coli (All)	152	98	105	124	44.80%	2.6
E. Coli O157 H7	80	75	84	90	-4.80%	1.4
Ehrlichiosis (All)	222	54	69	70	221.70%	3.8
Encephalitis Primary	1	0	0	2	N/A	0
Giardiasis	515	514	522	548	-1.30%	8.8
Gonorrhea	9,876	8,952	9,218	9,455	7.10%	169
HIV Disease	575	425	467	516	23.10%	9.8
Haemophilus Influenzae, Invasive	42	37	39	42	7.70%	0.7
Hansen's Disease (Leprosy)	2	0	0	1	N/A	0
Hemolytic Uremic Syndrome	9	4	8	8	12.50%	0.2
Hepatitis A Acute	24	34	45	60	-46.70%	0.4
Hepatitis B Acute	40	119	159	186	-74.80%	0.7
Hepatitis B Chronic Infection	343	95	175	341	96.00%	5.9
Hepatitis C Acute	5	18	38	256	-86.80%	0.1
Hepatitis C, Chronic Infection	4,463	2,774	3,146	3,811	41.90%	76.4
Hepatitis D Acute	1	0	1	2	100.00%	0
Influenza***	30,978	10,860	12,991	14,845	138.50%	530.2
Legionellosis	50	22	31	34	61.30%	0.9
Listeriosis	6	6	8	10	-25.00%	0.1
Lyme	10	17	26	41	-61.50%	0.2
Malaria	8	6	16	18	-50.00%	0.1
Meningococcal Disease	18	20	28	47	-35.70%	0.3
Mumps	12	4	4	5	200.00%	0.2
Pertussis	118	208	308	595	-61.70%	2
Q Fever	12	3	3	11	300.00%	0.2
Rabies Animal	38	50	59	66	-35.60%	N/A
Rabies Post Exposure Prophylasis**	159		13		1123%	2.7
Rocky Mountain Spotted Fever	315	96	106	128	197.20%	5.4
Salmonellosis	764	766	801	811	-4.60%	13.1
Shiga Toxin + (Non E. Coli - Unknown Organism)**	9		9		0.00%	0.2
Shigellosis	1,276	214	355	658	259.40%	21.8
Staph Aureus VISA**	3		1		200.00%	0.1
Strep Disease, Group A Invasive	91	62	74	81	23.00%	1.6
Strep Pneumoniae, Drug-Resistant	65	16	20	37	225.00%	1.1
Strep Pneumoniae, lt 5 Years, Invasive	29	11	13	16	123.10%	0.5
Syphilis, Primary and Secondary	239	61	94	147	154.30%	4.1
Tetanus	3	0	0	2	N/A	0.1
Toxic Shock (Staph) Syndrome	3	3	4	5	-25.00%	0.1
Toxic Shock (Strep) Syndrome	1	1	2	3	-50.00%	0
Tuberculosis	118	108	127	129	-7.10%	2
Tularemia	35	16	27	28	29.60%	0.6
Typhoid Fever	3	1	2	2	50.00%	0.1
Varicella (Chickenpox) Death Resulted	1	1	1	2	0.00%	0
Varicella (Chickenpox)**	944		1,431		-34.00%	16.2
West Nile Fever and Viral Encephalitis-Meningitis	77	36	63	70	22.20%	1.3
Yersiniosis	4	10	11	15	-63.60%	0.1

**Not a reportable disease in at least 3 of the last 5-years. The count mean of the years reported is used in this situation if available.
***Influenza is reported based on the Influenza Season Year. 2007 includes Weeks 40 to 52 of 2007 and Weeks 1 to 20 of 2008.

Section A - Communicable Disease Surveillance

Cryptosporidiosis

Click to view maps

Cryptosporidiosis is a diarrheal disease caused by a microscopic parasite. Both the disease and the parasite are commonly known as "Crypto".

Crypto lives in the intestine of infected humans or animals. An infected person or animal sheds Cryptosporidium parasites in the stool. Crypto may be found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. People become infected after accidentally swallowing the parasite. The most common symptom of cryptosporidiosis is watery diarrhea. Other symptoms include stomach cramps or pain, dehydration, nausea, vomiting, fever, and weight loss. Some individuals with Crypto will have no symptoms at all. While the disease is typically mild, people with weakened immune systems may develop serious, chronic, and sometimes fatal illness.

Table 1. Cryptosporidiosis—Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		214	100.0%	3.7	78	174.4%
Sex	Female	110	51.4%	3.7	41	168.3%
	Male	104	48.6%	3.6	37	181.1%
Race	Black	10	4.7%	1.4	2	400.0%
	Other	2	0.9%	1.6	1	100.0%
	Unknown	55	25.7%	N/A	32	71.9%
	White	147	68.7%	2.9	43	241.9%
Age Group	00 to <01	4	1.9%	4.9	2	100.0%
	01 to 04	43	20.1%	14.1	15	186.7%
	05 to 14	45	21.0%	5.8	21	114.3%
	15 to 24	19	8.9%	2.3	8	137.5%
	25 to 39	39	18.2%	3.4	11	254.5%
	40 to 64	48	22.4%	2.5	20	140.0%
	65 plus	15	7.0%	1.9	8	87.5%
	Unknown	1	0.5%	N/A	0	N/A
District	Central	8	3.7%	1.2	6	33.3%
	Eastern	55	25.7%	2.5	12	358.3%
	Northwest	59	27.6%	3.9	23	156.5%
	Southeast	15	7.0%	3.2	4	275.0%
	Southwest	77	36.0%	7.8	36	113.9%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

Although this parasite can be transmitted in several different ways, water is a common method of transmission and Cryptosporidium is one of the most frequent causes of waterborne disease (drinking water and recreational water) among humans in the United States. Unlike bacterial pathogens, Cryptosporidium cysts are resistant to chlorine disinfection and can survive for days in treated recreational water venues. The popularity of recreational water venues, the number and geographic distribution of recent cryptosporidiosis outbreaks, and the resistance of Cryptosporidium to chlorination prompted more stringent recommendations from CDC on treatment strategies for recreational water facilities.

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Statewide in 2007, there were 214 cases of cryptosporidiosis reported. This is a 174% increase when compared to the 5-year median (2002-2006). The overall incidence rate was 3.7 per 100,000. There was a slight drop in the incidence rates from 2006 to 2007, however the rate is still above the national trend.

During 2007, no large outbreaks occurred in the state. However, many of the reported cases were attributed to recreational waters. Nationally, there appears to be a steady upward trend in the number of cases as well. Because of the growing concern, a new alert system is being put into place during 2008 to help make aquatic operators aware of outbreaks in their areas. CDC is collaborating with the National Swimming Pool Foundation (NSPF) to set up a Crypto outbreak alert system for the aquatics sector. Making these facilities aware of possible outbreaks will allow them to implement enhanced control measures.

Along with national alert systems, public education should be fostered among communities during months of peak recreational water use. Healthy swimming behaviors are needed to protect you and your kids from Recreational Water Illnesses **(**RWIs) and will help stop germs from getting in the pool in the first place. CDC and DHSS would like all swimmers to abide by the six "**PLEAs**" that promote Healthy Swimming[1]:

Please don't swim when you have diarrhea. You can spread germs in the water and make other people sick. This is especially important for kids in diapers.

Please don't swallow the pool water. In fact, avoid getting water in your mouth.

Please practice good hygiene. Take a shower before swimming and wash your hands after using the toilet or changing diapers. Germs on your body end up in the water.

Please take your kids on bathroom breaks or check diapers often. Waiting to hear "I have to go" may mean that it's too late.

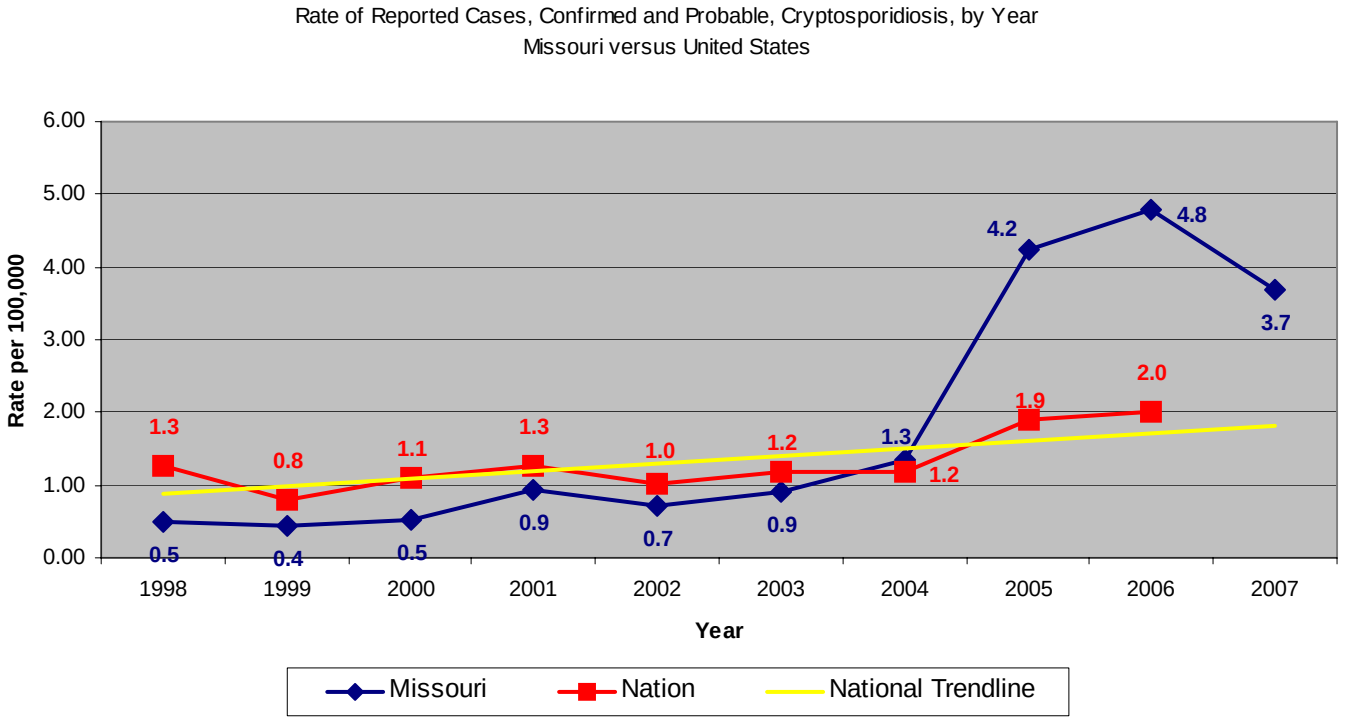
Please change diapers in a bathroom or a diaper-changing area and not at poolside. Germs can spread to surfaces and objects in and around the pool and cause illness.

Please wash your child thoroughly (especially the rear end) with soap and water before swimming. Everyone has invisible amounts of fecal matter on their bottoms that ends up in the pool.

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Comparison to National Data: The annual rate of reported cryptosporidiosis in Missouri has shown a steady increase for the past four years beginning in 2004. For each of these years, Missouri has surpassed the national rate. Nationally there appears to be a steady upward trend in the number of cases as well.



[1]Centers for Disease Control and Prevention, Division of Parasitic Diseases, National Center for Zoonotic, Vector-borne, and Enteric Diseases; Six "PLEAs" For Healthy Swimming: Protection Against Recreational Water Illnesses (RWIs).

Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Ehrlichiosis (All) and anaplasmosis

Ehrlichiosis and anaplasmosis are tick-borne illnesses that typically begin with a sudden fever, chills, and a severe headache. Many people with these illnesses also feel tired and experience weakness and muscle aches. Up to a third of ehrlichiosis patients will develop a rash, but this symptom is more common in children.

These two diseases can be difficult to recognize because the early symptoms are similar to other illnesses, such as influenza or a sinus infection. In addition to a sudden flu-like illness, many patients will also have a low white blood cell count, low platelet count, and higher levels of liver enzymes. Clues such as recent tick exposure, exposure to tick-infested habitats when ticks are seeking hosts, or a similar illness in family members, coworkers, or pet dogs should increase a physician's suspicion of ehrlichiosis or anaplasmosis.

Table 1. —Compartative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		222	100.00%	3.8	69	221.70%
Sex	Female	70	31.50%	2.3	27	159.30%
	Male	152	68.50%	5.3	38	300.00%
Race	Black	5	2.30%	0.7	0	N/A
	Unknown	29	13.10%	N/A	27	7.40%
	White	188	84.70%	3.7	40	370.00%
Age Group	00 to <01	0	0.00%	0	0	N/A
	01 to 04	3	1.40%	1	0	N/A
	05 to 14	13	5.90%	1.7	2	550.00%
	15 to 24	15	6.80%	1.8	3	400.00%
	25 to 39	18	8.10%	1.6	7	157.10%
	40 to 64	96	43.20%	5	34	182.40%
	65 plus	77	34.70%	9.9	20	285.00%
District	Central	51	23.00%	8	15	240.00%
	Eastern	52	23.40%	2.3	9	477.80%
	Northwest	26	11.70%	1.7	16	62.50%
	Southeast	25	11.30%	5.4	2	1150%
	Southwest	68	30.60%	6.9	15	353.30%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

Statewide in 2007, Missouri recorded 222 cases of ehrlichiosis and anaplasmosis, which is a 221.7% increase in the number of cases compared with the 2002-2006 five-year median. The incidence rate for the year was 3.8 cases per 100,000 population, more than twice the incidence rate for 2006 and a dramatic increase over the five-year median incidence rate of 1.1 per 100,000.

The incidence of ehrlichiosis and anaplasmosis in men was over twice that of women in 2007, with 5.3 cases of reported illness per 100,000 population of men compared with an incidence in women of 2.3 cases per 100,000. This difference is not well understood, but may be due to men having greater exposure to infected ticks through occupational and recreational activities.

Section A - Communicable Disease Surveillance

Ehrlichiosis (All) and anaplasmosis - Continued

Individuals age 40 and older accounted for over 75% of all reported ehrlichiosis and anaplasmosis cases in Missouri for 2007. Epidemiologists predict the likelihood of increases in the incidence of severe ehrlichiosis disease and ehrlichiosis fatalities over the next 25 years. Subpopulations expected to be more susceptible to severe infection include aging baby-boomers as well as an increasing number of people receiving immunosuppressive therapies or suffering from conditions that weaken the immune system.

The Southeast District saw considerable growth in ehrlichiosis and anaplasmosis case reports, increasing 1150% over that area's five-year median. Reports from Eastern and Southwest District also rose over their five-year medians by 477.8% and 353.3% respectively. Some of the increase in ehrlichiosis and anaplasmosis cases is likely the result of increased recognition and reporting by physicians and laboratories. However, ticks and humans are increasingly in contact, as people inhabit new environments and spend time outdoors for work or pleasure. In addition, changes in wildlife habitat and human land use can favor tick reproduction and increase their range, density, and likelihood of human interaction.

In 2007, five Missouri residents died from ehrlichiosis and anaplasmosis. Two pediatric patients died within 10 days of their first medical care visit. Two of the adult fatalities were individuals under immune-suppressing cancer and leukemia therapies, and the fifth patient had a preexisting heart condition.

