Reportable Diseases in Kansas

2008 Summary

Kansas Department of Health and Environment
Bureau of Epidemiology and Disease Prevention

REPORTABLE

INFECTIOUS DISEASES

IN

KANSAS

2008 SUMMARY

Kansas Department of Health and Environment
Division of Health
Bureau of Surveillance and Epidemiology
1000 S.W. Jackson Street, Suite 210
Topeka, Kansas 66612-1274
Telephone (785) 296-2951
Fax (785) 291-3775

Disease Reporting and Public Health Emergencies:
Toll-Free Phone 1-877-427-7317
Toll-Free Fax 1-877-427-7318
Website: http://www.kdheks.gov/epi

TABLE OF CONTENTS

	PAGE #
INTRODUCTION	1
SECTION I: DISEASE SUMMARIES	
Amebiasis	4
Anthrax	*No 2008 cases; summary not included*
Arboviral Disease, including West Nile Virus	7
Botulism	*No 2008 cases; summary not included*
Brucellosis	*No 2008 cases; summary not included*
Campylobacter infections	10
Chancroid	*See http://www.kdheks.gov/std/index.html*
Chlamydia trachomatis	*See http://www.kdheks.gov/std/index.html*
Cholera	*No 2008 cases; summary not included*
Cryptosporidiosis	14
Cyclospora	*No 2008 cases; summary not included*
Diphtheria	*No 2008 cases; summary not included*
Ehrlichiosis	*No 2008 cases; summary not included*
Diarrhea-causing *Eschericia coli*	19
Giardiasis	24
Gonorrhea	*See http://www.kdheks.gov/std/index.html*
Haemophilus influenzae, invasive disease	28
Hantavirus Pulmonary Syndrome	*No 2008 cases; summary not included*
Hemolytic Uremic Syndrome, postdiarrheal	31
Hepatitis A	34
Hepatitis B, including perinatal hepatitis B	37
Hepatitis C	42
Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS)	*See http://www.kdheks.gov/hiv/index.html*
Influenza deaths in children <18 years of age	*See Section II: Special Reports*
Legionellosis	47
Leprosy (Hansen's disease)	*No 2008 cases; summary not included*
Listeriosis	50
Lyme disease	53
Malaria	57
Measles (rubeola)	*No 2008 cases; summary not included*
Meningitis, other bacterial	60
Meningococcocal disease	63
Mumps	66
Pertussis (whooping cough)	69
Plague	*No 2008 cases; summary not included*
Poliomyelitis	*No 2008 cases; summary not included*
Psittacosis	*No 2008 cases; summary not included*
Q fever	73
Rabies, animal	76
Rabies, human	*No 2008 cases; summary not included*
Rocky Mountain spotted fever	*No 2008 cases; summary not included*
Rubella, including congenital rubella syndrome	*No 2008 cases; summary not included*
Salmonellosis, non-typhiodal	81
Severe Acute Respiratory Syndrome (SARS)	*No 2008 cases; summary not included*
Shigellosis	86
Smallpox	*No 2008 cases; summary not included*

PAGE #

Streptococcal invasive disease	90
Syphilis	*See http://www.kdheks.gov/std/index.html*
Tetanus	*No 2008 cases; summary not included*
Toxic shock syndrome	*No 2008 cases; summary not included*
Transmissable Spongioform Encephalopathy (TSE) or prion disease (includes CJD)	99
Trichinosis	*No 2008 cases; summary not included*
Tuberculosis, active disease	102
Tuberculosis, latent infection	107
Tularemia	110
Typhoid fever	113
Varicella (chickenpox)	116
Viral hemorrhagic fever	*No 2008 cases; summary not included*
Yellow fever	*No 2008 cases; summary not included*

SECTION II: SPECIAL REPORTS

Influenza Surveillance, Kansas, 2008-2009	122
Summary of Outbreak Investigations, 2008	133

SECTION III: APPENDICES

Kansas Notifiable Disease Form	143
List of Reportable Diseases, 2008	144
Kansas Map	145
Kansas County Abbreviations	146
Kansas County Populations (2007 Estimates)	147
Denominators Used for Rate Calculations	148
Table 1. Reportable disease cases by year, Kansas, 1999-2008	149
Table 2. Reportable disease cases by county, Kansas, 2008	152
Table 3. Reportable diseases with no known cases, Kansas, 2008	159
References	160

INTRODUCTION

Purpose and format of this report

This is the fourteenth annual summary of reportable diseases published by the Kansas Department of Health and Environment (KDHE). The purpose of this report is to provide useful information for health care providers, public health workers, and policy makers about infectious diseases in Kansas.

The report is divided into three sections. Section I presents summaries of infectious, reportable diseases or conditions of public health importance. Some reportable diseases were not detected during 2008; summaries are presented for those diseases that were reported. Cases must meet the surveillance definition for a confirmed case and be reported to KDHE before March 1, 2009 to be included in this document. Each of the disease summaries includes a brief overview and the surveillance case definition. Rates by demographic characteristics are reported only if more than 50 cases of the disease were reported. Rates have been calculated from the Vintage 2007 bridged-race postcensal population estimates provided by the U.S. Census Bureau and National Center for Health Statistics. Whenever possible, information about disease trends for the United States has been included for comparison with Kansas' trends. Due to confidentiality concerns, limited demographic information is presented if fewer than five total cases of a disease were reported.

Disease incidence of urban and non-urban counties has been included for many diseases. Urban counties are designated based upon population density. Five counties account for approximately half of the state population: Johnson, Wyandotte, Sedgwick, Shawnee, and Douglas. The remaining 100 counties in the state are aggregated into the "non-urban" category.

Race data is collected uniformly for most diseases as follows: American Indian/Alaskan Native (AIAN), Asian/pacific Islander (API), Black/African-American, and White. Ethnicity data is reported as either Hispanic or non-Hispanic.

Section II includes special studies and reports. Section III includes reference documents and supplementary tables.

Disease reporting in Kansas

Health care providers, laboratories, and hospitals are required by Kansas law (K.S.A. 65-118, 65-128; 65-6001 through 65-6007; K.A.R. 28-1-2, 28-1-4, and 28-1-18) to report selected diseases and conditions. Reports of infectious diseases are initially sent to KDHE's Bureau of Surveillance and Epidemiology (BSE), where they are reviewed and forwarded to local health departments. The local health departments are responsible for any required investigation and for instituting basic public health interventions.

Case reports are stored in Kansas' electronic disease surveillance system (also known as KS-EDSS). KS-EDSS is a central, statewide database of reportable and selected non-reportable diseases and conditions. It can be accessed via the internet by authorized public health officials. To protect restricted, confidential, health and clinical data of individuals, internal security structures are in place. The KS-EDSS system allows users to report disease occurrences rapidly and efficiently; user may also generate summary statistics and reports to assist in evaluating public health efforts. Kansas' disease incidence numbers are transmitted from KS-EDSS to the Centers for Disease Control and Prevention (CDC) every week for inclusion in *Morbidity and Mortality Weekly Report* (*MMWR*), a series of publications produced by the CDC's Epidemiology Program Office.

In collaboration with the Council of State and Territorial Epidemiologists (CSTE), CDC publishes case definitions for public health surveillance - the CDC/CSTE surveillance case definitions combine clinical, laboratory, and epidemiologic criteria. By providing uniform criteria for disease reporting, case definitions allow greater specificity and comparability of diseases reported from different geographic regions. The CDC/CSTE case definitions can be found at:

- http://www.cdc.gov/mmwr/preview/mmwrhtml/00047449.htm
- http://www.cdc.gov/epo/dphsi/casedef/case_definitions.htm
- Centers for Disease Control and Prevention. Case definitions for infectious conditions under public health surveillance. MMWR 1997; 46 (no. RR-10).

The usefulness of public health surveillance data depends on its uniformity, simplicity, and timeliness. The case definitions in this report follow the CDC/CSTE surveillance definitions for disease reporting and should not be confused with clinical diagnoses. The use of additional clinical, epidemiologic, and laboratory data may enable a physician to diagnose a disease even though the formal standardized surveillance case definition may not be met.

Interpretation of the data

When interpreting the data in this report, it is important to remember that the completeness of disease reporting is variable. For example, reporting of AIDS cases is estimated to be 90% complete, while nationwide reporting of salmonellosis is estimated to be 2% complete. When interpreting data, absolute numbers are less meaningful than trends; however, trends can be influenced by changes in case definitions, reporting patterns, and by random fluctuations. It is also important to note that small numbers affect rates and interpretation of rates. Small case numbers can produce artificially high disease rates and unstable, widely fluctuating disease trends.

SECTION ONE - DISEASE SUMMARIES

AMEBIASIS

Clinical Features: There are two forms of amebiasis: intestinal and extraintestinal. The intestinal form of the disease is usually asymptomatic, ranging from acute mild abdominal discomfort to chronic diarrhea and fulminating dysentery. Fever, chills, and bloody mucoid diarrhea may also be present. Diarrheal episodes may alternate with periods of constipation or remission. The extraintestinal form appears in severe cases, often characterized by amebic liver abscesses. Infection also may be asymptomatic.

Causative Agent: The protozoan parasite *Entamoeba histolytica*.

Mode of Transmission: *E. histolytica* predominantly infects humans and other primates. Transmission among humans most often occurs through ingestion of chlorine-resistant amebic cysts present in fecally contaminated water or food. Oral-anal sexual contact is also a risk factor for infection.

Incubation Period: Onset of symptoms usually occurs 2 to 4 weeks after infection, but this may be variable.

Period of Communicability: Infection may occur as long as cysts are present in stool, which may continue for years.

Public Health Significance: Amebiasis is of public health concern due to the prolonged shedding period and the severe complications that may develop, usually involving the liver. Immunocompromised persons are also at increased risk of developing the severe form of disease. Treatment is available for both intestinal and extraintestinal amebiasis.

Reportable Disease in Kansas Since: 1982.

Clinical Criteria

- Infection of the large intestine by *Entamoeba histolytica* may result in an illness of variable severity ranging from mild, chronic diarrhea to fulminant dysentery. Extraintestinal infection also can occur (e.g., hepatic abscess).

Laboratory Criteria for Surveillance Purposes

- Intestinal amebiasis
  - Demonstration of cysts or trophozoites of *E. histolytica* in stool or
  - Demonstration of trophozoites in tissue biopsy or ulcer scrapings by culture or histopathology

- Extraintestinal amebiasis
  - Demonstration of *E. histolytica* trophozoites in extraintestinal tissue

Surveillance Case Definitions

- *Confirmed, intestinal amebiasis*: a clinically compatible illness that is laboratory confirmed. Asymptomatic intestinal carriage of *E. histolytica* should not be reported.

- *Confirmed, extraintestinal amebiasis*: a parasitologically confirmed infection of extraintestinal tissue, or among symptomatic persons (with clinical or radiographic findings consistent with extraintestinal infection), demonstration of specific antibody against *E. histolytica* as measured by indirect hemagglutination or other reliable immunodiagnostic test (e.g., enzyme-linked immunosorbent assay). Among asymptomatic persons, a positive serologic test does not necessarily indicate extraintestinal amebiasis.

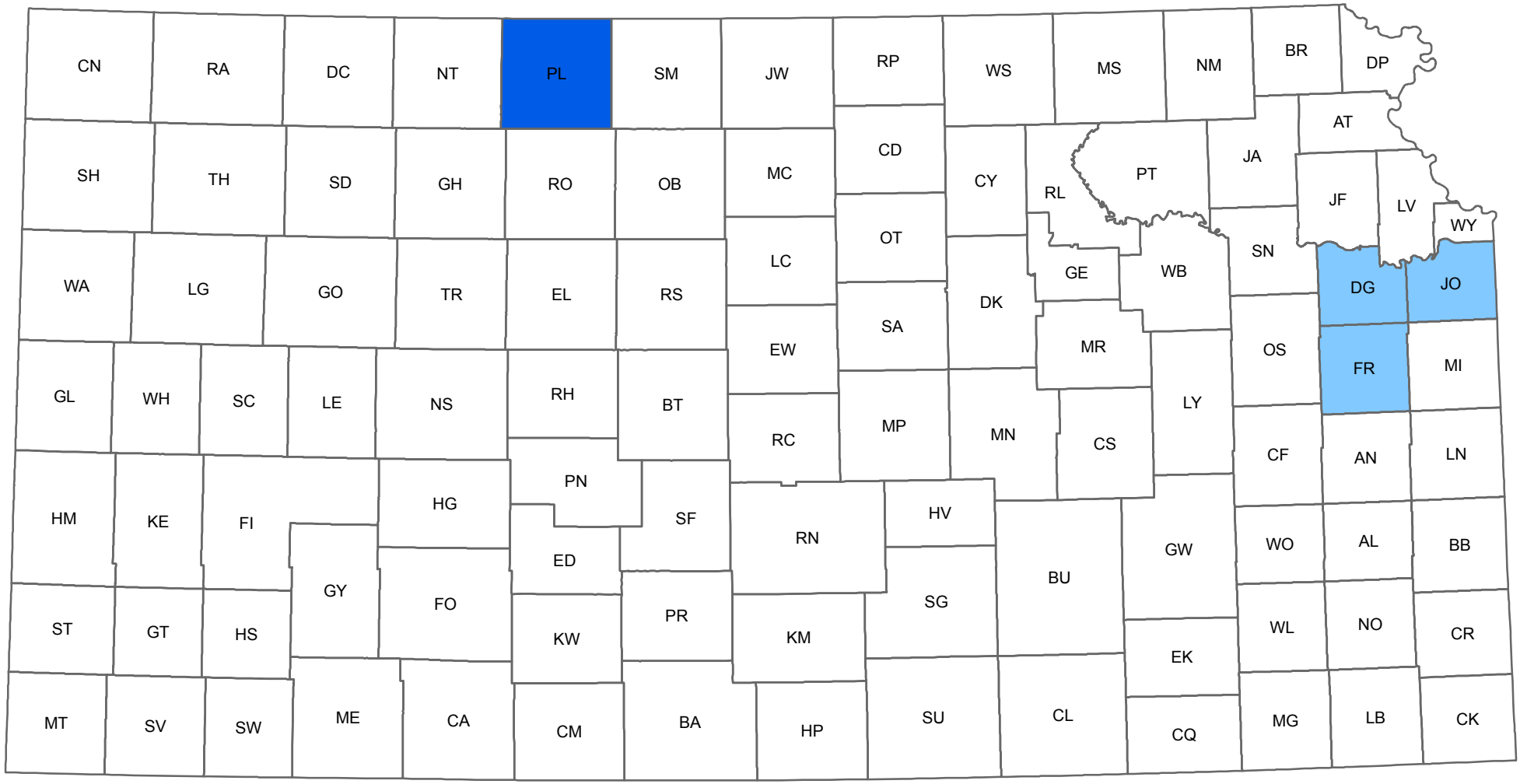
Epidemiology and Trends

2008 Kansas Count: 4

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.0 - 0.3)
U.S. Rate (2007)	*NA*	*NA*

Four cases of intestinal amebiasis were reported during 2008. The three-year median for 2005-2007 was four cases.

Amebiasis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | >= 5.0

ARBOVIRAL DISEASE

(including West Nile virus, Western equine encephalitis, and St. Louis encephalitis)

Clinical Features: Arboviral infections may be asymptomatic or may result in illness of variable severity, sometimes associated with central nervous system (CNS) involvement. When the CNS is affected, clinical syndromes ranging from febrile headache to aseptic meningitis to encephalitis may occur. WNV presents clinical features similar to other causative agents of meningitis and encephalitis.

Causative Agent: Arboviruses, including West Nile virus, Western equine encephalitis virus, and St. Louis encephalitis virus.

Mode of Transmission: Arboviruses are transmitted by the bite of an infected mosquito. Natural transmission involves a mosquito-bird-mosquito cycle; animals such as humans and horses do not circulate enough virus to re-infect a blood-feeding mosquito, and thus are referred to as "dead-end" or "accidental" hosts. Mosquito species responsible for transmission vary by region.

Incubation Period: Varies. For West Nile virus, the incubation period ranges from 3 to 15 days (usually 6 days).

Period of Communicability: Human-to-human transmission is exceptionally rare, but has occurred among blood and organ recipients.

Public Health Significance: The role of public health is limited to surveillance and education. Prevention is accomplished through adopting personal behaviors to prevent being bitten by mosquitoes, and through destroying mosquito breeding sites.

Reportable Disease in Kansas Since: 2002

Laboratory Criteria for Surveillance Purposes

- Fourfold or greater change in virus-specific serum antibody titer, ***OR***
- Isolation of virus from or demonstration of specific viral antigen or genomic sequences in tissue, blood, cerebral spinal fluid (CSF), or other body fluid, ***OR***
- Virus specific immunoglobulin M (IgM) antibodies demonstrated in CSF by antibody-capture enzyme immunoassay (EIA), ***OR***
- Virus-specific IgM antibodies demonstrated in serum by antibody-capture EIA and confirmed by demonstration of virus-specific serum immunoglobulin G (IgG)

antibodies in the same or a later specimen by another serologic assay (e.g., neutralization or hemagglutination inhibition).

Surveillance Case Definitions

- *Confirmed:* an encephalitis or meningitis case that is laboratory confirmed.
- *Probable:* an encephalitis or meningitis case occurring during a period when arboviral transmission is likely and with the following supportive serology:

  1) a single or stable (less than or equal to twofold change) but elevated titer of virus-specific serum antibodies; ***OR***

  2) serum IgM antibodies detected by antibody-capture EIA but with no available results of a confirmatory test for virus-specific serum IgG antibodies in the same or later specimen.

Epidemiology and Trends

2008 Kansas Count: 5

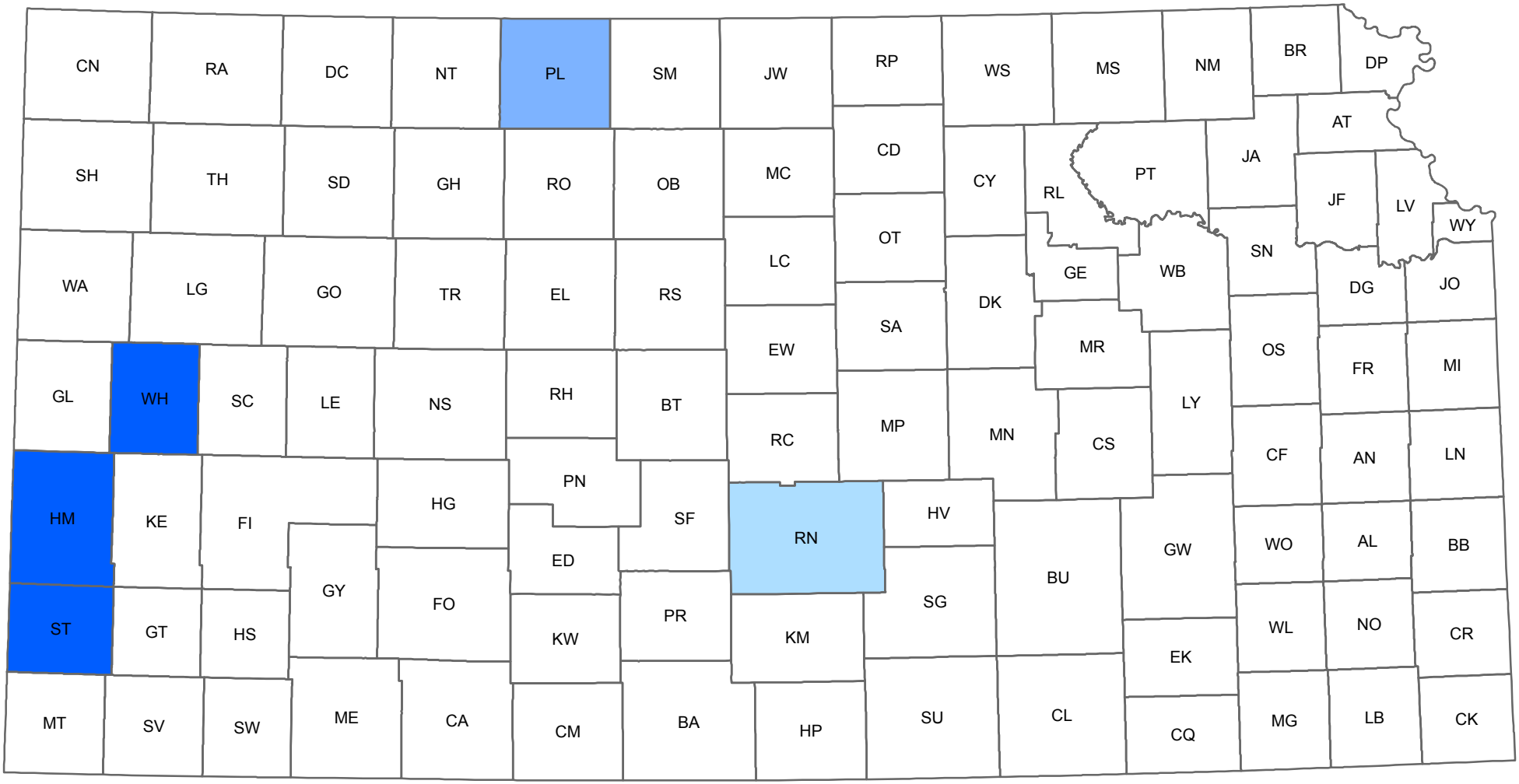
	Rate per 100,000[¶]	*95% Confidence Interval*
Kansas Rate	0.2	(0.0 – 0.3)
U.S. Rate (2007)	0.4	*NA*

[¶] *West Nile virus, neuroinvasive disease*

In 2008, five confirmed cases of arboviral disease were reported in Kansas. Neuroinvasive West Nile virus (WNV) accounted for all five of the cases; one case was fatal.

The three-year median for neuroinvasive WNV for 2005-2007 was 9 cases. Incidence declined sharply after 2003; this is likely due to acquired immunity through exposure to the virus. Historically, neuroinvasive WNV cases have been reported most frequently among persons aged 50 years and older. In 2008, the five neuroinvasive cases ranged from 42 to 64 years of age. The median age was 54 years.

Arboviral Disease Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 19.9 | >= 40.0

CAMPYLOBACTERIOSIS

Clinical Features: An illness characterized by diarrhea, abdominal pain, malaise, fever, nausea, and vomiting. Stools may contain visible or occult blood. Clinical manifestations from *Campylobacter* can range from mild infections lasting 1 to 2 days to severe persistent infections. Occasionally, long-term consequences may result from infection, including Guillain-Barre′ syndrome (GBS), a rare disease that affects the nervous system.

Causative Agent: *Campylobacter* spp., most commonly *Campylobacter jejuni.*

Mode of Transmission: Occurs after ingestion of contaminated liquids (particularly untreated water or unpasteurized milk and juices) or food (undercooked chicken or pork). Direct contact with fecal material from infected animals and person-to-person contact are less frequent causes of infection. Reservoirs include animals, most commonly poultry and cattle. Puppies, kittens, other pets, swine, sheep, rodents, and birds may also be sources of human infection. Chronic infection of poultry and other animals constitutes the primary source of infection.

Incubation Period: 1 to 10 days (average 2 to 5 days)

Period of Communicability: Throughout the course of infection; usually from several days to several weeks; can last from 2 to 7 weeks if not treated with antibiotics.

Public Health Significance: *Campylobacter* spp. are an important cause of diarrheal illness in all parts of the world and in all age groups. Common source outbreaks have occurred, most often associated with foods, especially undercooked chicken, unpasteurized milk, and nonchlorinated water

Reportable Disease in Kansas Since: 1990

Laboratory Criteria for Surveillance Purposes

- Isolation of *Campylobacter* from any clinical specimen.

Surveillance Case Definitions

- *Confirmed:* A case that is laboratory confirmed.
- *Probable:* A clinically compatible case that is epidemiologically linked to a confirmed case

Epidemiology and Trends

In 2008, 399 cases of campylobacteriosis were reported in Kansas. The three-year median for 2005-2007 was 335 cases.

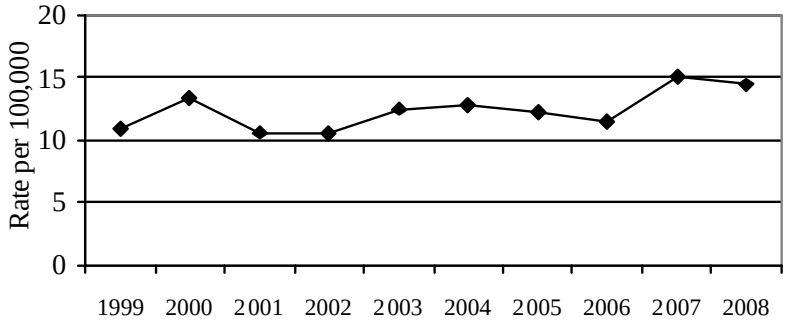
Confirmed cases ranged in age from less than one year to 92 years. The median age was 32 years. The highest incidence rate occurred in those under 5 years of age (19.9 per 100,000).

The species of *Campylobacter* was reported for 248 (62%) of the reported cases. Of these, 242 (98%) were *Campylobacter jejuni*. The remaining six isolates were *Campylobacter coli*.

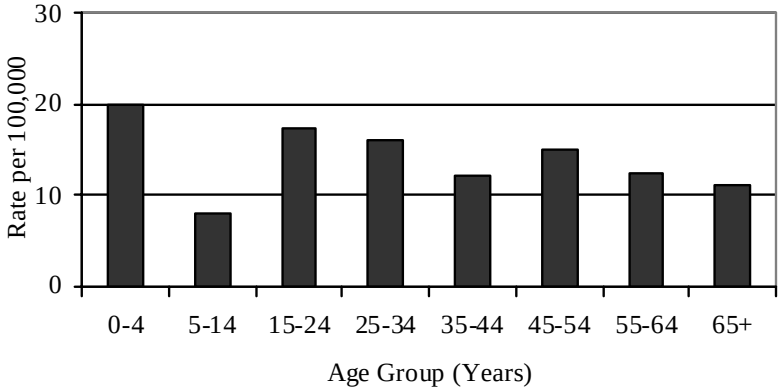
2008 Kansas Count: 399

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	14.4	(13.0 – 15.8)
U.S. Rate (2007)	*NA*	*NA*
Gender		
Male	16.2	(14.1 – 18.3)
Female	12.6	(10.7 – 14.4)
Race		
White	9.3	(8.1 – 10.5)
Black	1.1	(0.0 – 2.6)
Asian/Pacific Islander	5.9	(0.1 – 11.7)
Native American	3.2	(0 – 9.4)
Ethnicity		
Hispanic	9.4	(5.6 – 13.3)
Non-Hispanic	6.4	(5.5 – 7.4)
County of Residence		
Urban County	11.7	(9.9 – 13.5)
Non-Urban County	17.3	(15.0 – 19.5)

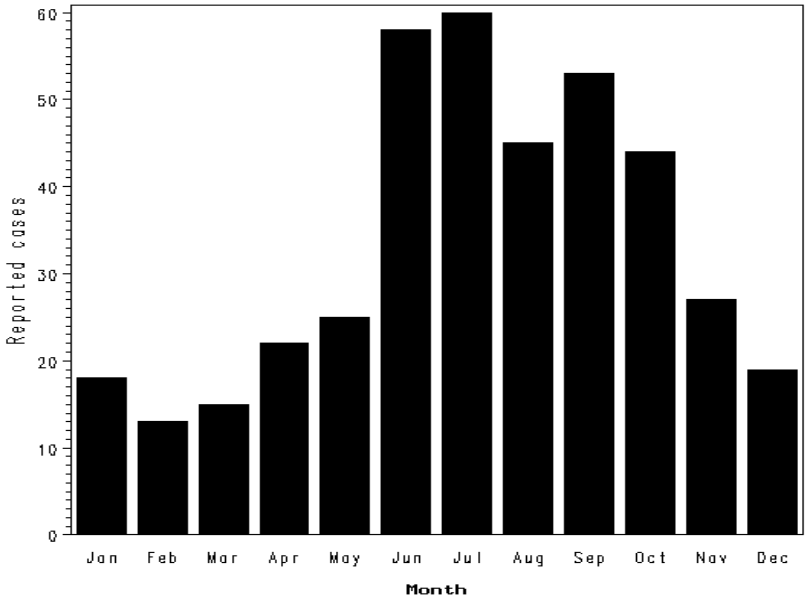
Campylobacteriosis rate by year
Kansas, 1999 - 2008



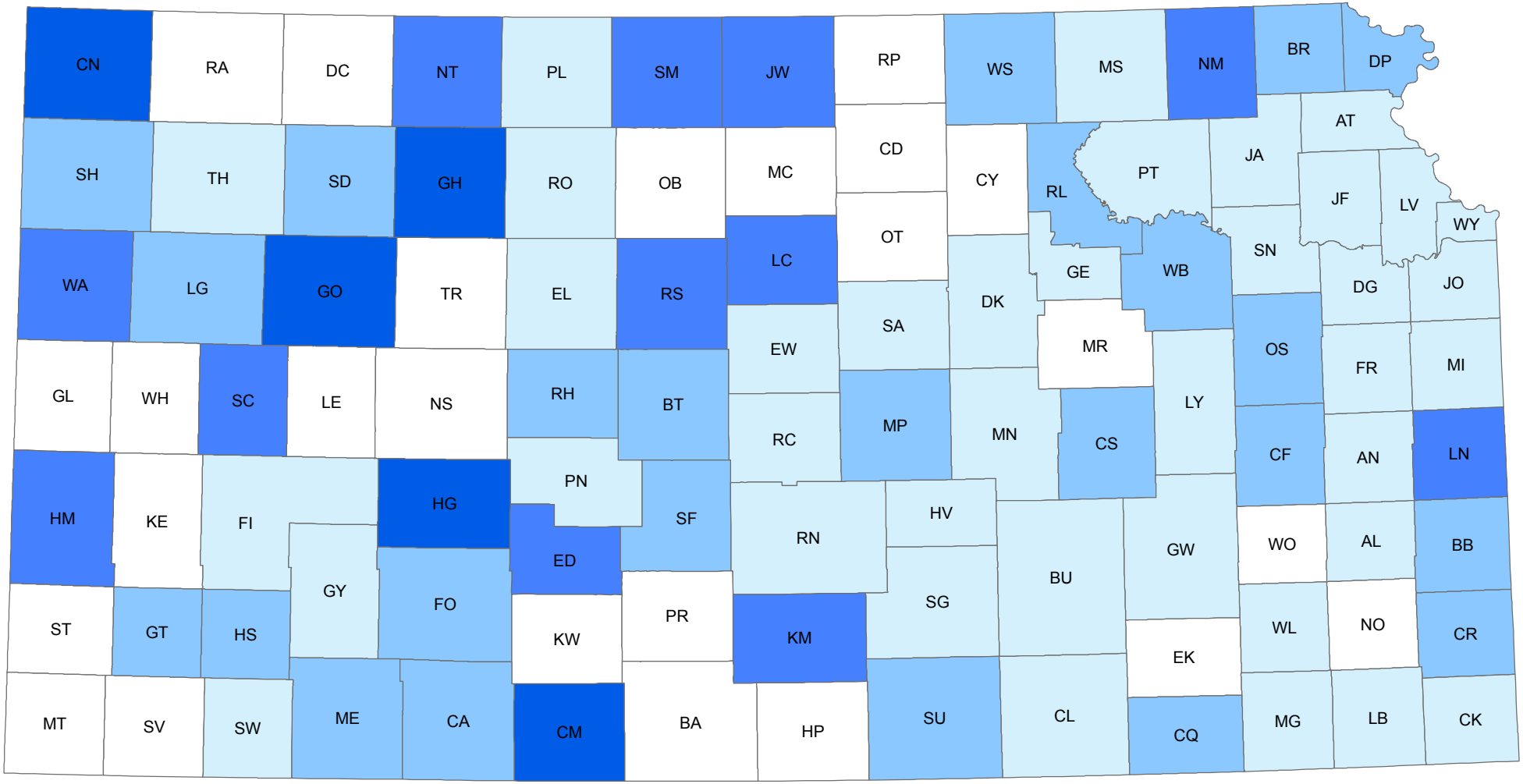
Campylobacteriosis rate by age group
Kansas, 2008



Campylobacteriosis cases by month
Kansas, 2008



Campylobacteriosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 19.9 | 20.0 - 49.9 | 50.0 - 99.9 | >= 100.0

CRYPTOSPORIDIOSIS

Clinical Features: An illness characterized by profuse, watery diarrhea. Other symptoms that may appear include abdominal cramps, loss of appetite, severe weight loss, low-grade fever, nausea, and vomiting. Symptoms often wax and wane and disappear in two weeks among healthy people. Asymptomatic infections are also common.

Causative Agent: *Cryptosporidium* spp., a spore-forming coccidian protozoa. *C. parvum* and *C. hominis* are the most common species affecting humans.

Mode of Transmission: Occurs person-to-person, animal-to-person, waterborne and foodborne via the fecal-oral route. Reservoirs include humans, cattle, and other domestic animals.

Incubation Period: 1 to 12 days (average 7 days)

Period of Communicability: As long as oocysts are present in the stool. Oocysts may be shed in the stool from the onset of symptoms to several weeks after symptoms resolve.

Public Health Significance: *C. parvum* has been the cause of several large waterborne outbreaks (drinking and recreational) in recent decades. The oocysts are highly resistant to normal amounts of chemical disinfectants, including chlorine, and filtration is needed to remove the oocysts from public water supplies.

With a low infectious dose (as low as 10 organisms) and a long shedding period (sometimes up to 2 months), cryptosporidiosis is extremely contagious and may be easily transmitted person-to-person. Attack rates of 30% to 60% have been reported in outbreaks associated with childcare centers.

Though all individuals are at risk for infection, young children and pregnant women may be more susceptible to dehydration. Illness among immunocompromised individuals, especially persons with HIV/AIDS, may be life-threatening.

Reportable Disease in Kansas Since: 1997

Laboratory Criteria for Surveillance Purposes

- Laboratory-confirmed cryptosporidiosis shall be defined as the detection—in symptomatic or asymptomatic persons—of *Cryptosporidium*

1. oocysts in stool by microscopic examination, ***OR***
2. in intestinal fluid or small-bowel biopsy specimens, ***OR***

3.oocyst or sporozoite antigens by immunodiagnostic methods, e.g., ELISA, ***OR***
4.by PCR techniques when routinely available, ***OR***
5.demonstration of reproductive stages in tissue preparations.