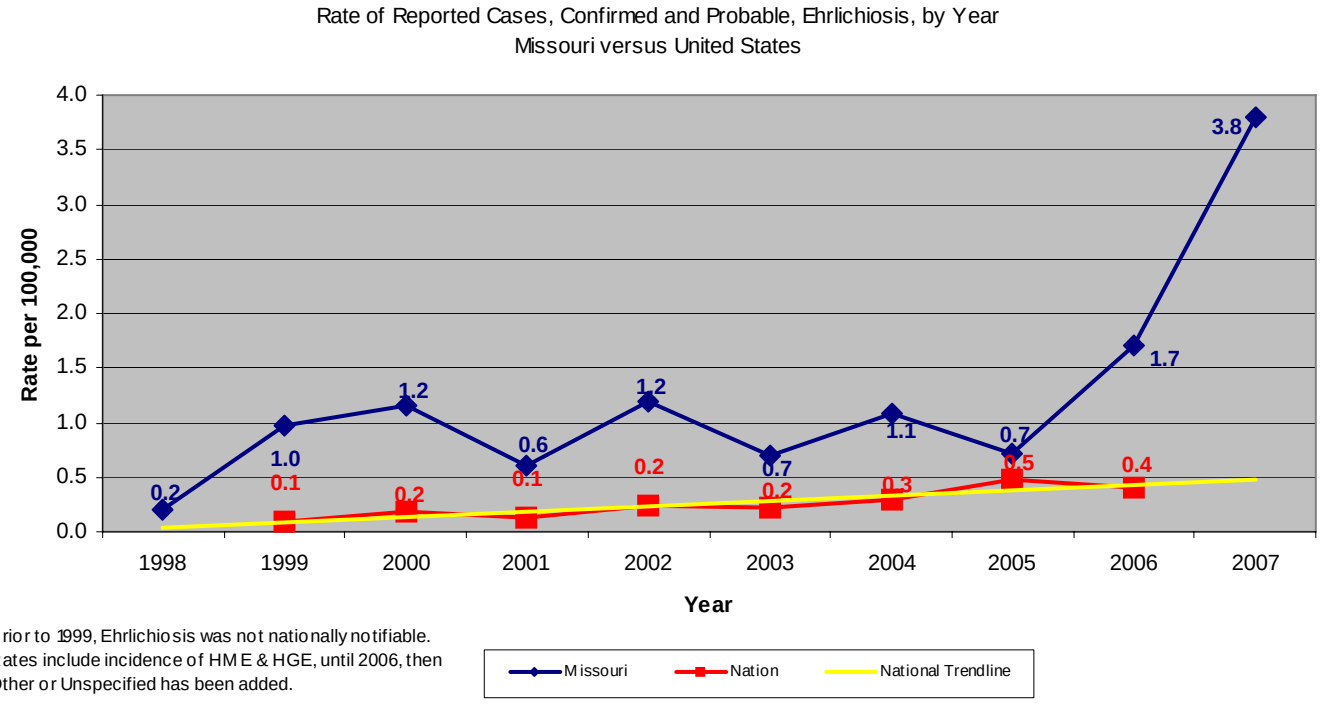
Comparison with National Data: While national and Missouri rates fluctuate from year to year, Missouri's rates of ehrlichiosis have been consistently higher than national rates since 1998. The peaks and valleys of the ehrlichiosis rates may be due in part to environmental factors. In years of plentiful wildlife food production, animal host populations may increase in numbers, fostering tick population increases as well. In turn, an abundance of ticks increases the opportunity of human exposure to pathogens that are carried by ticks.

Under Missouri law, physicians and laboratories are required to report suspected cases of ehrlichiosis and anaplasmosis to state or local health officials. Information obtained by health departments in the investigation of these illnesses is critical for targeting public health education and disease prevention efforts.

Section A - Communicable Disease Surveillance

Ehrlichiosis (All) and anaplasmosis - Continued

Aside from accounts from the public of increased encounters with ticks, the epidemiological and ecological factors that caused the 2007 increase in Missouri in ehrlichiosis and anaplasmosis disease reports are not well understood. People should protect themselves from tick bites by avoiding areas with lots of ticks, keeping ticks off the skin through repellent use and protective clothing, and by performing tick checks. Increased attention to tick bite prevention is strongly recommended for people who appear to be at higher risk for ehrlichiosis disease – men, people with compromised immune systems, and people over age 40.



Prior to 1999, Ehrlichiosis was not nationally notifiable.
Rates include incidence of HME & HGE, until 2006, then Other or Unspecified has been added.

Additional Website Resources
CDC Health Topics | CDIRM | Health Region Defined

Table of Contents | Next Page | Previous Page

Section A - Communicable Disease Surveillance

Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS)

Escherichia coli (abbreviated as *E. coli*) are a large and diverse group of bacteria. They mostly live in the intestinal tracts of mammals. Generally, they do not cause disease. However, some of them can produce illness in humans. The *E. coli* bacteria that makes "Shiga toxin", or STEC for short, might also be referred to as verocytotoxic *E. coli* (VTEC) or enterohemorrhagic *E. coli*, (EHEC). These all refer generally to the same group of bacteria. The primary source of STEC is the intestinal tract of cattle, but it has also been isolated from deer, horses, pigs, dogs and, of course, humans. [1] They can cause illnesses ranging from mild diarrhea to severe, bloody diarrhea to Hemolytic Uremic Syndrome (HUS), the most common cause of acute renal (or kidney) failure in children.

Table 1. ***Escherichia coli* (*E. coli*)** - Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		152	100.0%	2.6	105	44.8%
Sex	Female	80	52.6%	2.7	58	37.9%
	Male	72	47.4%	2.5	47	53.2%
Race	Black	6	3.9%	0.9	3	100.0%
	Other	4	2.6%	3.1	0	N/A
	Unknown	37	24.3%	N/A	47	-21.3%
	White	105	69.1%	2.1	62	69.4%
Age Group	00 to <01	6	3.9%	7.4	3	100.0%
	01 to 04	39	25.7%	12.8	23	69.6%
	05 to 14	29	19.1%	3.7	27	7.4%
	15 to 24	21	13.8%	2.5	15	40.0%
	25 to 39	22	14.5%	1.9	11	100.0%
	40 to 64	21	13.8%	1.1	18	16.7%
	65 plus	13	8.6%	1.7	8	62.5%
	Unknown	1	0.7%	N/A	0	N/A
District	Central	16	10.5%	2.5	13	23.1%
	Eastern	55	36.2%	2.5	51	7.8%
	Northwest	31	20.4%	2	20	55.0%
	Southeast	14	9.2%	3	6	133.3%
	Southwest	36	23.7%	3.6	19	89.5%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.

The identification system that was developed to help keep track of the many different *E. coli* serotypes uses two different antigens. The "O" in O157 stands for a specific antigen found on the outer surface of the bacteria. There are over 170 different O antigens identified. The "H" is an antigen found on the flagellae of the bacteria. The flagellae are snake-like appendages that the bacteria use to move through liquid environments. Currently, a total of 54 H antigens have been identified for *E. coli*. *E. coli* O157:H7 is the most common STEC and is responsible for over 90% of the diarrhea-associated HUS cases. However, several other STEC serotypes have been identified in the United States including O26, O111, O103, O45, and O121. [2]

E coli O157:H7 was first recognized as a pathogen when it was identified as being responsible for an outbreak of illness associated with consumption of undercooked hamburger from fast food restaurants in Washington state in 1982. Since that time, a number of outbreaks have been linked not only to undercooked meat, but also to fruit juice, sprouts, and most recently, pre-packaged salad greens. In 1999, CDC estimated that 73,000 people in the United States got sick each year from STEC. [3] With better Public Health education, the number of cases have been reduced. In 2006, there were 4,432 cases of STEC reported to CDC. [4]

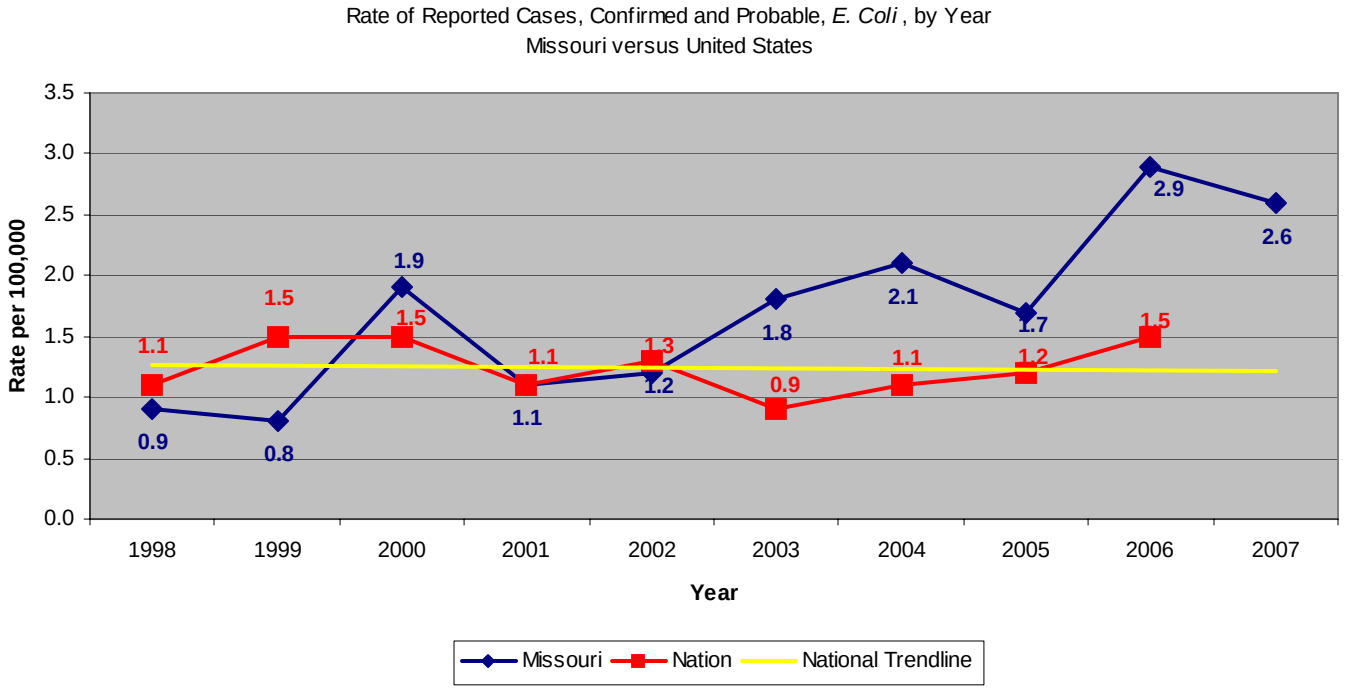
Section A - Communicable Disease Surveillance

Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS) - Continued

The first outbreak of *E coli* O157:H7 associated with public drinking water occurred in Cabool, MO in December 1990 – January 1991. It caused at least 243 cases of illness, including 86 cases of bloody diarrhea, two cases of HUS, and four deaths. [5] Recently in Missouri, we have seen a number of cases that may be related to drinking unpasteurized milk. Raw milk is a particularly hazardous food and has been linked to several STEC outbreaks. Additionally, raw milk is a potential source for *Listeria*, *Brucella*, *Campylobacter*, *Salmonella*, and other pathogenic organisms.

In the past several years, changes in laboratory practices as well as changes in surveillance case definitions, have made comparing the yearly occurrence of disease caused by STEC difficult. Table 1 on page 18 illustrates the number of cases of STEC, both culture confirmed and identified by serological evidence of the ability to produce toxin.

Comparison to National Data: While the incidence of STEC nationwide has been essentially stable over the past 10 years, in Missouri, we have seen a steady increase in reported cases, especially during the past five years. Whether this represents an actual increase in the incidence of disease or is a reflection of increased awareness and better diagnostics is unknown.



Section A - Communicable Disease Surveillance

Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS) - Continued

The key to reducing this disease lies in better public health education. Following are some guidelines to help reduce the occurrence of disease caused by STEC.[3]

- Cook ground beef to 160° F. Test the meat by putting a food thermometer in the thickest part of the meat. Wash the meat thermometer after use. Do not eat ground beef that is still pink in the middle. If a restaurant serves you an under – cooked hamburger, send it back for more cooking. Ask for a new bun and a clean plate, too.
- Never put cooked hamburgers or meat on the plate they were on before cooking.
- Drink only pasteurized milk, juice, or cider. Frozen juice or juice sold in boxes and glass jars at room temperature has been pasteurized, although it may not say so on the label.
- Drink water from safe sources like municipal water that has been treated with chlorine, wells that have been tested, or bottled water.
- Don't spread bacteria in your kitchen. Keep raw meat away from other foods. Wash your hands, cutting board, counter, dishes, and knives and forks with hot soapy water after they touch raw meat, spinach, greens, or sprouts.
- Do not swallow lake or pool water while you are swimming.
- Wash hands thoroughly after contact with animals. This is especially important for children in such environments as farms or petting zoos.
- During an outbreak: Carefully follow instructions provided by public health officials on what foods to avoid in order to protect yourself and your family from infection.

HUS is more serious and also much less common than the diarrheal illnesses caused by STEC. HUS is the most common cause of kidney failure in children and is characterized by the triad of microangiopathic hemolytic anemia, thrombocytopenia, and acute renal failure. While it can be associated with a number of bacteria or even viruses, it usually follows diarrheal illness caused by STEC, and may result in permanent kidney damage or even death. Approximately 8-10% of cases with bloody diarrhea due to STEC will develop HUS. It strikes children more often than adults and is seasonal, occurring more often during the summer or fall. Use of an antimotility medication, such as Loperamide (Imodium®) or antibiotics may increase the risk of HUS, especially in children.[6]

Section A - Communicable Disease Surveillance

Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS) - Continued

Table 2 illustrates the occurrence of HUS in Missouri in 2007, as compared with the 5 year median.

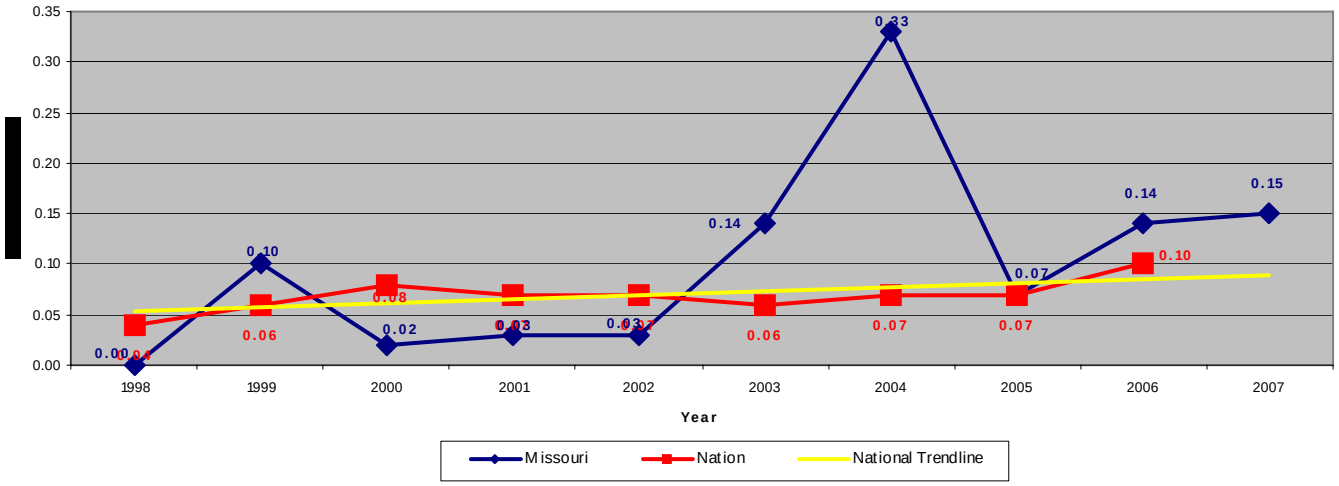
The chart below compares the historical diagnosis of HUS in Missouri and Nationally for 1998 – 2007. The spike in Missouri's rate during 2004 was due in part to an outbreak in the Southwestern portion of the state.

Table 2. Hemolytic Uremic Syndrome (HUS) - Comparative Statistics,

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		9	100.0%	0.2	8	12.5%
Sex	Female	6	66.7%	0.2	5	20.0%
	Male	3	33.3%	0.1	2	50.0%
Race	Black	1	11.1%	0.1	0	N/A
	Other	1	11.1%	0.8	0	N/A
	White	7	77.8%	0.1	7	0.0%
Age Group	00 to <01	0	0.0%	0	0	N/A
	01 to 04	5	55.6%	1.6	3	66.7%
	05 to 14	2	22.2%	0.3	3	-33.3%
	15 to 24	0	0.0%	0	0	N/A
	25 to 39	0	0.0%	0	0	N/A
	40 to 64	1	11.1%	0.1	0	N/A
	65 plus	1	11.1%	0.1	0	N/A
District	Central	1	11.1%	0.2	2	-50.0%
	Eastern	2	22.2%	0.1	0	N/A
	Northwest	2	22.2%	0.1	1	100.0%
	Southeast	2	22.2%	0.4	0	N/A
	Southwest	2	22.2%	0.2	3	-33.3%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.