Surveillance Case Definitions

- Confirmed, symptomatic: a laboratory-confirmed case associated with one of the symptoms described above

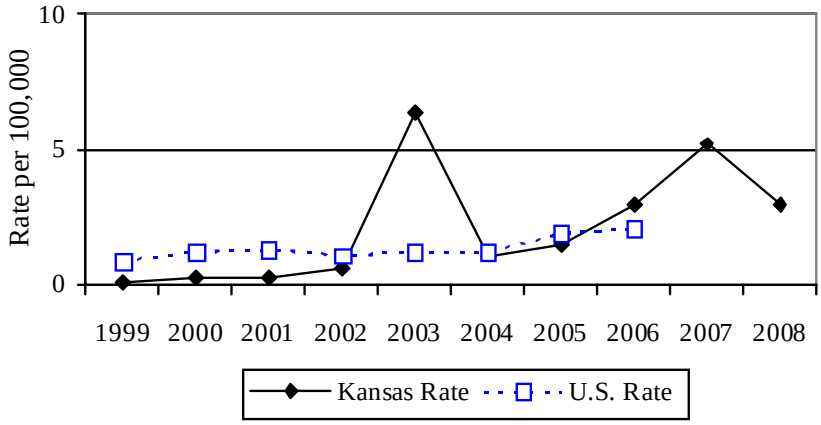
- Confirmed, asymptomatic: a laboratory-confirmed case associated with none of the above symptoms

Epidemiology and Trends

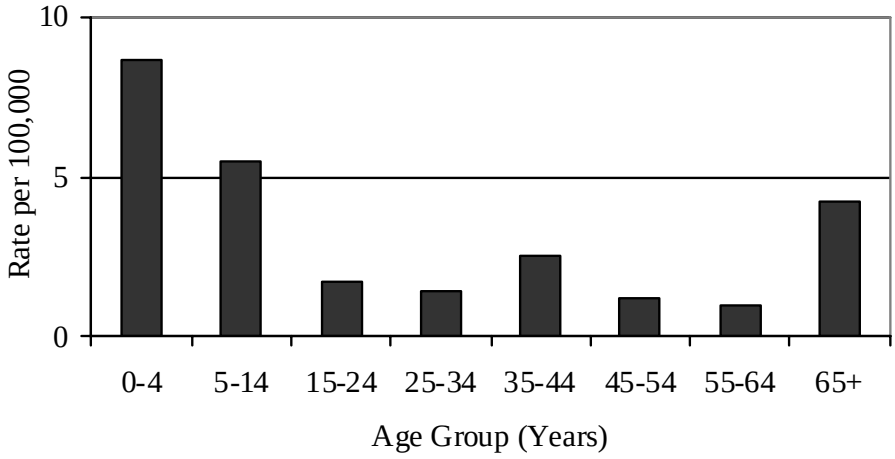
2008 Kansas Count: 84

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	3.0	(2.4 – 3.7)
U.S. Rate (2007)	3.7	*NA*
Gender		
Male	3.0	(2.1 – 3.9)
Female	3.1	(2.2 – 4.0)
Race		
White	2.3	(1.7 – 2.9)
Black	0.5	(0.0 – 1.6)
Ethnicity		
Hispanic	1.2	(0.0 – 2.6)
Non-Hispanic	1.7	(1.2 – 2.3)
County of Residence		
Urban County	2.2	(1.4 – 2.9)
Non-Urban County	4.0	(2.9 – 5.1)

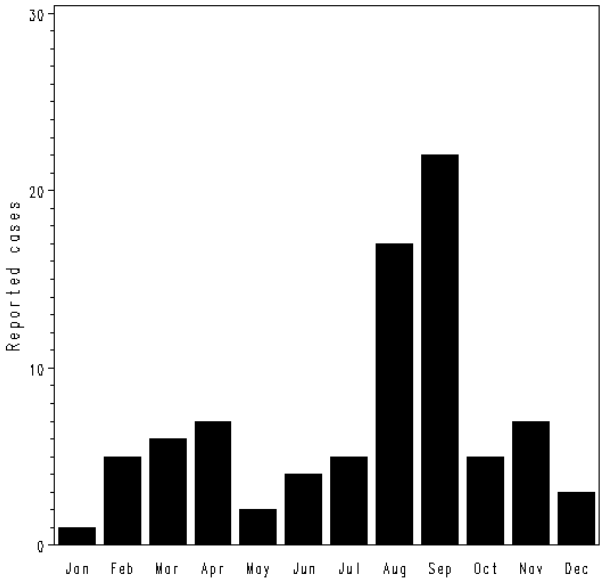
Cryptosporidiosis rate by year, 1999 - 2008



Cryptosporidiosis rate by age group
Kansas, 2008



Cryptosporidiosis cases by month
Kansas, 2008



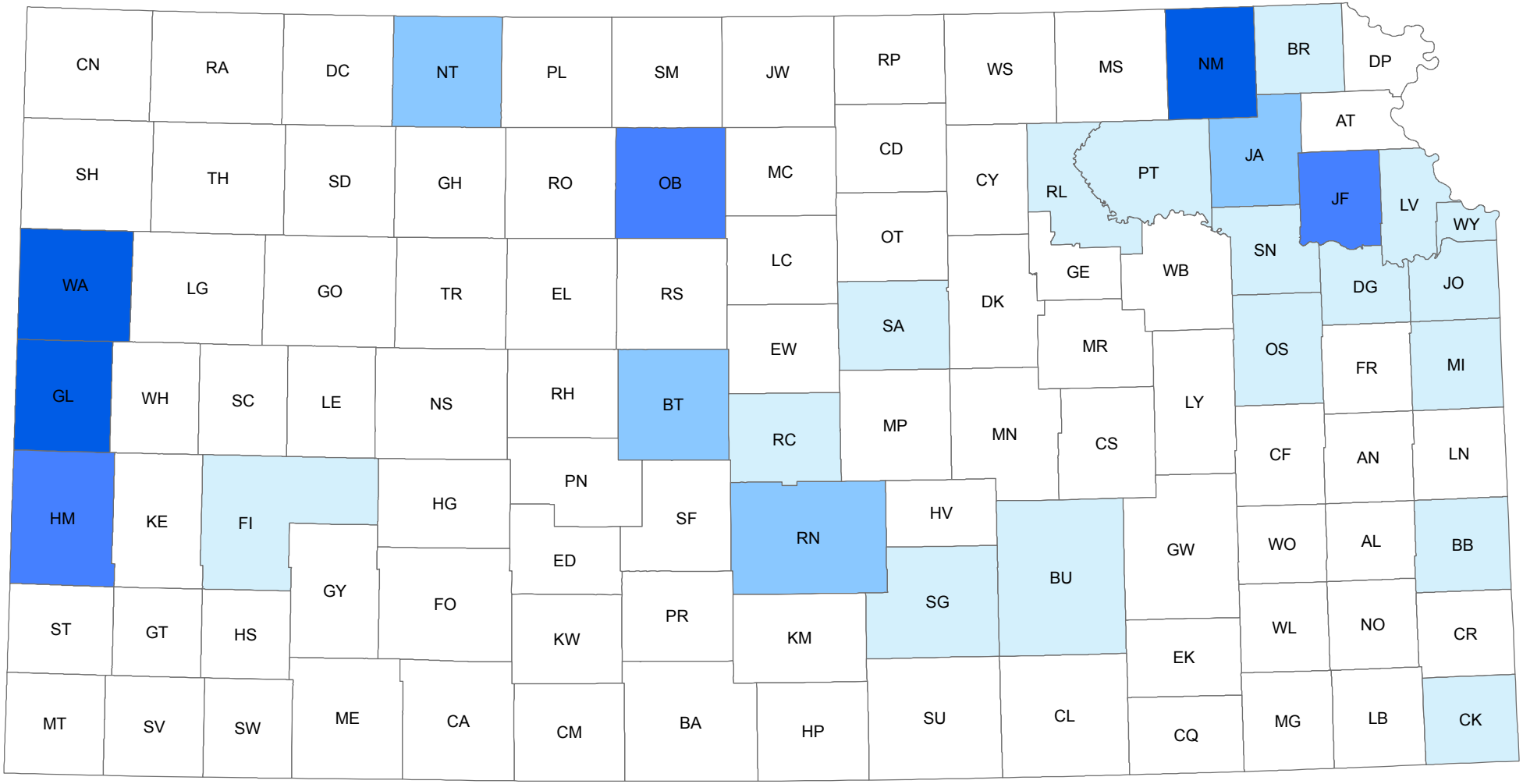
The number of confirmed cryptosporidiosis cases among Kansas residents fell to 84, down from 2007's four-year high of 144 cases. The three-year median from 2005-2007 was 82 cases.

The highest rate of infection (8.7 per 100,000) was among children aged less than five years. Children aged less than 15 years constituted nearly half (47.6%) of the confirmed cases. Non-urban county residents were more affected than urban residents.

Outbreaks were identified in Saline County and Nemaha County[*]. A total of 8 confirmed cases, two from Saline and six from Nemaha, were linked to these outbreaks.

[*] A detailed outbreak report may be found in Section II of this document, "Special Reports".

Cryptosporidiosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 9.9 | 10.0 - 19.9 | 20.0 - 49.9 | >= 50.0

DIARRHEA-CAUSING *ESCHERICHIA COLI*

Clinical Features: Most strains of *E. coli* are harmless and live in the intestines of healthy humans and animals; other strains may cause disease in humans. The most virulent of these strains is Shiga toxin-producing *E. coli* (STEC), formally known as enterohemorrhagic *E. coli* (EHEC). *E. coli* O157:H7 is the predominant EHEC serotype. Illness due to STEC is usually self-limiting and consists of severe abdominal cramping and bloody diarrhea. Serious clinical manifestations, including hemolytic-uremic syndrome (HUS), a complication that alters normal kidney function, and postdiarhreal thrombotic thrombocytopenic purpura (TTP), a blood and kidney illness that affects the nervous system, may occur, particularly among immunocomprised individuals, young children, and the elderly.

Causative Agent: at least five strains of diarrhea-producing *Escherichia coli* bacteria have been identified: Shiga toxin-producing *E. coli* (STEC), enteropathogenic *E. coli* (EPEC), enterotoxigenic *E. coli* (ETEC), enteroinvasive *E. coli* (EIEC), and enteroaggregative *E.coli* (EAEC).

Mode of Transmission: Transmission of STEC strains occurs via the fecal-oral route, during which susceptible individuals ingest food or liquids contaminated with human or animal feces. Outbreaks of STEC infections have been linked to eating undercooked ground beef, consuming contaminated produce, and drinking contaminated water or unpasteurized juice. Person-to-person transmission may also occur, especially within daycare settings and nursing homes.

Incubation Period: may range from 2-8 days (usually for 3-4 days).

Period of Communicability: The duration of excretion of the pathogen may vary by age group. Adults typically shed STEC for up to one week; however, infected children have been found to shed STEC for three weeks. A prolonged carriage state is not common.

Public Health Significance: Diarrhea-causing *E. coli* is often associated with contaminated beef and food products. Monitoring this disease serves as a potential indicator to problems in meat, fruit, and/or vegetable processing. A product recall may be issued if *E. coli* O157:H7 contamination is suspected—the USDA enforces a "zero tolerance" policy on this pathogen.

Reportable Disease in Kansas Since: 1997

Laboratory Criteria for Surveillance Purposes

- Isolation of *Escherichia coli* O157:H7 from a specimen. *Escherichia coli* O157:H7 isolates may be assumed to be Shiga toxin-producing. For all other *E. coli* isolates, Shiga toxin production or the presence of Shiga toxin genes must be determined to be considered STEC.

Surveillance Case Definitions

- *Suspect*:
  - A case of postdiarrheal HUS or TTP, ***OR***
  - Identification of Shiga toxin in a specimen from a clinically compatible case without the isolation of the Shiga toxin-producing *E. coli*.

- *Probable*:
  - A case with isolation of *E. coli* O157 from a clinical specimen, without confirmation of H7 or Shiga toxin production, ***OR***
  - A clinically compatible case that is epidemiologically linked to a confirmed or probable case, ***OR***
  - Identification of an elevated antibody titer to a known Shiga toxin-producing *E. coli* serotype from a clinically compatible case.

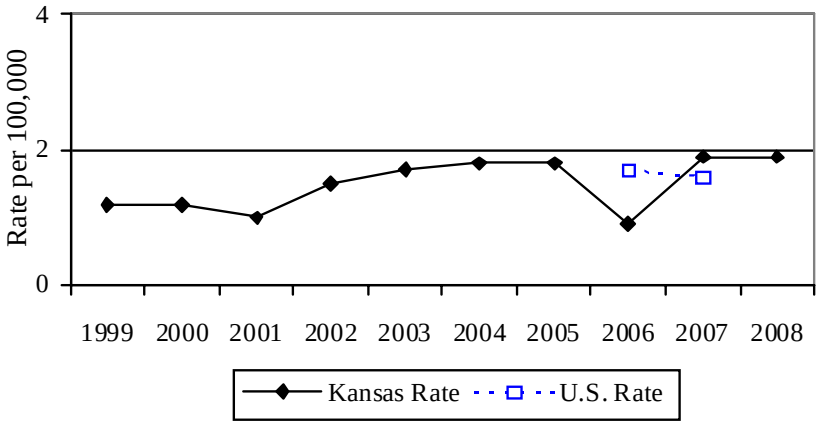
- *Confirmed*: A case that meets the laboratory criteria for diagnosis.

Epidemiology and Trends

2008 Kansas Count: 52

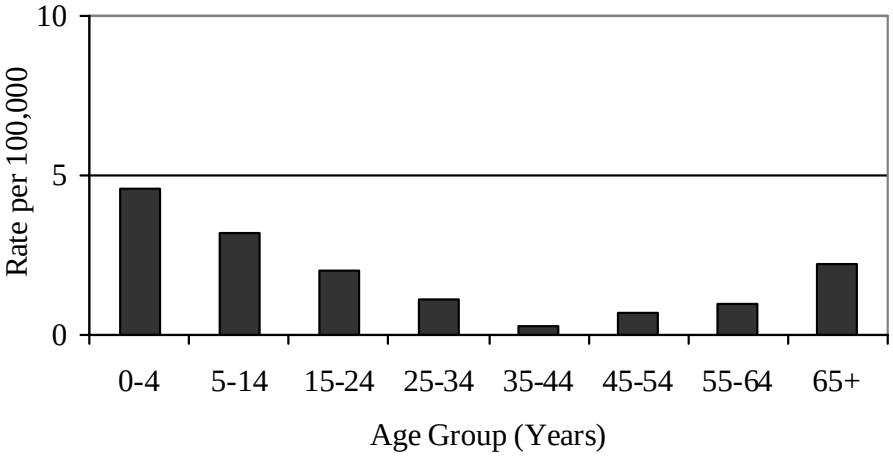
	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	1.9	(1.4 – 2.4)
U.S. Rate (2007)	1.6	*NA*
Gender		
Male	1.8	(1.1 – 2.5)
Female	1.9	(1.2 – 2.7)
Race		
White	1.5	(1.0 – 2.0)
Ethnicity		
Hispanic	2.1	(0.3 – 3.8)
Non-Hispanic	0.8	(0.4 – 1.1)
County of Residence		
Urban County	1.7	(1.0 – 2.3)
Non-Urban County	2.1	(1.3 – 2.9)

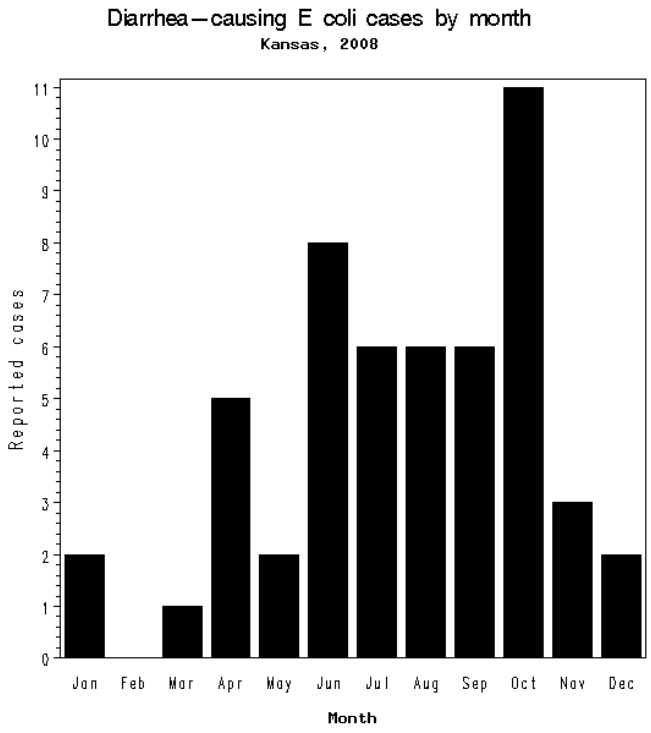
Diarrhea-causing *E. coli* rate by year, 1999 - 2008*



**Shiga toxin producing E. coli was not nationally reportable before 2006.*

Diarrhea-causing *E. coli* rate by age group
Kansas, 2008

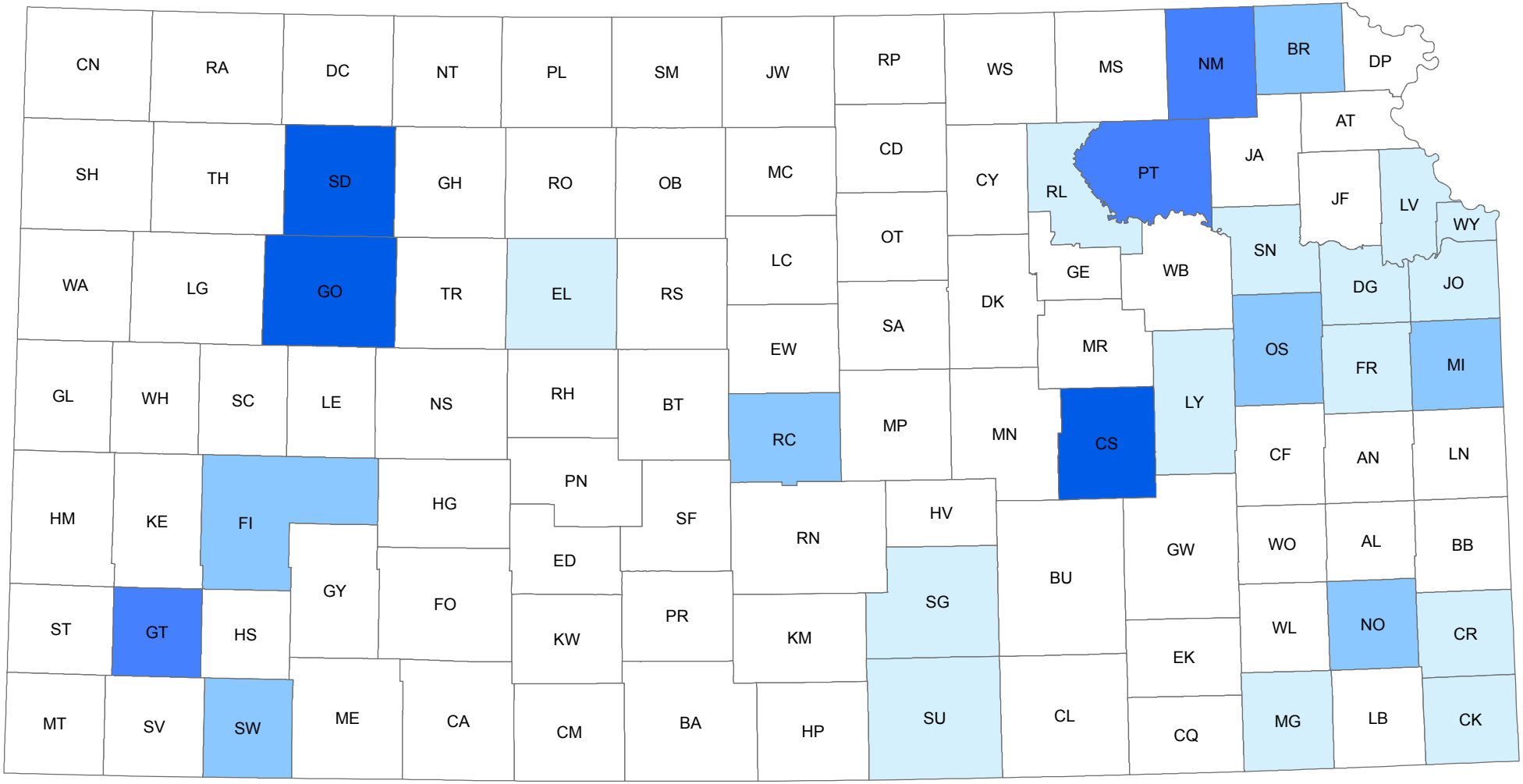




Of the 52 cases of diarrhea-causing *E. coli* reported in Kansas during 2008, 28 (54%) were caused by *E. coli* O157:H7. The remaining cases were attributed to other STEC strains. Kansas' three-year median for 2005-2007 was 49 cases.

The highest rate of disease (4.6 per 100,000) was reported among children aged less than five years.

Diarrhea-causing E. coli Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.0 - 19.9 | >= 20.0

GIARDIASIS

Clinical Features: The disease is often asymptomatic. When symptomatic, most common symptoms include chronic diarrhea, abdominal cramps, bloating, frequent loose and pale stools, malabsorption of fat and fat-soluble vitamins, fatigue, and weight loss. In severe giardiasis, damage to the duodenal and jejunal mucosal cells may occur.

Causative Agent: *Giardia lamblia*, a protozoan parasite

Mode of Transmission: Person-to-person transmission, especially in institutions and day care centers, is the principal mode of spread. Transmission is via the fecal-oral route, through ingestion of contaminated drinking water and recreational water, and less often from contaminated food. Humans are the principal reservoir of the infection. Dogs, cats, beavers, and other animals could be infected.

Incubation Period: Ranges from 3-25 days or longer (average of 7-10 days).

Period of Communicability: Entire period of infection. *Giardia* is often shed in the stool for months.

Public Health Significance: Disease may be prevented by promotion of good hand washing. Institutional outbreaks, especially in child day care centers, may result from person-to-person transmission - exclusion policies may apply to infected day care enrollees, foodworkers, and direct patient care providers.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Demonstration of *Giardia lamblia* cysts in stool, **OR**
- Demonstration of *Giardia lamblia* trophozoites in stool, duodenal fluid, or small bowel biopsy, **OR**
- Demonstration of *Giardia lamblia* antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay - ELISA).

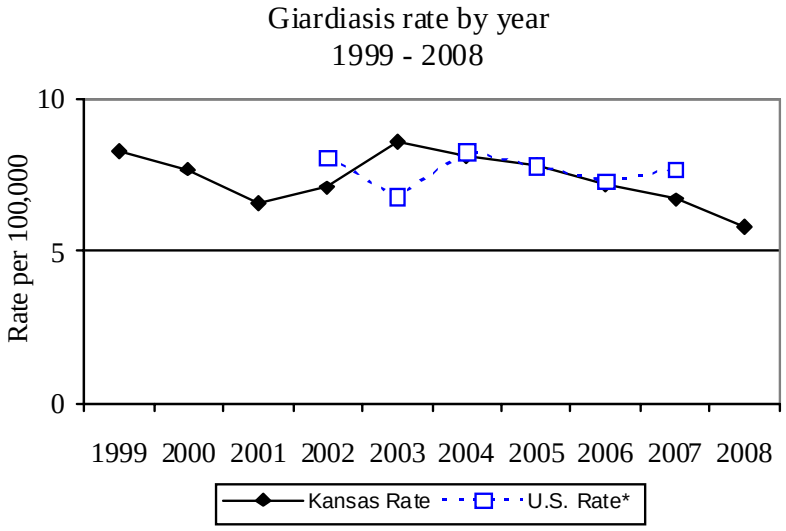
Surveillance Case Definitions

- *Confirmed:* a case that is laboratory confirmed.
- *Probable:* a clinically compatible case that is epidemiologically linked to a confirmed case.

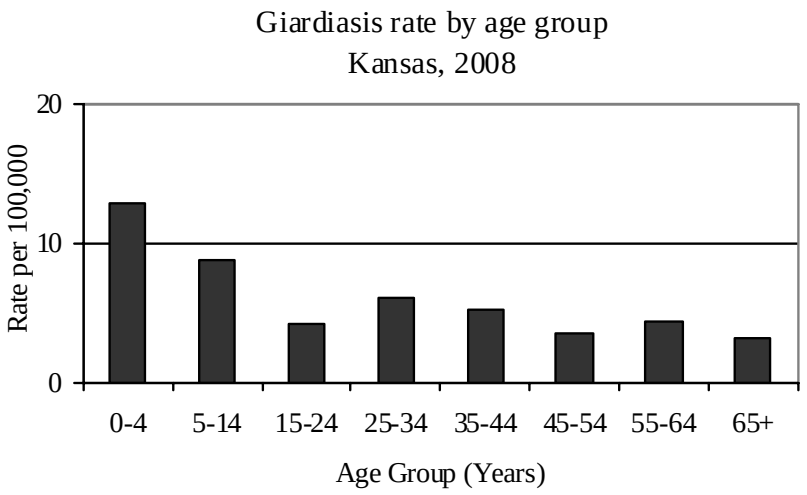
Epidemiology and Trends

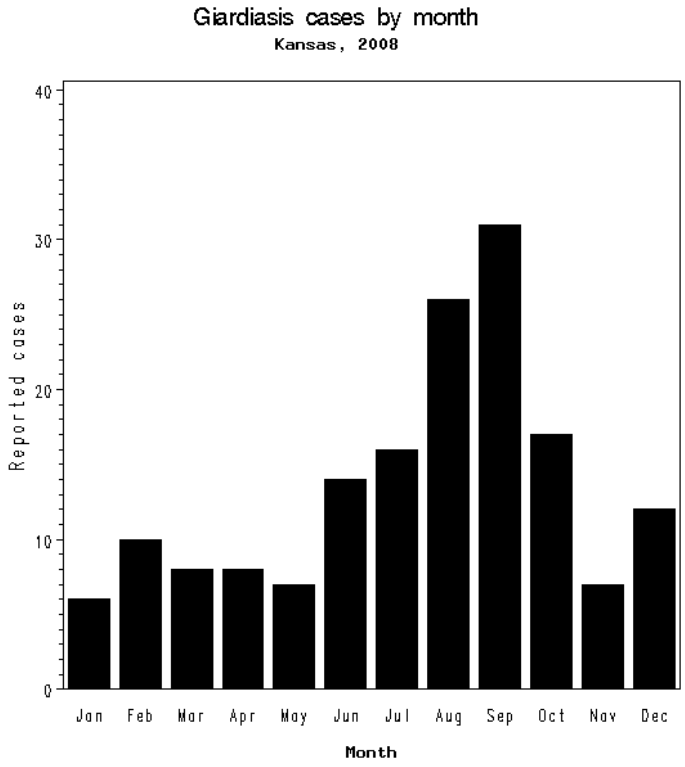
2008 Kansas Count: 162

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	5.8	(4.9 – 6.7)
U.S. Rate (2007)	7.7	*NA*
Gender		
Male	6.5	(5.1 – 7.8)
Female	5.2	(4.0 – 6.4)
Race		
White	2.8	(2.2 – 3.5)
Black	1.6	(0.0 – 3.5)
Asian/Pacific Islander	14.8	(5.6 – 23.9)
Ethnicity		
Hispanic	4.5	(1.8 – 7.2)
Non-Hispanic	2.3	(1.7 – 2.9)
County of Residence		
Urban County	6.2	(5.0 – 7.5)
Non-Urban County	5.4	(4.2 – 6.7)



**Not nationally notifiable until 2002*

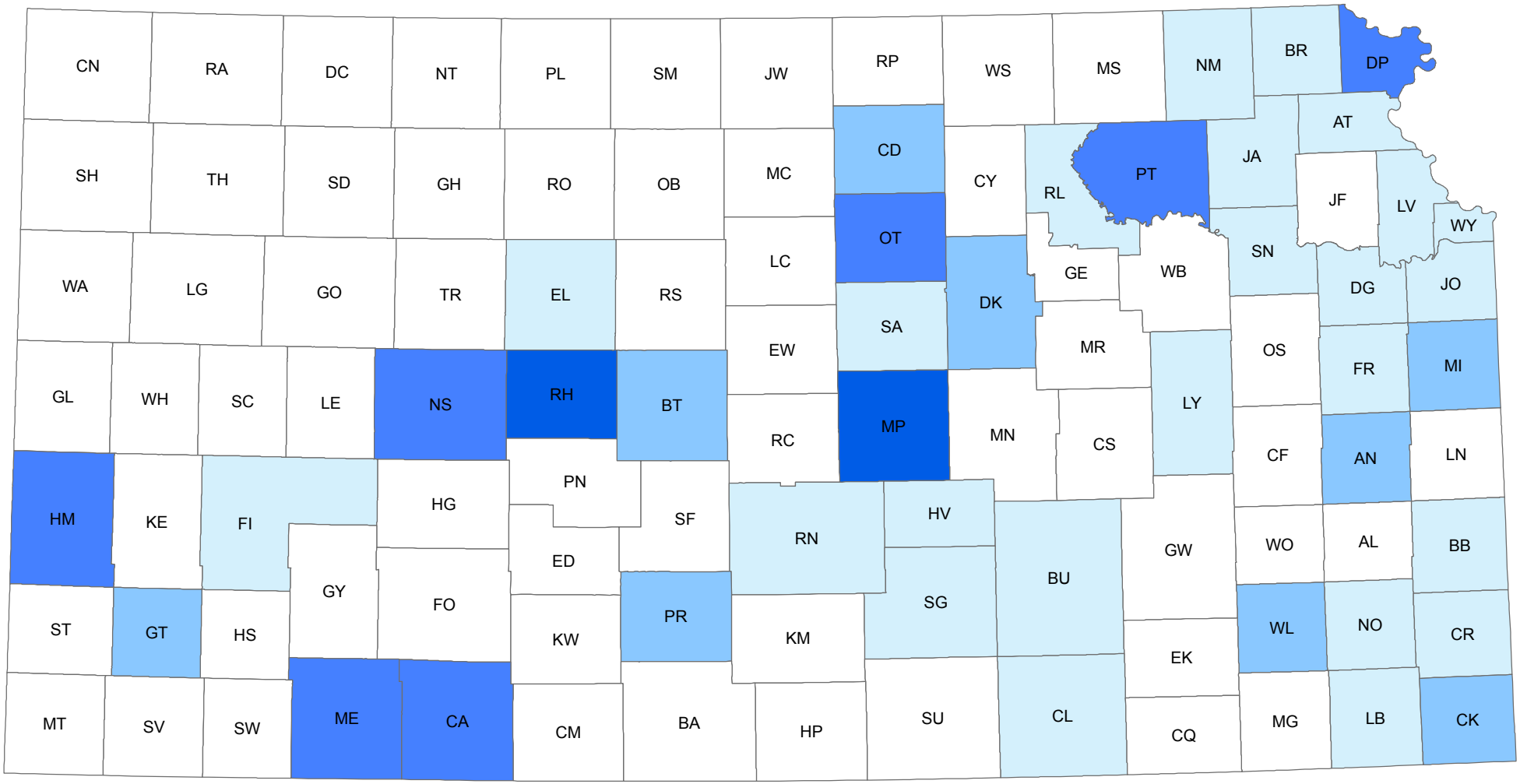




Reported cases of giardiasis decreased for the fifth consecutive year. In 2008, 162 cases (5.8 per 100,000 residents) were reported in Kansas. The three-year median for 2005-2007 was 198 cases.

Confirmed cases ranged in age from less than one year to 87 years. The median age of cases was 25.5 years. The highest incidence rate (12.8 per 100,000) occurred in those under 5 years of age.

Giardiasis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 9.9 | 10.0 - 19.9 | 20.0 - 49.9 | >= 50.0

HAEMOPHILUS INFLUENZAE, INVASIVE DISEASE

Clinical Features: Several clinical syndromes including meningitis, septic arthritis, epiglottitis, cellulitis, bacteremia, and pneumonia may characterize invasive infection. Symptoms of meningitis may include fever, headache, lethargy, vomiting, and stiff neck. Other symptoms depend on the part of the body affected.

Causative Agent: *Haemophilus influenzae*, a gram-negative bacterium with six serotypes (a through f)

Mode of Transmission: Found in the upper respiratory tract of humans, the organism may be transmitted by direct contact or droplet inhalation of respiratory tract secretions.

Incubation Period: Unknown; probably short, 2-4 days.

Period of Communicability: As long as organisms are present, which may be for a prolonged period, even without nasal discharge. Considered noncommunicable within 24-48 hours after starting effective antibiotic therapy.

Public Health Significance: Before *H. influenzae* type B (HiB) conjugate vaccinations, *H. influenzae* type B was the leading cause of invasive diseases among children under 5 years of age. Immunization has been an effective method of limiting invasive HiB disease. Preventive antibiotics may prevent illness in close contacts to known cases of HiB, especially susceptible children.

Reportable Disease in Kansas Since: 1997

Laboratory Criteria for Surveillance Purposes

- Isolation of *H. influenzae* from a normally sterile site, such as blood, bone, joint, pericardial fluid, peritoneal fluid, or spinal fluid. (Note: Positive antigen test results from urine or serum samples are unreliable for diagnosis of *H. influenzae*.)

Surveillance Case Definitions

- *Confirmed:* A clinically compatible case that is laboratory confirmed.

- *Probable:* A clinically compatible case with detection of *H. influenzae* type B antigen in CSF.

Epidemiology and Trends

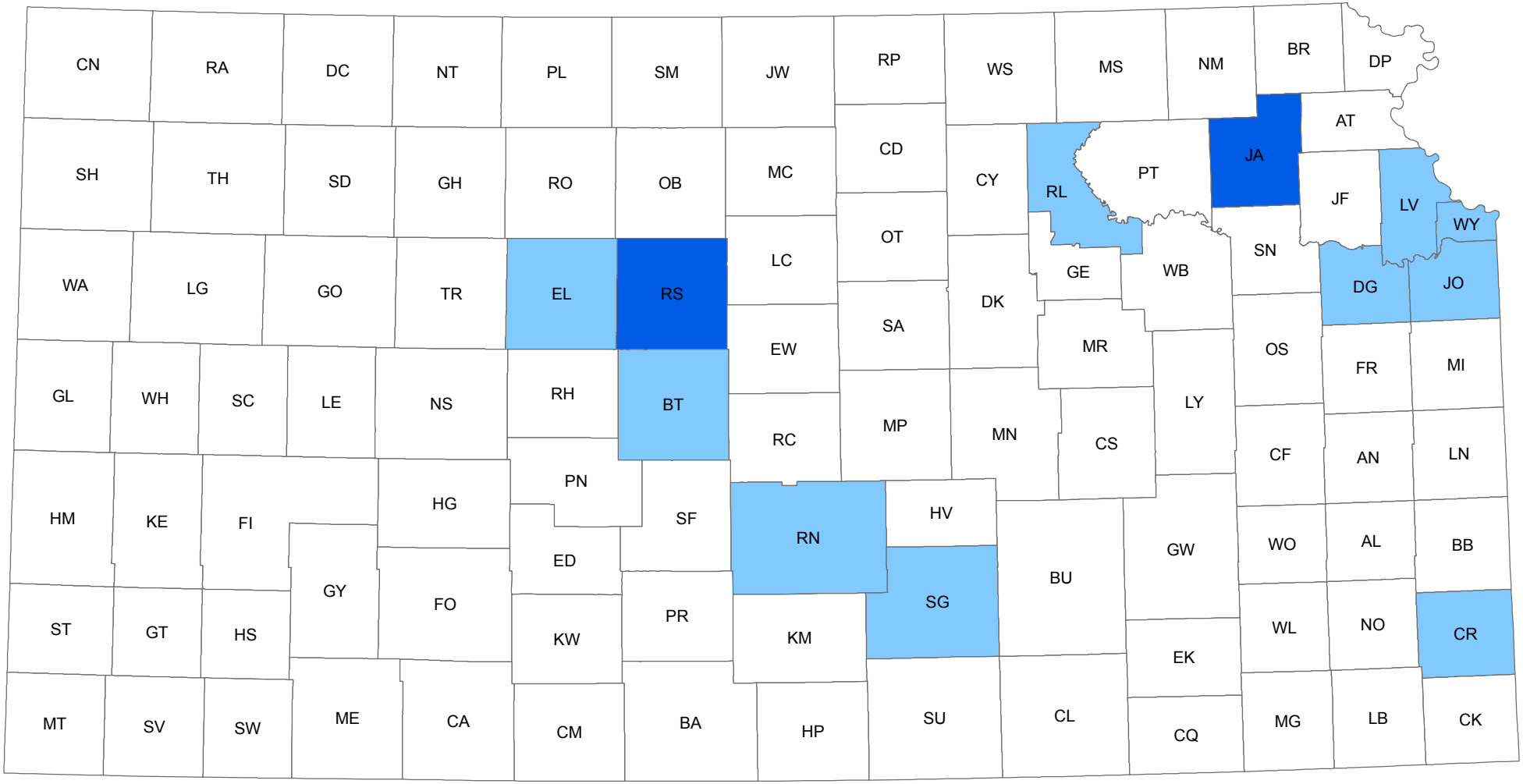
2008 Kansas Count: 20

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.7	(0.4 – 1.0)
U.S. Rate (2007)	0.9	*NA*

In 2008, there were 20 reported cases of invasive *Haemophilus influenzae* infections in Kansas. The three-year median for 2005-2007 was 18 cases. The cases ranged from less than one year of age to 97 years of age; the median age was 73.0 years. Two of the 20 reported cases were less than five years of age.