Rate of Reported Cases, Confirmed and Probable, Hemolytic Uremic Syndrome, by Year
Missouri versus United States



Section A - Communicable Disease Surveillance

Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS) - Continued

References:

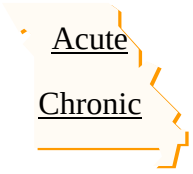
1. Christopher W.Olsen "*E. coli* O157:H7 and *Salmonella typhimurium* DT104: the role of animals". ZOONOTIC DISEASES TUTORIAL http://www.vetmed.wisc.edu/pbs/zoonoses/O157DT104/O157DT104index.html (May 2008)
2. Bos, John. Missouri. DHSS, BCDC. "What the EHEC… VTEC… STEC???". Infection Connection. 12, May/June 2008: 3.
3. Centers for Disease Control and Prevention. "Questions & Answers: Sickness caused by E. coli" http://www.cdc.gov/ecoli/qa_ecoli_sickness.htm (May 2008)
1. Centers for Disease Control and Prevention. "Summaries of Notifiable Diseases in the United States, 2006". MMWR 2007;56:21.
2. Swerdlow, D.L. *et al*. (1992). A waterborne outbreak in Missouri of *Escherichia coli* 0157:H7 associated with bloody diarrhea and death. *Ann. Intern. Med.*, 117(10), 812–819.
3. Shapiro, William. "Hemolytic Uremic Syndrome" eMedicine Journal, January 11 2007, V 8, N 1. http://author.emedicine.com/EMERG/topic238.htm (May, 2008)

Additional Website Resources
CDC Health Topics | CDIRM | Health Region Defined

Table of Contents | Next Page | Previous Page

Section A - Communicable Disease Surveillance

Hepatitis C Acute/Chronic



Hepatitis C is a liver disease caused by the hepatitis C virus (HCV). HCV infection sometimes results in an acute illness, but most often becomes a chronic condition that can lead to cirrhosis of the liver and liver cancer. Percutaneous exposure to blood or blood products of an infected person is the primary route of transmission. Exposure to the hepatitis C virus often occurs through the sharing of contaminated needles during injection drug use. There is also a small risk of transmission of hepatitis C through sexual contact with an infected person, and transmission from an infected mother to her child during the birthing process. There is no vaccine for hepatitis C.

Table 1. - Compartative Statistics, by Socio-demographic Category, Missouri[1]

Hepatitis C, acute		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year median
State of Missorui		5	100.00%	0.1	38	-86.80%
Sex	Female	3	60.00%	0.1	21	-85.70%
	Male	2	40.00%	0.1	17	-88.20%
Race	Black	1	20.00%	0.1	1	0.00%
	White	4	80.00%	0.1	26	-84.60%
Age Group	00 to <01	0	0.00%	0	0	N/A
	01 to 04	0	0.00%	0	0	N/A
	05 to 14	0	0.00%	0	0	N/A
	15 to 24	1	20.00%	0.1	13	-92.30%
	25 to 39	2	40.00%	0.2	10	-80.00%
	40 to 64	2	40.00%	0.1	14	-85.70%
	65 plus	0	0.00%	0	1	-100.00%
District	Central	0	0.00%	0	3	-100.00%
	Eastern	1	20.00%	0	3	-66.70%
	Northwest	3	60.00%	0.2	14	-78.60%
	Southeast	1	20.00%	0.2	1	0.00%
	Southwest	0	0.00%	0	20	-100.00%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

Hepatitis is an inflammation of the liver. HCV is a contagious liver disease caused by an infection with a virus of the genus Hepacavirus of the Flaviviridae family. Hepatitis C can range in severity from a mild illness (symptoms such as fatigue, decreased appetite, weakness, muscle and joint aches, and skin rash) lasting a few weeks to a serious, lifelong illness (cirrhosis, liver failure or liver cancer). Hepatitis C is usually spread when blood from a person infected with the hepatitis C virus (HCV) enters the body of someone who is not infected. Most people become infected with HCV by sharing needles or other equipment to inject or inhale drugs.

Transmission may have occurred during a blood transfusion with contaminated blood prior to 1992 (when routine screening for HCV was implemented). Transmission may also occur when health care workers, and public service workers are exposed to infected blood during the course of their job. Some medical procedures such as dialysis put people at risk for hepatitis C. Transmission has occurred by receiving a transplanted organ such as a kidney, an eye, heart, or liver from a hepatitis C infected donor. Transmission

Section A - Communicable Disease Surveillance

Hepatitis C Acute/Chronic - Continued

of hepatitis C may occur through tattooing and body piercing. Hepatitis C is less likely to be transmitted from one person to another through sexual activity. Although the risk is low (about 3-5%) hepatitis C infected women may transmit the virus to their baby during birth. Hepatitis C infected mothers may breast -feed their babies, as breast-feeding is not considered a risk for hepatitis C transmission.

Hepatitis C can be either "actute" or "chronic". Acute HCV infection is a short-term illness that occurs within the first six months after someone is exposed to the HCV. For most people, acute infection leads to chronic infection. Chronic hepatitis C is a serious disease that can result in long-term health problems, or even death.

The best way to prevent hepatitis C is by avoiding behaviors that can spread the disease, especially injection drug use. During the past two decades, hepatitis C has become recognized as one of the most common causes of liver disease and liver cancer in people in the United States.

In 2007, there were 4,468 cases of hepatitis C reported in Missouri. Of those reported, five were acute or recent infections, and 4,463 were chronic or long-term infections. Acute hepatitis C infections tend to be overlooked because those newly infected may have no symptoms or minimal symptoms and therefore are not tested or reported. Chronic hepatitis C is more likely to be discovered through routine medical checkups and through evaluation of gastrointestinal pain in advanced liver disease.

Table 2. —Compartative Statistics, by Socio-demographic Category, Missouri[1]

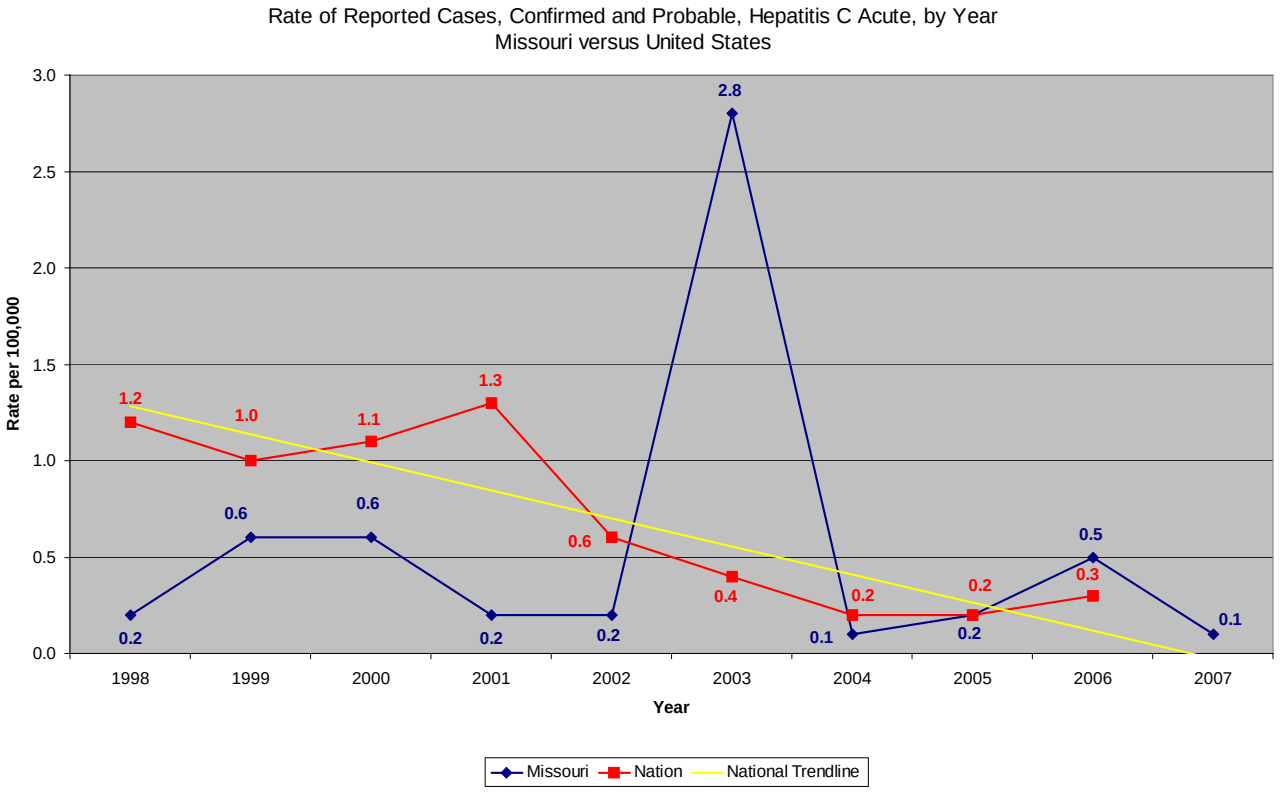
Hepatitis C, chronic		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		4,463	100.00%	76.4	3,146	41.90%
Sex	Female	1,797	40.30%	60.1	1,194	50.50%
	Male	2,666	59.70%	93.4	1,920	38.90%
Race	Black	183	4.10%	26.3	303	-39.60%
	Other	17	0.40%	13.2	9	88.90%
	Unknown	2,813	63.00%	N/A	2,002	40.50%
	White	1,450	32.50%	28.9	807	79.70%
Age Group	00 to <01	12	0.30%	14.8	8	50.00%
	01 to 04	2	0.00%	0.7	2	0.00%
	05 to 14	5	0.10%	0.6	4	25.00%
	15 to 24	231	5.20%	28	117	97.40%
	25 to 39	970	21.70%	84	615	57.70%
	40 to 64	2,999	67.20%	155.8	2,193	36.80%
	65 plus	208	4.70%	26.7	163	27.60%
	Unknown	36	0.80%	N/A	26	38.50%
District	Central	495	11.10%	77.2	158	213.30%
	Eastern	1,217	27.30%	54.7	1,117	9.00%
	Northwest	1,129	25.30%	74.2	829	36.20%
	Southeast	606	13.60%	130.4	284	113.40%
	Southwest	1,016	22.80%	102.5	743	36.70%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

In 2007, chronic hepatitis C reports decreased by 6.3 percent from 2006, but have remained markedly increased as compared to 2002 case reports. The incidence rate for chronic hepatitis C in 2007 was 76.4 per 100,000 population.

Section A - Communicable Disease Surveillance

Hepatitis C Acute/Chronic - Continued



67% of Missouri chronic HCV infections are in the 40 – 64 year old age group. This is probably due in part to blood transfusions or organ transplants prior to 1992. Certainly many are due to recreational drug use that exposed them to HCV, which progressed to chronic HCV later in life. Eastern and Northwest districts had 27% and 25% of the cases respectively. This is probably due in part because the Eastern and Northwest districts represent over 64% of the state population.

Although there was a slight decline in the hepatitis C incidence rates between 2006 and 2007, Missouri continues to experience significant reported cases of this disease. Increased cases may also be attributed to increased testing, increased reporting, as well as increased disease.

Section A - Communicable Disease Surveillance

Hepatitis C Acute/Chronic - Continued

Comparison to National Data: According to national data, CDC estimates that the number of new infections per year has declined from an average of 240,000 in the 1980s to about 19,000 in 2006. This may be attributed to better screening of blood, plasma, tissue, and organ donors. Many transfusion-associated cases occurred prior to blood donor screening. Now, HCV transmission occurs in less than one per two million transfused units of blood. CDC estimates that 4.1 million (1.6%) Americans have been infected with HCV, of whom 3.2 million are chronically infected. The risk for perinatal HCV transmission is about 4%, and if coinfected with HIV, the risk for perinatal infection is about 19%.

The annual rate of reported hepatitis C acute and chronic cases in Missouri has shown marked increases between 2002 and 2006 with only a slight decrease between 2006 and 2007. This decrease may be the result of improved quality assurance procedures which remove duplicate records and confirm HCV cases meet the national case definition.

For those persons who may be at risk of acquiring HCV, early hepatitis C detection is important through appropriate screening tests, and early treatment to help reduce transmission and to hinder progression of liver disease.

Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Influenza

Click to view maps

Influenza is an acute viral disease of the respiratory tract characterized by abrupt onset of fever, often with chills or rigors, headache, malaise, diffuse myalgia, and nonproductive cough. Subsequently, as symptoms progress, sore throat, nasal congestion, rhinitis, and cough become more prominent.

The influenza season is defined as the period between week 40 (usually the first week of October) of one year and week 20 (around mid-May) of the next. The 2007-2008 season began September 29, 2007, and ended May 24, 2008. Statewide, for the 2007-2008 season, there were 30,978 reported cases of confirmed influenza in Missouri, for a rate of 530 cases per 100,000 population.

Table 1: 2007-2008 Influenza Counts and 5-Season Median, by Influenza Type

Influenza Type	2007-2008 Season	% of Total	5-Season Median	% Change from 5-Season Median
Influenza A	17,720	57.2%	7,835	126.20%
Influenza B	5,766	18.6%	1,032	458.70%
Influenza Unknown Or Untyped	7,492	24.2%	3,274	128.80%
Total	30,978	100%	12,991	138.50%

Data Source: Missouri Health Information Surveillance System (MOHSIS)

Table 2: 2007-2008 Influenza Count by Age Group

Age Group	2007-2008 Season	% of Total	5-Season Median	% Change from 5-Year Season Median
<02	3,332	10.8%	1,685	97.70%
02-04	3,631	11.7%	1,657	119.10%
05-14	6,435	20.8%	2,754	133.70%
15-24	4,032	13.0%	1,326	204.10%
25-49	8,076	26.1%	1,970	309.90%
50-64	2,681	8.7%	599	347.60%
65+	2,791	9.0%	1,277	118.60%
Total	30,978	100%	12,991	138.50%

Data Source: Missouri Health Information Surveillance System (MOHSIS)

Influenza A accounted for 57.2% of the cases, which is in keeping with previous years. Usually there are two distinct age groups affected by influenza, those under the age of 15 and those 50 years or above. Approximately 43.3 % of all reported cases were <15 years of age.

Those 50 years or above accounted for 17.7 % of the cases. The age groups of 15-24 and 25-49, accounted for 39.1% of all cases. There were seventeen (17) outbreaks reported during the 2007-2008 season, compared to thirteen (13) reported during the 2006-2007 season.

Influenza affects the health of a large number of people every year. Most people recover within a week, but a cough and tiredness can linger for two weeks or longer. Dehydration, bronchitis, and bacterial pneumonia, are examples of complications from flu. The flu can make chronic health problems worse. For example, people with asthma may experience asthma attacks while they have the flu, and people with chronic congestive heart failure may have worsening of this condition that is triggered by the flu. Children may get sinus problems and ear infections as complications from the flu. Those persons 65 years and older,

Section A - Communicable Disease Surveillance

Influenza - Continued

children under age 2, and person of any age with chronic medical conditions are at highest risk for serious complications of flu. In the United States, influenza and pneumonia combined are among the top 10 leading causes of death. On average, influenza is annually associated with more than 36,000 deaths and more than 200,000 hospitalizations.

Table 3: Influenza Comparative Statistics by Health District, Missouri 2007-2008

District	2007-2008 Season	% of Total	Rate* 2007 2008	5-Season Median	% Change from 5-Season Median
Central	5,361	17.3%	835.7	1,784	200.50%
Eastern	10,069	32.5%	452.6	4,146	142.90%
Northwest	9,034	29.2%	594.1	3,868	133.60%
Southeast	2,126	6.9%	457.6	690	208.10%
Southwest	4,388	14.2%	442.6	2,017	117.60%
State of Missouri	30,978	100%	530.2	12,991	138.50%

*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics
Data Source: Missouri Health Information Surveillance System (MOHSIS)

In Missouri, influenza and pneumonia are attributed to approximately 1,500-3,000 deaths per year. The economic impact of influenza illness is staggering. Studies have shown that during an average influenza season, direct and indirect medical costs in the United States are in the billions of dollars. An influenza vaccine is available and is licensed for use in persons six months of age to adult. The vaccine is effective in preventing disease in persons 18-49 years of age and lessening complications in those 50 and older, and/or with chronic conditions. A case-controlled study performed in Wisconsin demonstrated that even though 2007's influenza vaccine was not a perfect match with the circulating influenza viruses identified in Wisconsin, it provided approximately 58% protection against the Influenza A (H3N2) strain. It provided little protection against the circulating Influenza B strain. Overall the vaccine provided approximately 44% protection.

The number of cases for the 2007-2008 influenza season was higher than the previous four seasons. The number of cases has not been this high since 1975, when 44,367 cases were reported. Improved availability of rapid tests and increased testing by physicians may contribute to the growing number of cases. Laboratory-confirmed cases of influenza are not reportable nationwide so national data are unavailable for comparison.

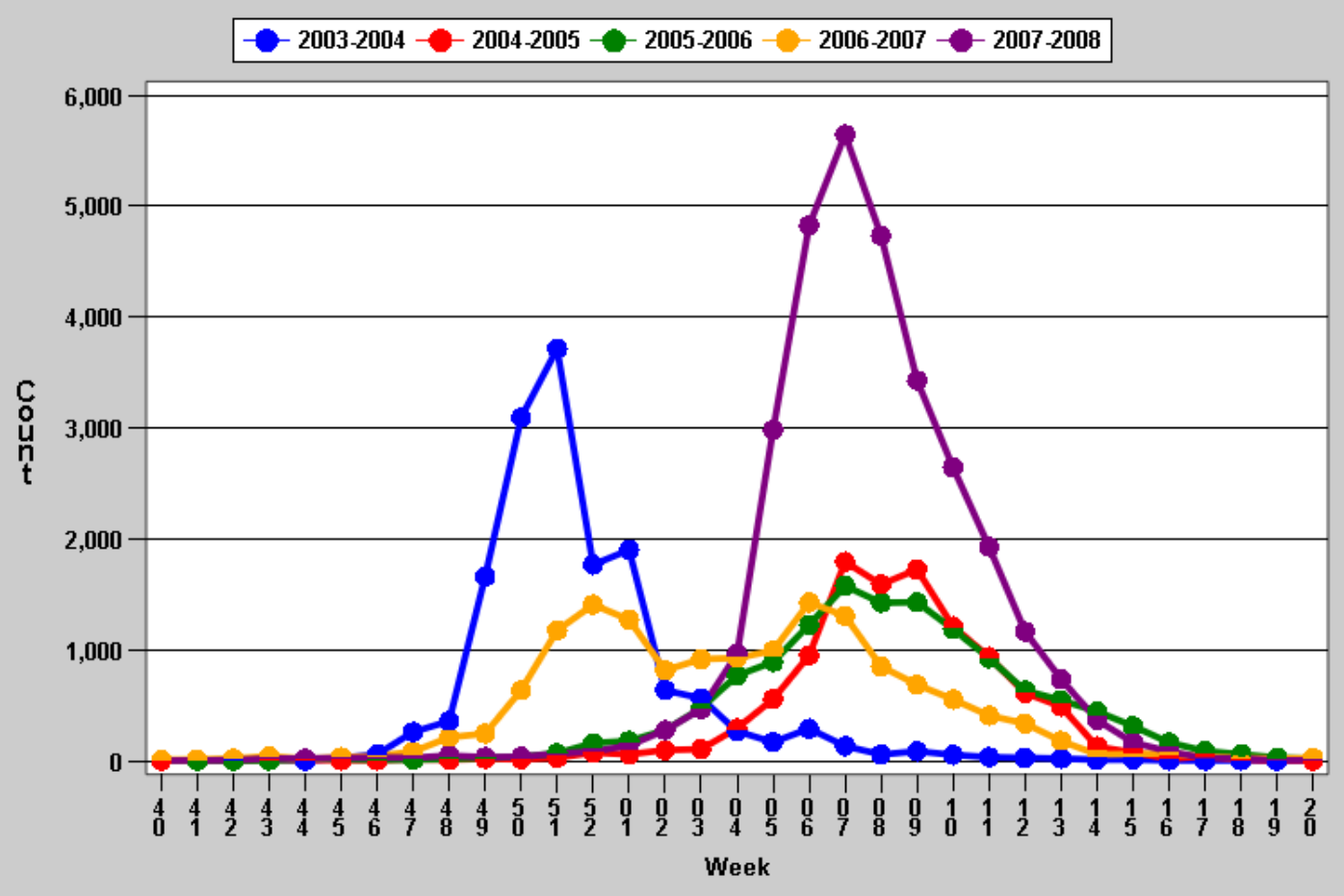
While a less than ideal match between the viruses in the vaccine and circulating viruses can reduce the vaccine's effectiveness, the vaccine can still protect enough to make illness milder and prevent flu-related complications.

In addition to prudent and appropriate vaccinations, studies clearly show that simple preventive measures are effective in lowering a persons risk of contracting the flu and reducing the spread of the flu virus. These measures include hand washing, cough/sneeze etiquette, and staying home when ill. More information on flu prevention can be found at: www.dhss.mo.gov/Influenza.

Section A - Communicable Disease Surveillance

Influenza - Continued

Graph 1. Influenza 2007-08 Season-To-Date as compared to the previous 4 influenza seasons through the week ending May 17, 2008 (Week 20)



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Legionellosis

Click to view maps

Legionellosis refers to conditions associated with the bacteria called *Legionella*. Although a total of 35 species of *Legionella* with at least 45 serogroups are currently recognized, *Legionella pneumophila* serogroup 1 (*L. pneumophila*) accounts for up to 90% of human cases of the disease. The term legionellosis encompasses two very distinct clinical and epidemiological conditions called Legionnaires' disease and Pontiac fever.

Table 1. —Compartative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		50	100.00%	0.9	31	61.30%
Sex	Female	17	34.00%	0.6	10	70.00%
	Male	33	66.00%	1.2	17	94.10%
Race	Black	5	10.00%	0.7	4	25.00%
	Unknown	16	32.00%	N/A	10	60.00%
	White	29	58.00%	0.6	14	107.10%
Age Group	00 to <01	0	0.00%	0	0	N/A
	01 to 04	0	0.00%	0	0	N/A
	05 to 14	0	0.00%	0	0	N/A
	15 to 24	2	4.00%	0.2	0	N/A
	25 to 39	2	4.00%	0.2	5	-60.00%
	40 to 64	26	52.00%	1.4	15	73.30%
	65 plus	20	40.00%	2.6	10	100.00%
District	Central	5	10.00%	0.8	2	150.00%
	Eastern	17	34.00%	0.8	12	41.70%
	Northwest	16	32.00%	1.1	7	128.60%
	Southeast	1	2.00%	0.2	0	N/A
	Southwest	11	22.00%	1.1	5	120.00%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

The natural reservoirs for the *Legionella* bacteria are aqueous and include lakes, streams, and coastal oceans. However, the bacteria thrive in warm water and can contaminate hot water systems including showers, air conditioning cooling towers, humidifiers, whirlpool spas, respiratory therapy devices, and decorative fountains, which have all been associated with disease. The bacteria do not seem to grow in car or window air conditioners. Persons become infected when *Legionella* bacteria that have been aerosolized in the air are inhaled into the lungs. Symptoms of disease usually begin 2-10 days following exposure for Legionnaires' disease and 5-66 hours following exposure for Pontiac fever. The initial symptoms often include anorexia, malaise, myalgia, headache, diarrhea, cough, and a high fever. Persons with Legionnaires' disease will typically develop pneumonia while Pontiac fever is a milder illness and is generally not associated with pneumonia. Although most persons with Pontiac fever will recover fully, an estimated 10% to 15% of cases of Legionnaires' disease will be fatal. The bacteria that cause legionellosis are not spread from one person to another person.

Legionnaires' disease was first identified in 1976 following an outbreak of pneumonia in persons who had attended an American Legion convention in Philadelphia. In the United States an estimated 8,000 – 18,000 people are hospitalized with Legionnaires' disease each year and approximately 20% of cases are associated

Section A - Communicable Disease Surveillance

Legionellosis - Continued

with travel. Outbreaks of legionellosis are reported each year in the United States. During the years 2003-2004, a total of four outbreaks of *L. pneumophila* resulting in over 100 illnesses were reported. Each outbreak was associated with exposures to spas/hot tubs, and in all but one of the outbreaks, the spa was located at a hotel.

Statewide, in 2007, there were 50 cases of legionellosis reported, which was a 61% increase in the number of cases compared to the five-year median data from 2002-2006. The incidence rate for the year was 0.9 cases per 100,000 population and represents the highest rate of reported legionellosis cases observed over the past decade. The cases ranged in age from 21 to 92 years of age with a mean age of 59 years. The age group specific incidence rate was highest among persons aged 65 year and older (2.6 per 100,000 population). Sixty-six percent of cases were male and the race specific incidence rates were similar among both blacks and whites.

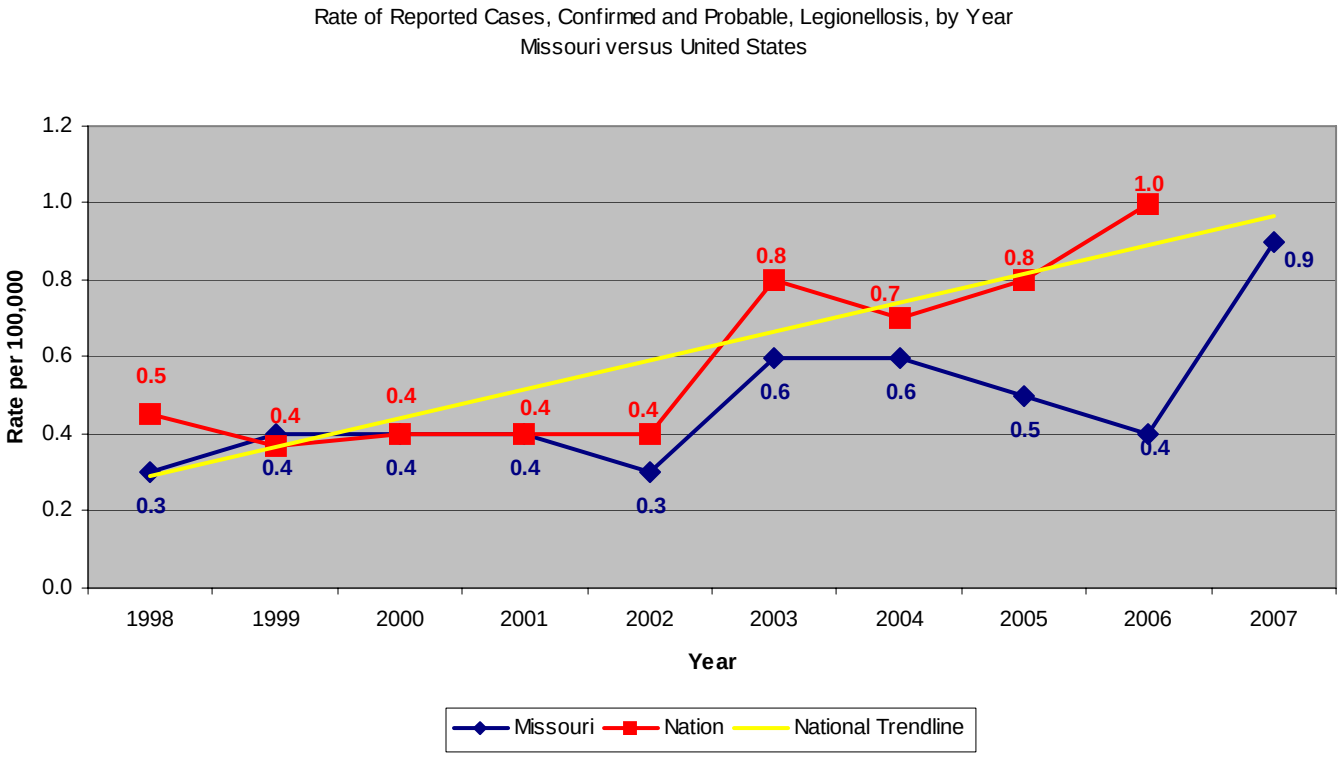
Missouri experienced a significant increase in the number of reported legionellosis cases in 2007. The increase in cases was observed in all but one district of the state, as the Central, Northwest, and Southwest districts all had increases of greater than or equal to 120% above the previous five-year median for each district. Although legionellosis cases were reported during each month, 32% of cases were reported in the months of June and July. The increase of reported cases could not be attributed to a specific cause as no geographic clustering of cases or outbreaks due to legionellosis were reported.

Comparison to national data: In 2006, the national rate per 100,000 population was 1.0 while the state had a rate of 0.9 per 100,000 population in 2007. The slight decline in the annual incidence rate of legionellosis cases in Missouri, from 2005 through 2006, was in contrast to the steady increase observed nationally. Despite the increase in reported legionellosis cases in 2007, the incidence rate of reported legionellosis cases remains slightly below the national rate. The rates of reported legionellosis cases in Missouri and nationally have continued an upward trend over the past decade.

Outbreaks of legionellosis have been associated with hotels and other travel associated exposures and often resulting in severe disease. This highlights the importance of owners and operators to properly maintain water sources such as air conditioning cooling towers, spas, hot tubs, and the like, to prevent the growth and/or proliferation and spread of *Legionella* bacteria and therefore prevent legionellosis disease. The American Society of Heating, Refrigerating, and Air Conditioning Engineers has developed Guideline 12-2000 "Minimizing the Risk of Legionellosis Associated with Building Water Systems". Legionellosis case and outbreak investigations often require the expedient collaboration of local, state, federal, and international agencies to identify and eliminate sources of disease.

Section A - Communicable Disease Surveillance

Legionellosis - Continued



Additional Website Resources

CDC Health Topics
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Health Region Defined

Section A - Communicable Disease Surveillance

Methicillin-resistant Staphylococcus aureus (MRSA)

Methicillin-resistant Staphylococcus aureus (MRSA) infection is caused by bacteria called Staphylococcus aureus, often called "staph". Staph are normally found on the skin or in the nose of about one-third of the population. If you have staph on the skin or in your nose but are not sick, you are said to be colonized but not infected. Healthy people can be colonized with staph and have no ill effects. These bacteria are normally harmless unless they enter the body through cuts, scrapes, or other wounds, and even then they often only cause minor skin infections in healthy people. However, in older people, those who are ill, or have weakened immune systems, even ordinary staph infections can cause serious illness.

The triumph of antibiotics over disease-causing bacteria is one of modern medicine's greatest success stories. After more than 50 years of widespread use, however, some bacteria have developed ways to outwit the effects of antibiotics. Penicillin was used widely in the 1950s and 60s and soon staph developed resistance to penicillin. Today 95% of Staphylococcus aureus are resistant to penicillin. In 1960, a new antibiotic was developed to treat staph infections and it was called methicillin. In the late 1970s, strains of staph that had developed resistance to methicillin began being found in hospitals. These resistant bacteria were first seen in large teaching hospitals in the intensive care units on the East and West coast where large amounts of antibiotics are commonly used. These organisms then moved to community hospitals and have spread throughout the United States.

This organism, called Healthcare-Associated MRSA (HA-MRSA), commonly infects older patients who are ill and have a variety of invasive procedures during their hospital stay. HA-MRSA is resistant to most older antibiotics and is commonly treated with vancomycin or one of the newer antibiotics. In the 1990s, another type of MRSA showed up in the wider community. It is known as community-acquired MRSA, or CA-MRSA. It commonly causes skin and soft tissue infections.

CA-MRSA is distinctly different from the hospital strain in that it primarily infects younger people and seldom causes serious infections unless untreated. It is resistant to methicillin but can be treated by a variety of other antibiotics unlike the hospital strain.

Often MRSA infections in the community start as small red bumps that resemble pimples or boils and they are often mistaken for "spider bites". CA- MRSA differs from the hospital strain also in that it often contains a toxin. If left untreated a minor infection can become very serious due to the ability of the toxin to break down defense mechanisms allowing the bacterium to burrow deep into the body, causing life-threatening infections in bones, joints, wounds, the bloodstream, or the lungs.