Of the 10 isolates for which serotyping was performed, six were serotype non-b and four were non-typeable. For the cases less than five years of age, both were unencapsulated, non-typeable strains. No cases of serotype B (HiB) were reported.

Haemophilus Influenzae Invasive Disease Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | >= 5.0

HEMOLYTIC UREMIC SYNDROME, POSTDIARRHEAL

Clinical Features: Hemolytic uremic syndrome (HUS) is characterized by the acute onset of microangiopathic hemolytic anemia, renal injury, and low platelet count. Thrombotic thrombocytopenic purpura (TTP) also is characterized by these features but can include central nervous system (CNS) involvement and fever and may have a more gradual onset. Most cases of HUS (but few cases of TTP) occur after an acute gastrointestinal illness (usually diarrheal). Some evidence has suggested that the use of antimicrobial therapy may precipitate complications like HUS.

Causative Agent: Shiga toxin-producing bacteria. *E. coli* O157:H7 causes an estimated 90% of HUS cases; *Shigella dysenteriae* type 1 may also cause HUS.

Mode of Transmission: HUS is not transmissible, although its causative agent may be transmitted via the fecal-oral route—susceptible individuals ingest food or liquids contaminated with human or animal feces. Outbreaks have been linked to animal contact, eating undercooked ground beef, consuming contaminated produce, and drinking contaminated water or unpasteurized juice. Person-to-person transmission may also occur, especially within daycare settings and nursing homes.

Incubation Period: Undefined. HUS is typically diagnosed a week or more after the onset of diarrhea

Period of Communicability: *N/A*

Public Health Significance: HUS is most commonly caused by *E. coli* O157:H7, a bacterium often associated with contaminated beef and food products. Monitoring this disease serves as a potential indicator to problems in meat, fruit, and/or vegetable processing. Risk for HUS may be lowered if *E. coli* O157:H7 enteritis patients are not treated with antimicrobial agents.

Reportable Disease in Kansas Since: 2000

Laboratory Criteria for Surveillance Purposes

- Anemia (acute onset) with microangiopathic changes (i.e., schistocytes, burr cells, or helmet cells) on peripheral blood smear, ***AND***

- Renal injury (acute onset) evidenced by either hematuria, proteinuria, or elevated creatinine level (i.e., greater than or equal to 1.0 mg/dL in a child aged less than 13 years or greater than or equal to 1.5 mg/dL in a person aged greater than or equal to 13 years, or greater than or equal to 50% increase over baseline)

Surveillance Case Definitions

- *Confirmed*: an acute illness diagnosed as HUS or TTP that both meets the laboratory criteria and began within 3 weeks after onset of an episode of acute or bloody diarrhea

- *Probable*:

  - An acute illness diagnosed as HUS or TTP that meets the laboratory criteria in a patient who does not have a clear history of acute or bloody diarrhea in preceding 3 weeks, ***OR***

  - An acute illness diagnosed as HUS or TTP, that a) has onset within 3 weeks after onset of an acute or bloody diarrhea and b) meets the laboratory criteria except that microangiopathic changes are not confirmed

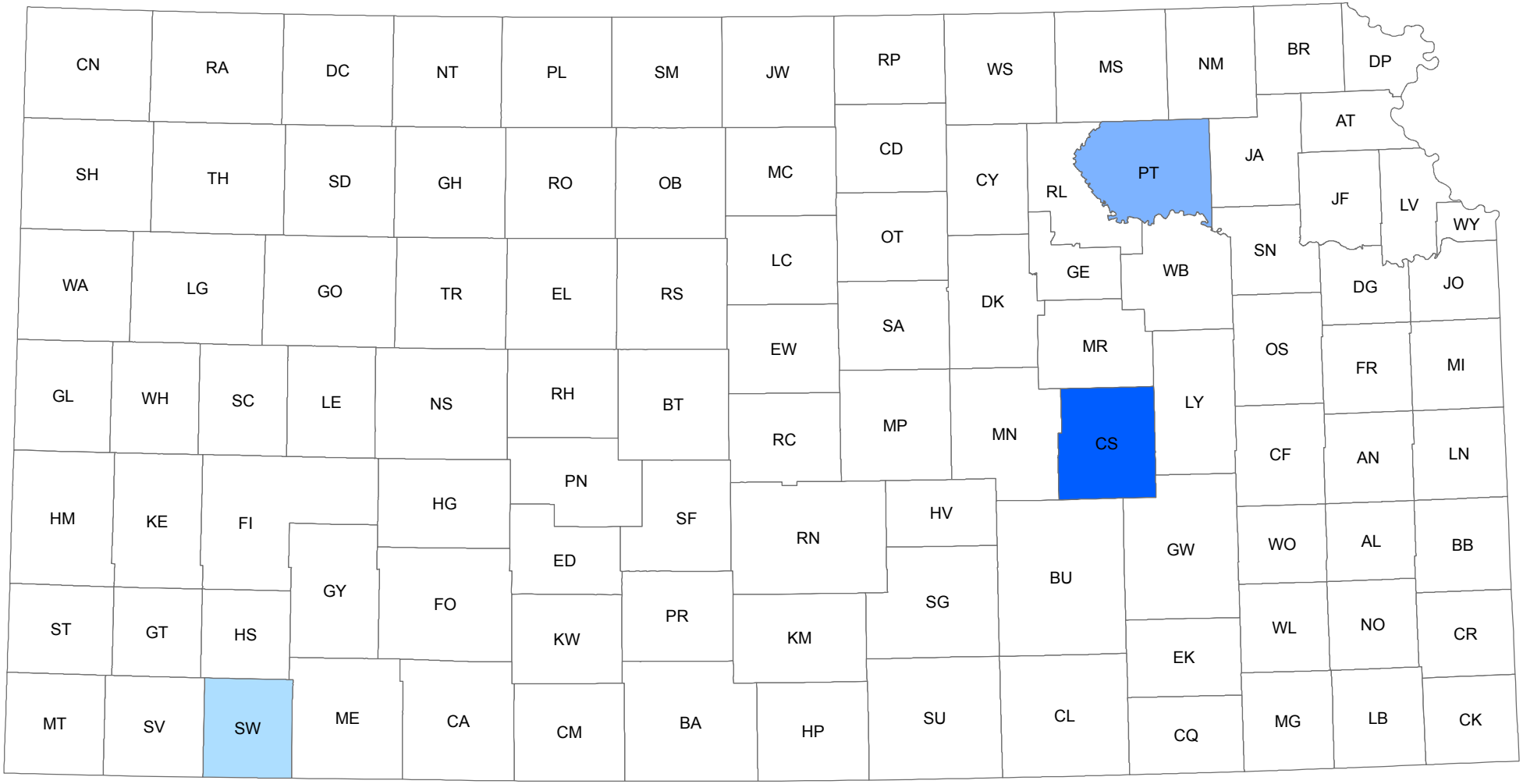
Epidemiology and Trends

2008 Kansas Count: 3

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.11	(0.01 – 0.2)
U.S. Rate (2007)	0.1	*NA*

In 2008, three confirmed cases of postdiarrheal hemolytic uremic syndrome were reported in Kansas. Ages of cases ranged from 1 to 69 years. The causative agent was determined to be *E. coli* O157:H7 in two out of the three cases.

Hemolytic Uremic Syndrome Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | >= 10.0

HEPATITIS A

Clinical Features: Abrupt onset of fever, malaise, anorexia, abdominal cramps, and sometimes diarrhea. Jaundice may develop a few days after onset.

Causative Agent: Hepatitis A virus

Mode of Transmission: Transmission is through person-to-person, direct fecal-oral contact; consumption of food or beverages contaminated by an infectious person (indirect-fecal oral contact); or consumption of undercooked food exposed to contaminated water or feces (i.e., mollusks, lettuce, strawberries)

Incubation Period: 15 to 50 days (average 28 to 30 days)

Period of Communicability: From the latter half of the incubation period to a maximum of 7 days after the onset of jaundice. This can be as long as one month.

Public Health Significance: Hepatitis A continues to be one of the most frequently reported vaccine-preventable diseases in the United States. An inactivated hepatitis A vaccine is very effective in preventing infection; it is recommended for travelers to countries where hepatitis A is a common infection as well as for high-risk adults and children residing in these countries.

Gamma globulin (IG) can help prevent hepatitis A if administered soon after infection, and is recommended for people who live in the same house as a person with hepatitis A, for sexual contacts of a person with hepatitis A, and for children in the same day care center with a child with hepatitis A. IG is **NOT** given to casual contacts of a person with hepatitis A because the risk of infection in these situations is extremely small.

The goal of hepatitis A surveillance in Kansas is to identify cases and apply appropriate control measures. Control measures include contact identification and administration of post-exposure prophylaxis. If control measures are completed in a timely fashion, outbreaks can be prevented.

Reportable Disease in Kansas Since: 1982

Clinical Criteria

- An acute illness with (a) discrete onset of symptoms, ***AND*** (b) jaundice or elevated serum aminotranferase levels.

Laboratory Criteria for Surveillance Purposes

- Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive.

Surveillance Case Definitions

- *Confirmed:*

  - A case that meets the clinical case definition and is laboratory confirmed, ***OR***

  - A case that meets the clinical case definition and occurs in a person who has an epidemiologic link with a person who has laboratory-confirmed hepatitis A (e.g., household or sexual contact with an infected person during the 15-50 days before the onset of symptoms).

Epidemiology and Trends

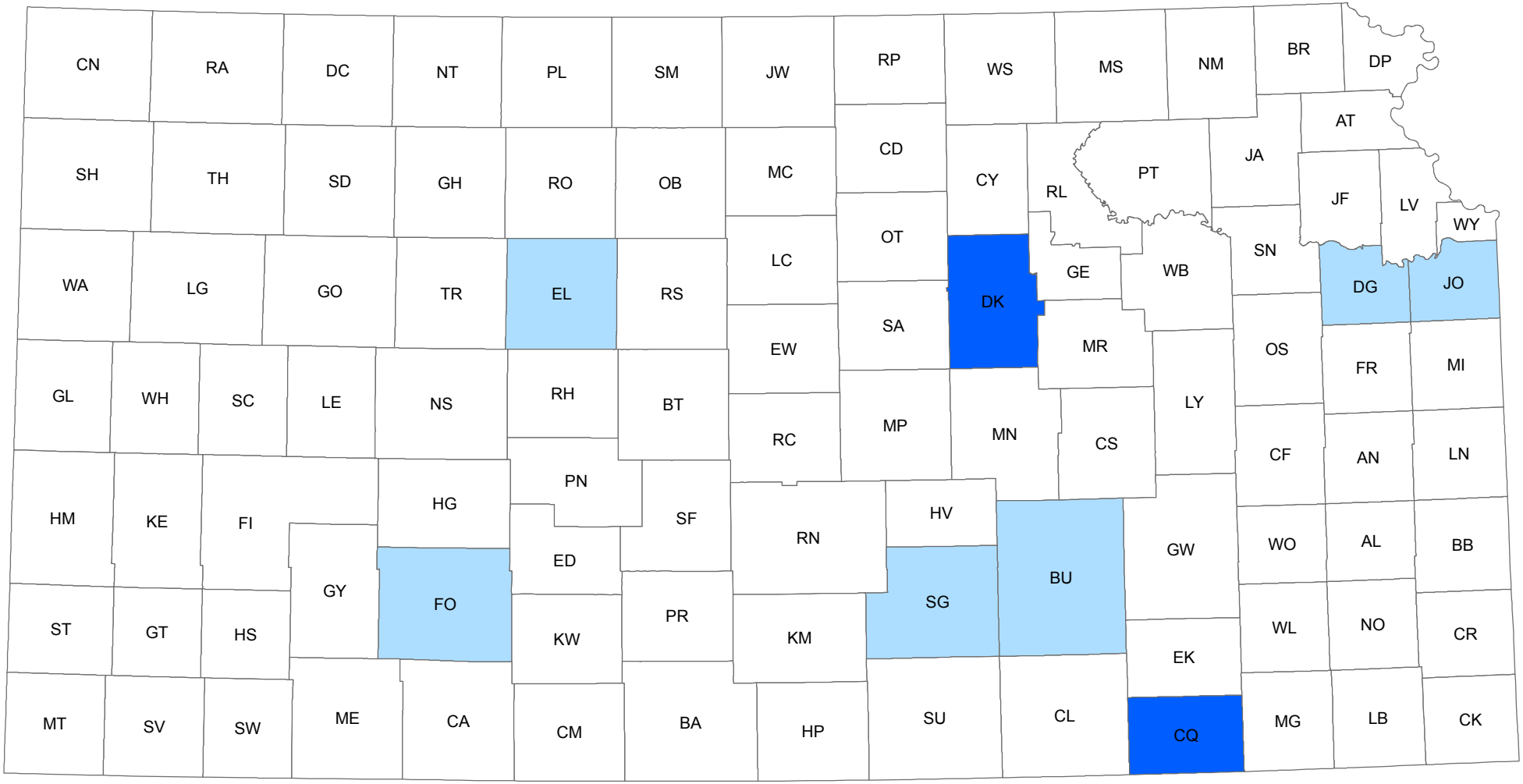
2008 Kansas Count: 15

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.5	(0.3 – 0.8)
U.S. Rate (2007)	1.0	*NA*

Fifteen cases of hepatitis A were reported in Kansas in 2008. The three-year median for 2005-2007 was 16 cases. The 2008 cases ranged in age from five to 79 years; the median age was 31 years.

Ethnicity was known for ten cases—four (40%) were Hispanic. The incidence rate among Hispanics was higher (1.6 per 100,000) compared to non-Hispanics (0.2 per 100,000).

Hepatitis A Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | >= 10.0

HEPATITIS B

Clinical Features: Acute hepatitis B is an acute illness characterized by anorexia, abdominal discomfort, nausea and vomiting. Jaundice is present in <10% of children and <50% of adults. A low-grade fever, rash, and joint pain may also be present. Chronic hepatitis B illness may or may not demonstrate symptoms of hepatic inflammation. Only about one third of patients have elevated aminotransferase levels, which may fluctuate with intermittent exacerbations of hepatic inflammation. Chronic cases may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer.

Causative Agent: Hepatitis B virus

Mode of Transmission: Transmission occurs via percutaneous or permucaosal exposure: i.e. (1) infected blood or body fluids introduced at birth, (2) through sexual contact, or (3) by contaminated needles. Blood (and serum-derived fluids), saliva, semen, and vaginal fluids have been shown to be infectious. The likelihood of transmission is greater if the *e* antigen or viral DNA is present in an individual's blood.

Incubation Period: 45 to 180 days (average 60 to 90 days)

Period of Communicability: All persons who are hepatitis B surface antigen (HbsAg) positive are potentially infectious; some individuals may clear the surface antigen from their blood, while others may not.

Public Health Significance: According to CDC, both acute and chronic hepatitis B cases are major causes of morbidity and mortality in the US. However, transmission of hepatitis B can be interrupted by vaccination and early identification of cases and their contacts. Timely identification of susceptible contacts of hepatitis B cases allows for effective post-exposure prophylaxis. Timely post-exposure prophylaxis is highly effective in preventing hepatitis B transmission from mother to infant. For this reason, all pregnant mothers are required to be tested for hepatitis B during pregnancy.

Routine hepatitis B vaccine is recommended for all children at birth, 1-2 and 6-18 months of age or, if not previously received, at 11-12 years of age. Hepatitis B vaccine is also recommended for persons in the following high risk groups: persons with occupational risk, clients and staff of institutions for the developmentally disabled; hemodialysis patients; recipients of certain blood products; household and sexual partners of HBsAg carriers; international travelers visiting high prevalence areas; injecting drug users; sexually active persons with multiple partners; and inmates of long-term facilities.

Reportable Disease in Kansas Since: 1982

ACUTE HEPATITIS B

Clinical Criteria

- An acute illness with a) discrete onset of symptoms and b) jaundice or elevated serum aminotransferase levels

Laboratory Criteria for Surveillance Purposes

- IgM antibody to hepatitis B core antigen (anti-HBc) positive or hepatitis B surface antigen (HBsAg) positive, ***AND***
- IgM anti-HAV negative (if done)

Surveillance Case Definitions

- *Confirmed:* a case that meets the clinical case definition and is laboratory confirmed

Epidemiology and Trends

2008 Kansas Count: 9

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.3	(0.1 – 0.5)
U.S. Rate (2007)	1.5	*NA*

In 2008, 9 acute cases of hepatitis B were reported in Kansas. The three-year median for 2005-2007 was 10 cases.

Cases ranged from 23 to 84 years of age; the median age was 36 years.

PERINATAL HEPATITIS B

Clinical Criteria

- Perinatal hepatitis B in the newborn may range from asymptomatic to fulminant hepatitis.

Laboratory Criteria for Surveillance Purposes

- Hepatitis B surface antigen (HBsAg) positive.

Surveillance Case Definitions

- *Confirmed:* HBsAg positivity in any infant aged >1-24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother.

Epidemiology and Trends

2008 Kansas Count: 0

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	*NA*	*NA*
U.S. Rate (2007)	*NA*	*NA*

No cases of perinatal hepatitis B were reported in 2008.

CHRONIC HEPATITIS B

Laboratory Criteria for Surveillance Purposes

- IgM antibodies to hepatitis B core antigen (anti-HBc) negative AND a positive result on one of the following tests: hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), or hepatitis B virus (HBV) DNA, ***OR***
- HBsAg positive or HBV DNA positive or HBeAg positive two times at least 6 months apart (Any combination of these tests performed 6 months apart is acceptable.)

Surveillance Case Definitions

- *Confirmed:* A case that meets either laboratory criteria for diagnosis
- *Probable:* a case with a single HBsAg positive or HBV DNA positive or HBeAg positive lab result when no IgM anti-HBc results are available

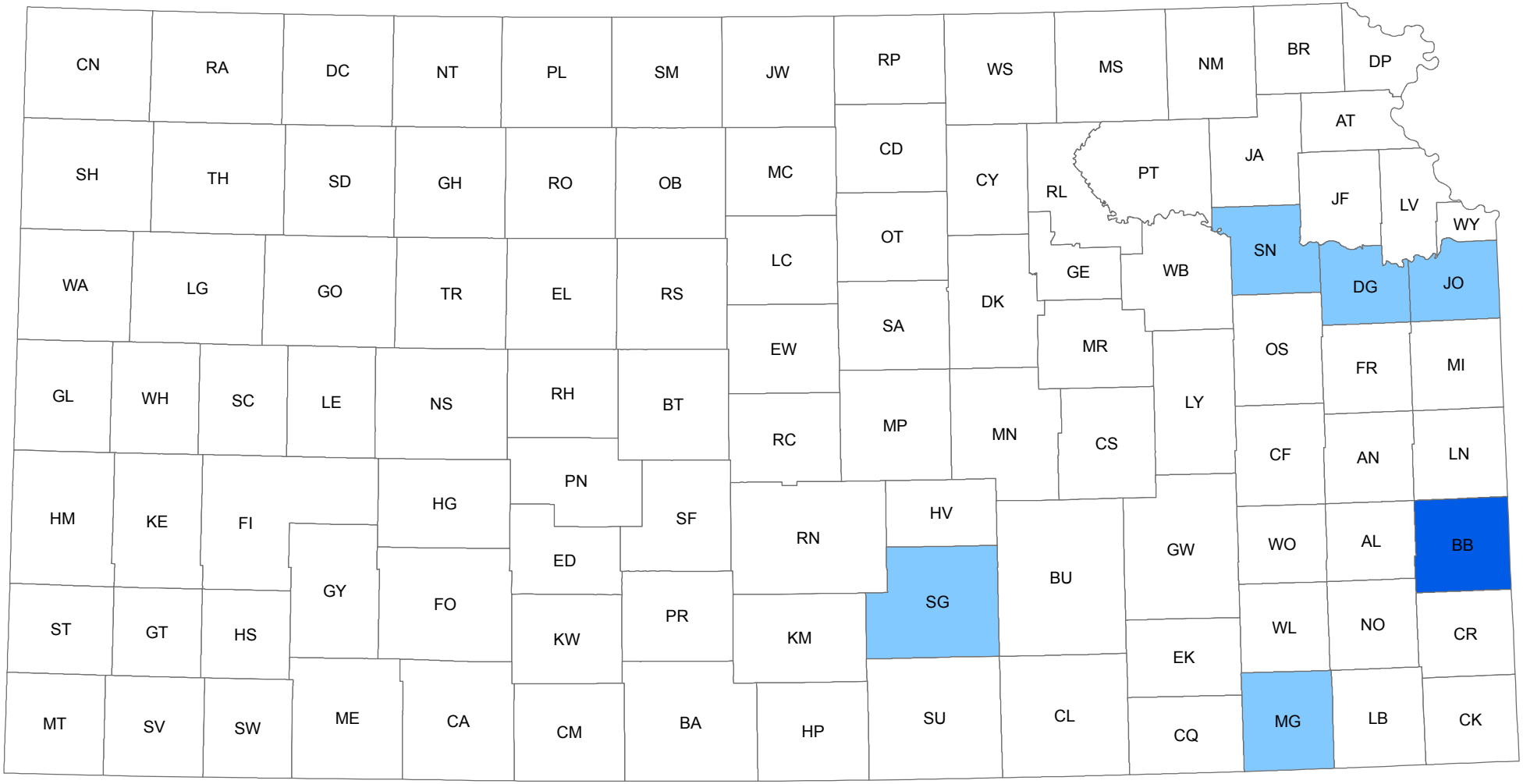
Epidemiology and Trends

2008 Kansas Count: 27

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	1.0	(0.6 – 1.3)
U.S. Rate (2007)	*NA*	*NA*

In 2008, 27 cases of chronic hepatitis B were reported. The cases ranged from five to 89 years of age; the median age was 41 years. Race was reported for 14 (52%) of the chronic cases: the incidence rate among Asians (5.9 per 100,000) was higher compared to African-Americans (0.5 per 100,000) and Whites (0.3 per 100,000).

Acute Hepatitis B Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9

HEPATITIS C

Clinical Features: Initial infection may be asymptomatic or mild (<90% of cases); chronic infection is common (55% to 85% of cases). Approximately 70% of the chronically infected will develop chronic liver disease, cirrhosis or hepatocellular carcinoma. Liver function tests may be elevated or normal during chronic disease.

Causative Agent: The hepatitis C virus is an enveloped RNA virus in the Flavivirdae family.

Mode of Transmission: Primarily as a bloodborne pathogen (e.g. sharing of contaminated objects especially needles and syringes) - transmission through sexual contact may also occur, although this is rare.

Incubation Period: The incubation period ranges from 2 weeks to 6 months, averaging 6-9 weeks. Acute hepatitis C infection will convert to a chronic carrier state within 6 months if the acute infection does not resolve. Chronic infection may persist for 10 to 20 years prior to onset of symptoms.

Period of Communicability: Communicability persists as long as virus is present in the body. Chronic cases are considered infectious for life. Peaks in virus concentration correlate with peaks in ALT activity.

Public Health Significance: Preventative measures for hepatitis C include behavior modifications that also lower risk factors for acquiring other diseases, such as HIV. While no vaccine exists for hepatitis C, vaccination against hepatitis A and B are recommended for infected individuals.

Reportable Disease in Kansas Since: 2000

ACUTE HEPATITIS C

Laboratory Criteria for Surveillance Purposes

- **One or more of the following three criteria:**
  - Antibodies to hepatitis C virus (anti-HCV) screening-test-positive with a signal to cut-off ratio predictive of a true positive as determined for the particular assay as defined by CDC. (URL for the signal to cut-off ratios: http://www.cdc.gov/ncidod/diseases/hepatitis/c/sc_ratios.htm), ***OR***
  - Hepatitis C Virus Recombinant Immunoblot Assay (HCV RIBA) positive, ***OR***
  - Nucleic Acid Test (NAT) for HCV RNA positive

- **AND, meets the following two criteria:**
  - IgM antibody to hepatitis A virus (IgM anti-HAV) negative, **AND**
  - IgM antibody to hepatitis B core antigen (IgM anti-HBc) negative

Surveillance Case Definitions

Confirmed: a case that meets the clinical case definition, is laboratory confirmed, and is not known to have chronic hepatitis C.

Epidemiology and Trends

2008 Kansas Count: 1

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	<0.1	(0.0 – 0.1)
U.S. Rate (2007)	0.3	*NA*

One acute case of hepatitis C was reported in Kansas in 2008.

CHRONIC HEPATITIS C

Laboratory Criteria for Surveillance Purposes

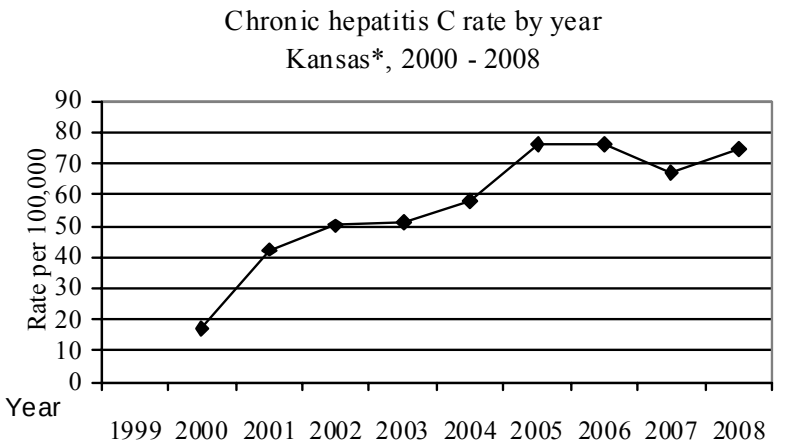
- Anti-HCV positive by EIA, verified by an additional specific assay (e.g. RIBA for anti-HCV or nucleic acid testing (PCR) for HCV RNA, ***OR***
- HCV RIBA positive, ***OR***
- Nucleic acid test (PCR) for HCV RNA positive, ***OR***
- Report of HCV genotype, ***OR***
- Anti-HCV positive screening with a signal to cut-off ratio ≥ 3.8 (KDHE laboratory) and ≥ 3.0 (Private laboratory).

Surveillance Case Definitions

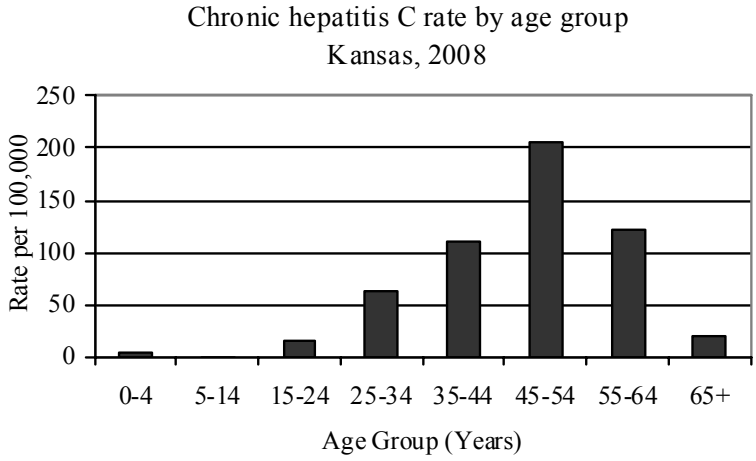
Confirmed: A case that is laboratory confirmed and that does not meet the case definition for acute hepatitis C (i.e. does not have a discrete onset of any sign or symptom consistent with acute viral hepatitis, does not have a negative hepatitis A IgM result, and does not have a negative IgM antibody to hepatitis B core antigen result).

2008 Kansas Count: 2080

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	74.9	(71.7 – 78.2)
U.S. Rate (2007)	*NA*	*NA*
Gender		
Male	93.2	(88.1 – 98.3)
Female	56.8	(52.9 – 60.8)
Race		
White	24.0	(22.0 – 25.9)
Black	41.8	(32.5 – 51.2)
Asian/Pacific Islander	7.4	(0.9 – 13.8)
Native American	25.4	(7.8 – 43.0)
Ethnicity		
Hispanic	20.9	(15.2 – 26.6)
Non-Hispanic	19.6	(17.8 – 21.3)
County of Residence		
Urban County	82.3	(77.6 – 87.0)
Non-Urban County	66.9	(62.5 – 71.3)



**Not reportable until 2000; comparable U.S. rate not available.*

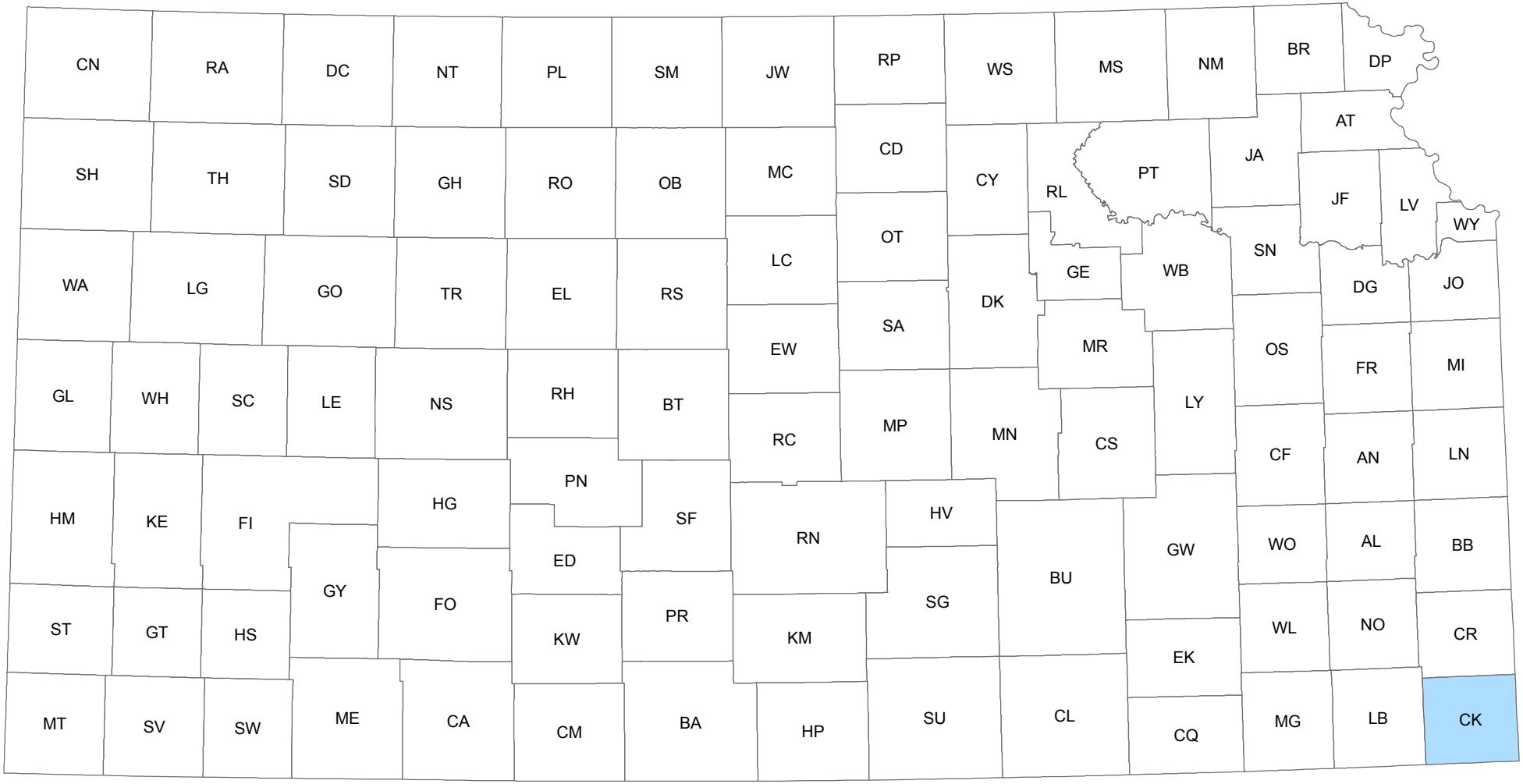


In 2008, 2080 chronic hepatitis C cases were reported. Cases may represent prior unreported infections, or individuals who were previously infected but asymptomatic.

More infections were reported among males (93.2 per 100,000) than females (56.8 per 100,000).

Race was not reported for 1,388 (67%) of the cases, and ethnicity was not reported for 1,534 (74%) of the cases. According to the race data that was collected, the rate of diagnosis was highest among African-Americans (41.8 per 100,000). Improved collection of race and ethnicity information is needed to more definitively describe the burden of chronic hepatitis C prevalence in Kansas.

Acute Hepatitis C Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

LEGIONELLOSIS

Clinical Features: Infection may result in either of two distinct illnesses: Legionnaires' disease, characterized by fever, myalgia, cough, and pneumonia, and Pontiac Fever, a milder form of the illness without pneumonia.

Causative Agent: *Legionella spp.*, gram-negative bacilli. *L. pneumophila* serogroup 1 is most commonly associated with disease.

Mode of Transmission: Inhalation of contaminated aerosols from a soil or water source; other modes are possible, but have not been conclusively proven.

Incubation Period: Ranges from 2-10 days. Pontiac Fever has a shorter average incubation period (1-2 days) compared to Legionnaires' disease (5-6 days).

Period of Communicability: Person-to-person spread has not been documented.

Public Health Significance: Legionellosis is an emerging infection that most frequently occurs in the elderly and the immunocompromised. Although most illnesses are sporadic, many outbreaks have been linked to contaminated water tanks, air conditioning cooling towers, evaporative condensers, and soil at excavation sites. Public health goals are outbreak identification and environmental remediation.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- *Suspect*:

  - By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 *(*e.g., *L. micdadei*, *L. pneumophila* serogroup 6) , ***OR***
  - By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents, ***OR***
  - By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, immunohistochemstry (IHC), or other similar method, using validated reagents, ***OR***
  - By detection of *Legionella* species by a validated nucleic acid assay.

- *Confirmed*:

  - By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid, ***OR***
  - By detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents, ***OR***
  - By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents.

Surveillance Case Definitions

- *Suspect*: a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.

- *Confirmed:* A clinically compatible case that meets at least one of the confirmatory laboratory criteria.