Some settings have factors that make it easier for staph infections (including MRSA) to be transmitted. These factors, referred to as the "5C's" are as follows:

Section A - Communicable Disease Surveillance

MRSA - Continued

- **C**rowding,
- Frequent skin-to-skin **C**ontact,
- **C**ompromised skin (i.e. cuts or abrasions),
- **C**ontaminated items and surfaces, and
- Lack of **C**leanliness.

According to CDC, locations where the 5C's are common include schools, dormitories, military barracks, households, correctional facilities, and child care centers.

Following basic hygiene can best prevent these infections:

1. Keep your hands clean by washing thoroughly with soap and water or using an alcohol-based hand sanitizer when a sink isn't available.
2. Shower after working out.
3. Keep cuts and scrapes clean and covered with a bandage until healed.
4. Avoid contact with other people's wounds or bandages.
5. Avoid sharing personal items such as towels or razors.
6. Use a barrier (e.g., clothing or a towel) between your skin and shared equipment (e.g., exercise equipment in a gym), and wipe the surfaces of the equipment before and after use.

DHSS developed a website (http://www.dhss.mo.gov/MRSA/index.html) that contains specific information for the public, schools and childcare centers, correctional facilities and communities.

Public health's capacity to investigate every single case of MRSA infection is limited and requiring individual case reports to be sent to DHSS would be exceedingly expensive and would overwhelm the system. The primary purpose of state reporting is to identify problems and to monitor resistance trends in healthcare facilities and in communities. In order to accommodate these issues in Missouri, three types of reports regarding MRSA are required by law:

1. Outbreaks of MRSA are reportable to the DHSS. As with other outbreaks, this allows public health intervention as necessary to assist in controlling outbreaks.

2. In addition, in 2004, Senate Bill 1279 required aggregate HA-MRSA data to be reported to DHSS quarterly so that resistance trends can be monitored. This has been collected since July of 2005 and some of the results are provided in Table 1 and Graph 1.

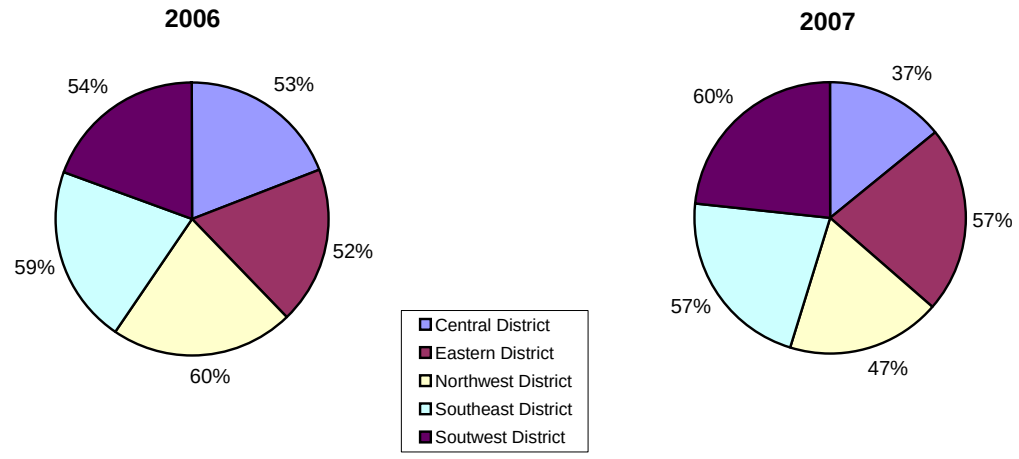
Section A - Communicable Disease Surveillance

MRSA - Continued

Table 1. Healthcare-associated staph aureus Reported in Missouri, by Year *				
Reporting Year	**2005**	**2006**	**2007**	**2005-2007**
Infections reported*	1239	2303	2482	6024
Number Sensitive	581	1038	1196	2815
Number Resistant	658	1265	1286	3209
Percent Resistant	53%	55%	52%	53%
The **Healthcare-Associated staph aureus infections reported include only data from those body sites monitored by individual reporting hospitals.*				

Table 1 shows that in Missouri, 53% (3235/6063) of the healthcare-associated isolates of S. aureus from body sites monitored by individual hospitals in Missouri are resistant to methicillin (MRSA). By monitoring this information each year, trends of resistance can be followed to determine the extent of resistance in the state. For example, Graph 1 demonstrates healthcare-associated S. aureus resistance rates by district, for 2006 and 2007.

Graph 1. Missouri healthcare-associated staph aureus resistance rates by District, for 2006 and 2007



3. Senate Bill 1279 also required laboratories who provide antibiotic sensitivity reports to healthcare facilities in Missouri to submit annual reports of antibiotic sensitivity for each healthcare facility served by the laboratory starting in 2008. These reports are called “antibiograms” and they will be used to look at antibiotic resistance trends for all bacteria cultured in healthcare laboratories throughout the state. This trending will allow the state to monitor emerging trends of overall antibiotic resistance and to provide clinicians information which may help in the appropriate treatment of patients in the future and in the selection of appropriate antibiotics. The first report from these data will be developed in 2009.

Section A - Communicable Disease Surveillance

Rabies, Animal and Rabies Post-Exposure Prophylaxis (PEP) Initiated

All Species Map
Wild Species Map
Domesticated Species Map
PEP Map

Rabies is a fatal viral illness that affects animals and humans. Laboratory testing for rabies is useful for confirmation of the virus' presence in certain species and geographic locations, and for determination of the need to administer rabies prophylaxis in cases of human exposure to a potentially rabid animal. The only reliable method of testing animals for the presence of rabies virus is through laboratory analysis of brain tissue. Surveillance for this disease in the domestic and wild animal population is a valuable tool in the prevention of human rabies cases.

Table 1. - Animal Rabies, by Species, Missouri

Species	Number Examined	Number Positive	Percent Positive
Bat	1,521	33	2.20%
Cat	579	0	0.00%
Cow	13	0	0.00%
Dog	673	0	0.00%
Fox	2	0	0.00%
Horse	19	1	5.30%
Other Domestic	8	0	0.00%
Other Wild	24	0	0.00%
Raccoon	98	0	0.00%
Rodent/Rabbit	77	0	0.00%
Skunk	22	4	18.20%
Total	3,036	38	1.30%

During 2007, 38 cases of animal rabies were detected in Missouri, compared to 66 cases the previous year, representing a 42% decrease (Table 1). Animals found to be rabid in Missouri during 2007 included: bats (33 cases); skunks (4 cases); and horses (1 case). The number of specimens tested in 2007 was 3,036, with 38 found positive, giving a positivity rate of 1.3%. In 2006, 66 of 2,658 submitted specimens tested positive, yielding a 2.5% positivity rate. The annual number of rabies cases during the preceding ten years (1997-2006) ranged from a low of 31 cases in each of the years 1997 and 1999 to a high of 73 cases in 2005. The median number of cases per year during this time period was 44.

The lower number of rabid wild animals detected in 2007 most likely represents a trough in the normal cycling of this disease in reservoir animal species (i.e., bats and skunks). An "up and down" cycling of rabies in wild animals results when high numbers of rabies cases occur in large, vulnerable animal populations followed by lower numbers of cases among surviving animals following a rabies die-off. For example, skunk populations increase in response to favorable environmental conditions (mild winter, adequate rainfall, etc.), which results in higher densities of immunologically naïve animals. In a rabies-endemic area (such as Missouri), a number of these animals will be infected with rabies and, as skunks encounter each other, the virus will be transmitted among them resulting in increased numbers of cases and a "peak" in the cycle. It is during these peak periods that the disease has its greatest potential to affect other wild animals, domestic animals, and humans. As skunks die from this disease (and perhaps other factors such as adverse environmental conditions and human hunting/trapping) and their numbers decrease, there

Section A - Communicable Disease Surveillance

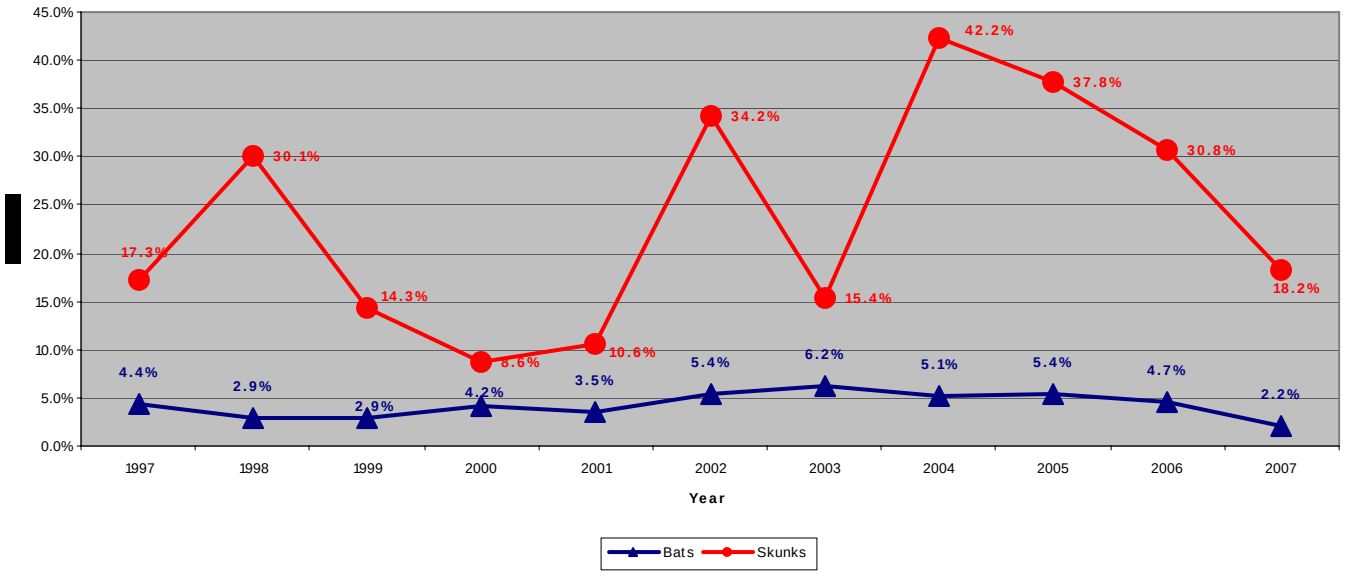
Rabies, Animal and Rabies post-exposure Prophylaxis (PEP) Initiated - Continued

will be less contact among survivors and some of these animals will also perhaps possess a level of immunity. As these conditions gradually develop, the number of rabies cases will decline, eventually reaching a minimum level, i.e., a "trough." Due to decreased population levels, surviving animals will normally have less competition for food and habitat and will thrive, reproduce, and start the cycle on its inevitable upward course again.

Also to be noted is the fact that in recent years, bats have accounted for the vast majority of animals submitted for rabies testing in Missouri, exceeding all other species combined in 2007. In 2007, 1,521 bats were submitted and 33 (2.2%) were found to be rabid, compared to 1,180 bat submissions the previous year with 55 (4.7%) positive. Even a small decrease in the percent testing positive (decreased by 2.5% from 2006 to 2007) applied across a large number of specimens results in a seemingly large decrease in rabid animals (22 fewer rabid bats from 2006 to 2007, or a 40% decrease). The number of cases will increase just as quickly when the percent positively rate begins to climb again, which it is sure to do.

Wild and domestic animals are tested for rabies only when they have potentially exposed a person or pet, or in other situations with possible public health implications. In 2007, specimens were submitted in a representative fashion from all regions of the state (only 17 counties did not submit any specimens for testing). Rabies in bats occurs sporadically across Missouri. While rabid skunks can be found anywhere in the state, most cases are usually confined to about the southern one-half of Missouri. Both the north-central and south-central variants of the skunk rabies virus are found in rabid skunks in Missouri.

Percent of Positive Rabies Tests, Bats and Skunks, 1997-2007



Section A - Communicable Disease Surveillance

Rabies, Animal and Rabies post-exposure Prophylaxis (PEP) Initiated - Continued

A county is placed under a "rabies alert" when a positive domestic animal is detected in that county, or when the threshold level for rabid wild animals is exceeded. One county (Phelps) was placed under alert in March 2007, when a rabid horse was detected. Alerts routinely last for three months, but the Phelps County alert was extended when a rabid bat was found in June; Phelps County was removed from its alert status in September 2007.

The percent of bats that test positive for rabies does not fluctuate greatly from year to year, ranging from about 2 to 6 percent from 1997 – 2007. This correlates closely with the experience of other states, even during periods when bat rabies is "epizootic." The percent positive can presumably reach somewhat higher levels in a smaller geographic region (e.g., in a given city or county), but it would be unusual to vary substantially from statewide levels in the long term. Bats remain the major source of exposure for humans since their bites can seem insignificant or go unnoticed, and because they often find their way into living quarters due to their small size.

The percent of skunks that test positive for rabies fluctuates significantly as environmental and skunk population factors vary, making transmission of this virus more easily accomplished. This is also consistent with national trend data. In Missouri, percent positive rates varied from about 9 to 42 percent during the period 1997 – 2007. Public health authorities should notify citizens when rates begin to climb above "normal" levels, since rabies in a terrestrial species like the skunk is more likely (than bat rabies) to be transmitted to other terrestrial species such as livestock, dogs, and cats.

Other wild and domestic species of animals in Missouri are found to be rabid each year. Although they are of public health significance, their relatively low numbers does not make calculation of percent positive rates statistically meaningful over long periods of time.

The first complete year for reporting "Rabies post-exposure prophylaxis (initiated)" was 2007 (it became a reportable condition as of August 31, 2006). A total of 159 persons were included in this category in 2007, which probably was an underestimate since some medical providers were undoubtedly unaware that this condition had recently become reportable. CDC estimates that about 40,000 persons receive rabies post-exposure prophylaxis in the United States each year. Missourians no doubt account for a significant portion of these cases due to the endemnicity of rabies in wild animals in the state and the interaction of people and their pets with these animals. The expense of providing rabies post-exposure prophylaxis remains high, with an estimated average cost of $2,500 per patient.

Section A - Communicable Disease Surveillance

Rabies, Animal and Rabies post-exposure Prophylaxis (PEP) Initiated - Continued

Human rabies in Missouri is uncommon, with the last case reported in 1959. The low frequency of cases does not mean rabies is not a threat. To the contrary, this major public health victory is directly attributable to an effective medical preventive regimen (i.e., anti-rabies shots), improved public health practices (e.g., animal quarantine/testing, prompt investigation of animal bite incidents by LPHA's), and improved rabies vaccinations for dogs and cats.

CDC recently published *Human Rabies Prevention – United States, 2008, Recommendations of the Advisory Committee on Immunization Practices*, which is available on the Internet at www.cdc.gov/mmwr/pdf/rr/rr57e507.pdf. This is significant because it is CDC's first revision since 1999. The document provides basic guidance for preventing rabies in humans, and includes recommendations for rabies pre- and post-exposure prophylaxis as well as treatment considerations for human rabies patients. Updated information includes: (1) clarification of language regarding recommendations and better specification of situations in which rabies pre- and post-exposure prophylaxis should be administered, (2) no new rabies biologics are presented, and no changes have been made to the vaccination schedules, (3) rabies vaccine adsorbed (RVA, Bioport Corporation) is no longer available for rabies pre- or post-exposure prophylaxis, and (4) intradermal pre-exposure prophylaxis is no longer recommended because it is not available in the United States.

You can help reduce your risk of exposure to rabies by:

- Vaccinating your dogs, cats, and ferrets against rabies.
- Keeping your pets under supervision.
- Not handling wild animals or strays.
- Contacting an animal control officer, if you see a wild animal or a stray, especially if the animal is acting strangely.
- Washing the wound with soap and water between 10 to 15 minutes, if you do get bitten by an animal, and contacting your health care provider to see if you need rabies post-exposure prophylaxis.
- Getting your pets spayed or neutered. Pets that are fixed are less likely to leave home, become strays, and make more stray animals.

Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Rocky Mountain Spotted Fever

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Rocky Mountain Spotted Fever (RMSF) is a zoonotic tick-borne disease caused by the bacteria *Rickettsia rickettsii*. It is characterized by an acute onset of fever, severe headache, muscle pain, nausea, vomiting, and lack of appetite. Later symptoms include rash, abdominal pain, joint pain, and diarrhea. Thirty-five to sixty percent of RMSF patients will develop the characteristic red spotted (petechial) rash. The rash usually develops two to five days after the onset of fever and begins as faint small, flat pink, non-itchy spots. Most often this rash begins on the wrists, forearms and ankles and eventually develops into the charecteristic red spotted (petechial) rash of RMSF and often spreads to involve the palms of the hand as well as the soles of the feet. However, some 10 to 15 percent of RMSF patients may never develop the rash. RMSF is the most severe and most frequently reported tick-borne rickettsial illness in both Missouri and the United States. The disease can be difficult to diagnose in the early stages and without prompt appropriate treatment it can be fatal. RMSF is a seasonal disease and occurs throughout the United States during the months of April through September. Although the disease was first discovered and recognized in the Rocky Mountain area relatively few cases are reported from that area today. The highest incidence rates have been found in Oklahoma, Arkansas, Missouri, North Carolina, and South Carolina.

Table 1. RMSF—Comparative Statistics, by Socio-demograph Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		315	100.00%	5.4	106	197.20%
Sex	Female	112	35.60%	3.7	46	143.50%
	Male	203	64.40%	7.1	60	238.30%
Race	Black	2	0.60%	0.3	1	100.00%
	Unknown	45	14.30%	N/A	47	-4.30%
	White	268	85.10%	5.3	61	339.30%
Age Group	00 to <01	0	0.00%	0	0	N/A
	01 to 04	2	0.60%	0.7	4	-50.00%
	05 to 14	17	5.40%	2.2	5	240.00%
	15 to 24	26	8.30%	3.2	10	160.00%
	25 to 39	53	16.80%	4.6	18	194.40%
	40 to 64	156	49.50%	8.1	41	280.50%
	65 plus	60	19.00%	7.7	21	185.70%
	Unknown	1	0.30%	N/A	0	N/A
District	Central	88	27.90%	13.7	15	486.70%
	Eastern	42	13.30%	1.9	8	425.00%
	Northwest	25	7.90%	1.6	18	38.90%
	Southeast	55	17.50%	11.8	10	450.00%
	Southwest	105	33.30%	10.6	49	114.30%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

Most zoonotic diseases require a biological vector, such as mosquitoes, ticks, fleas or mites, to transmit the disease from the animal host to the human host. In RMSF, the tick serves as both the reservoir and the vector. Ticks transmit the pathogen primarily by their bite. Less commonly, infections may occur after exposure to crushed tick tissues, fluid, or tick feces.

Section A - Communicable Disease Surveillance

Rocky Mountain Spotted Fever - Continued

In Missouri, the major tick vectors are the American dog tick and the Rocky Mountain Wood tick. The Rikettsiae are transmitted to the host through the saliva while the tick is feeding. It usually takes several hours of attachment and feeding before the Rickettsiae are transmitted to the host. The risk of exposure to a tick carrying *Rickettsia rickettsii* is relatively low since only 1% to 3% of the tick population carries *Rickettsia rickettsii* even in areas where cases of human RMSF are most frequently reported.

Ticks become infected with *Rickettsia rickettsii* while feeding on blood from the host in either the larval, nymphal, or adult stage. Male ticks may also pass on the *Rickettsia rickettsii* to the female tick through body fluids or spermatozoa during mating. The female tick can then transmit the *Rickettsia rickettsii* to her eggs. Once a tick is infected it can carry the pathogen for life.

In 2007, Missouri had 315 confirmed and probable cases of RMSF, which exceeded the combined number of reports for Missouri's other tick-borne diseases (ehrlichiosis, tularemia, and Lyme disease). This represents a statewide incident rate of 5.4 per 100,000, which is nearly three times the median number for the previous five-year period.

Comparison to National Data: Missouri's rate of RMSF dropped below the national average in 1998 hitting a 10-year low. Since then, the rates have increased from 0.1 per 100,000 in 1998 to 5.4 per 100,000 in 2007, remaining consistently above the national average since 1999 and well above the national rate of 0.8 in 2006. This ongoing increase may be related to lifestyle changes or other environmental factors that increase individuals' exposure to ticks (such as increase in outdoor activities, travel to the country side, and urbanization of rural areas). In addition, there appears to be an increased awareness of tick-borne illness among physicians that may also contribute to the increased use of commercially available diagnostic tests, which have the ability to detect current or past infections.

Limiting exposure to ticks is the most effective way to reduce the likelihood of RMSF infection. In persons exposed to tick-infested habitats, prompt careful inspection and removal of crawling or attached ticks is an important method of preventing disease. It may take extended attachment time before organisms are transmitted from the tick to the host. Currently, no licensed vaccine is available for prevention of RMSF.

It is unreasonable to assume that a person can completely eliminate activities that may result in tick exposure. Therefore, prevention measures should emphasize personal protection when exposed to natural areas where ticks are present:

Section A - Communicable Disease Surveillance

RMSF - Continued

- Wear light-colored clothing which allows you to see ticks that are crawling on your clothing.
- Tuck your pants legs into your socks so that ticks cannot crawl up the inside of your pants legs.
- Apply repellents to discourage tick attachment. Repellents containing permethrin can be sprayed on boots and clothing, and will last for several days. Repellents containing DEET (n, n-diethyl-m-toluamide) can be applied to the skin, but will last only a few hours before reapplication is necessary. Use DEET with caution on children. Application of large amounts of DEET on children has been associated with adverse reactions.
- Conduct a body check upon return from potentially tick-infested areas by searching your entire body for ticks. Use a hand-held or full-length mirror to view all parts of your body. Remove any tick you find on your body.
- Parents should check their children for ticks, especially in the hair, when returning from potentially tick-infested areas. Ticks may also be carried into the household on clothing and pets, and attach later, so both should be examined carefully to exclude the ticks.

Rate of Reported Cases, Confirmed and Probable, Rocky Mountain Spotted Fever, by Year
Missouri versus United States

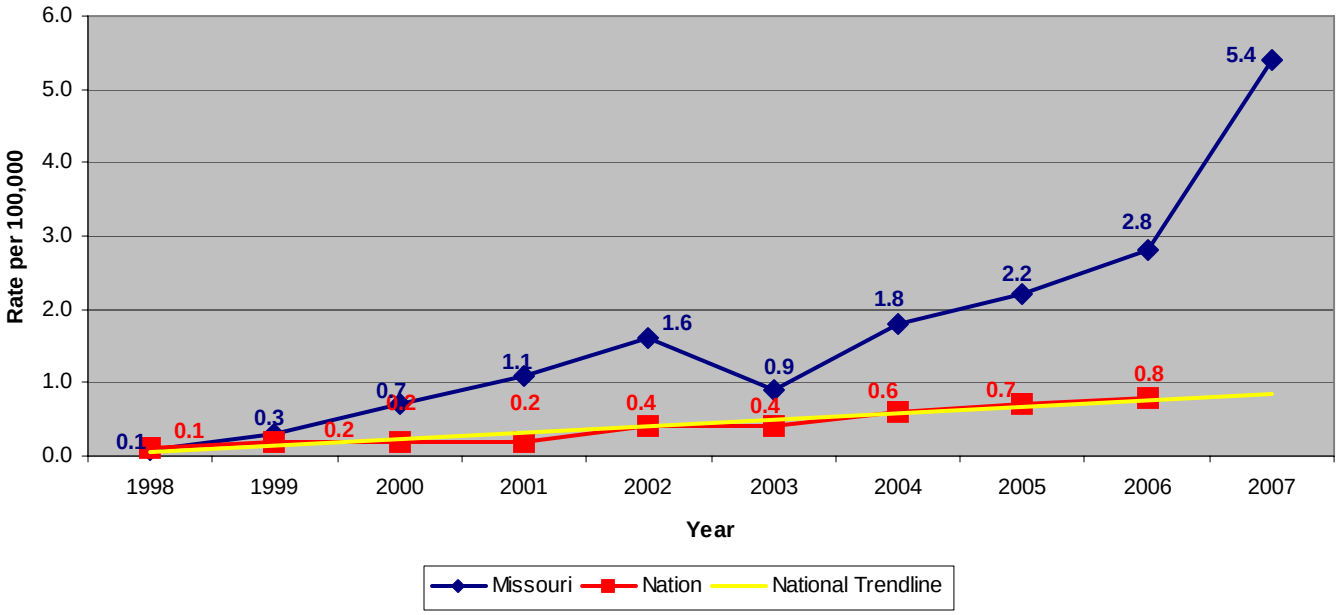

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Table of Contents | Next Page | Previous Page

Section A - Communicable Disease Surveillance

Salmonellosis

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Salmonellosis is an infection with bacteria called *Salmonella*. The most common symptoms are sudden onset of headache, abdominal pain, diarrhea, nausea and sometimes vomiting, and the illness usually lasts four to seven days. Fever is almost always present. Deaths are uncommon, except in very young infants, the very old, and debilitated or immunosuppressed patients. Asymptomatic infection or mild illness is common.

Table 1. Salmonellosis - Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		764	100.0%	13.1	801	-4.6%
Sex	Female	402	52.6%	13.5	409	-1.7%
	Male	362	47.4%	12.7	385	-6.0%
Race	Black	63	8.2%	9.1	68	-7.4%
	Other	4	0.5%	3.1	5	-20.0%
	Unknown	252	33.0%	N/A	408	-38.2%
	White	445	58.2%	8.9	335	32.8%
Age Group	00 to <01	67	8.8%	82.4	71	-5.6%
	01 to 04	108	14.1%	35.4	111	-2.7%
	05 to 14	85	11.1%	11	116	-26.7%
	15 to 24	95	12.4%	11.5	89	6.7%
	25 to 39	108	14.1%	9.4	122	-11.5%
	40 to 64	179	23.4%	9.3	195	-8.2%
	65 plus	122	16.0%	15.7	75	62.7%
District	Central	81	10.6%	12.6	90	-10.0%
	Eastern	268	35.1%	12	307	-12.7%
	Northwest	190	24.9%	12.5	170	11.8%
	Southeast	104	13.6%	22.4	99	5.1%
	Southwest	121	15.8%	12.2	106	14.2%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

Missouri experienced a slight decrease in the number of Salmonellosis cases in 2007. Statewide there were 764 cases of Salmonellosis for the year, which was a 4.6% decrease in the number of cases as compared to the combined five-year median data from 2002-2006. The incidence rate for the year was 13.1 per 100,000 Missourians. Females account for 52.6% of the cases. The age group of less than one year of age report 82.4 cases per 100,000 population, followed by the age group of 1-4 with 35.4 cases per 100,000 population.

Missouri also reported three cases of *Salmonella* Typhi (Typhoid Fever) for 2007 for an incidence rate of 0.1 per 100,000 population. The age of the cases ranged from two to 19 years. Females were reported in two of the three cases. All cases reported foreign travel prior to onset of illness.

Salmonellosis is usually a foodborne disease; contaminated food, mainly of animal origin, is the most common vehicle of transmission. Food can be contaminated at its source, or by an infected food handler. The incubation period is generally six to 72 hours, is usually 12 to 36 hours, and has been as long as five to seven days. Person-to-person transmission can also occur since the organism is shed in stool. Pets, especially chicks, ducklings, and turtles, can also transmit *Salmonella*.

Section A - Communicable Disease Surveillance

Salmonellosis - Continued

Salmonella organisms can multiply in a variety of foods. Outbreaks have been traced to processed meat products, inadequately cooked poultry, raw (unpasteurized) milk, dairy products, water supplies, and uncooked or lightly cooked products containing eggs. More recently, fresh produce has been implicated in outbreaks. Contaminated utensils and work surfaces can also spread Salmonellosis.

Since foods of animal origin may be contaminated with *Salmonella*, people should not eat raw or undercooked eggs, poultry, or meat. Raw eggs may be unrecognized in some foods such as homemade hollandaise sauce, caesar and other homemade salad dressings, tiramisu, homemade ice cream, homemade mayonnaise, cookie dough, and frostings. Poultry and meat, including hamburgers, should be well-cooked, not pink in the middle. Persons also should not consume unpasteurized milk or other dairy products. Produce should be thoroughly washed before consuming.

Cross-contamination of foods should be avoided. Uncooked meats should be kept separate from produce, cooked foods, and ready-to-eat foods. Hands, cutting boards, counters, knives, and other utensils should be washed thoroughly after handling uncooked foods. Hands should be washed before handling any food and between handling different food items.

People should wash their hands after handling animals, pet toys, leashes, treats, or feces. Since reptiles are particularly likely to have *Salmonella*, everyone should immediately wash their hands after handling reptiles. Baby chicks, ducklings, and reptiles (including turtles) are not appropriate pets for small children and should not be in the same house as an infant.

Numerous serotypes of *Salmonella* cause illness in both animals and humans. The prevalence of these serotypes varies from place to place and at different times. The most common are *Salmonella* serotype Typhimurium and *Salmonella* serotype Enteritidis. Diagnosis is made through isolation of *Salmonella* organisms from cultures of stool or other specimens. Serotyping can be a very useful tool for recognition of an outbreak from a common source. The Department also utilizes pulsed-field gel electrophoresis (PFGE) to detect clusters and/or outbreaks, both in Missouri and nationwide.

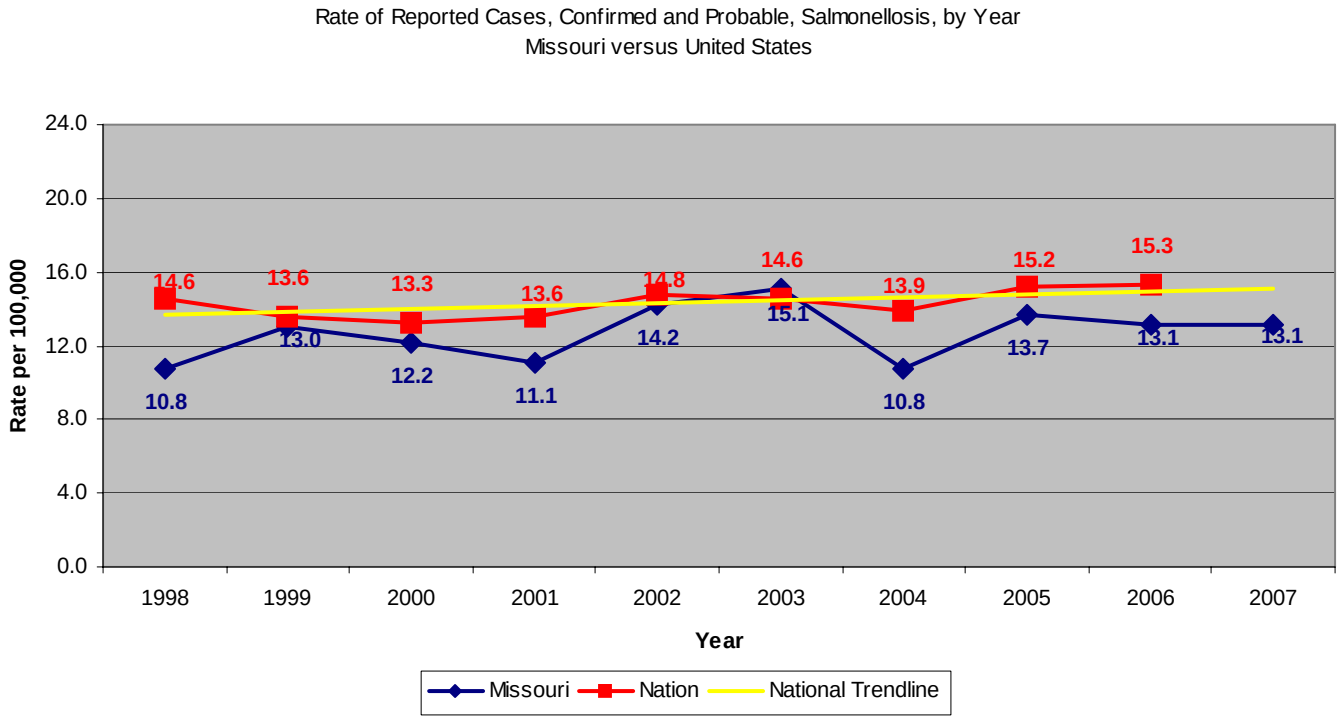
Missouri reported two *Salmonella* outbreaks for 2007. One was a multi-state *S.* Muenchen outbreak reported in May with no source identified. The second was *S.* I 4,[5],12:i:- associated with pot pie consumption.