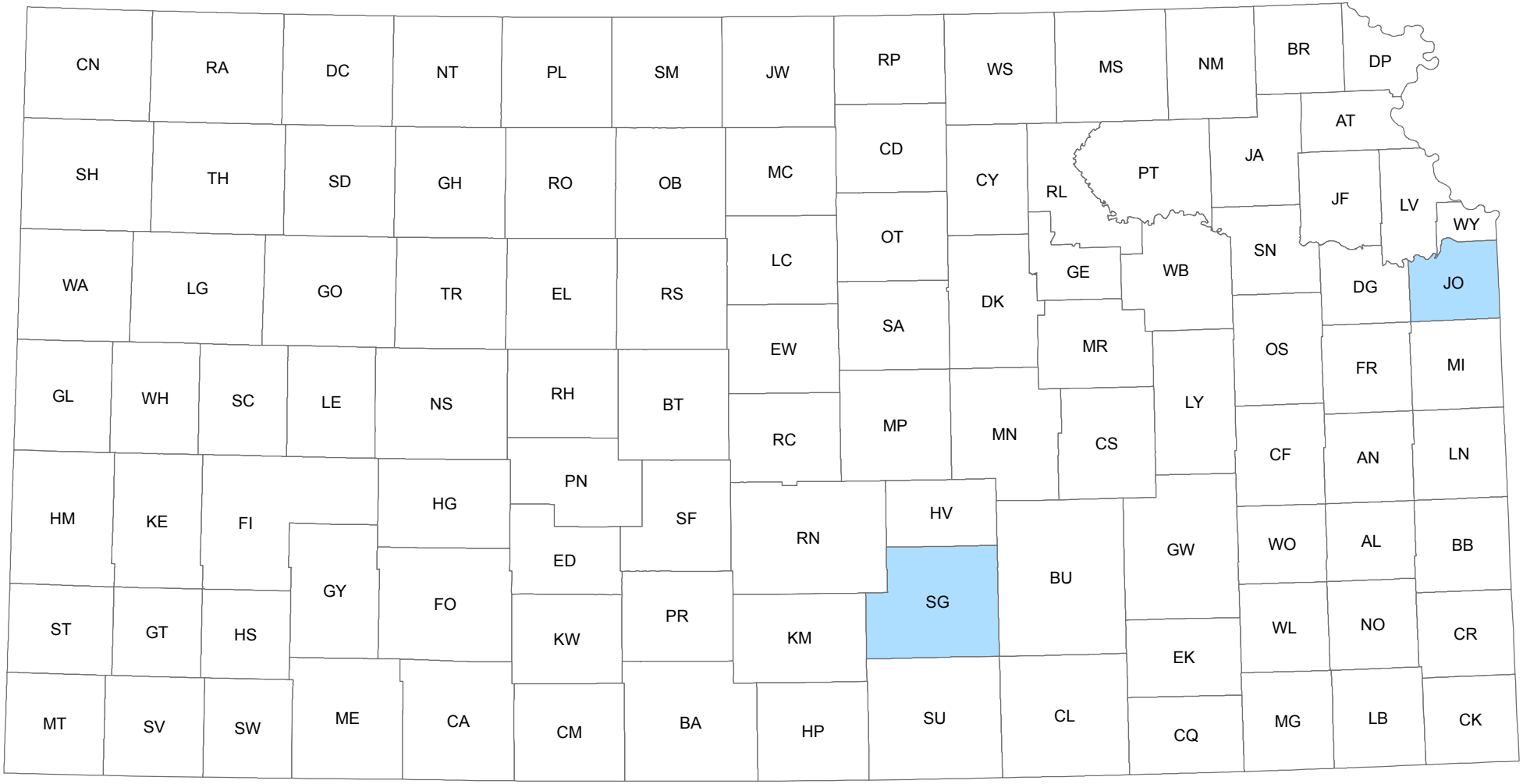
Epidemiology and Trends

2008 Kansas Count: 2

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.0 – 0.2)
U.S. Rate (2007)	0.9	*NA*

In 2008, two cases of legionellosis were reported in Kansas. The three-year median for 2005-2007 was 10 cases. Both cases were greater than 50 years of age; one case was hospitalized.

Legionellosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

LISTERIOSIS

Clinical Features: Symptoms vary and are dependent on the individual affected. Neonates, elderly, immunocompromised individuals, and pregnant women are at highest risk. Symptoms include fever, malaise, headache, nausea, vomiting, meningitis, septicemia, delirium, and coma. On rare occasion, symptoms may include endocarditis, granulomatous lesions in the liver and other organs, localized internal or external abscesses, and pustular or papular cutaneous lesion. In pregnant women, infection can be transmitted to the fetus, and infants may be stillborn, born with septicemia, or develop meningitis in the neonatal period - even though the mother may be asymptomatic at delivery.

Causative Agent: *Listeria monocytogenes*, a gram-positive bacterium.

Mode of Transmission: Ingestion of raw or contaminated milk, soft cheeses, vegetables, pate, unwashed raw vegetables, and ready to eat meats, such as deli meat and hot dogs. Direct contact with infected materials may lead to pupular lesions on hands and arms. In utero transmission from mother to fetus may occur; transmission during passage through the infected birth canal is also possible. The principal reservoir of *Listeria monocytogenes* is in soil, forage, water, mud and silage. Other reservoirs include infected domestic and wild mammals, fowl, and people. Asymptomatic fecal carriage is common in humans.

Incubation Period: Ranges from 3-70 days (average 3 weeks).

Period of Communicability: Mothers of infected newborn infants can shed the infectious agent in vaginal discharges and urine for 7-10 days after delivery, rarely longer. However, infected individuals can shed the organisms in their stool for several months.

Public Health Significance: Pregnant women, fetuses and newborns infants are highly susceptible. The postpartum course of the mother is usually uneventful, but the case fatality rate is 30% in newborn infants and approaches 50% when onset occurs in the first 4 days. Severe disease in adults, including pregnant women, associated with contaminated food emphasized that older children and adults can have systemic disease with mortality. Listeriosis is often associated with contaminated food products. A product recall may be issued if *Listeria* contamination is suspected.

Reportable Disease in Kansas Since: 2000

Laboratory Criteria for Surveillance Purposes

- Isolation of *L. monocytogenes* from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, less commonly, joint, pleural, or pericardial fluid), ***OR***
- In the setting of miscarriage or stillbirth, isolation of L. monocytogenes from placental or fetal tissues.

Surveillance Case Definitions

- *Confirmed:* A clinically compatible case that is laboratory confirmed.

- *Probable:* A clinically compatible case that is epidemiologically linked to a confirmed case.

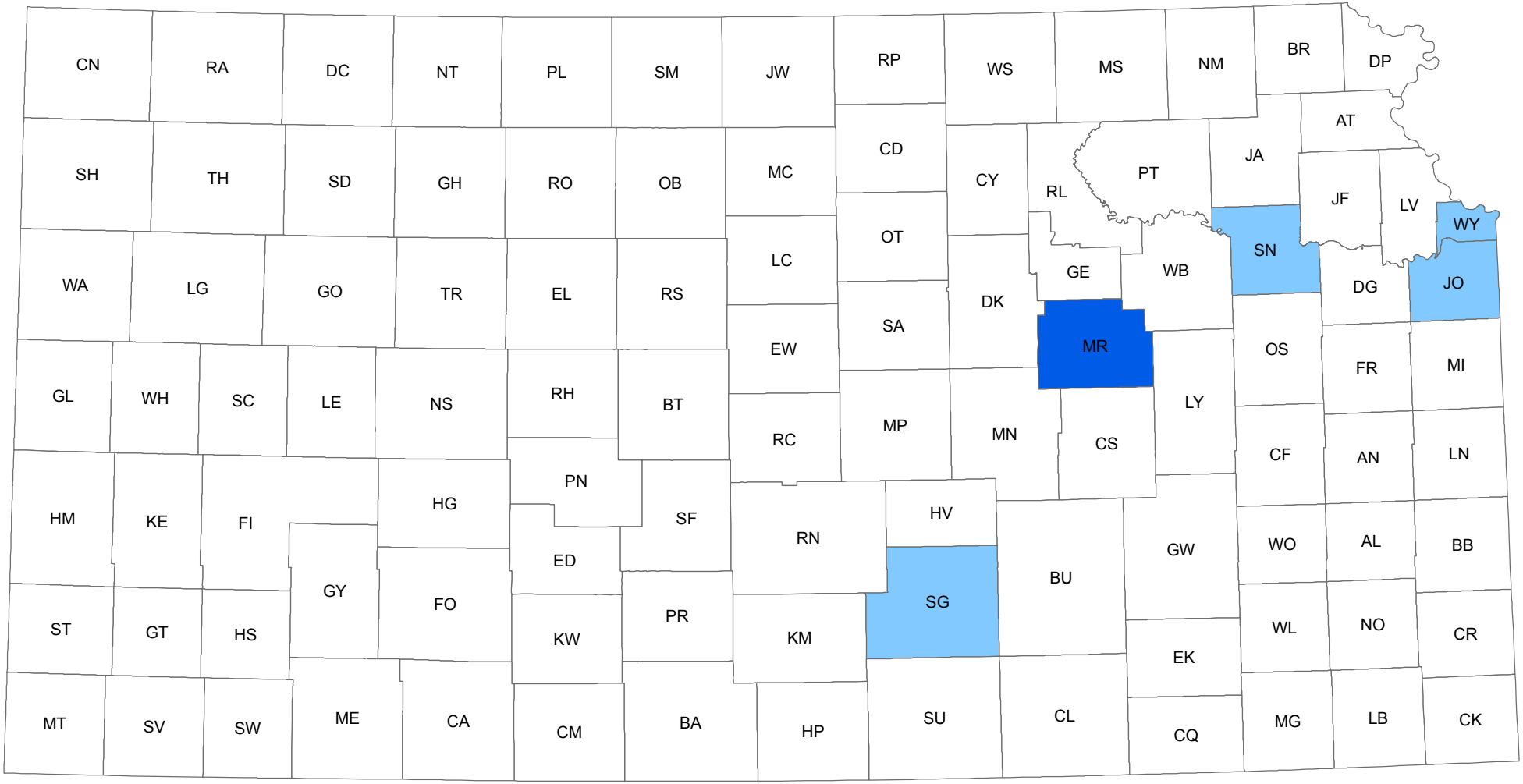
2008 Kansas Count: 6

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.2	(0.0 – 0.4)
U.S. Rate (2007)	0.3	*NA*

Six cases of listeriosis were reported in Kansas in 2008. The three-year median for 2005-2007 was four cases.

Four (67%) of the six cases were female, and five (83%) of the six cases were older than 65 years of age. All six were hospitalized due to their illness.

Listeriosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | >= 5.0

LYME DISEASE

Clinical Features: A systemic, tick-borne disease, almost never fatal, with manifestations affecting skin, nervous system, heart and/or joints. In early stages, 60%-80% of patients present with a characteristic "bull's-eye" rash, erythema migrans (EM), accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, myalgia, and arthralgia. If untreated, some patients may develop arthritis; neurologic abnormalities, such as aseptic meningitis, facial palsy, nerve inflammation and encephalitis; and cardiac problems.

Causative Agent: *Borrelia burgdorferi*, a spirochete bacterium

Mode of Transmission: Maintained in the blood and tissues of small rodents and deer, the organism is transmitted by blood to feeding ticks, specifically the *Ixode*s species including the deer tick (*I. scapularis*) and the western black-legged tick (*I. pacificus*). During its feeding process, the infected tick will transmit the organism to humans and other mammals. Transmission occurs after $\geq$24 hours of tick attachment.

Incubation Period: After tick exposure, 3-32 days, with an average of 7-10 days.

Period of Communicability: Person-to-person transmission has not been documented.

Public Health Significance: A vaccine against Lyme disease was available in 2001, but has since been withdrawn by the manufacturer. The role of the health department is limited to providing education on the mode of tick transmission and means of personal protection.

Reportable Disease in Kansas Since: 1990

Clinical Criteria

- Erythema migrans diagnosed by a physician and defined by a single primary lesion $\geq$5 cm in size and/or the occurrence of secondary lesions, ***OR***
- At least one late manifestation, as defined below, with laboratory confirmation of *B. burgdorferi* infection and without an alternate explanation found.

    - *Musculoskeletal system*. Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. Additionally, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.

- *Nervous system*. Any of the following, alone or in combination: lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Encephalomyelitis must be confirmed by demonstration of antibody production against *B. burgdorferi* in the CSF, evidenced by a higher titer of antibody in CSF than in serum. Headache, fatigue, paresthesia, or mildly stiff neck alone is not criteria for neurologic involvement.

- *Cardiovascular system*. Acute onset of high-grade (2nd-degree or 3rd-degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

Laboratory Criteria for Surveillance Purposes

- a positive culture for *B. burgdorferi*, ***OR***
- two-tier testing interpreted using established criteria, ***OR***
- single-tier IgG immunoblot seropositivity interpreted using established criteria.

Surveillance Case Definitions

- *Confirmed:*
  - a case of EM with a known exposure (as defined above), ***OR***
  - a case of EM with laboratory evidence of infection (as defined above) and without a known exposure, ***OR***
  - a case with at least one late manifestation that has laboratory evidence of infection.

- *Probable***:** any other case of physician-diagnosed Lyme disease that has laboratory evidence of infection (as defined above).

- *Suspected***:**
  - a case of EM where there is no known exposure (as defined above) and no laboratory evidence of infection, ***OR***
  - a case with laboratory evidence of infection but no clinical information available (e.g. a laboratory report).

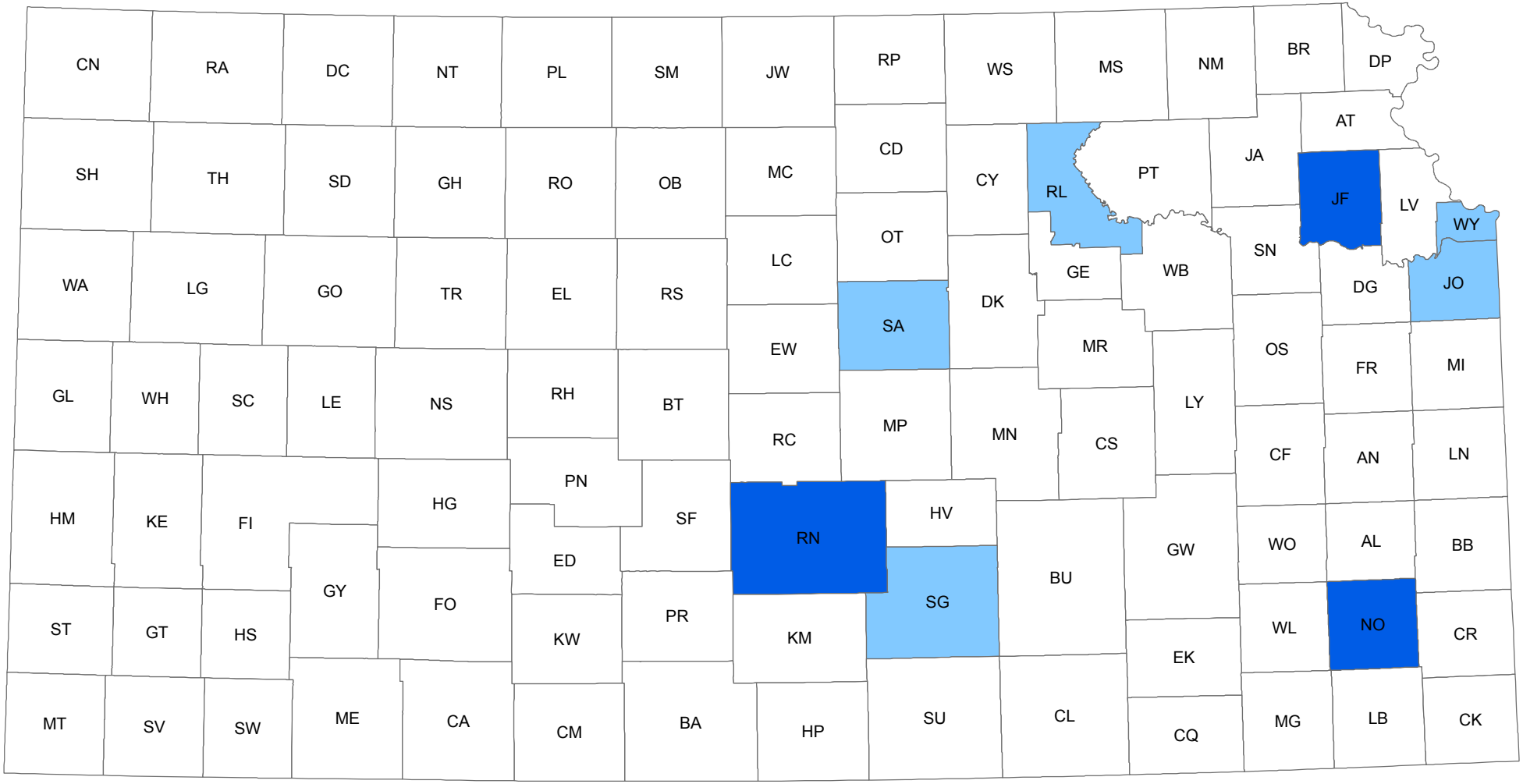
Epidemiology and Trends

2008 Kansas Count: 16

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.6	(0.3 – 0.9)
U.S. Rate (2007)	9.2	*NA*

Sixteen confirmed cases of lyme disease were reported in Kansas during 2008. The three-year median for 2005-2007 was 4 cases. The surveillance case definition was altered in 2008, which may account for the increase in confirmed cases.

Lyme Disease Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9

MALARIA

Clinical Features: The symptoms of malaria include high fever, chills, rigor, and headache, which may be recurrent and suddenly. If untreated fever and other symptom may occur in a cyclical pattern every second or third day. Other commonly associated symptoms include back pain, sweats, myalgia, nausea, vomiting, diarrhea, and cough. Untreated *Plasmodium falciparum* infection can lead to coma, renal failure, pulmonary edema, and death. The diagnosis of malaria should be considered for any person who has these symptoms and who has traveled to an area in which malaria is endemic. Asymptomatic parasitemia can occur among persons who have been long-term residents of areas in which malaria is endemic.

Causative Agent: *Plasmodium vivax, P. ovale, P. malaria,* or *P. falciparum*

Mode of Transmission: By the bite of an infective female *Anopheles spp.* mosquito. Most species feed at dusk and during early night hours; some important vectors have biting peaks around midnight or early hours of morning. Malaria may also be transmitted by injection or transfusion of blood of infected persons or by use of contaminated needles or syringes, as by drug users. Humans are the only important reservoir of human malaria.

Incubation Period: The time between the infective bite and the appearance of clinical symptoms is approximately 9 to 14 days for *P. falciparum*, 12 to 18 days for *P. vivax* and *P. ovale*, and 18 to 40 days for *P. malariae*.

Period of Communicability: *Plasmodium* may be passed on to biting mosquitoes as long as infective gametocytes are present in human blood; this varies from one to five years depending on the parasite species and response to treatment. The mosquito remains infective for life. Transmission by transfusion may occur as long as asexual forms remain in the circulating blood, up to 40 years. Stored blood can remain infective for at least one month.

Public Health Significance: Even though malaria is not endemic to the United States or Kansas, it remains a public health threat for several reasons: (1) most persons have no protective immunity and can develop a rapid severe disease, (2) malaria cases can transmit the parasites to local mosquitoes, which in turn can pass it onto local residents.

Cases of malaria in Kansas have been reported among individuals with history of foreign travel. Persons traveling to areas at high risk for malaria can protect themselves by taking effective antimalarial drugs and following measures to prevent mosquito bites.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Demonstration of malaria parasites in blood films

Surveillance Case Definitions

- *Confirmed:* an episode of microscopically confirmed malaria parasitemia in any person (symptomatic or asymptomatic) diagnosed in the United States, regardless of whether the person experienced previous episodes of malaria while outside the country.

Comment

- A subsequent attack caused by a different *Plasmodium spp*. is counted as an incident case. In the United States, a subsequent attack caused by the same species may indicate a relapsing infection or treatment failure caused by drug resistance.

Epidemiology and Trends

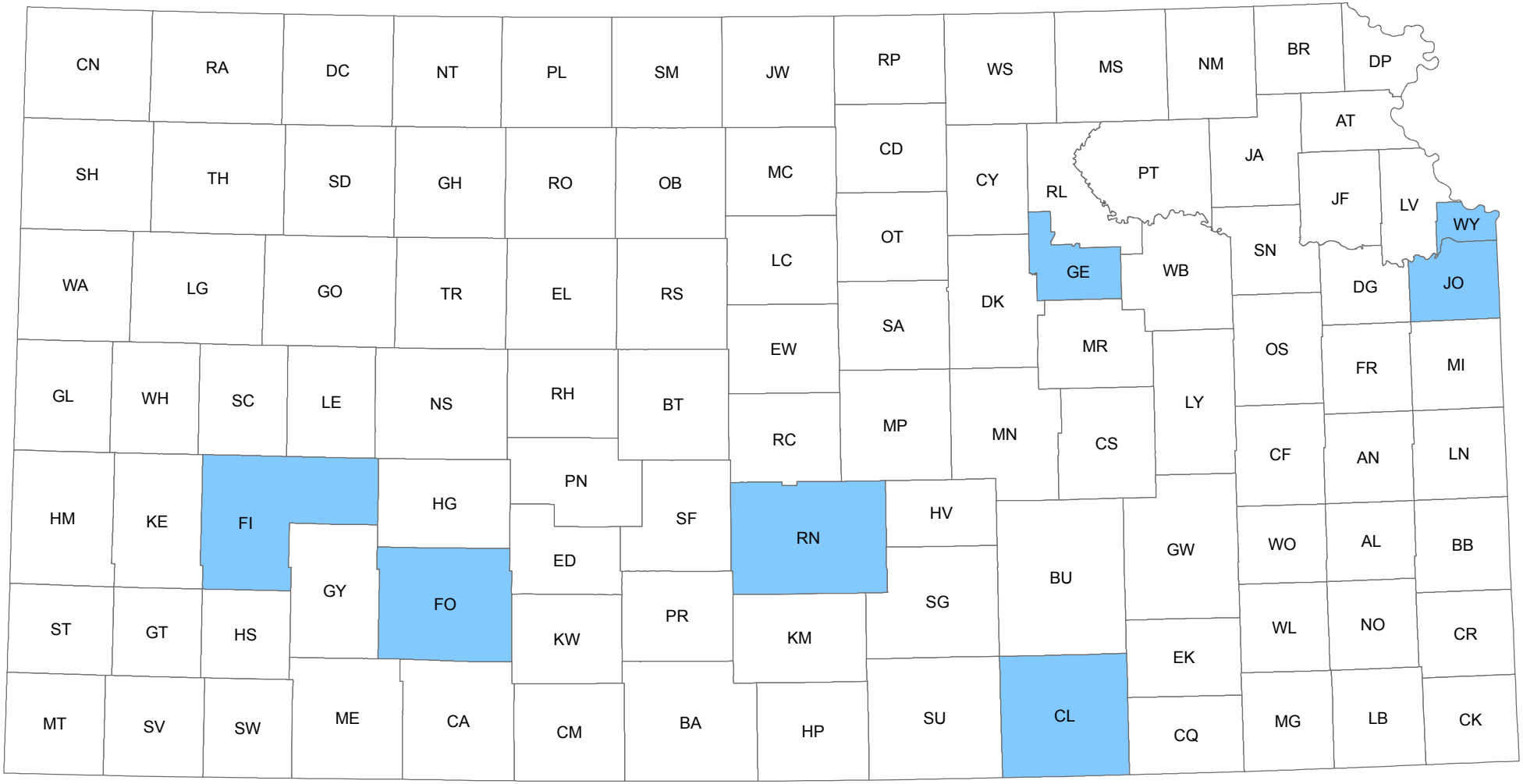
2008 Kansas Count: 9

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.3	(0.1 – 0.5)
U.S. Rate (2007)	0.5	*NA*

In 2008, nine cases of malaria were reported in Kansas. The cases ranged from 15 to 51 years of age, with a median age of 39 years. Seven cases were male. The three-year median for 2005-2007 was seven cases.

Travel history was obtained for eight of the nine cases; the eight cases reported foreign travel to malaria endemic regions, including Africa (Ghana, Nigeria, Sudan, Somalia and Uganda) and South America (Peru). Six cases were infected with *P. falciparum*. The remaining three cases consisted of one *P. vivax* infection, one *P. ovale* infection and one unspecified *Plasmodium* species.

Malaria Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

MENINGITIS, OTHER BACTERIAL
(non-meningococcal and non-*Haemophilus influenzae* type B)

Clinical Features: May include fever, headache, stiff neck, vomiting, and rash.

Causative Agent: For the purposes of this document, "other" bacterial meningitis is defined as an infection of the meninges caused by bacteria other than *Neisseria meningitidis* or *Haemophilus influenzae* type B.

Mode of Transmission: Direct person-to-person contact, including respiratory droplets from the nose or throat of infected individuals.

Incubation Period: ranges from 2 to 10 days

Period of Communicability: Untreated patients are most infectious for 2-3 weeks after the illness onset, although transmission may occur until the bacteria are no longer found in respiratory secretions.

Public Health Significance: Meningitis caused by *Streptococcus pneumoniae* may be prevented through vaccination. Contacts of non-meningococcal and non-HiB meningitis normally do not require post-exposure prophylaxis.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Isolation and identification of a bacterial pathogen from CSF or blood.

Surveillance Case Definitions

Confirmed: A clinically compatible case that is laboratory confirmed.

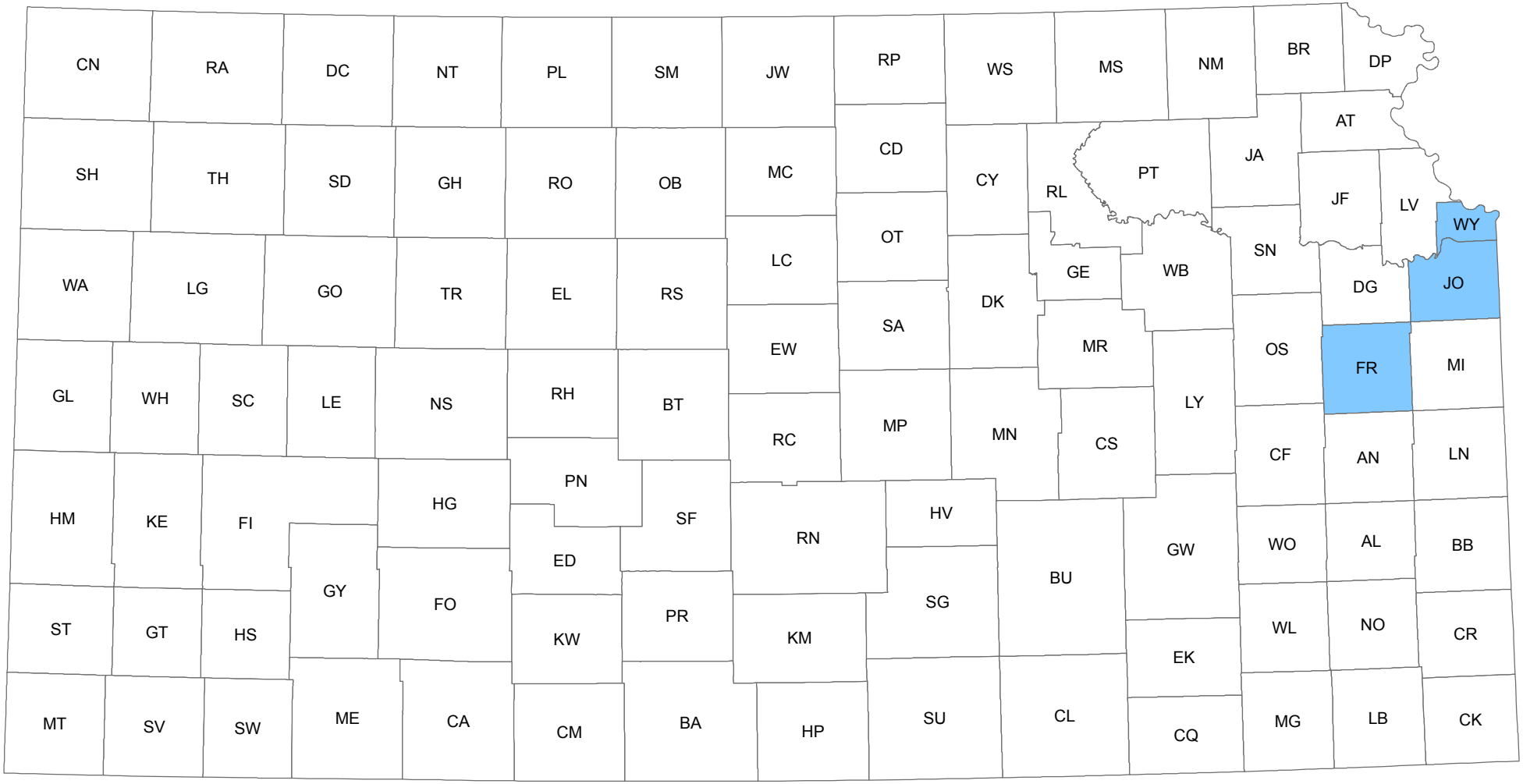
Epidemiology and Trends

2008 Kansas Count: 3

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.0 – 0.2)
U.S. Rate (2007)	*NA*	*NA*

In 2008, there were three reported cases of non-meningococcal, non-*Haemophilus influenza*e type B bacterial meningitis. Causative agents were identified each case: *Staphylococcus warneri*, *Stapyhlococcus epidermis*, and *Streptococcus pneumoniae*.

Other Bacterial Meningitis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

MENINGOCOCCAL DISEASE

Clinical Features: The disease manifests most commonly as meningitis and/or meningococcemia that may progress rapidly to purpura fulminant, shock, and death. The disease is characterized by sudden onset with fever, intense headache, nausea (often with vomiting), and stiff neck. Up to 15% of the population may carry *N. meningitidis* in the nasopharynx without developing invasive disease, while a few develop bacteremia, sepsis, meningitis, or pneumonia. Even with early diagnosis and appropriate treatment, the fatality rate of meningococcal meningitis is 5-15%.

Causative Agent: Meningococcal disease is an acute bacterial disease caused by *Neisseria meningitidis*, a gram-negative, diplococcus bacterium. The most common serogroups of *N. meningitidis* in the United States are B, C, W-135, and Y.

Mode of Transmission: Transmission of *N. meningitidis* is from person to person by direct contact with respiratory droplets from the nose and throat of infected individuals. Late winter to early spring is the peak season for infection, but infections can occur at any time of the year. Humans are the reservoir.

Incubation Period: The incubation period is usually three or four days, but may range from two to 10 days.

Period of Communicability: Individuals are communicable until meningococci are no longer present in the discharges from the nose and mouth. Meningococci usually disappear from the nasopharynx within 24 hours after the institution of appropriate therapy. Penicillin will temporarily suppress the organisms but will not eradicate them.

Public Health Significance: Vaccination and post-exposure prophylaxis are effective in preventing meningococcemia. Vaccines are available to prevent disease caused by types A, C, Y, and W-135. There is no vaccine for serogroup B, historically responsible for 20-30% of reported cases in Kansas. Chemoprophylaxis is used for close contacts of cases (e.g., household members, intimate contacts, health care personnel performing mouth-to-mouth resuscitation, day care center playmates). No chemoprophylaxis is recommended for less intimate contacts (e.g., school classmates, health care workers with minimal contact, and etc.) except during an outbreak or in a child care center.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Isolation of *Neisseria meningitidis* from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, joint, pleural, or pericardial fluid). (Note: a positive antigen test is not sufficient to confirm a case for surveillance purposes. Positive antigen test results from urine or serum samples are unreliable for diagnosing meningococcal disease.)

Surveillance Case Definitions

- *Confirmed:* Isolation of Neisseria meningitidis
  - From a normally sterile body site (e.g., blood or cerebrospinal fluid, or, less commonly, synovial, pleural, or pericardial fluid), ***OR***
  - From purpuric lesions.

- *Probable:*
  - Detection of N. meningitidis-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g.,. blood or CSF), using a validated polymerase chain reaction (PCR) assay; ***OR***
  - Detection of N. meningitidis antigen
    - In formalin-fixed tissue by immunohistochemistry (IHC); ***OR***
    - In CSF by latex agglutination.
- *Suspect:*
  - Clinical purpura fulminans in the absence of a positive blood culture; ***OR***
  - Gram-negative diplococci, not yet identified, isolated from a normally sterile body site (e.g., blood or CSF).

Epidemiology and Trends

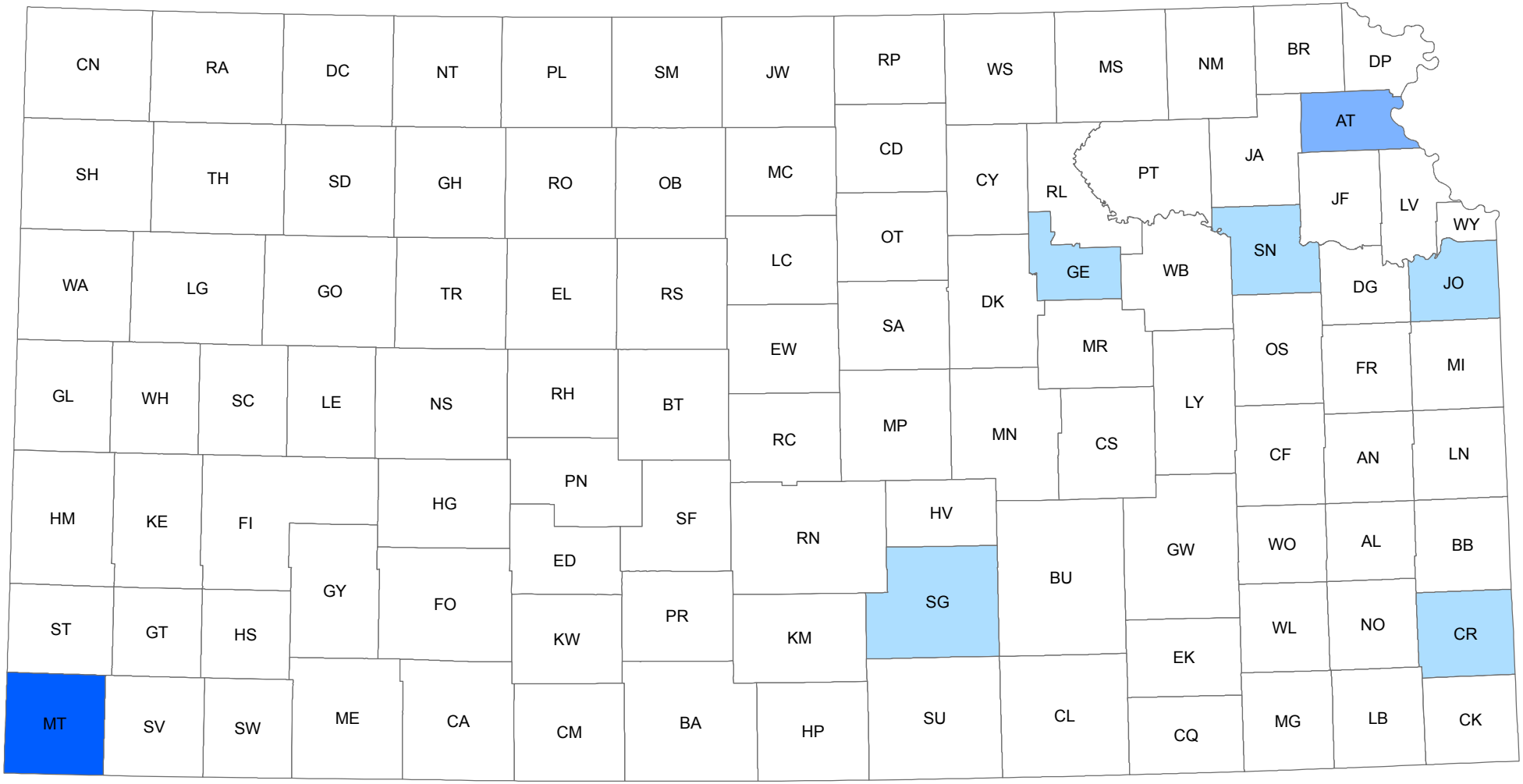
2008 Kansas Count: 8

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.3	(0.1 – 0.5)
U.S. Rate (2007)	0.4	*NA*

Eight cases of meningococcal disease were reported in Kansas during 2008. Seven cases were reported as meningitis; the remaining case was reported as meningococcemia. The three-year median for 2005-2007 was 10 cases.

Five of the eight *Neisseria* isolates were successfully serogrouped at the state laboratory. One group Y isolate, two group B isolates, and two group C isolates were identified.

Meningococcal Disease Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | >= 10.0

MUMPS

Clinical Features: Characterized by fever, swelling, and tenderness of one or more of the salivary glands: the parotid, the sublingual, and the submaxillary glands. Orchitis may occur in males and oophoritis in females.

Causative Agent: The mumps virus, a type of paramyxovirus.

Mode of Transmission: Direct contact with the saliva of an infected person, droplet spread, and airborne transmission.

Incubation Period: May range from 12-25 days (average 15-18 days).

Period of Communicability: Virus has been isolated from saliva a week before overt parotitis and 9 days after symptom onset. Cases are most infectious from two days prior to four days after symptom onset.

Public Health Significance: Mumps is a vaccine-preventable disease; vaccine is available either as a single vaccine or in combination with rubella and measles (MMR). Exclusions may apply to infected individuals enrolled in daycare or school.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Isolation of mumps virus from clinical specimen, ***OR***
- Detection of mumps nucleic acid (e.g., standard or real time RT-PCR assays), ***OR***
- Detection of mumps IgM antibody, ***OR***
- Demonstration of specific mumps antibody response in absence of recent vaccination, either a four-fold increase in IgG titer as measured by quantitative assays, or a seroconversion from negative to positive using a standard serologic assay of paired acute and convalescent serum specimens.

Surveillance Case Definitions

- *Confirmed:* A case that: 1) meets the clinical case definition or has clinically compatible illness, and 2) is either laboratory confirmed or is epidemiologically linked to a confirmed case.

- *Probable:* A case that meets the clinical case definition without laboratory confirmation and is epidemiologically linked to a clinically compatible case.

- *Suspected:* A case with clinically compatible illness or that meets the clinical case definition without laboratory testing, or a case with laboratory tests suggestive of mumps without clinical information.

Epidemiology and Trends

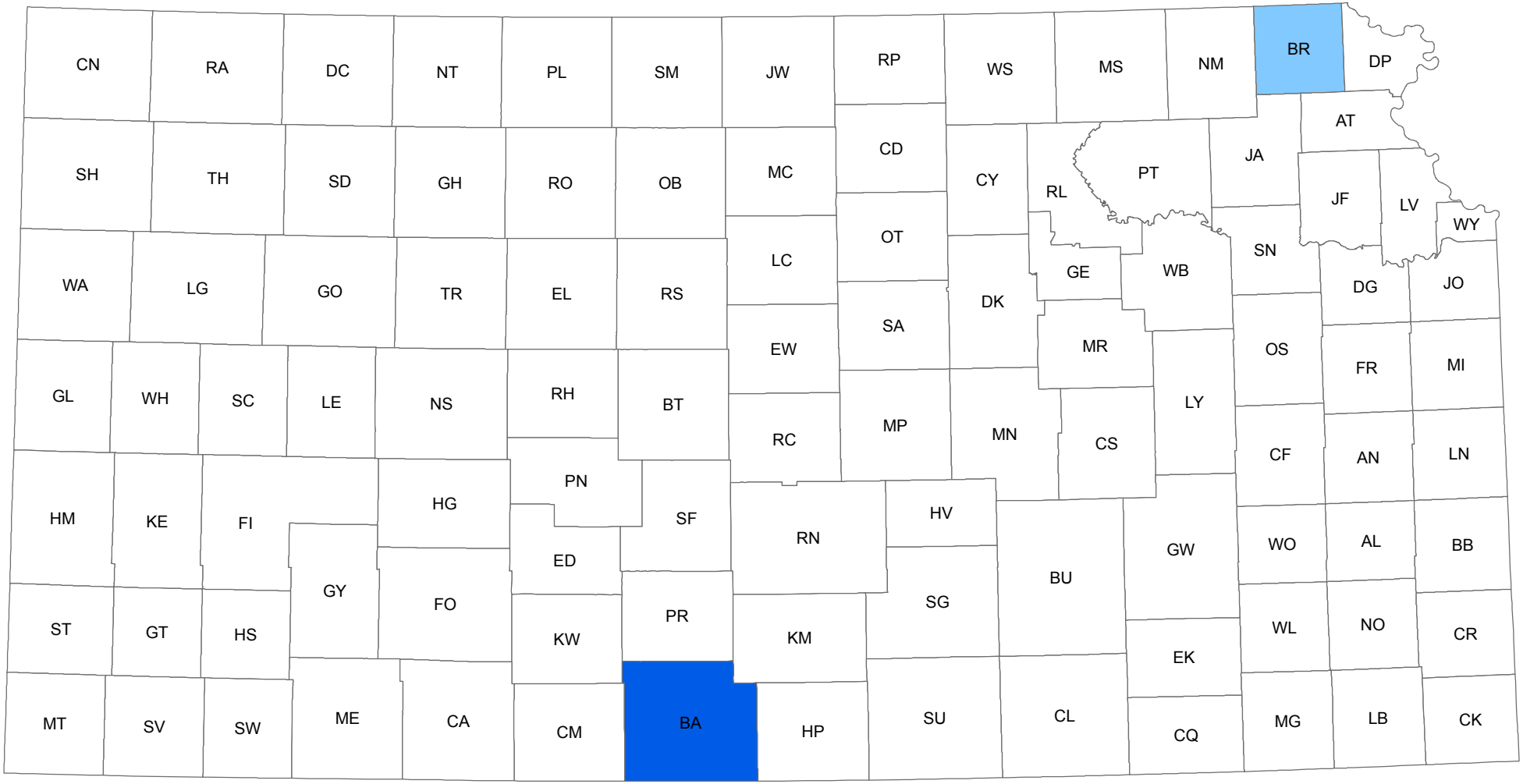
2008 Kansas Count: 2

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.1 – 0.2)
U.S. Rate (2007)	0.3	*NA*

In 2008, two confirmed cases of mumps were reported in Kansas. The three-year median for 2005-2007 was seven cases.

Both confirmed cases occurred among males in the 55 to 64 year age group.

Mumps Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 9.9 | 10.0 - 29.9

PERTUSSIS (WHOOPING COUGH)

Clinical Features: A prolonged, paroxysmal cough with characteristic inspiratory "whoop" is the primary symptom; posttussive vomiting may also occur. Infants may present with apnea or cyanosis, while adults may present only with a chronic spasmodic cough.

Causative Agent: *Bordetella pertussis*, a bacillus bacterium.

Mode of Transmission: Contact with respiratory secretions of infected persons.

Incubation Period: Ranges from 5-21 days (average 5-10 days).

Period of Communicability: Most transmissible in the period before cough becomes paroxysmal. Communicability gradually decreases and becomes negligible after 3 weeks. Patients are considered infectious until 5 days after beginning treatment.

Public Health Significance: Pertussis affects all age groups, but the disease is most severe in infants and young children. A vaccine exists to prevent illness in this age group (i.e., children under seven years old). In addition, a booster vaccine is licensed for those 11-64 years old.

Reportable Disease in Kansas Since: 1982

Clinical Criteria

- A cough illness lasting >2 weeks with one of the following: paroxysms of coughing, inspiratory "whoop", or posttussive vomiting, without other apparent cause.

Laboratory Criteria for Surveillance Purposes

- Isolation of *Bordetella pertussis* from clinical specimen, ***OR***
- Positive polymerase chain reaction (PCR) for *B. pertussis*.

Surveillance Case Definitions

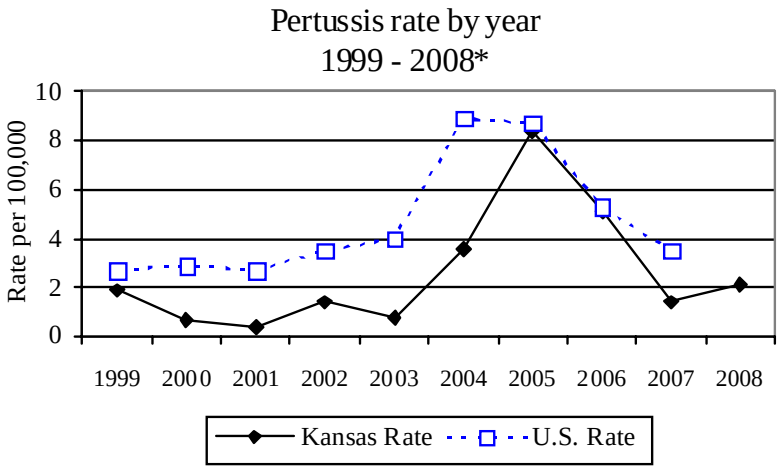
- *Confirmed:*
  - A case that is culture positive and in which an acute cough illness of any duration is present, ***OR***
  - A case that meets the clinical case definition and is confirmed by positive PCR, ***OR***
  - A case that meets the clinical case definition and is epidemiologically linked directly to a case confirmed by either culture or PCR

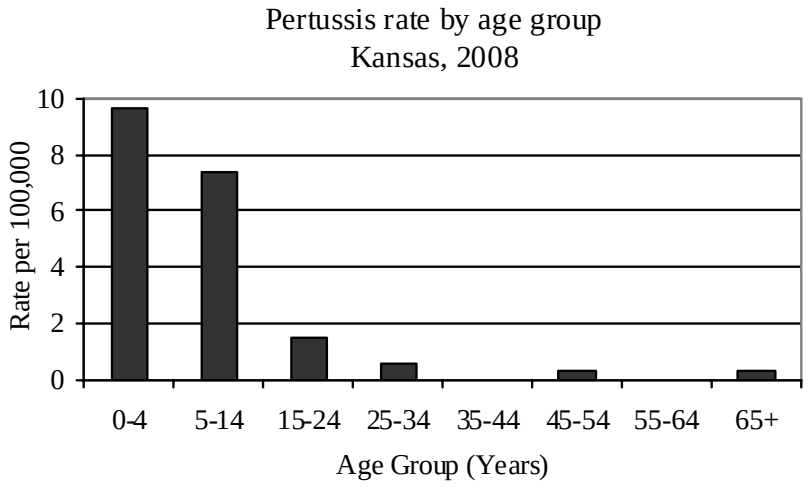
- *Probable:* A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to a laboratory-confirmed case.

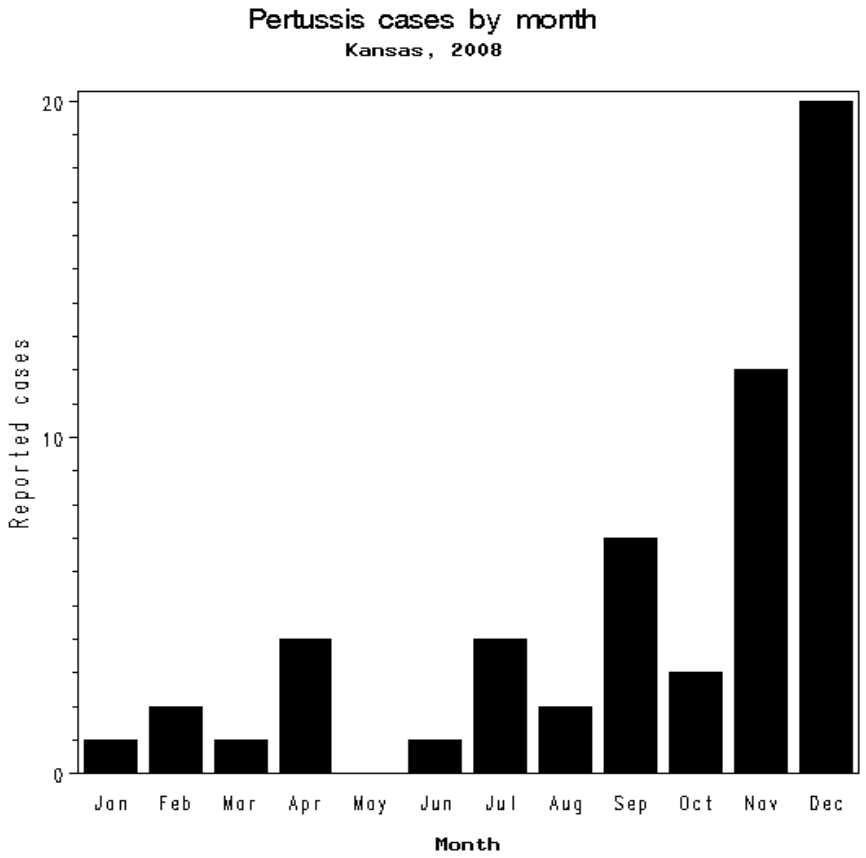
Epidemiology and Trends

2008 Kansas Count: 57

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	2.1	(1.5 – 2.6)
U.S. Rate (2007)	3.5	*NA*
Gender		
Male	16.2	(14.1 – 18.3)
Female	18.3	(16.1 – 20.5)
Race		
White	16.3	(14.7 – 17.9)
Black	6.1	(2.5 – 9.8)
Asian/Pacific Islander	16.2	(6.6 – 25.8)
Ethnicity		
Hispanic	33.6	(26.3 – 40.1)
Non-Hispanic	12.1	(10.7 – 13.4)
County of Residence		
Urban County	19.7	(17.4 – 22.0)
Non-Urban County	14.8	(12.7 – 16.9)

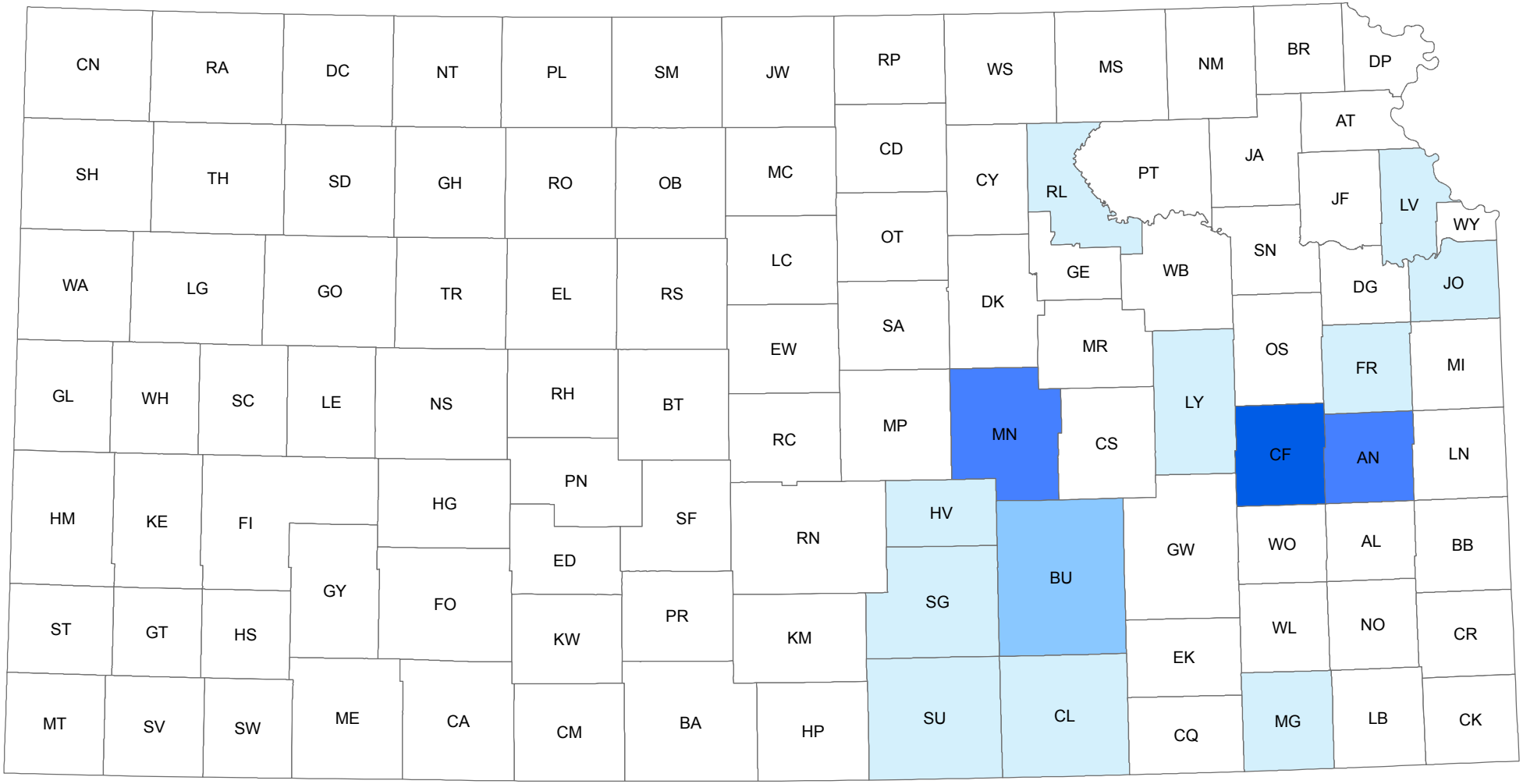






In 2008, 57 confirmed cases of pertussis were reported in Kansas. The three-year median of cases for 2005-2007 was 141 cases. Cases ranged in age from less than one year to 66 years; the median age was 9 years. The majority of confirmed cases (n=47, 82%) were among individuals less than 15 years of age. The rate of incidence was highest (9.7 per 100,000) among children less than 4 years of age. Five doses of pertussis vaccine are necessary for full protection; children are not eligible to receive their fifth dose of vaccine until their fourth birthday.

Pertussis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.1 - 19.9 | 20.0 - 29.9

Q FEVER

Clinical Features: The onset may be sudden with chills, retrobulbar headache, weakness, malaise and severe sweats. There is considerable variation in the severity and duration of symptoms; however, acute Q fever usually lasts 1 to 4 weeks. Infections may be inapparent or present as "fever of unknown origin". A pneumonitis is found on x-ray in some cases but without the cough, chest pain, sputum production, or physical findings typical of most pneumonias. Elevated liver enzymes are common and complications can include acute and chronic granulomatous hepatitis. Chronic Q fever can manifest as endocarditis with a prolonged course lasting for years and lead to the destruction of native heart valves necessitating valve replacement. Rare clinical syndromes, including neurologic complications, have been described.

Causative Agent: *Coxiella burnetii*, an intracellular, rickettsial bacterium

Mode of Transmission: The most common reservoirs are domestic farm animals, especially sheep, goats, and cows. Cats, dogs, rodents, marsupials, other mammalian species, and some wild and domestic bird species may also transmit infection to humans. Tick vectors may be important for maintaining animal and bird reservoirs, but are not thought to be important in transmission to humans. Humans typically acquire infection by inhalation of *C. burnetii* in fine-particle aerosols generated from birthing fluids during animal partuition or through inhalation of dust contaminated by these materials.

Incubation Period: Can vary from 9 to 39 days but is usually 14 to 22 days.

Period of Communicability: Direct transmission from person to person rarely if ever occurs. However, contaminated clothing may be a source of infection.

Public Health Significance: The organism responsible for Q fever is a potential bioterrorist agent. Special safety practices are recommended for laboratory procedures and research facilities involving *Coxiella burnettii.* Strict adherence to proper hygiene when handling parturient animals can help decrease the risk of infection in the farm setting. Experimental vaccines for domestic animals and laboratory and other high-risk workers have been developed but are not licensed or available in the United States at this time.

Reportable Disease in Kansas Since: 2000

Laboratory Criteria for Surveillance Purposes

- Fourfold change in antibody titer to *C. burnetii* antigen by immunofluorenscence antibody assay or complement fixation
- Positive polymerase chain reaction assay result
- Culture of *C. burnetii* from a clinical specimen
- Positive immunostaining of *C. burnetii* in tissue, especially a heart valve

Surveillance Case Definitions

- *Confirmed:* a laboratory confirmed case that either meets clinical case criteria or is epidemiologically linked to a lab confirmed case.

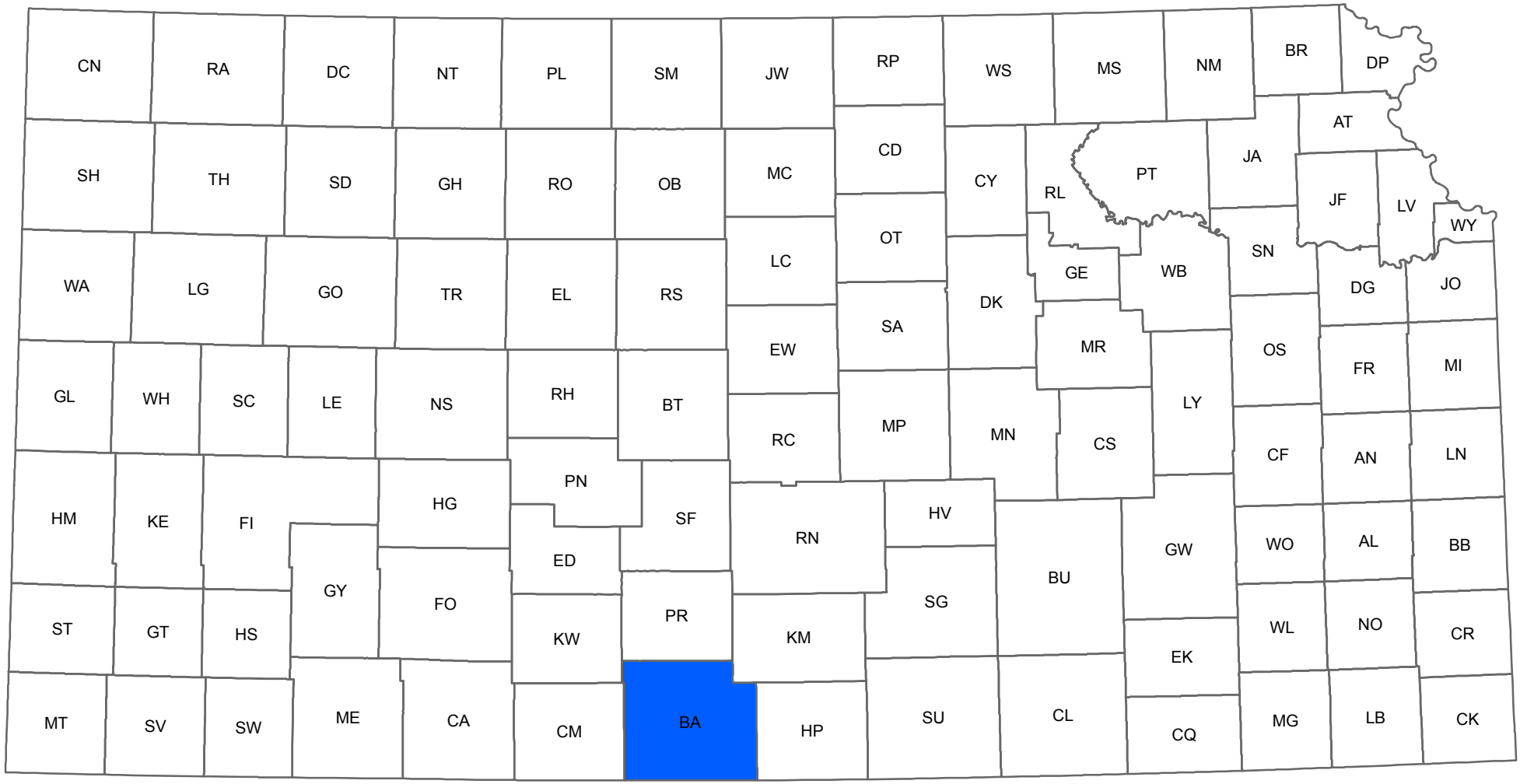
Epidemiology and Trends

2008 Kansas Count: 1

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.04	(0.0 – 0.11)
U.S. Rate (2007)	0.06	*NA*

One confirmed case of Q fever was reported in Kansas during 2008. Since Q fever became a reportable disease in 2001, zero to two cases have been reported annually, for a total of seven cases.

Q Fever Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | >= 10.0

RABIES, ANIMAL

Clinical Features: In animals, the disease has three phases. The first phase (prodromal) often presents as gastrointestinal symptoms (diarrhea, vomiting, etc.), progressing to furious then dumb (paralytic) rabies. During furious rabies, animals may become very aggressive and may roam, biting humans and other animals. In dumb rabies, paralysis is the predominant manifestation of the disease. This often begins with paralysis of the jaw accompanied by excessive salivation because of an inability to swallow. Owners may think the animal has a foreign body stuck in its throat and expose themselves while attempting to remove the perceived foreign object.

Causative Agent: Lyssavirus

Mode of Transmission: Wild mammals are the most important source of infection for both humans and animals in the United States. Skunks are the main reservoir for rabies in Kansas. Transmission may occur through bites and non-bite exposures. Bite exposures are most common - if the skin is broken during the bite, virus particles may reach a nerve and cause infection. A non-bite exposure occurs if an open wound, scratch, abrasion, or mucous membrane is contaminated with saliva, brain material, or cerebrospinal fluid from a rabid animal; a scratch from a rabid animal is also considered a non-bite exposure.

Incubation Period: The incubation period in animals varies by species.

Period of Communicability: In dogs, cats, and ferrets, rabies is communicable 3-7 days before the onset of clinical signs, and throughout the illness until death. The period of communicability in other species is unknown.

Public Health Significance: A dog, cat, or ferret inflicting a bite may be observed daily for 10 days (if a human was exposed) or quarantined for 6 months (if another animal was exposed) following the exposure to rule out the risk of rabies transmission. If the animal develops signs of rabies or dies during the observation or quarantine period, or if the animal is considered wildlife or an exotic species, it must be humanely euthanized and tested for rabies. As rabies is fatal, those who have been bitten by a rabid animal should receive PEP as soon as possible - PEP consists of one dose of Human Rabies Immune Globulin (HRIG) and doses of rabies vaccine on days 0, 3, 7, 14, and 28.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Positive direct fluorescent antibody test (preferably performed on central nervous system tissue), ***OR***
- Isolation of rabies virus in cell culture or in a laboratory animal

Surveillance Case Definitions

- *Confirmed:* a case that is laboratory confirmed.

Epidemiology and Trends

2008 Kansas Count: 68*

In Kansas, 68 laboratory confirmed cases of rabies in animals were reported during 2008. The three-year median for 2005-2007 was 83 cases. Confirmed cases per year may not represent an actual change in rabies prevalence, but rather a change in the number of animal-to-animal or animal-to-human exposures. In Kansas, animals are not usually tested unless an exposure has occurred. In 2008, 5.4% of all animal submissions tested positive for rabies; the five-year median for 2003-2007 was 8.1%. The number of animals submitted for testing and the number of rabies-positive animals tend to follow the cyclical pattern of the skunk population in the state.

Skunks tested positive most frequently (Table 1). The state's predominant strain, the "south central skunk" strain, was found in all of the terrestrial animals tested in Kansas in 2008. The “raccoon strain” seen on the East Coast of the U.S. has not been identified in Kansas.

Table 1 - Positive animal rabies species, Kansas, 2008

	Species	*Number Tested*	*Number Positive*	*Percent Positive*
Domestic	Cat	424	11	3%
Wildlife	Bat	192	6	3%
	Skunk	106	49	46%
Livestock	Horse	22	2	9%

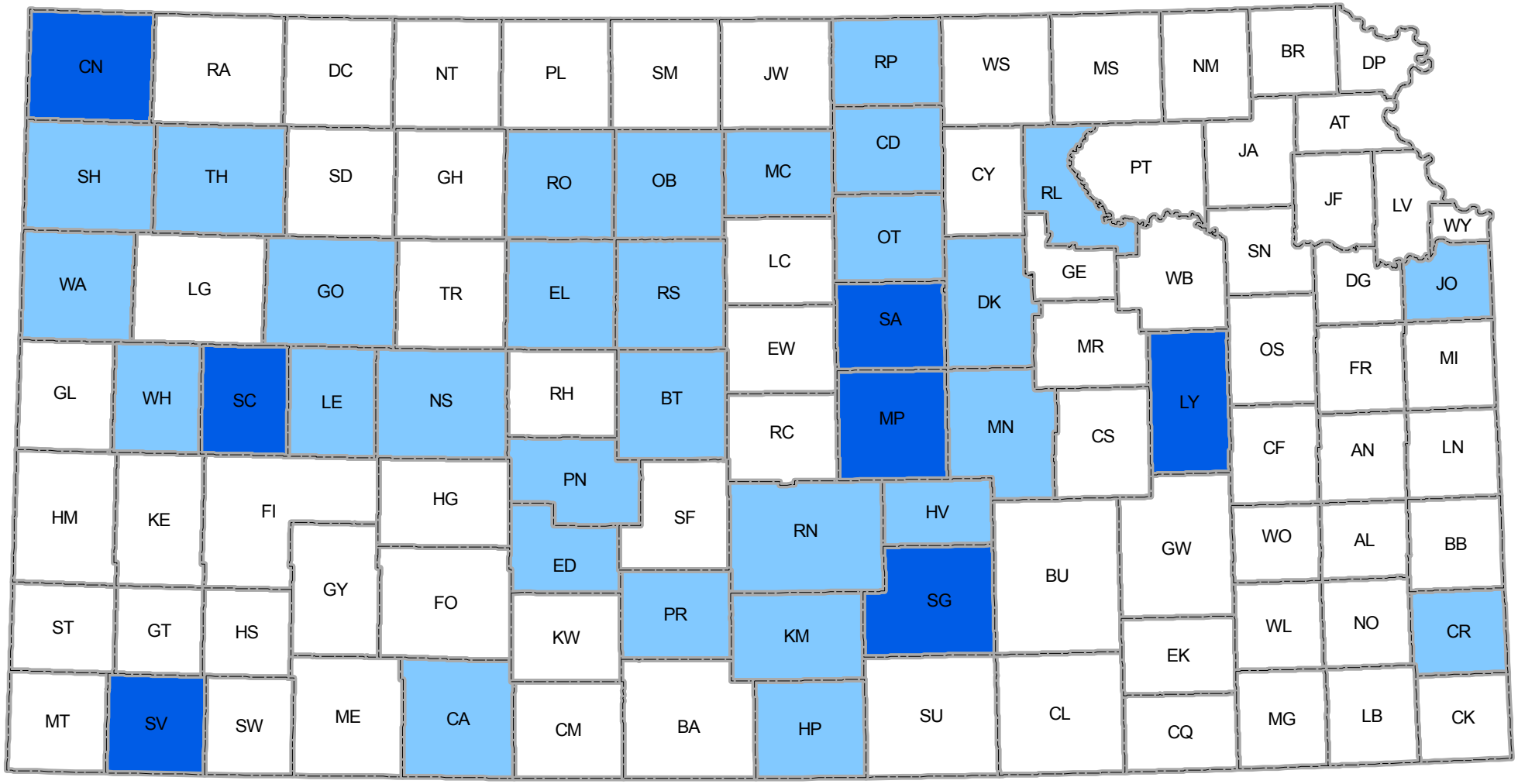
For the second consecutive year, no rabies virus was found among the 350 dogs tested. The state regulations on rabies, K.A.R. 28-1-2, do not mandate rabies vaccination for any domestic animal, though several local jurisdictions require vaccinations of some domestic animals, usually dogs. No cows tested positive for rabies in 2008.

* Animal rabies data is maintained by the Kansas State University College of Veterinary Medicine’s Rabies Laboratory. See http://www.vet.k-state.edu/depts/dmp/service/rabies/kansas.htm

Bats have been associated with most of the human cases in the U.S. Six of 192 submitted bats tested positive for rabies in Kansas in 2008—all were big brown bats (*Eptesicus fuscus*) except for one hoary bat *(Lasiurus cinereus)*.

There were no human rabies cases in Kansas in 2008; the last human rabies case in Kansas was reported in 1968.

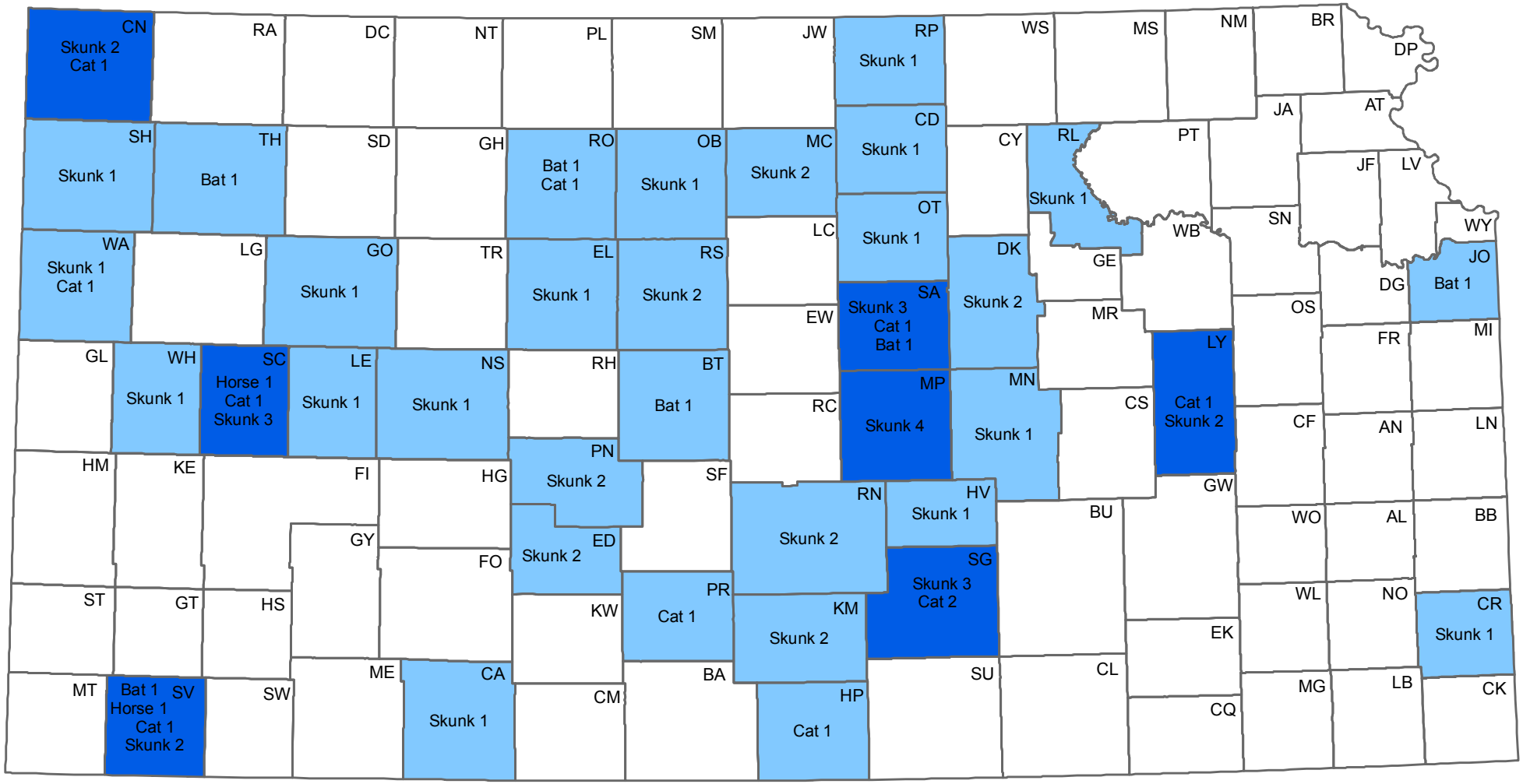
Animal Rabies Cases by County, 2008



Laboratory-confirmed cases

0 | 1 - 2 | 3 - 5

Animal Rabies Cases by County, 2008



Laboratory-confirmed cases

0 | 1 - 2 | 3 - 5

SALMONELLOSIS
(non-typhoidal)

Clinical Features: Acute gastroenteritis with sudden onset of fever, headache, diarrhea, abdominal pain, nausea, and sometimes vomiting. Dehydration may be severe. Asymptomatic infections and extraintestinal infections can occur. Children younger than 4 years of age, elderly individuals, and persons with immunosuppressive conditions may experience severe complications, including invasive infection and mortality.