Section A - Communicable Disease Surveillance

Salmonellosis - Continued

The United States reported four large multi-state outbreaks of *Salmonella* infections during 2007: an outbreak of *S.* Tennessee infections caused by contaminated peanut butter; an outbreak of *S.* I 4,[5],12:i:- infections caused by contaminated frozen pot pies; an outbreak of *S.* Wandsworth and *S.* Typhimurium infections attributed to a puffed vegetable snack; and an outbreak of *S.* Paratyphi B var. Java associated with exposure to turtles. Missouri did not have cases associated with the *S.* Wandsworth and *S.* Typhimurium outbreak, and only reported one case associated with the *S.* Paratyphi B var. Java outbreak but did not have exposure to the implicated source.

Comparison to National Data: The annual rate of reported Salmonellosis in Missouri has shown a slight decrease for the past four years beginning in 2004. For each of these years, Missouri has been below the national rate. In 2006, the national rate per 100,000 population was 15.3 while the state had a rate of 13.1. While the national rate remains between 13.3 to 15.3, the Missouri rate varies from 10.8 to 15.1 for the years 1998 to 2007.



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Section A - Communicable Disease Surveillance

Shigellosis

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Shigellosis is an infectious disease caused by a group of bacteria called *Shigella*. Most who are infected with Shigellosis develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the organism. Stools are frequent, loose to watery, of small volume, and often mucoid and/or bloody. The diarrhea is usually self-limiting, resolving in five to seven days. Young children and the elderly may be more severely affected, in some cases needing hospitalization. However, some persons who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others.

Table 1. Shigellosis - Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Change from 5-Year Median
State of Missouri		1,276	100.0%	21.8	355	259.4%
Sex	Female	677	53.1%	22.7	186	264.0%
	Male	599	46.9%	21	165	263.0%
Race	Black	423	33.2%	60.8	82	415.9%
	Other	2	0.2%	1.6	0	N/A
	Unknown	631	49.5%	N/A	157	301.9%
	White	220	17.2%	4.4	105	109.5%
Age Group	00 to <01	61	4.8%	75	10	510.0%
	01 to 04	574	45.0%	188	137	319.0%
	05 to 14	355	27.8%	45.8	82	332.9%
	15 to 24	75	5.9%	9.1	36	108.3%
	25 to 39	124	9.7%	10.7	46	169.6%
	40 to 64	67	5.3%	3.5	27	148.1%
	65 plus	16	1.3%	2.1	9	77.8%
	Unknown	4	0.3%	N/A	4	0.0%
District	Central	43	3.4%	6.7	14	207.1%
	Eastern	1,139	89.3%	51.2	123	826.0%
	Northwest	12	0.9%	0.8	55	-78.2%
	Southeast	66	5.2%	14.2	5	1220.0%
	Southwest	16	1.3%	1.6	50	-68.0%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2006 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

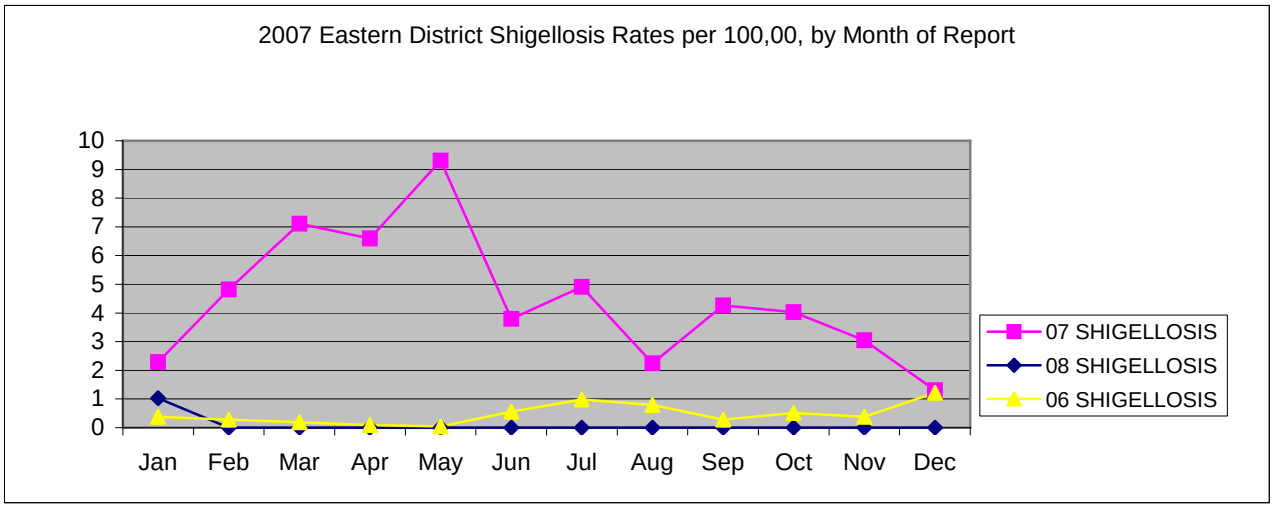
Humans are the primary source of this infectious disease. However, other animals can carry or pass Shigella. *Shigellosis* is transmitted by the fecal-oral route. When those who are infected fail to adequately wash their hands following a bowel movement, they subsequently transfer the organisms to food or objects that are ingested or placed in someone else's mouth. The infectious dose is quite small, from 10 to 200 organisms, compared to 100 to 1000 organisms for *Salmonella*. For this reason, it is extremely easy to spread shigellosis from person to person.

Statewide in 2007, Missouri recorded 1,276 confirmed and probable cases of shigellosis. This represents a statewide incidence rate of 21.8 per 100,000 population, more than three times the median incidence rate for the previous five years of 6.1 per 100,000.

Section A - Communicable Disease Surveillance

Shigellosis - Continued

Eastern District Outbreak: In 2007, nearly 90% of all reported shigellosis cases occurred in the Eastern District. This district experienced a tri-county outbreak (St. Louis County, St. Louis City, and St. Charles County) of over 1,000 cases over a year.



The outbreak began November 1, 2006, and ended November 30, 2007. There were 1,117 cases reported from St. Louis City, St. Louis County, and St. Charles County. The highest percentage of cases were seen in children aged 4 and under. Nearly 75 percent of the cases (74.1%) occurred in children less than 10 years old.

Many of the shigellosis cases were daycare-associated. One hundred thirty-five (135) daycare-associated cases were identified during weeks 17 and 18 (2007). These two weeks accounted for 11.3% of all cases reported during the outbreak.

While most early cases were children attending daycare, elementary school-aged children and women of childbearing age began to be reported as the outbreak went on.

Tri-County Shigellosis outbreak by age group
November 1, 2006 through November 30, 2007

Age Group	Case Count (% of Total)
<1 year	55 (4.9)
1 - 4 years	539 (48.3)
5 - 9 years	233 (20.9)
10 - 17 years	80 (7.2)
18 - 24 years	57 (5.1)
25 - 39 years	101 (9.0)
40 - 59 years	39 (3.5)
60+ years	11 (1.0)
Unknown age	2 (0.1)
TOTAL	1,117 (100)

Section A - Communicable Disease Surveillance

Shigellosis - Continued

Barriers to controlling the outbreak were challenging. Children with shigellosis were excluded from daycare. Excluded children could not return until they tested negative for Shigella twice. Local county health departments found it difficult to keep parents and daycare providers from enrolling ill or recovering children in other daycares once they were excluded from a facility. Parents were concerned about missing work. Day care operators were concerned about losing business when they excluded clients and losing personnel if they became ill. Therefore, some of the excluded children began attending other daycares, which resulted in some of the spread of Shigella between daycares.

Measures used to control and mitigate the outbreak included press releases, health alerts, environmental daycare inspections, and daycare education, including weekend workshops for at-home daycare providers. Physicians and school nurses were alerted to look for and report compatible symptoms.

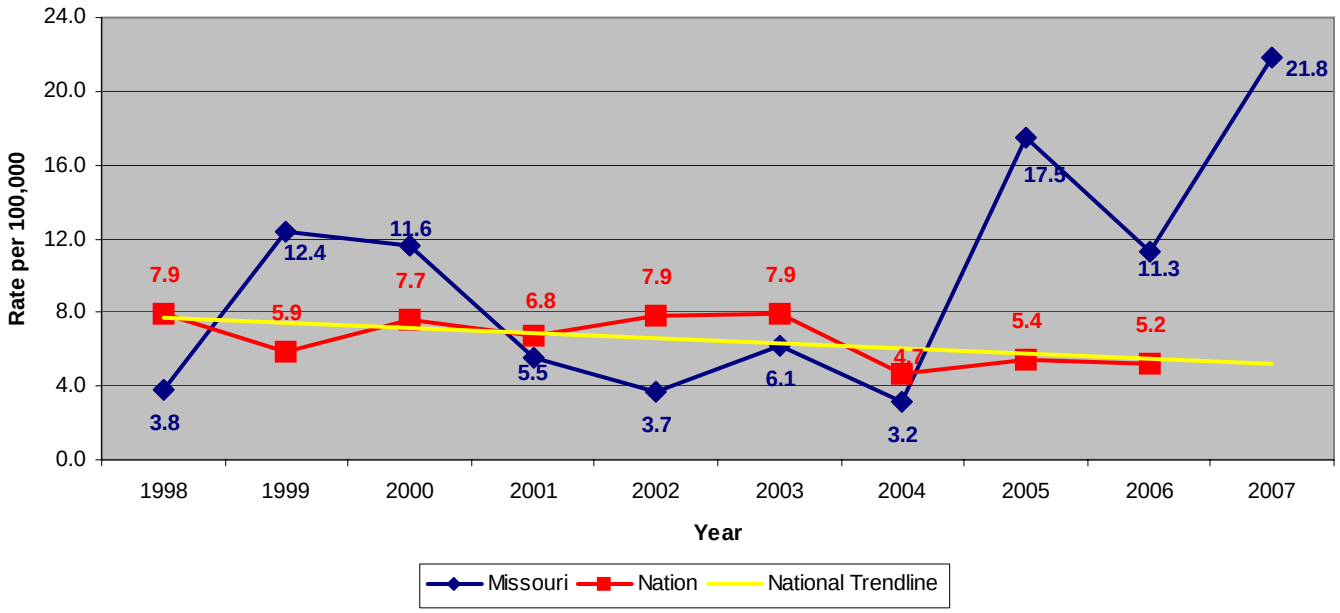
Comparison to National Data: Missouri has been above the national rate for the past three years of 2007, 2006, and 2005. This is due mostly to outbreaks that occurred in each of those years. Historically, Missouri occasionally climbs above the national rate for a few years, then drops back down to, or below, the national rate.

National and state trends have demonstrated an affinity for shigellosis in the younger populations, as revealed from the outbreaks of shigellosis in Missouri that occurred the last three years. Through diligent work with childcare centers and making certain that these facilities are meeting state standards and requirements, and providing expert consultation and educational materials, the numbers of shigellosis cases were far less than would have been expected in absence of these standards and requirements. These outbreaks demonstrate the need for DHSS' Bureau of Environmental Regulation and Licensure to maintain and oversee these standards and requirements at the state and local level and our need to educate all populations on the benefits of good personal hygiene.

Section A - Communicable Disease Surveillance

Shigellosis - Continued

Rate of Reported Cases, Confirmed and Probable, Shigellosis, by Year
Missouri versus United States



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Section A - Communicable Disease Surveillance

Tuberculosis and LTBI

TB Map

LTBI Map

Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria can attack any part of your body, but it usually attacks the lungs. TB is spread through the air from one person to another. The bacteria are expelled into the air when a person with TB disease of the lungs or throat coughs, sneezes, speaks or sings. These bacteria can stay in the air for several hours, depending on the environment.

Table 1. Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	% Changefrom 5-Year Median
State of Missouri		118	100.00%	2	127	-7.10%
Sex	Female	55	46.60%	1.8	42	31.00%
	Male	63	53.40%	2.2	85	-25.90%
Race	Black	39	33.10%	5.6	40	-2.50%
	Other	27	22.90%	21	16	68.80%
	White	52	44.10%	1	60	-13.30%
Age Group	00 to <01	0	0.00%	0	1	-100.00%
	01 to 04	4	3.40%	1.3	2	100.00%
	05 to 14	0	0.00%	0	3	-100.00%
	15 to 24	15	12.70%	1.8	12	25.00%
	25 to 39	24	20.30%	2.1	24	0.00%
	40 to 64	49	41.50%	2.5	40	22.50%
	65 plus	26	22.00%	3.3	41	-36.60%
District	Central	6	5.10%	0.9	7	-14.30%
	Eastern	48	40.70%	2.2	46	4.30%
	Northwest	33	28.00%	2.2	39	-15.40%
	Southeast	14	11.90%	3	9	55.60%
	Southwest	17	14.40%	1.7	18	-5.60%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System.

People who become infected with TB bacteria usually have had very close, day-to-day contact with someone who has TB disease (e.g. a family member, friend, or close co-worker). You are not likely to get infected from someone coughing in line at a supermarket or restaurant. Dishes do not spread TB, nor do drinking glasses, sheets, or clothing. In most people who become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI). These people do not have symptoms of TB disease, and they cannot spread TB to others.

Statewide in 2007, Missouri recorded 118 cases of TB disease. This represents a statewide incidence rate of 2.1 per 100,000, reflecting a slight increase in cases from the 104 cases in 2006. Persons over 40 years of age represent 63% of the cases in Missouri. Many of these cases represent LTBIs progressing to TB disease.

The rate of individuals born outside of the United States who were diagnosed with TB while residing in Missouri continues to comprise a significant portion of the TB cases in Missouri. In 2007, 36% of all TB cases were individuals who were born outside of the United States. This is a decrease of 12% from 2006.

Section A - Communicable Disease Surveillance

Tuberculosis and LTBI - Continued

In 2007, Missouri had two cases linked to colleges and universities associated with international students. One case required an extended TB contact investigation to identify students and faculty who may have been infected. Ninety-two students and faculty were identified as contacts to this case, four individuals were diagnosed with LTBI.

The responsibility for providing TB screening for students upon admission to universities and colleges currently comes from university policies. The BCDCP's TB Control Program conducted four training sessions in Missouri for area universities and colleges on how to implement TB control programs for their campuses, and provided policy templates for their use.

Extended contact investigations also occurred as the result of an employee at a poultry plant in Missouri with active TB. Sixty employees from this plant were identified as possible contacts to this case and were evaluated for tuberculosis. Twenty-six were determined to have LTBI.

Also in 2007, a staff member at a local elementary school was identified as having tuberculosis. As a result, 294 students and staff members at this school were evaluated with two individuals being identified as having LTBI.

If you are infectious with TB while at home, there are certain things you can do to protect yourself and others near you. Your doctor may tell you to follow these guidelines to protect yourself and others:

- The most important thing is to take your medicine.
- Always cover your mouth with a tissue when you cough, sneeze, or laugh. Put the tissue in a closed bag and throw it away.
- Do not go to work or school. Separate yourself from others and avoid close contact with anyone. Sleep in a bedroom away from other family members.
- Air out your room often to the outside of the building (weather permitting). TB spreads in small, closed spaces where air does not move. Put a fan in your window to blow out (exhaust) air that may be filled with TB bacteria. If you open other windows in the room, the fan also will pull in fresh air. This will reduce the chances that TB bacteria will stay in the room and infect someone who breathes the air.

Remember, TB is spread through the air. People cannot get infected with TB bacteria through handshakes, sitting on toilet seats, or sharing dishes and utensils with someone who has TB.

After taking medication, as directed, for two to three weeks, you may no longer be able to spread TB bacteria to others. If your doctor or nurse agrees, you will be able to go back to your daily routine. Remember, you will get well only if you take your medicine exactly as directed.