Causative Agent: *Salmonella enterica* subsp. *enterica* serovars, gram-negative bacteria (~2,000 serotypes cause human infection)

Mode of Transmission: Naturally found in a wide range of domestic and wild animals, such as poultry, livestock, reptiles, and pets. Transmission occurs by ingestion of organisms in water or food contaminated by feces of an infected animal or person or food derived from infected animals. Handling raw meat or poultry products, or contact with infected reptiles, can also result in transmission.

Incubation Period: 6-72 hours, usually 12-36 hours.

Period of Communicability: Extremely variable, usually several days to several weeks dependent upon the course of infection. A carrier state can continue for over 1 year in 1% of adults and 5% of children under 5 years of age, especially infants. Prolonged, asymptomatic fecal shedding can promote person-to-person transmission.

Public Health Significance: Disease can be prevented by promotion of good hand washing and food handling practices. Symptomatic food handlers should be excluded from normal duties. Outbreak situations should be examined for a common vehicle of transmission. Situations in which control cannot be established may require exclusion of infected persons from daycare, patient care, or food handling.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Isolation of *Salmonella* from a clinical specimen.

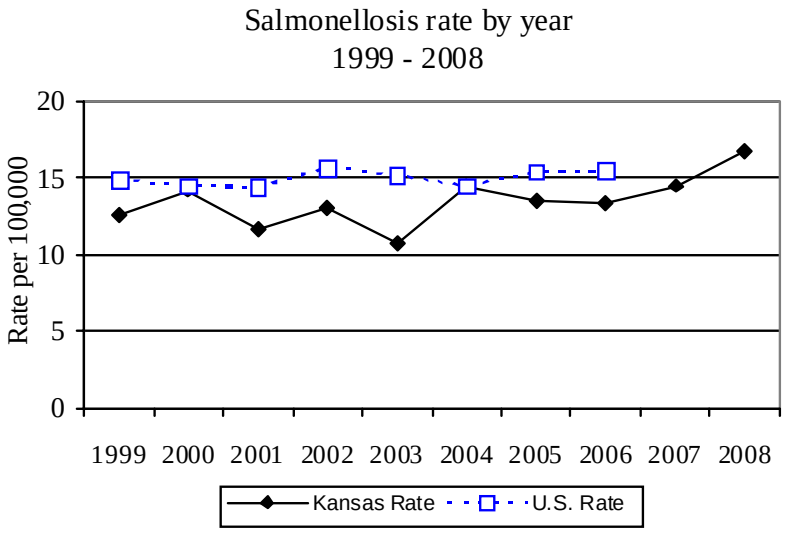
Surveillance Case Definitions

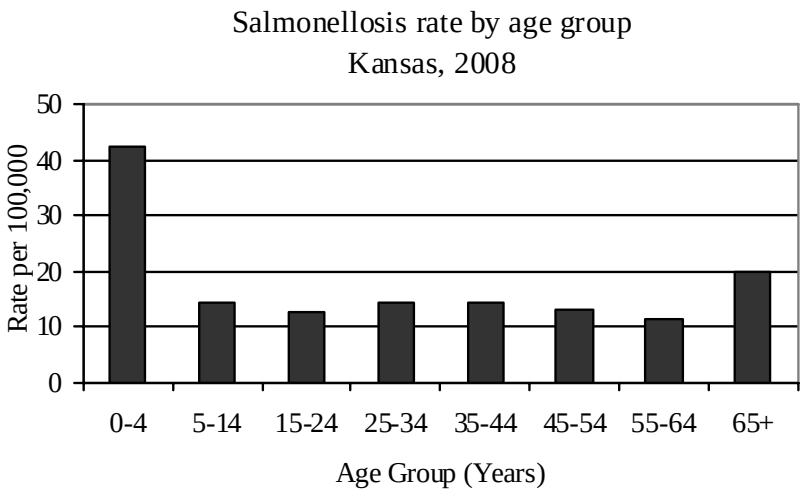
- *Confirmed:* A case that is laboratory confirmed.
- *Probable:* A clinically compatible case that is epidemiologically linked to a confirmed case.

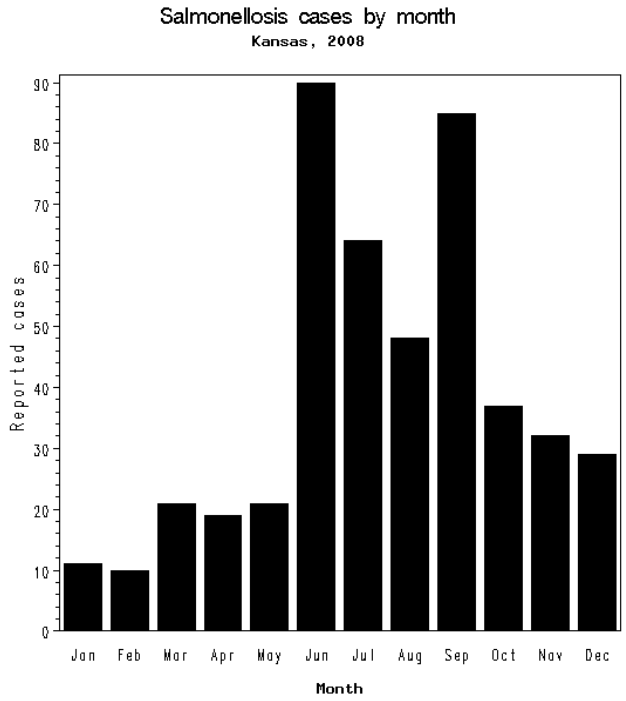
Epidemiology and Trends

2008 Kansas Count: 466

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	16.8	(15.3 – 18.4)
U.S. Rate (2007)	16.0	*NA*
Gender		
Male	14.8	(12.8 – 16.9)
Female	18.8	(16.5 – 21.1)
Race		
White	11.8	(10.5 – 13.1)
Black	10.3	(5.7 – 15.0)
Asian/Pacific Islander	10.3	(2.7 – 18.0)
Native American	6.4	(0 – 15.1)
Ethnicity		
Hispanic	12.3	(7.9 – 16.7)
Non-Hispanic	8.5	(7.4 – 9.7)
County of Residence		
Urban County	12.6	(10.8 – 14.4)
Non-Urban County	21.4	(18.9 – 23.9)







In 2008, 466 cases of salmonellosis were reported in Kansas. The three-year median for 2005-2007 was 369 cases. Cases ranged in age from less than 1 year to 93 years; the median age was 33 years. Though salmonellosis occurred in persons of all age groups, 19% of cases (42.3 per 100,000 population) occurred in those less than 5 years of age.

Twenty-four (5%) of the confirmed cases were linked to an outbreak of *Salmonella* Enteritidis.*

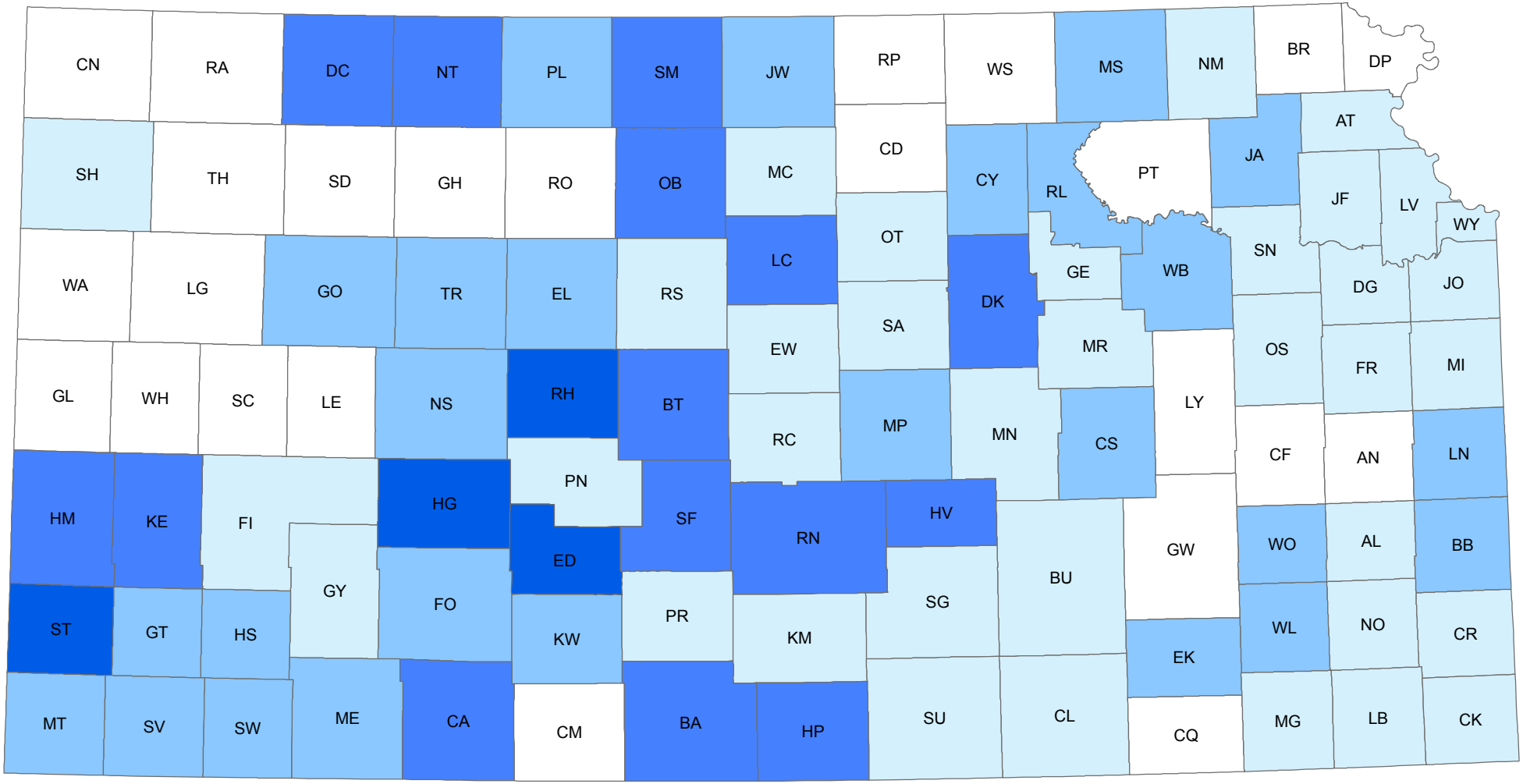
Complete serotype information was available for 448 (96%) of the reported cases:

* A detailed outbreak report may be found in Section II of this document, "Special Reports".

Most frequently reported *Salmonella* serotypes, Kansas, 2008

Salmonella serotype	*Reported isolates*	
	Number	*% of total*
Enteritidis	95	21%
Typhimurium	74	17%
Newport	69	15%
Saintpaul	24	5%
Heidelberg	21	5%
Montevideo	16	4%
Braenderup	13	3%
1,4,5,12:i:-	16	4%
Thompson	12	3%
Infantis	8	2%
Muenchen	8	2%
Javiana	7	2%
Agona	6	1%
Oranienberg	6	1%
Typhimurium var. 5-	6	1%
Bardo	4	1%
Paratyphi B	4	1%
Berta	3	1%
Hadar	3	1%

Salmonellosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 19.9 | 20.0 - 39.9 | 40.0 - 89.9 | >= 90.0

SHIGELLOSIS

Clinical Features: Illness of variable severity characterized by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections may occur.

Causative Agent: *Shigella* spp., a gram-negative bacterium, including *S. flexneri, S. sonnei, S. boydii,* and *S. dysenteriae.*

Mode of Transmission: Primarily spread through fecal-oral transmission through direct or indirect contact. May also be spread through water or milk by direct fecal contamination. Humans are the natural host for *Shigella*.

Incubation Period: Ranges from 12 hours to 7 days (average 2 to 4 days).

Period of Communicability: During the acute illness until the organism is no longer present in feces. Organism will usually clear within 4 weeks of illness onset, although in rare cases it may persist for months.

Public Health Significance: Disease may be prevented by promotion of good hand washing. Outbreaks are common among homosexual men, in conditions of overcrowding, and in day care and institutional settings; exclusion policies may apply in some outbreak situations.

Reportable Disease in Kansas Since: 1982

Laboratory Criteria for Surveillance Purposes

- Isolation of *Shigella* spp. from a clinical specimen.

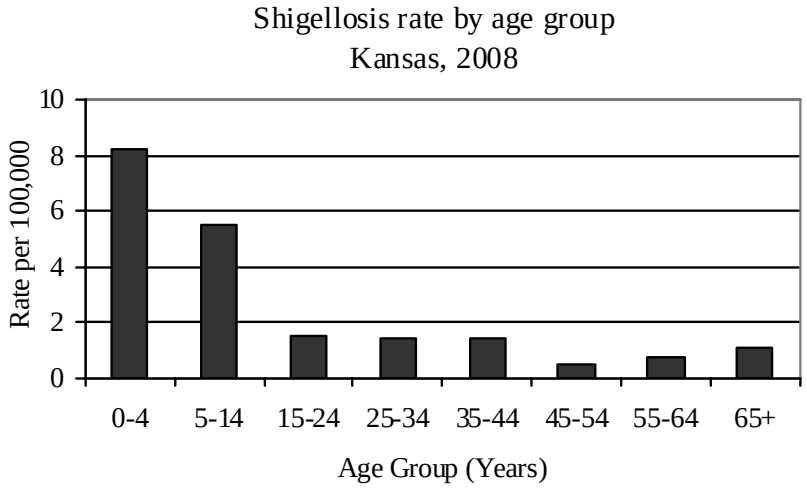
Surveillance Case Definitions

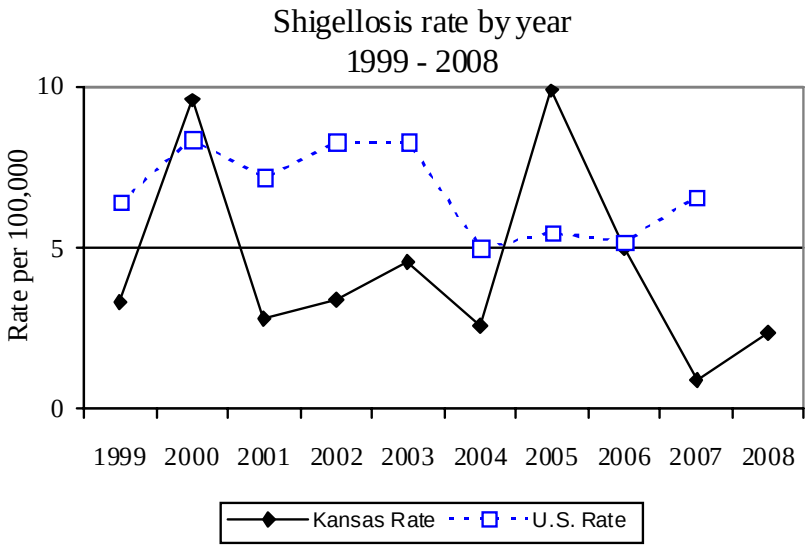
- *Confirmed:* A case that is laboratory confirmed.
- *Probable:* A clinically compatible case that is epidemiologically linked to a confirmed case.

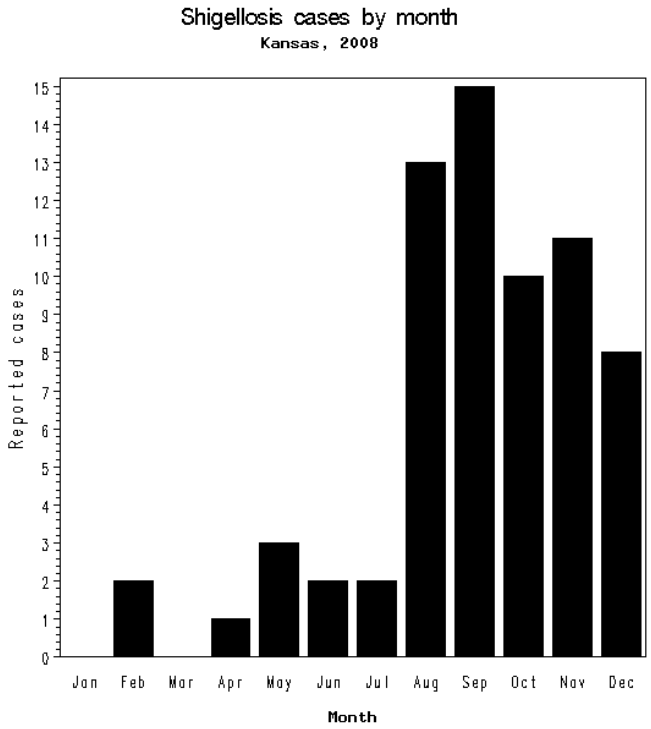
Epidemiology and Trends

2008 Kansas Count: 67

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	2.4	(1.8 – 3.0)
U.S. Rate (2007)	6.6	*NA*
Gender		
Male	2.3	(1.5 – 3.1)
Female	2.6	(1.7 – 3.4)
Race		
White	1.5	(1.0 – 2.0)
Black	3.8	(1.0 – 6.6)
Asian/Pacific Islander	5.9	(0.1 – 11.7)
Native American	3.2	(0 – 9.4)
Ethnicity		
Hispanic	11.1	(6.9 – 15.2)
Non-Hispanic	0.8	(0.5 – 1.2)
County of Residence		
Urban County	2.7	(1.9 – 3.6)
Non-Urban County	2.1	(1.3 – 2.9)





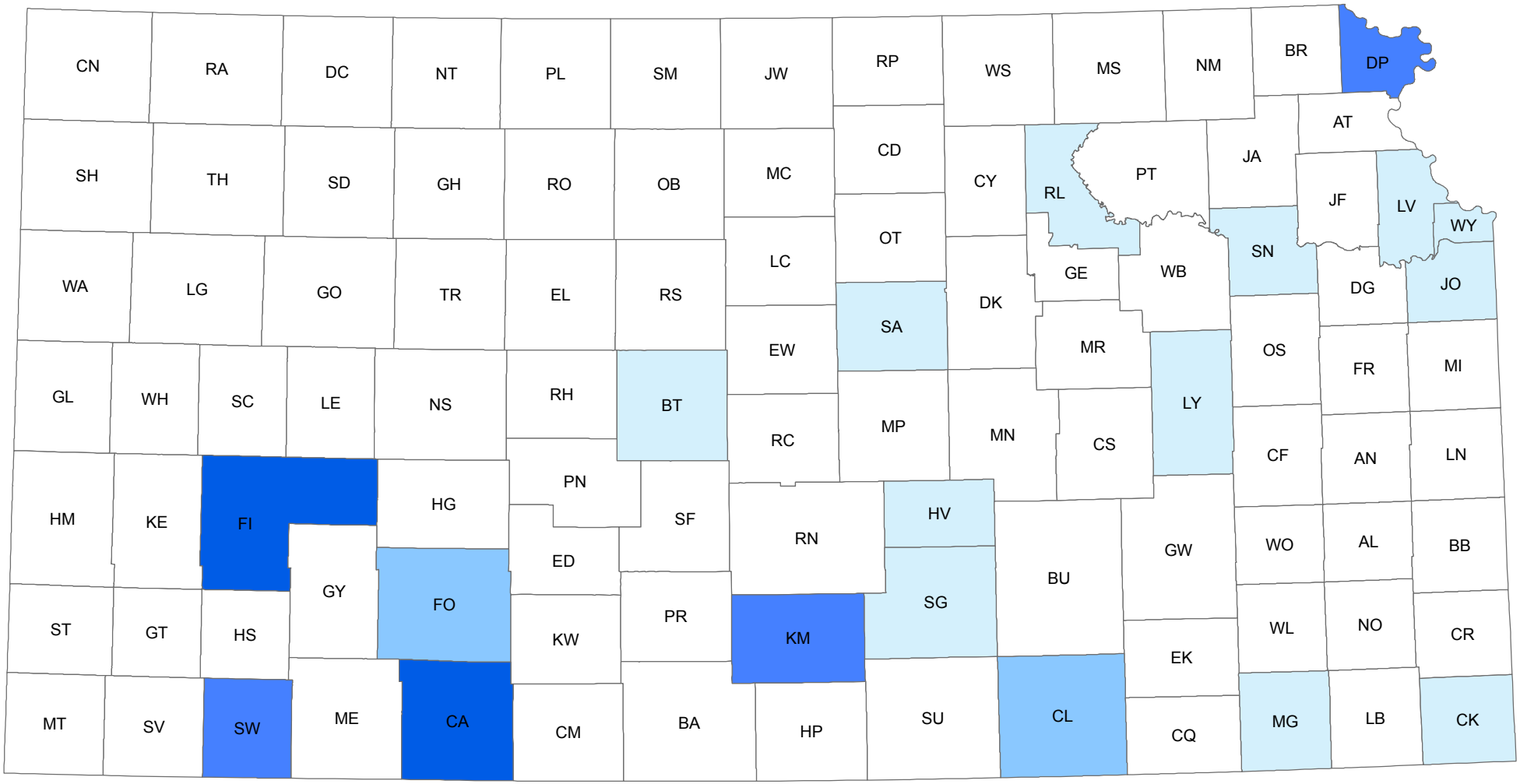


In 2008, 67 confirmed cases of shigellosis were reported in Kansas. The three-year median for 2005-2007 was 138 cases.

Confirmed cases ranged in age from one year to 75 years. The median age was 6 years. Nearly two-thirds (62%) of the cases occurred among children less than 15 years of age; the highest incidence rate occurred in those under 5 years of age (8.2 per 100,000).

The species of *Shigella* was reported for 65 (97%) of the 67 cases; 53 (82%) were identified as *S. sonnei*, 11 (17%) were *S. flexneri*, and one (1%) was *S. dysenteriae*.

Shigellosis Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.0 - 19.9 | >= 20.0

STREPTOCOCCAL INVASIVE DISEASE

Group A *Streptococcus* or *Streptococcus pneumoniae*

Clinical Features: Symptoms vary and are dependent on the site of infection (e.g. acute otitis media, pneumonia, bacteremia, or meningitis). Group A infections are characterized by sudden onset of fever, shaking chill, pleural pain, dyspnea, tachypnea, and leukocytosis. Infants and young children may experience fever, vomiting, and convulsions.

Causative Agent: Group A *Streptococcus* (*Streptococcus pyogenes*) or *Streptococcus pneumoniae*

Mode of Transmission: The organisms may spread directly via respiratory droplets and oral contact. Contact with articles (e.g. tissues) that have been freshly soiled with respiratory discharges may result in indirect transmission. Although the bacteria that cause invasive disease are commonly transmitted from person-to-person, invasive disease is not. Invasive illness among a patient's close and casual contacts is infrequent.

Incubation Period: 14 hours to 3 days. (The incubation period is not clearly defined; it may be dependent on the route of infection.)

Period of Communicability: Untreated patients are most infectious for 2-3 weeks after the illness onset, although transmission may occur until the bacteria are no longer found in respiratory secretions. Patients are not considered infectious 24 hours after treatment has begun.

Public Health Significance: School and day care exclusions apply to those with streptococcal pharyngitis or skin infections. Most types of pneumococcal disease (invasive *Streptococcus pneumoniae* infections) can be prevented through vaccination.

Reportable Disease in Kansas Since: All cases of streptococcal invasive disease have been reportable since 2000; drug-resistant strains were made reportable in 2006.

GROUP A *STREPTOCOCCUS*

Laboratory Criteria for Surveillance Purposes

- Isolation of Group A *Streptococcus* (*Streptococcus pyogenes*) by culture from a normally sterile site (e.g., blood, cerebrospinal fluid, joint, pleural, or pericardial fluid).

Surveillance Case Definitions

Confirmed: A clinically compatible case that is laboratory confirmed.

Epidemiology and Trends

2008 Kansas Count: 41

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	1.5	(1.0 – 1.9)
U.S. Rate (2007)	1.9	*NA*

In 2008, 41 cases of Group A *Streptococcus* were reported in Kansas. The majority of cases (n=30, 73%) occurred among adults aged 45 years and older. Twenty-nine cases (71%) occurred among residents of urban counties.

STREPTOCOCCUS PNEUMONIAE, DRUG-RESISTANT

Laboratory Criteria for Surveillance Purposes

- Isolation of *Streptococcus pneumoniae* by culture from a normally sterile site (e.g., blood, cerebrospinal fluid, joint, pleural, or pericardial fluid).
- "Nonsusceptible" isolate (i.e., intermediate- or high-level resistance of the *S. pneumoniae* isolate to at least one antimicrobial agent currently approved for use in treating pneumococcal infection

Surveillance Case Definitions

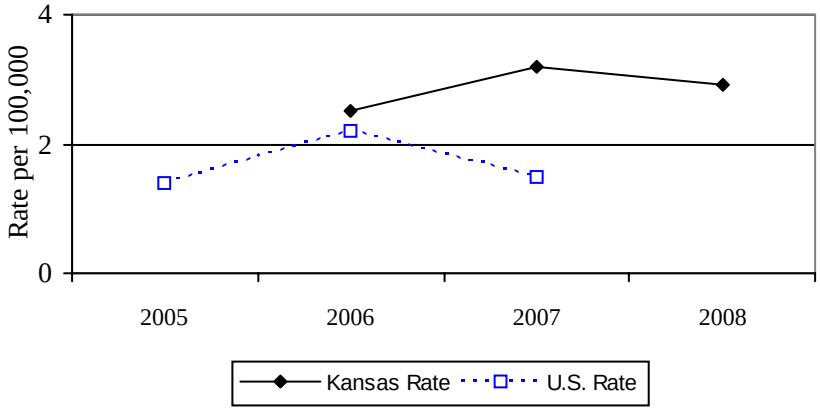
Confirmed: A clinically compatible case that is laboratory confirmed.

Epidemiology and Trends

2008 Kansas Count: 79

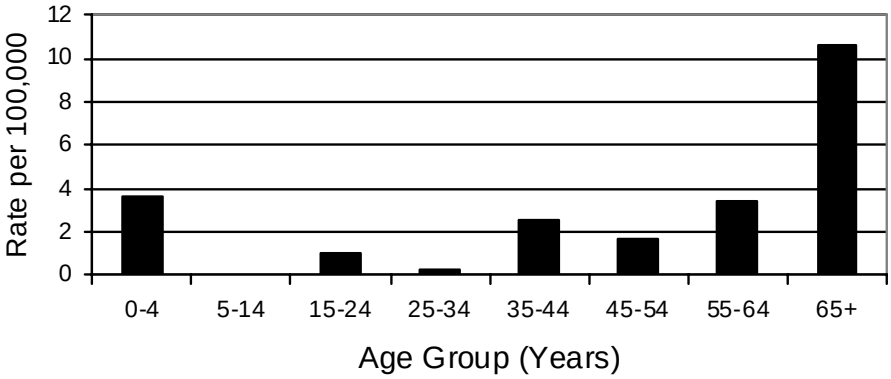
	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	2.9	(2.2 – 3.5)
U.S. Rate (2007)	1.5	*NA*
Gender		
Male	3.0	(2.1 – 3.9)
Female	2.7	(1.9 – 3.6)
Race		
White	1.8	(1.2 – 2.3)
Black	2.7	(0.3 – 5.1)
Asian/Pacific Islander	1.5	(0 – 4.4)
Native American	3.2	(0 – 9.4)
Ethnicity		
Hispanic	1.2	(0 – 2.6)
Non-Hispanic	1.4	(0.9 – 1.8)
County of Residence		
Urban County	3.3	(2.4 – 4.3)
Non-Urban County	2.3	(1.5 – 3.1)

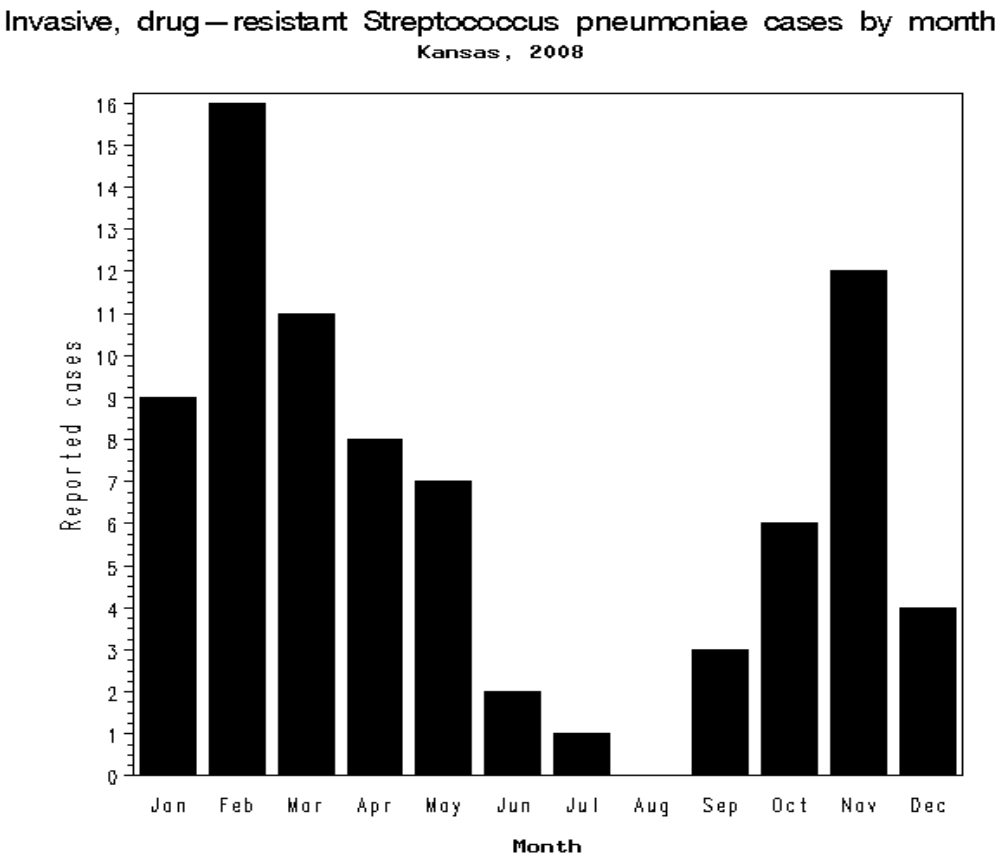
Drug-resistant *Streptococcus pneumoniae*
invasive disease rate by year, 2005 - 2007*



**Drug resistant S. pneumoniae was not reportable in Kansas before 2006.*

Drug-resistant *Streptococcus pneumoniae*
invasive disease rate by age group, Kansas, 2008





In 2008, 166 invasive *Streptococcus pneumoniae* infections were reported in Kansas. Kansas' disease reporting requirements were changed in 2006 to reflect national guidelines; for the second year, *S. pneumoniae* isolates were tested for antimicrobial resistance. Resistance was noted in 79 (48%) of the reported *S. pneumoniae* infections.

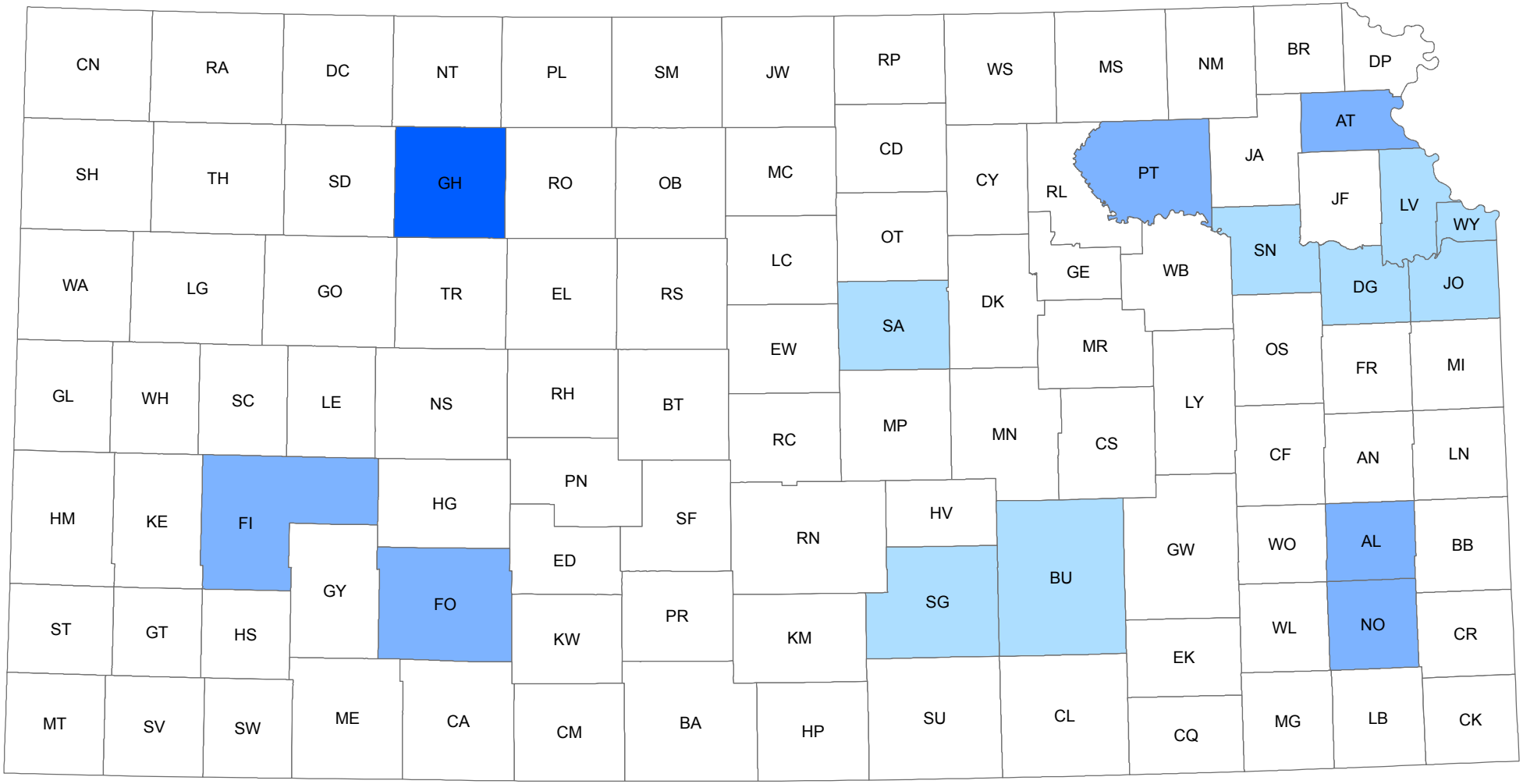
The rate of disease was higher among those residing in an urban county (3.3 per 100,000 residents) compared to those residing in non-urban counties (2.3 per 100,000 residents). Although the total number of African-Americans affected by streptococcal invasive disease in 2008 was low (5 cases), the disease incidence rate among African-Americans was high (2.7 per 100,000 population) compared to Whites (1.8 per 100,000 population). This reflects national trends; in the United States, the risk of disease is higher among non-Whites.[*]

Pneumococcal conjugate vaccine is recommended for children less than 2 years of age, and for high-risk children less than 5 years of age. In 2008, 7 of the 24 *S. pneumoniae* infections (including both drug-resistant and drug-susceptible strains) among children less than 5 years of age were caused by drug-resistant strains. The rate was 3.6 per 100,000 population. The reported national incidence for this age group in 2007 was 3.7 per 100,000 population.

[*] CDC. Prevention of pneumococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1997;46(No. RR-8):1--24.

Pneumococcal polysaccharide vaccine is recommended for adults age 65 and older. In 2008, 70 (42%) of invasive *S. pneumoniae* cases (including both drug-resistant and drug-susceptible strains) occurred among this age group. The vaccination status of these cases is unknown; the pneumococcal vaccination rate among Kansans age 65 and older is 67.3%, according to the 2008 Kansas Behavioral Risk Factor Surveillance System (BRFSS).

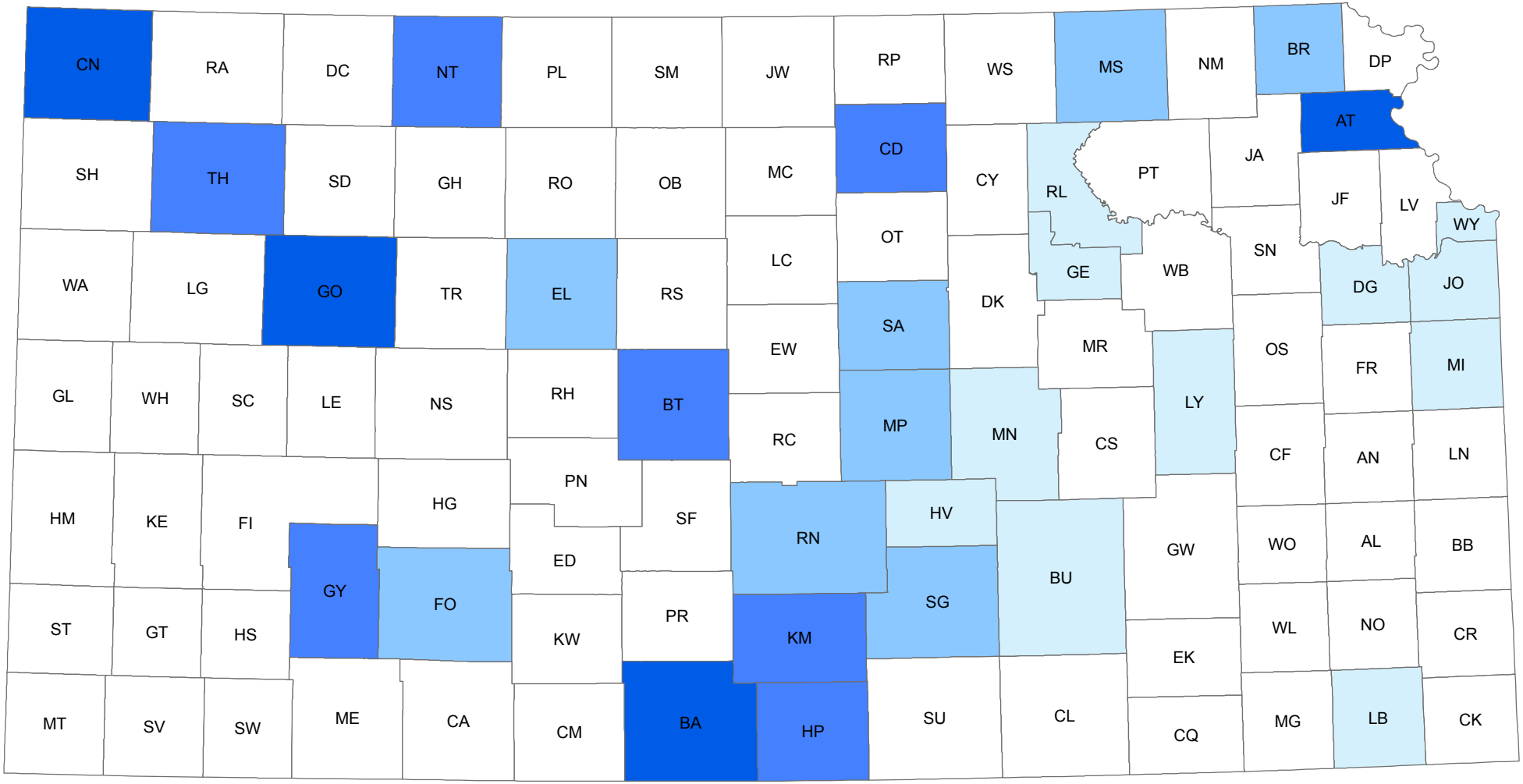
Invasive Group A Streptococcal Disease Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | >= 10.0

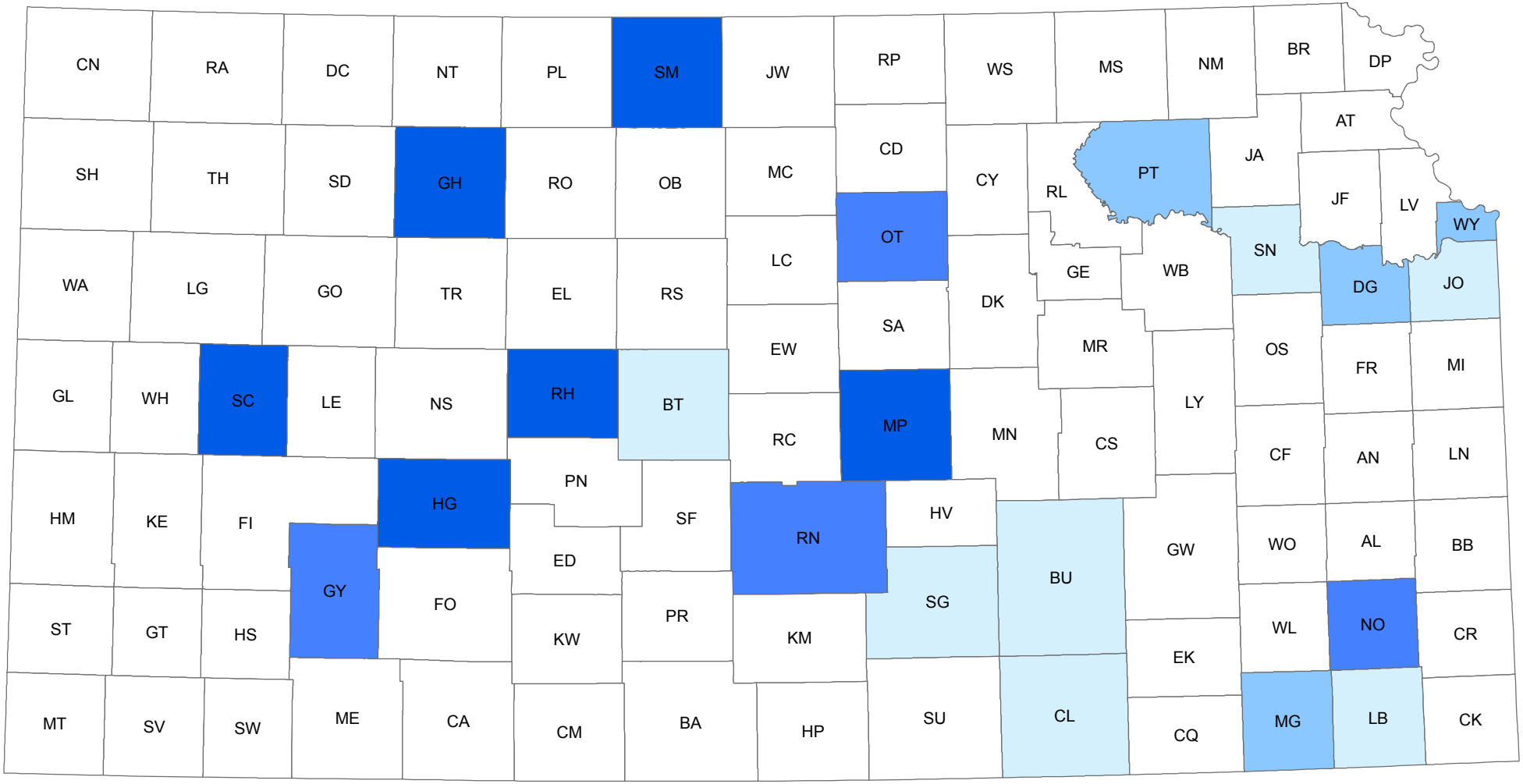
Invasive Streptococcus pneumoniae Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.0 - 19.9 | 20.0 - 39.9

Invasive, Drug-resistant Streptococcus pneumoniae
Incidence Rate per 100,000 by County, 2007



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.0 - 19.9 | >= 20.0

TRANSMISSIBLE SPONGIOFORM ENCEPHALOPATHY (TSE)
or
PRION DISEASE (including Creutzfeldt-Jakob Disease)

Clinical Features: Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response.

Causative Agent: The causative agent of TSEs is believed to be a prion. A prion is an abnormal, transmissible agent that is able to induce abnormal folding of normal cellular prion proteins in the brain, leading to brain damage and the characteristics signs and symptoms of the disease.

Mode of Transmission: Most TSEs are believed to occur sporadically, due to the spontaneous transformation of normal prion proteins into abnormal proteins. However, some TSEs, such as Kuru and Variant Creutzfeldt-Jakob Disease (vCJD) have been associated with consumption of infected human or animal tissue.

Incubation Period: Varies. TSEs have long incubation periods, measured in years.

Period of Communicability: Cases may be infectious for the duration of the illness, beginning early in the incubation period.

Public Health Significance: While most prion diseases seem to have species barriers, emphasis on disease surveillance and laboratory confirmation are needed to enhance understanding of the pathology and epidemiology of human prion diseases and to implement a system of detecting emerging human prion diseases.

Reportable Disease in Kansas Since: 2007

Surveillance Case Definitions

- *Confirmed:* A case that is laboratory confirmed by the National Prion Disease Pathology Surveillance Center.

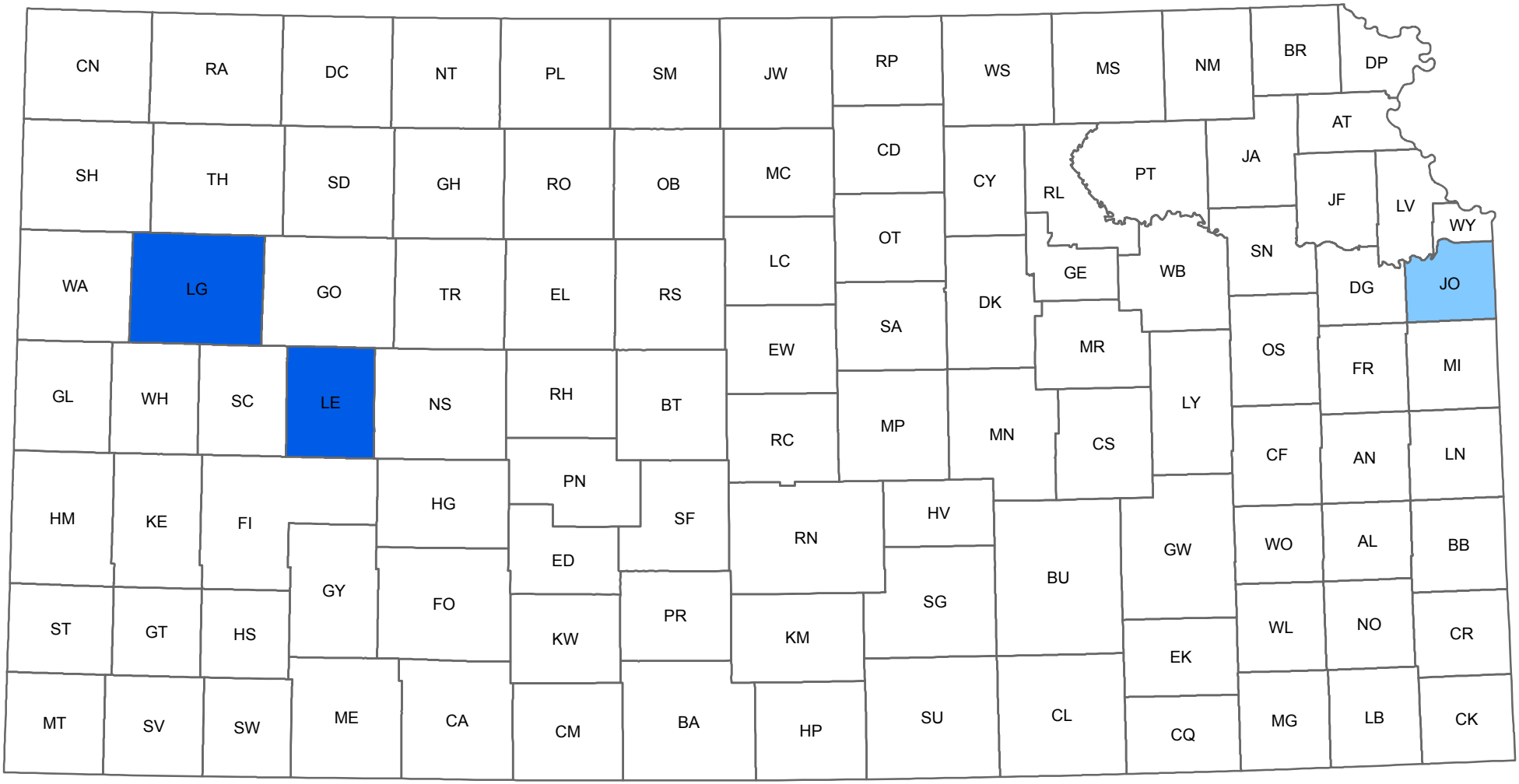
Epidemiology and Trends

2008 Kansas Count: 4

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.0 – 0.2)
U.S. Rate (2007)	*NA*	*NA*

In 2008, four cases of TSE were reported in Kansas; all four cases were fatal. The four cases ranged from 52 to 81 years of age. The median age was 62 years.

Transmissible Spongioform Encephalopathy Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | >= 5.0

TUBERCULOSIS (TB), ACTIVE DISEASE

Clinical Features: The most common site of disease is the lungs (pulmonary TB), but other organs (extrapulmonary TB) may be involved (e.g., brain, lymph nodes, kidneys, bones, joints, larynx, intestines, eyes). Systemic symptoms include low-grade fever, night sweats, fatigue, and weight loss. In pulmonary or laryngeal TB, there may also be hemoptysis (bloody sputum), a persistent and productive cough, chest pain, and shortness of breath.

Causative Agent: Mycobacterium tuberculosis complex. This complex includes *M. tuberculosis* and *M. africanum* (primarily from humans), and *M. bovis* (primarily from cattle).

Mode of Transmission: Exposure to tubercle bacilli through inhalation of airborne droplet nuclei from a person with active pulmonary/laryngeal TB. Prolonged close contact with an infectious case may lead to infection.

Incubation Period: approximately 2–12 weeks from infection to demonstrable primary lesion or significant tuberculin reaction. A latent, dormant TB infection can become active years after the initial infection; the incubation period can last for years.

Period of Communicability: Varies from case to case and is dependent upon the location of disease, the symptoms of disease, and smear status. Pulmonary and laryngeal clients pose the greatest risk for spreading tuberculosis. A client with a productive cough is considered a greater risk to transmit the disease than an individual without a cough. All smear positive pulmonary clients are considered contagious. Individuals that are smear negative upon diagnosis are generally not considered contagious unless they have symptoms of TB (i.e. a productive cough). An individual is presumed to be contagious until he/she has met three criteria: treated with appropriate tuberculosis medications for at least 2 weeks, improvement in symptoms, and three negative sputum smears.

Public Health Significance: Epidemics of tuberculosis have occurred among individuals in enclosed places, such as nursing homes, jails, hospitals, schools, office buildings, and factories. Tuberculosis is treatable with the use of medications; isoniazid, rifampin, pyrazinamide, and ethambutol. There are multi-drug resistant (i.e., resistant to both isoniazid and rifampin) forms of *M. tuberculosis*; fortunately, these strains have been reported only rarely in Kansas.

Reportable Disease in Kansas Since: 1982

Clinical Criteria

- A case that meets all of the following criteria:
  - A positive tuberculin skin test result
  - Other signs and symptoms compatible with tuberculosis, such as an abnormal, unstable (i.e., worsening or improving) chest radiograph, or clinical evidence of current disease
  - Treatment with two or more antituberculosis medications
  - A completed diagnostic evaluation

Laboratory Criteria for Surveillance Purposes

- Isolation of *M. tuberculosis* from a clinical specimen, ***OR***
- Demonstration of *M. tuberculosis* from a clinical specimen by nucleic acid amplification test, ***OR***
- Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained

Surveillance Case Definitions

- *Confirmed:* A case that meets the clinical case definition or is laboratory confirmed.

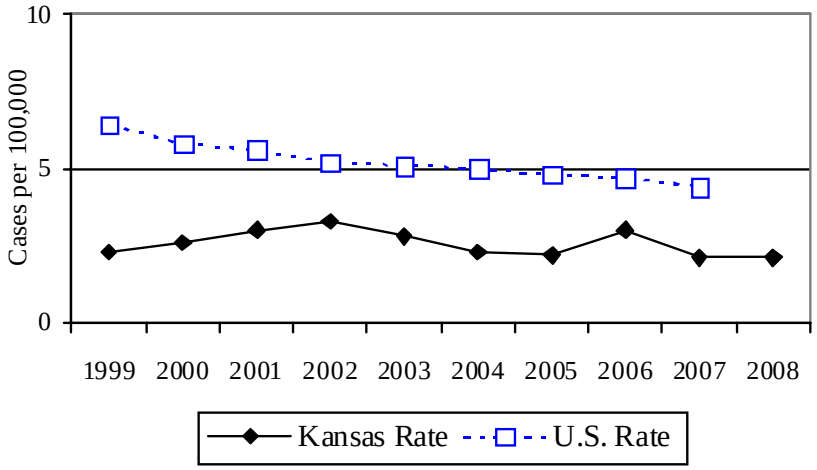
Epidemiology and Trends

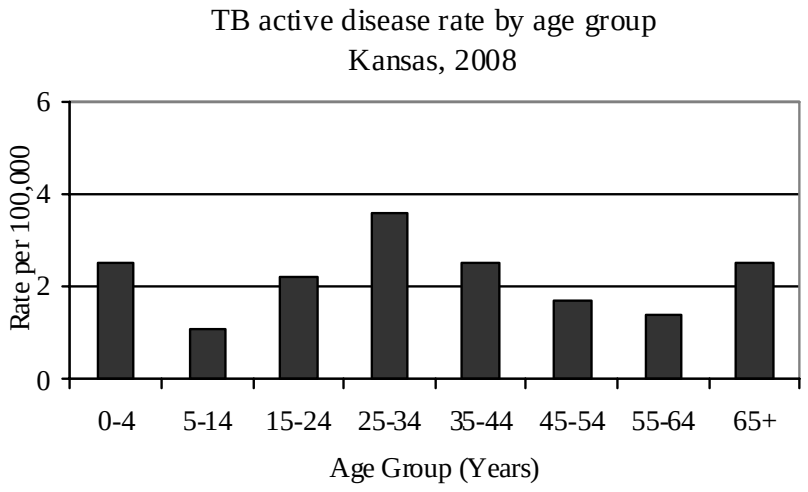
2008 Kansas Count: 57

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	2.1	(1.6 – 2.7)
U.S. Rate (2007)	4.4	*NA*
Gender		
Male	2.5	(1.7 – 3.4)
Female	1.6	(0.9 – 2.2)
Race*		
White	0.3	(0.1 – 0.5)
Black	6.3	(2.6 – 10.0)
Asian/Pacific Islander	25.9	(13.6 – 38.2)
Hispanic	8.6	(4.9 – 12.3)
County of Residence		
Urban County	2.8	(2.0 – 3.8)
Non-Urban County	1.2	(0.6 – 1.8)

**The tuberculosis program at KDHE combines race and ethnicity for analysis purposes. The denominators used for tuberculosis race rates were: White 2,263,370; Black 175,599; Hispanic 244,306; Native American/Alaska Native 27,057; Asian/Pacific Islander 65,665.*

TB active disease incidence rate by year, 1999-2008





In 2008, 57 confirmed cases of active tuberculosis disease were reported in Kansas. The three-year median for 2005-2007 was 61 cases.

The incidence rate was highest among minority populations. Asians and Pacific Islanders had the highest rate of disease (25.9 per 100,000), followed by Hispanics (8.6 per 100,000) and African-Americans (6.3 per 100,000). The majority of cases (66%) were foreign-born.

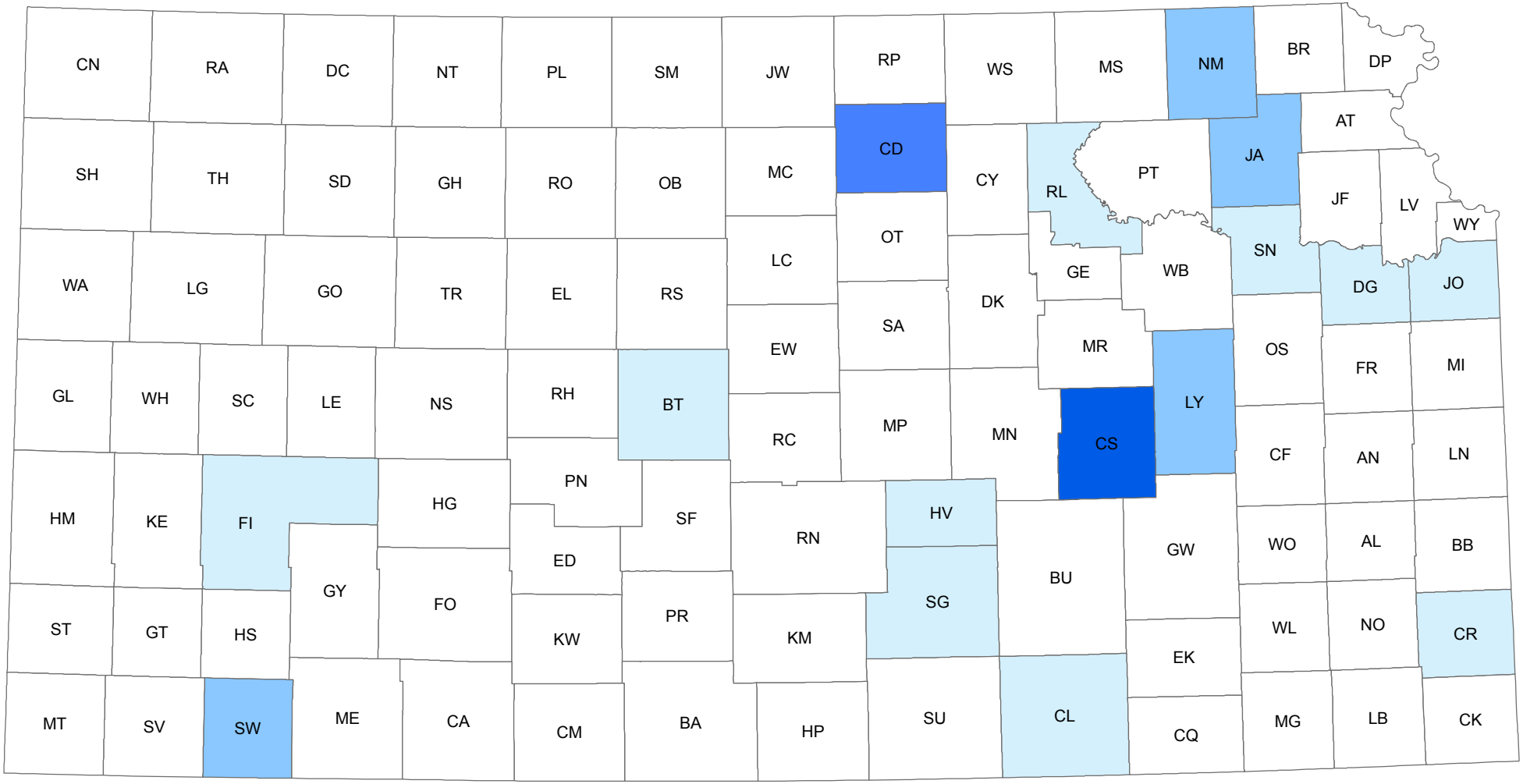
Tuberculosis cases by age group and origin of birth, Kansas, 2008

Age	US Born	Non US Born	Total
0 – 4	5	0	5
5 – 14	2	2	4
15 – 24	2	7	9
25 – 44	2	17	19
45 – 64	3	8	11
65 and older	6	3	9

Two cases were co-infected with Human Immunodeficiency Virus (HIV).

No Multidrug-Resistant Tuberculosis (MDR TB) was reported in 2008.

Active Tuberculosis Incidence Rate by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9 | 5.0 - 9.9 | 10.1 - 19.9 | 20.0 - 39.9

TUBERCULOSIS, LATENT INFECTION (LTBI)

Clinical Features: There are no systemic symptoms for latent TB infection (LTBI). Targeted testing programs exist to identify persons who are at high risk for LTBI and who would benefit from treatment.

Causative Agent: Mycobacterium tuberculosis complex. This complex includes *M. tuberculosis* and *M. africanum* (primarily from humans), and *M. bovis* (primarily from cattle).

Mode of Transmission: Exposure to tubercle bacilli through inhalation of airborne droplet nuclei from a person with active pulmonary/laryngeal TB. Prolonged close contact with an infectious case may lead to infection.

Incubation Period: approximately 2 –12 weeks from infection to demonstrable primary lesion or significant tuberculin reaction. A latent, dormant TB infection can become active years after the initial infection; the incubation period can last for years.

Period of Communicability: By definition, LTBI is not infectious.

Public Health Significance: Epidemics of tuberculosis have occurred among individuals in enclosed places, such as nursing homes, jails, hospitals, schools, office buildings, and factories. Recent immigrants, close contacts of an active TB case, HIV positive individuals, and persons with certain medical conditions (i.e. diabetes, cancer) are all high risk for developing TB disease once infected with *M. tuberculosis*. Thus, the treatment of LTBI is essential to controlling and eliminating TB in the United States. Treatment of LTBI substantially reduces the risk that TB infection will progress to TB disease. LTBI is treatable with the use of medications: isoniazid (INH) for 9 months, or rifampin (RIF) for 4 months (RIF is typically reserved for those who cannot tolerate the INH). Preventive medications for individuals with TB infection are provided at no cost to local health departments or other medical providers.

Reportable Disease in Kansas Since: 2004

Clinical Criteria

A case that meets all of the following criteria:

- A positive tuberculin skin test result (based upon risk factors)

≥ 5 mm is classified as positive in

- HIV positive persons
- Recent contacts of a TB case
- Persons with fibrotic changes on chest radiography consistent with old, healed TB
- Patients with organ transplants and other immunosuppressed patients

≥ 10 mm is classified as positive in

- Recent arrivals from high-prevalence countries
- Injection drug users
- Residents and employees of high-risk congregate settings
- Mycobacteriology laboratory personnel
- Persons with clinical conditions that place them at high risk
- Children <4 years of age, or children and adolescents exposed to adults in high-risk categories

≥ 15 mm is classified positive in

- Persons with no known risk factors for TB:
  - No signs and symptoms of active disease (i.e., productive cough, fever, night sweats)
  - Normal chest x-ray or an x-ray that is read as Negative for active TB disease
  - A completed diagnostic evaluation

Laboratory Criteria for Surveillance Purposes

- QuantiFERON® Gold is a blood test for detection of immune responses to latent tuberculosis TB infection. This test is new, and is not readily available for all Kansans to use due to the low percentage of labs certified in testing.

Surveillance Case Definitions

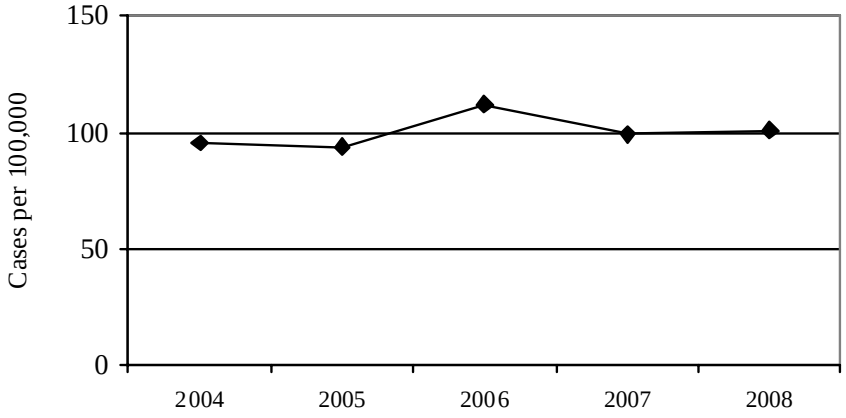
- *Confirmed:* A case that meets the clinical criteria ***OR*** is laboratory confirmed.

Epidemiology and Trends

2008 Kansas Count: 2812

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	101	(98 – 105)
U.S. Rate (2007)	*NA*	*NA*

Latent tuberculosis infection incidence rate by year, Kansas*, 2005-2008



**A comparable U.S. rate is not available.*

In 2008, 2,812 latent tuberculosis infections were reported in Kansas. Latent tuberculosis infections were first listed on the Kansas reportable disease list in 2004. Infections are not tracked nationally—no comparable U.S. rate is available.

TULAREMIA

Clinical Features: Most cases characterized by acute onset of fever, chills, myalgia, and headache appearing with various clinical syndromes dependent on the route of infection. Syndromes include an ulcer at the site of inoculation with regional lymphadenopathy (ulceroglandular); regional lymphadenopathy with no ulcer (glandular); conjunctivitis with preauricular lymphadenopathy (oculoglandular); stomatitis or pharyngitis or tonsillitis with cervical lymphadenopathy (oropharyngeal); intestinal pain, vomiting and diarrhea (intestinal); febrile illness without localizing signs and symptoms (typhoidal); and primary pleuropulmonary disease (pneumonic). Cases with pneumonia can develop chest pain, difficulty breathing, bloody sputum, and respiratory failure.

Causative Agent: *Francisella tularensis,* a gram-negative bacterium.

Mode of Transmission: Found in numerous wild animals, especially rabbits, hares, voles, muskrats, beavers, some domestic animals (i.e. dogs and cats), and various hard ticks, the organism is transmitted through the bite of arthropods; by inoculation of skin, conjunctiva or oropharyngeal mucosa with contaminated water, blood or tissue from infected animal carcasses; by handling or ingesting insufficiently cooked meat of infected animals; by drinking contaminated water; by inhalation of contaminated dust or aerosols; rarely, from bites of carnivores whose mouth presumably was contaminated from eating an infected animal; and from contaminated pelts and paws of animals.

Incubation Period: The incubation period ranges from 1-14 days (usually 3-5 days).

Period of Communicability: Not transmitted person-to-person. Draining lesions are potentially infectious.

Public Health Significance: In the U.S., risk of exposure is greater for those who spend a great deal of time outdoors; incidence is higher during hunting seasons and when ticks and deer flies are abundant. Illness may be prevented through education on the following risk factors: exposure to arthropod bites, exposure to potentially contaminated water, handling sick or dead wildlife, handling wild game carcasses, and ingestion of undercooked wild game. Tularemia is a potential bioterrorism agent, particularly if distributed as an aerosol.

Reportable Disease in Kansas Since: 1990

Laboratory Criteria for Surveillance Purposes

- Confirmed infection:
  - Isolation of *F. tularensis* from a clinical specimen, ***OR***
  - Fourfold or greater change in serum antibody titer to *F. tularensis* antigen.

- Presumptive infection:
  - Elevated serum antibody titer(s) to *F. tularensis* antigen (without documented fourfold or greater change) in a patient with no history of tularemia vaccination, ***OR***
  - Detection of *F. tularensis* in a clinical specimen by fluorescent assay.

Surveillance Case Definitions

- *Confirmed:* A clinically compatible illness that is laboratory confirmed.

Epidemiology and Trends

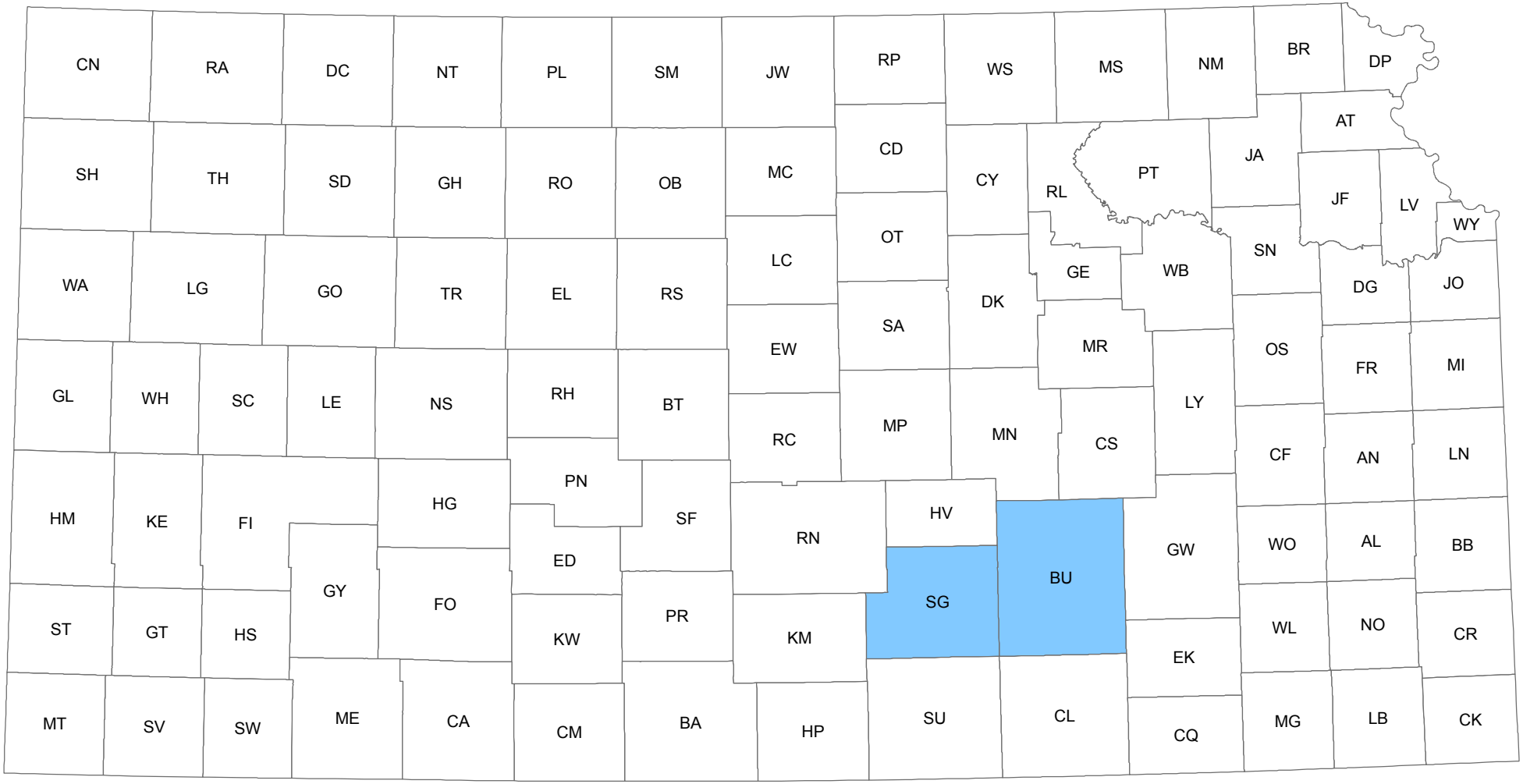
2008 Kansas Count: 2

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.07	(0.0 - 0.2)
U.S. Rate (2007)	0.05	*NA*

Two confirmed cases of tularemia were reported in Kansas during 2008. The three-year median for 2005-2007 was four cases. Two to eleven cases have been confirmed annually since 1999.