Section A - Communicable Disease Surveillance

Tuberculosis and LTBI - Continued

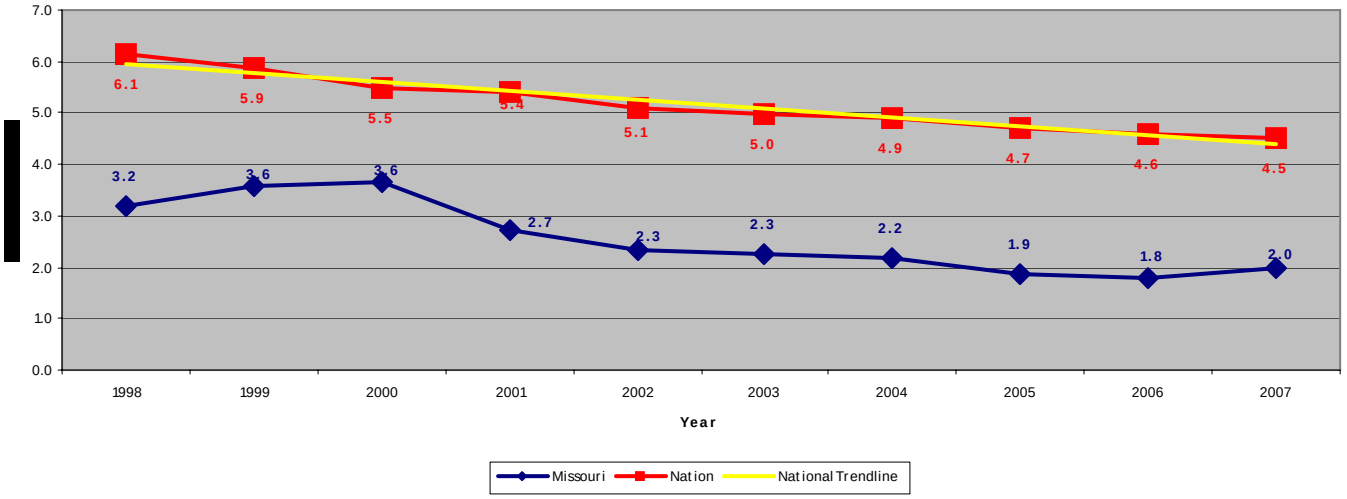
Think about people who may have spent time with you, such as family members, close friends, and coworkers. The local health department may need to test them for LTBI. TB is especially dangerous for children and people with HIV infection. If infected with TB bacteria, these people need medicine right away to keep from developing active TB disease.

LTBI

Suspected and/or confirmed TB disease is a reportable condition in Missouri. Missouri is one of several states that also require reporting of LTBI. If an individual has a normal chest x-ray and a positive TST (tuberculin skin test) they are considered infected with TB and could benefit from treatment. Persons at greatest risk for exposure to TB would be: close contacts of a person with known/suspected TB, foreign born from areas where TB is common, resident or employee of high-risk congregate settings such as jails, prisons, homeless shelters and nursing homes, and health care workers. Persons at higher risk for developing disease once infected include: HIV-positive persons, medically underserved and persons with certain medical conditions.

Missouri had 3,886 reported cases of LTBI in 2007. Approximately 10% of these individuals could develop TB in their lifetime if not treated for LTBI.

Rate of Reported Cases, Confirmed and Probable, Tuberculosis, by Year
Missouri versus United States



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Section A - Communicable Disease Surveillance

Tularemia

Click to view maps

Tularemia, also known as "rabbit fever," is a disease caused by the bacterium *Francisella tularensis*. Tularemia is typically found in animals, especially rodents, rabbits, and hares. People usually become infected through the bite of infected insects (most commonly ticks and deerflies), by handling infected sick or dead animals, by eating or drinking contaminated food or water, or by inhaling airborne bacteria. Tularemia is a zoonotic disease and is widespread among animals in the United States. Approximately 200 human cases of tularemia are reported each year in the United States, with most cases occurring June through September when arthropod-borne transmission is most common. Most cases occur in the south-central and western states although the disease has been reported in every state except Hawaii. Nearly all cases occur in rural areas, and are caused by the bites of ticks and biting flies or from handling infected rodents, rabbits, or hares. Cases also result from persons inhaling airborne bacteria and from laboratory accidents. *Francisella tularensis* is a hardy organism and can remain alive for weeks in water and soil. The signs and symptoms people develop depend on how they are exposed to tularemia. Possible symptoms include skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth sores, diarrhea or pneumonia. If the bacteria are inhaled, symptoms can include abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness. People with pneumonia can develop chest pain, difficulty with breathing, bloody sputum, and respiratory failure. Tularemia can be fatal if the person is not treated with appropriate antibiotics.

Table 1. Comparative Statistics, by Socio-demographic Category, Missouri[1]

		Case Count 2007	% of Total	Rate* 2007	5-Year Median	%Change from 5-Year Median
State of Missouri		35	100.00%	0.6	27	29.60%
Sex	Female	11	31.40%	0.4	7	57.10%
	Male	24	68.60%	0.8	17	41.20%
Race	Black	0	0.00%	0	0	N/A
	Unknown	14	40.00%	N/A	5	180.00%
	White	21	60.00%	0.4	17	23.50%
Age Group	00 to <01	0	0.00%	0	0	N/A
	01 to 04	4	11.40%	1.3	1	300.00%
	05 to 14	9	25.70%	1.2	5	80.00%
	15 to 24	1	2.90%	0.1	1	0.00%
	25 to 39	3	8.60%	0.3	2	50.00%
	40 to 64	9	25.70%	0.5	8	12.50%
	65 plus	9	25.70%	1.2	4	125.00%
District	Central	4	11.40%	0.6	6	-33.30%
	Eastern	3	8.60%	0.1	2	50.00%
	Northwest	4	11.40%	0.3	3	33.30%
	Southeast	10	28.60%	2.2	1	900.00%
	Southwest	14	40.00%	1.4	8	75.00%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2005 population estimates provided by MDHSS, Bureau of Health Informatics.

Statewide in 2007, Missouri recorded 35 confirmed and probable cases of tularemia. This represents a statewide incidence rate of 0.60 per 100,000, which is an increase of 30% as compared to the 5-year median. Tularemia is endemic to Missouri, especially in the southern part of the state. Together, the southwest and southeast districts of Missouri accounted for 69% of the state's cases. The southeast district

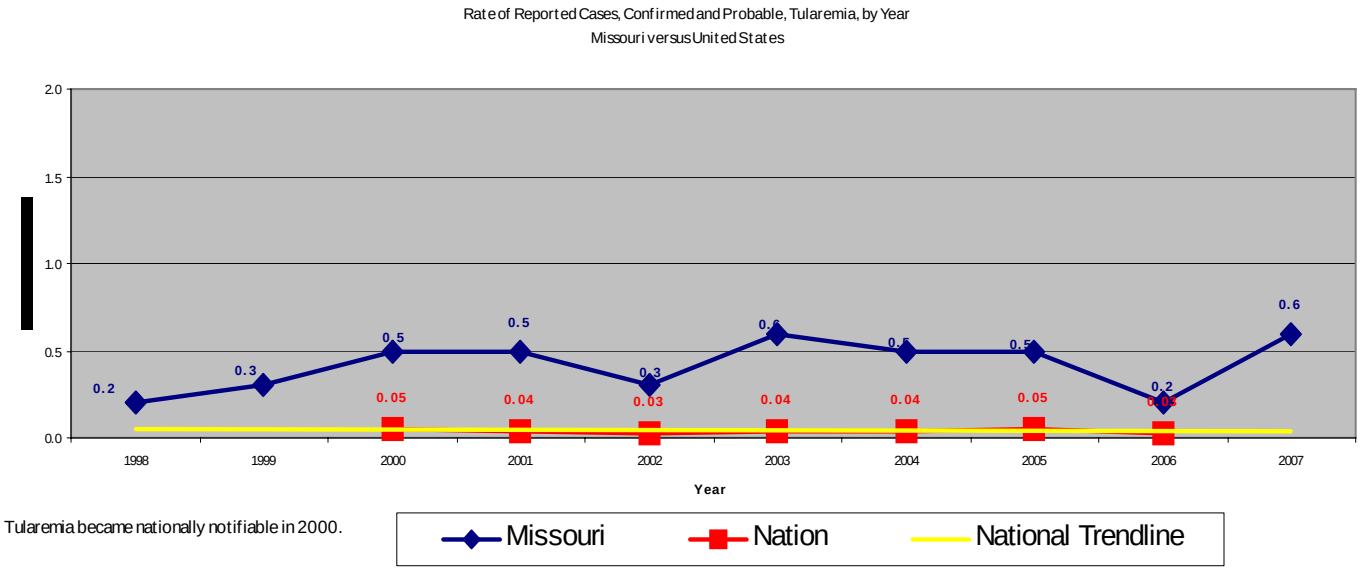
Section A - Communicable Disease Surveillance

Tularemia - Continued

experienced a 900% increase in cases (N=10) as compared to the 5-year median. There were no outbreaks or significant events that explain this district's increase in case numbers. The rise may be due to an increase in the prevalence of tularemia testing and reporting of the disease, factors related to tick density or a combination thereof. From 2002 to 2006, Missouri's rate of reported tularemia has been, on average, eleven times the national rate. (National data for 2007 was not available when this report was released.)

As tularemia is a potential agent for bioterrorism, each reported case was promptly investigated to assure it was a naturally occurring case. If tularemia was used as a weapon in a densely populated area, the release of the organism would be expected to result in an abrupt onset of large numbers of acute, nonspecific febrile illness beginning 3–5 days later (incubation range 1–14 days), with pleuropneumonitis developing in a significant proportion of cases during the ensuing days and weeks.

Tularemia occurs naturally in many parts of the United States, including Missouri. For naturally occurring tularemia, people can protect themselves from the disease and other tick-borne diseases such as Rocky Mountain spotted fever, ehrlichiosis and lyme-like disease by preventing tick bites. Use insect repellent containing DEET on your skin, or treat clothing with repellent containing permethrin, to prevent insect bites. Wash your hands often, using soap and warm water, especially after handling animal carcasses. Be sure to cook your food thoroughly and that your water is from a safe source. Note any change in the behavior of your pets (especially rodents, rabbits, and hares) or livestock, and consult a veterinarian if they develop unusual symptoms.



Additional Website Resources

CDC Health Topics | CDIRM | Health Region Defined

Table of Contents | Next Page | Previous Page

Glossary

Agent (of Disease) - A factor (e.g. virus, bacterium , parasite, chemical, or radiation) whose presence, excessive presence, or absence of, is essential for the occurrence of disease.

Bioterrorism - The intentional use of chemical, biological, or radiological agents as weapons during acts of violence or intimidation.

Case - A person or animal identified as having a particular disease.

Confirmed Case - surveillance definition, a case usually with positive laboratory results for the disease, generally associated with signs and symptoms of the disease.

Probable Case - surveillance definition, a case usually with a clinically compatible illness that is epidemiologically linked to a confirmed case.

Case Control Study - An epidemiologic study of persons with the disease of interest and a suitable control group of persons without the disease.

CD - Communicable Disease (or Infectious Disease) - diseases caused by biological agents such as a virus, bacterium or parasite.

Communicable - Able to spread disease from one person or species to another, either directly or indirectly; contagious.

Dead-End Host - a host from which infectious agents are not transmitted to other susceptible hosts.

Disseminated intravascular coagulopathy - bleeding into the skin.

ELC - Epi Laboratory Capacity Grant.

Endemnicity - Amount or severity of a disease in a particular geographic area.

Epidemiology - The study of how and why diseases and other conditions are distributed within the population the way they are.

Epidemiologist - An investigator who studies the occurrence of disease or other health-related conditions or events in defined populations.

Epizootic - An outbreak of disease in an animal population that may also affect people.

Fecal-oral route - The transmission of an infectious agent by ingestion of feces.

Five-year Median - A data set which includes five consecutive year data totals where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the “middle” of the data.

Glossary

Incidence - The number of new cases of a disease occurring in a population during a defined time period.

Incidence Rate - The rate at which new events occur in a population. For examples of the calculations, see page 59.

Incubation period - The time between exposure to an infectious agent and appearance of the first sign or symptom of the disease.

Leukopenia - Abnormal decrease of white blood cells usually below 5000/mm^3.

Malaise - A subjective sense of discomfort, weakness, fatigue, or feeling rundown that may occur alone or accompany other symptoms and illnesses.

MDR-TB - Multi-drug resistant tuberculosis

Mean - Commonly called average, is defined as the sum of the observations divided by the number of observations. For examples of the calculations, see page 59.

Median - The point in a data set where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the "middle" of the data. For examples of the calculations, see page 59.

Morbidity - Having disease, or the proportion of persons in a community with the disease.

Mortality - Refers to death.

Myalgia - Tenderness or pain in the muscles; muscular rheumatism.

Neonate - a newborn infant up to one month of age.

Nosocomial Infection - An infection occurring within an institution.

Outbreak - The occurrence of illness(es) similar in nature and clearly in excess of normal expectancy.

Pandemic - An outbreak occurring over a wide geographic area; widespread.

Pathogen - An organism capable of causing disease.

Pathogenic - Capable of causing disease.

PCR - Polymerase Chain Reaction. A laboratory procedure used to identify pathogens through amplification of genetic material.

PFGE - Pulse Field Gel Electrophoresis. A laboratory procedure of bacterial strain typing.

Glossary

Prevalence - The total number of cases of a disease existing in a given area at any given time.

Preventable TB case:
- A person with a previous positive TB skin test who is a candidate for treatment and not offered treatment;
- A person with a risk factor for TB who is never offered a TB skin test; and/or
- A secondary case to a preventable case.

Quartile - Any of three values which divide the sorted data set into four equal parts, so that each part represents 1/4 of the sample or population.

Risk Factors - The presence of any particular factor known to be associated with health related conditions considered important to prevent.

SDCEE - Section for Disease Control and Environmental Epidemiology

Serotype - To distinguish organisms on the basis of their constituent antigen(s).

Surveillance (of disease) - An ongoing mechanism to collect, analyze, interpret and distribute information.

Terrestrial species - are animals that live predominantly or entirely on land

Trend - Shows movement consistently in the same direction over a long time.

Thrombocytopenia - An abnormal decrease in the number of platelets.

Vaccine - A suspension of attenuated live or killed microorganisms or fractions thereof, administered to induce immunity and thereby prevent infectious disease.

Vector - A carrier, usually an insect or other arthropod.

XDR-TB - Extensively drug-resistant tuberculosis

Zoonosis - A disease communicable from animals to humans.

Statistical Calculations

Examples of Central Tendency Calculation

Mean

Calculate the **mean** by adding all of the values and dividing the sum by the number of observed values (in this case 11).

55 + 12 + 60 + 46 + 85 + 27 + 39 + 94 + 73 + 5 + 60 = **556**

556 / 11 = **50.54545455**

The **mean** for this data set is **50.5** (result is rounded).

Median

The **median** is the element that falls in the middle of the ordered set. Rank the values from least to most:

5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94.

In this example the **median** is the sixth element in the set, which is **55**.

5, 12, 27, 39, 46, **55**, 60, 60, 73, 85, 94

Example of a Measure of Frequency Calculation

Incidence rates are calculated with the following equation:

(X divided by Y) multiplied by K

Where:
X is the number of cases for a specified time period
Y is the population (possibly exposed) for the same time period
K is a constant (often 1000 or 100,000) that transforms the result into a uniform quantity allowing comparison with other similar quantities.

Example: The Southwest Region has 86 cases of Hepatitis A in 1993, compared to 63 cases in the Central Region for that year. The 1993 population for the Southwest Region is 694,712, while the population for the Central Region is 621,740.

Southwest Region: **(86 / 694,712) * 100,000 = 12.4**
Central Region: **(63 / 621,740) * 100,000 = 10.1**

A comparison of the two incidence rates shows that in 1993 Southwest Region has a slightly higher incidence of Hepatitis A (12.4 reported cases per 100,000 population) than the Central Region (10.1 reported cases per 100,000 population).