In 2008, both cases had ulceroglandular tularemia; one case was hospitalized. One case was bitten by a feral cat and *F. tularensis* was cultured from the wound. The cat was not tested for *F. tularensis.*

Tularemia Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

TYPHIOD FEVER

Clinical Features: Insidious onset of sustained fever, marked headache, malaise, anorexia, relative bradycardia, splenomegaly, constipation or diarrhea, rose spots on the trunk and nonproductive cough. Severity of symptoms can range from mild illness to invasive disease and complications, including death. Many mild and atypical infections occur, especially in endemic areas. Carriage of *S.* Typhi may be prolonged.

Causative Agent: *S.* Typhi bacterium (*S. enterica* subsp. e*nterica* serovar Typhi, formerly known as *S. typhi*).

Mode of Transmission: Humans are the only reservoir; therefore, ingestion of food (shellfish, fruit, vegetables) and water contaminated by feces and urine of *S.*Typhi cases and asymptomatic carriers are the main sources of infection. Flies also promote spread of disease.

Incubation Period: From 3 days to over 60 days, usual range 8-14 days.

Period of Communicability: Dependent upon the presence of organisms in excreta, communicability is usually from the first week throughout convalescence. Among 10% of untreated patients, this can be up to 3 months. Between 2% and 5% become permanent carriers.

Public Health Significance: Despite the availability of a vaccine and treatment, about 12.5 million persons in developing countries experience typhoid fever annually. A case-fatality rate of 15-20% is also observed among cases who do not receive prompt treatment. Typhoid fever infection can be prevented through access to safe water, proper sanitation, avoiding consumption of risky foods and liquids, and becoming immunized.

Reportable Disease in Kansas Since: 1982

Clinical Criteria

- Insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and nonproductive cough.

Laboratory Criteria for Surveillance Purposes

- Isolation of *S. typhi* from blood, stool, or other clinical specimen.

Surveillance Case Definitions

- *Confirmed:* A clinically compatible case that is laboratory confirmed *(NOTE**:** Isolation of the organism is required for confirmation. Serologic evidence alone is not sufficient for diagnosis. Asymptomatic carriage should not be reported as typhoid fever.)*

- *Probable:* A clinically compatible case that is epidemiologically linked to a confirmed case in an outbreak

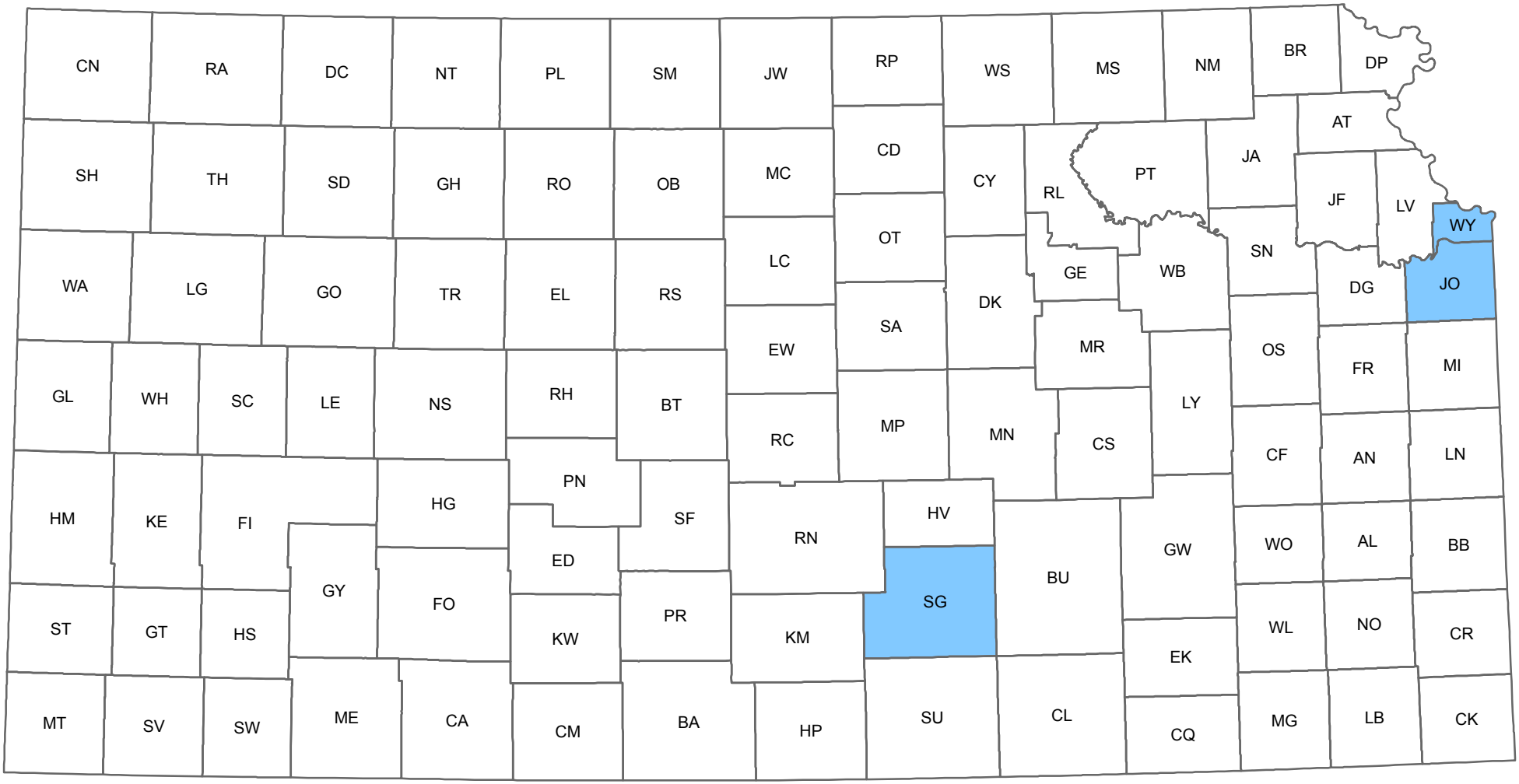
Epidemiology and Trends

2008 Kansas Count: 3

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	0.1	(0.0 – 0.2)
U.S. Rate (2007)	0.1	*NA*

There were three confirmed cases of typhoid fever reported in Kansas during 2008. Since 1994, zero to three cases have been reported annually.

Typhoid Fever Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 4.9

VARICELLA (CHICKENPOX)

Clinical Features: The disease is characterized by a generalized, pruritic rash that progresses from macules to papules to vesicular lesions before crusting. Healthy, unvaccinated children normally have 200-500 lesions in 2 to 4 successive crops — the lesions are more highly concentrated on the trunk than the extremities. Rash is usually the first sign of disease in children, followed by malaise, fever, and itching. Adults may experience fever and malaise in the 1 - 2 days prior to rash onset; the clinical course in adults is often more severe than what is seen in children. Adults also have a higher risk of complications, including secondary bacterial infections, pneumonia, dehydration, aseptic meningitis, and encephalitis.

Causative Agent: varicella zoster virus (VZV)

Mode of Transmission: The virus is highly transmissible from person to person. Direct contact with a case, or contact with a case's vesicle fluid or respiratory secretions (via airborne or droplet spread) may cause infection. Indirect transmission may occur if a case's vesicle fluid or respiratory secretions have soiled clothing, linens, etc.

Incubation Period: The incubation period may range from 10 to 21 days; the average incubation period is 14 - 16 days from exposure.

Period of Communicability: Cases are usually infective from 1 - 2 days before the onset of rash until all lesions are crusted. Cases with altered immunity may be infectious for a longer period of time.

Public Health Significance: A vaccine to protect against VZV is available; vaccination is required for school entry in Kansas. Disease has been reported in vaccinated children, although these "breakout" illnesses have been mild—vaccinated children that contract varicella normally report fewer lesions (less than 50), no fever, and a shorter duration of illness compared to non-vaccinated individuals. School and daycare restrictions apply to infected enrollees. The vaccine is also effective as postexposure prophylaxis in susceptible persons.

Reportable Disease in Kansas Since: 2003

Clinical Criteria

- An illness with acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause.

Laboratory Criteria for Surveillance Purposes

- Isolation of varicella virus from a clinical specimen, ***OR***
- Direct fluorescent antibody (DFA), ***OR***
- Polymerase chain reaction (PCR), ***OR***
- Significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay

Surveillance Case Definitions

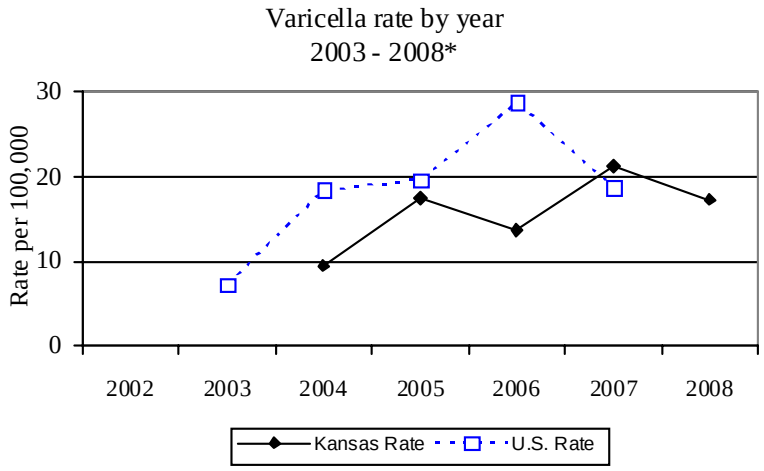
- *Confirmed:*
    - A case that is laboratory confirmed, ***OR***
    - A case that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case (Two probable cases that are epidemiologically linked would be considered confirmed, even in the absence of laboratory confirmation.)

- *Probable:* A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to another probable or confirmed case

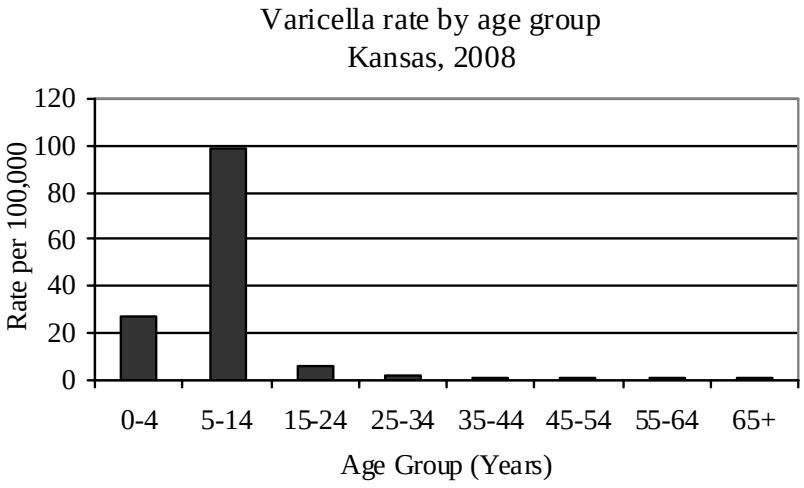
Epidemiology and Trends

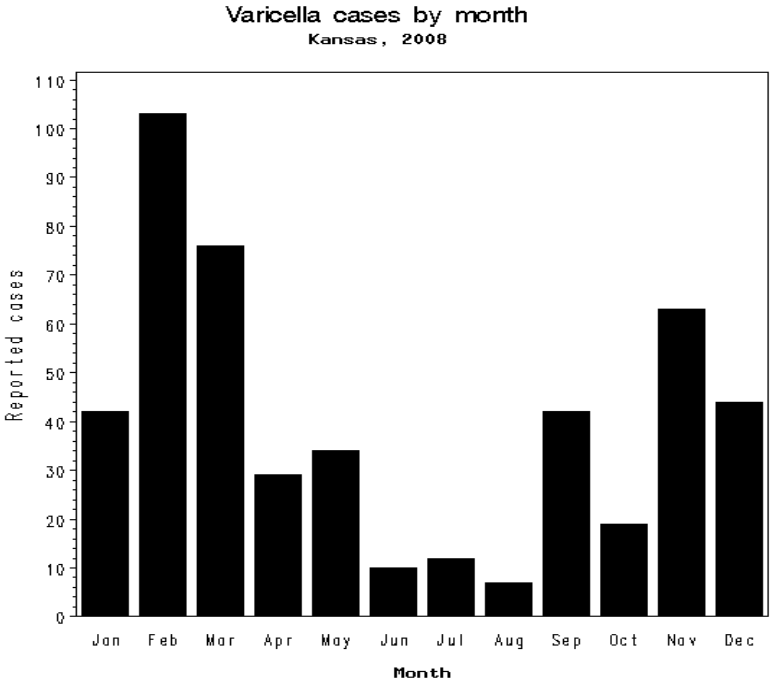
2008 Kansas Count: 481

	Rate per 100,000	*95% Confidence Interval*
Kansas Rate	17.3	(15.8 – 18.9)
U.S. Rate (2007)	18.7	*NA*
Gender		
Male	16.2	(14.1 – 18.3)
Female	18.3	(16.1 – 20.5)
Race		
White	16.3	(14.7 – 17.9)
Black	6.1	(2.5 – 9.8)
Asian/Pacific Islander	16.2	(6.6 – 25.8)
Ethnicity		
Hispanic	33.6	(26.3 – 40.1)
Non-Hispanic	12.1	(10.7 – 13.4)
County of Residence		
Urban County	19.7	(17.4 – 22.0)
Non-Urban County	14.8	(12.7 – 16.9)



**Varicella was not nationally reportable before 2003 and not reportable in Kansas before 2004.*

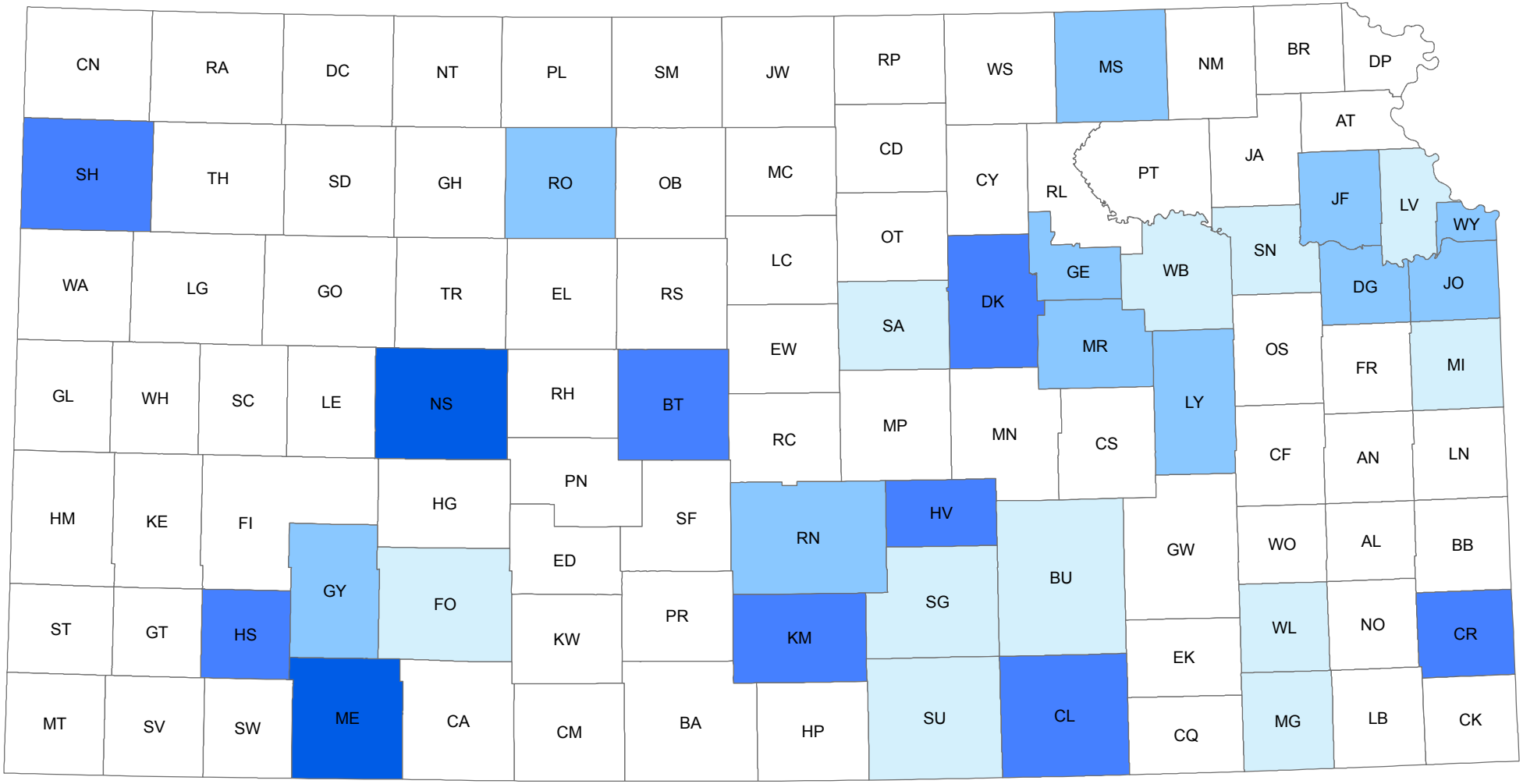




In 2008, 487 confirmed cases of chickenpox were reported in Kansas. Varicella has been a reportable disease since 2003 in Kansas—previously, only deaths resulting from varicella were reportable. The three-year median for 2005-2007 was 478 cases.

The vast number of case reports during 2008 precluded exhaustive investigation of every possible case; as a result, many cases may not have been reported as “confirmed”. For example, a case may be counted as "confirmed" if it is linked to another infected person, but this link may not be revealed without intensive follow-up. Unlinked, non-laboratory confirmed cases are counted as “probable” cases—394 probable cases were reported during 2008.

Varicella Incidence Rate per 100,000 by County, 2008



Incidence rate per 100,000 residents

0 | 0.1 - 19.9 | 20.0 - 49.9 | 50.0 - 99.9 | =>100

SECTION TWO - SPECIAL REPORTS

Kansas Influenza Surveillance, 2008-2009

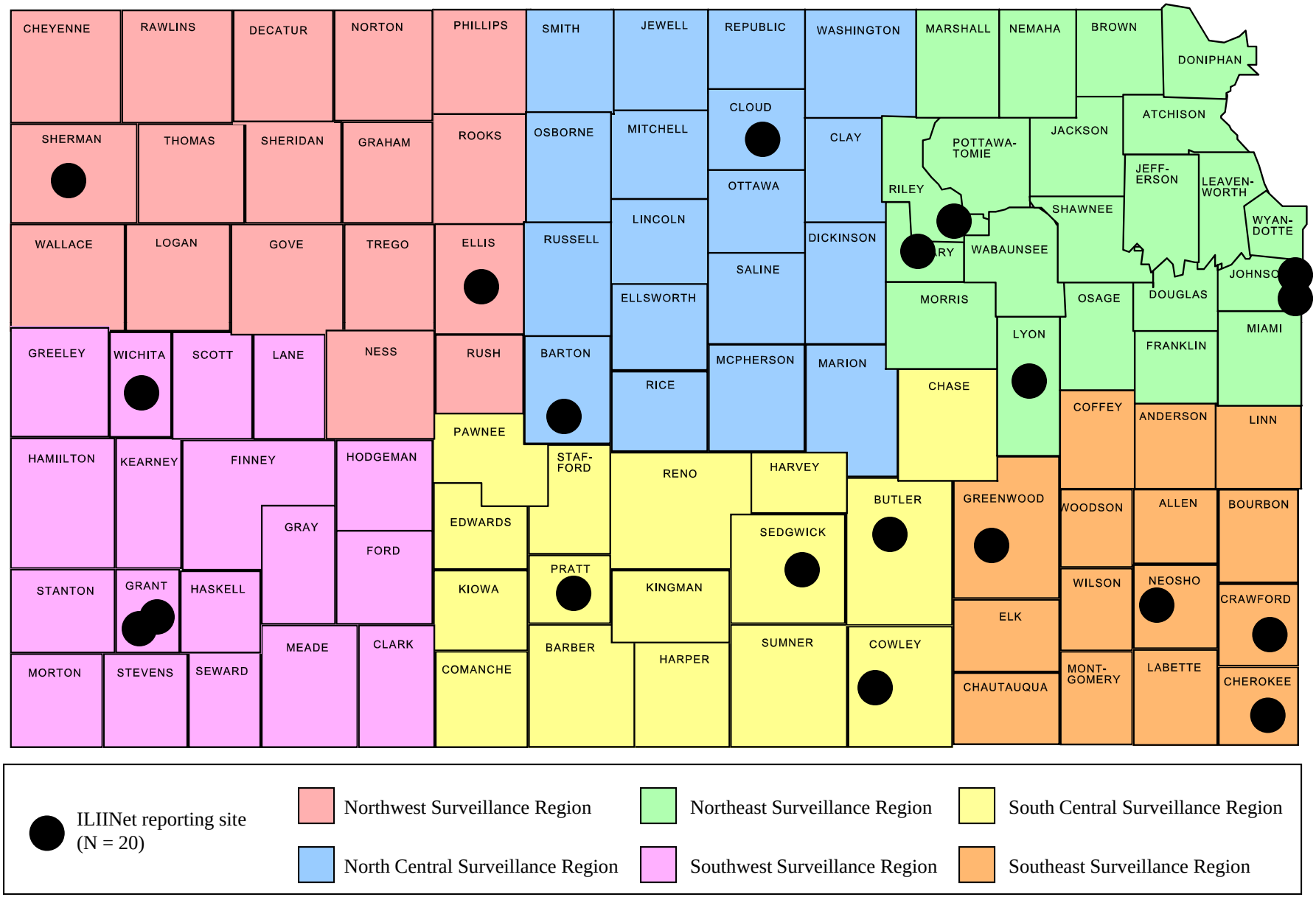
Morbidity Surveillance from the Outpatient Influenza-like Illness Surveillance Network (ILINet)

The Kansas Department of Health and Environment (KDHE) conducts sentinel influenza surveillance in collaboration with the Centers for Disease Control and Prevention (CDC), the Kansas Health and Environmental Laboratories (KHEL), and health care providers throughout the state of Kansas. The purpose of the surveillance is to:

- Track Influenza-like Illness (ILI),
- Recognize trends in influenza transmission,
- Determine the type of influenza circulating, and
- Detect seasonal changes in influenza viruses.

During the 2008-2009 influenza season, influenza surveillance was conducted in cooperation with 20 health care providers throughout the state: ten family practice clinics, five hospital emergency departments, four university student health centers, and one pediatric clinic (Figure 1).

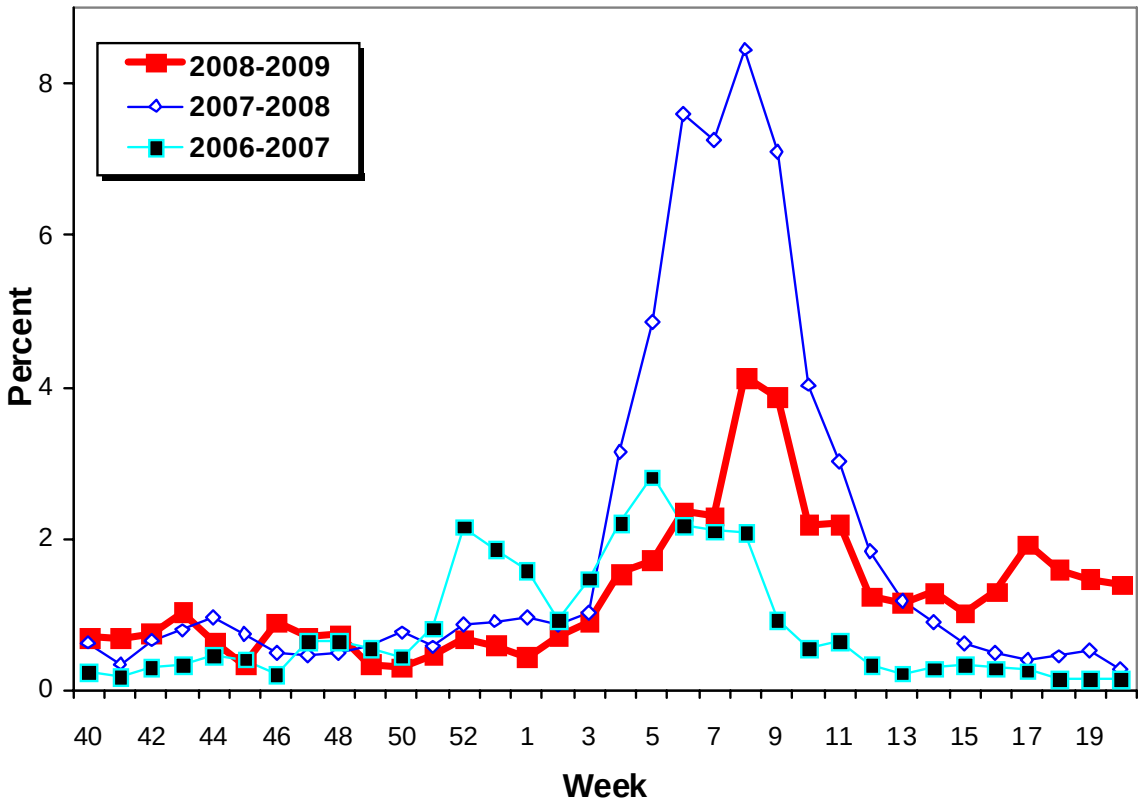
Figure 1: ILINet sites, 2008-2009 influenza season



Each week, sentinel site personnel determined the total number of patients seen with ILI during the previous week by age group — preschool (0-4 years), school age through college (5-24 years), adults (25-64 years), and older adults (>64 years). Influenza-like illness is defined by the CDC as fever (≥100°F or ≥37.8°C, measured either at the sentinel site or at the patient's home) with cough and/or sore throat, in the absence of a known cause other than influenza. In addition, the total number of patients seen during the previous week for any illness was recorded. The Outpatient Influenza-like Illness Surveillance Network (ILINet), which allows reporting by fax and the Internet, was used to transfer weekly data to CDC. Sites had the option of reporting directly to CDC or to KDHE.

During the influenza surveillance period, starting September 28, 2008 (week 40) and ending May 23, 2009 (week 20), sentinel sites observed a total of 147,655 patients — 1,941 (1.3%) sought care for ILI. Until week 4, ending January 31, 2009, less than one percent of patients seen every week had symptoms of ILI. The rate of ILI increased throughout February, peaking at 4.1% in week 8, ending February 28, 2009. Sentinel sites recorded 4,697 patient visits during week 8; 194 presented with ILI. Influenza-like illness visits decreased and held steady just above 1% from late March to late April, when a novel strain of swine-origin A/H1N1 influenza began to spread within the United States. While less severe than the previous influenza season, ILI activity during 2008-2009 remained elevated well after peaking. The ILI rate remained elevated beyond normal levels past the traditional end of the influenza surveillance season, week 20, ending May 23, 2009 (Figure 2). ILINet surveillance continued past May 23 to monitor the spread of the novel A/H1N1 virus.

Figure 2: Percentage of visits for ILI reported by ILINet sites, Kansas, 2006-2007, 2007-2008, and 2008-2009 influenza seasons*



**Sentinel sites may vary in number and type (student health, family practice, etc.) each season. Week 53 was unique to the 2008-2009 season; values for that week for the previous two seasons were calculated as the average ILI rate of weeks 52 and 1.*

Laboratory Surveillance

KHEL provided confirmatory testing for sentinel site patients with ILI, as well as for patients of other health care providers in the state. Viral isolation and Polymerase Chain Reaction (PCR) tests were used to analyze pharyngeal swabs for presence of influenza virus; positive specimens were typed and sub-typed. Laboratory data was sent weekly to CDC by KHEL to compare to regional and national activity. In addition, KHEL forwarded some viral specimens to CDC for antigenic characterization.

Routine testing was performed until April. From November 20, 2008, when the first respiratory specimen was received, until April 25, 2009, when the first Kansas cases infected with novel swine-origin A/H1N1 were identified, KHEL detected influenza in 30 of 45 specimens (Table 1). The first positive specimen was collected on December 3, 2008. The majority (n=22, 73%) of positive specimens were non-novel influenza

A/H1N1 viruses. Of the influenza B viruses detected, 7 were the B/Malaysia strain, and one was the B/Florida strain. Of these three virus strains, only B/Malaysia was unrelated to the strains found in the 2008-2009 influenza vaccine.

Table 1: KHEL-confirmed influenza specimens by region of collection, Kansas, November 20, 2008 – April 24, 2009* (n = 30)

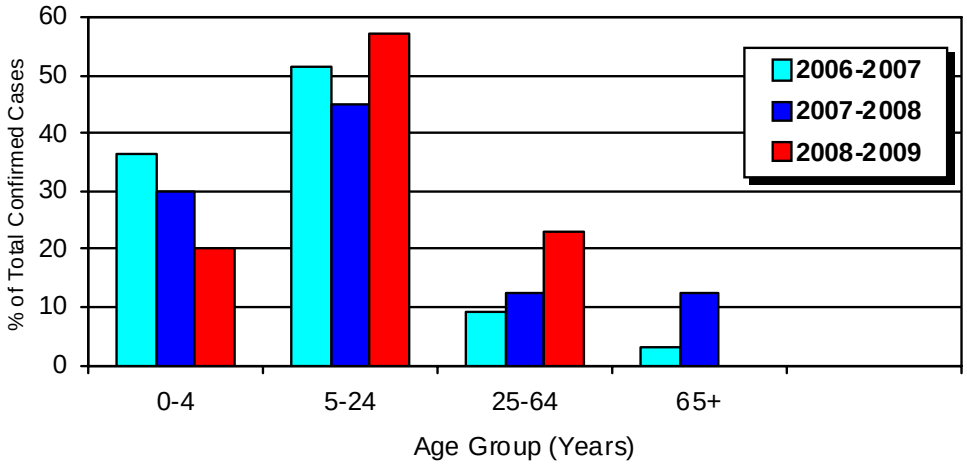
	Influenza subtype		
	A/H1	**B/Malaysia**	**B/Florida**
Northeast	10	2	0
North Central	0	0	0
Northwest	0	0	0
Southeast	2	4	0
South Central	10	1	1
Southwest	0	0	0

Influenza specimens were confirmed upon receipt. Routine sampling was not conducted in every region of the state.

The predominance of these strains during this time period was also seen nationally. As of April 18, testing at CDC revealed that 6,223 (89%) of 6,973 influenza A specimens were A/H1, and 256 (83%) of 307 influenza B specimens were B/Malaysia.

Positive specimens originated from every age group except for those 65 years and older. Of the 40 specimens confirmed at KHEL, 17 (57%) originated from the 25-64 age group (Figure 4). Sixteen (53%) of the positive specimens were from female patients.

Figure 4: Percentage of KHEL-confirmed influenza specimens by age group, Kansas, 2006-2007, 2007-2008, and 2008-2009 influenza seasons*



**Sentinel sites may vary in number and type (student health, family practice, etc.) each season. 2008-2009 data reflects specimens tested from November 20, 2008 – April 24*

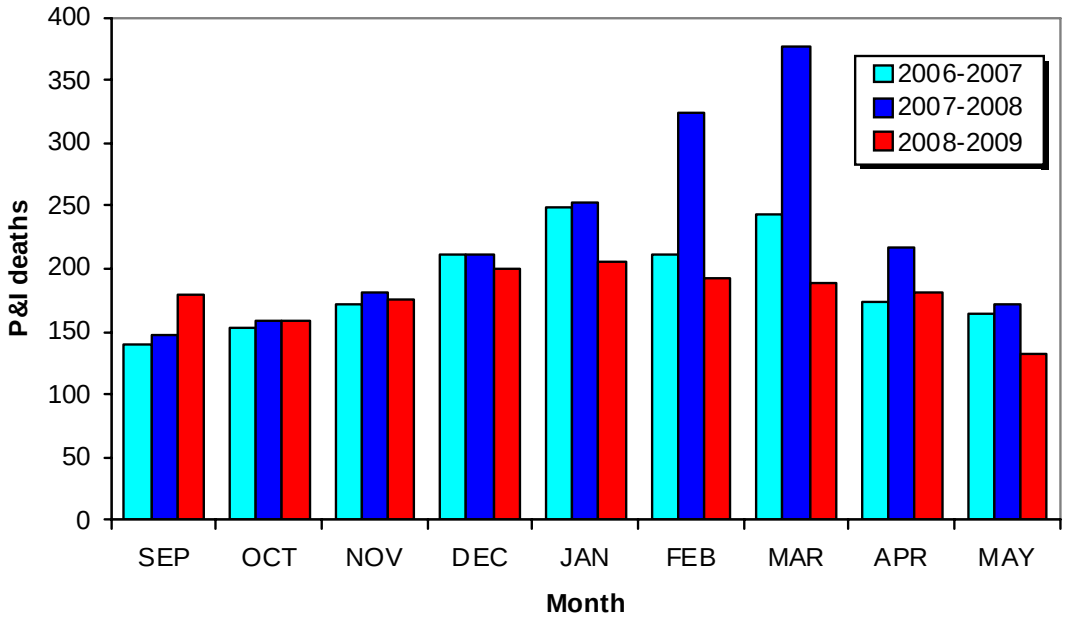
From April 25 to May 23, specimen submission to KHEL dramatically increased to detect additional cases of the novel A/H1N1 strain. The laboratory received 742 specimens during this time. Influenza was detected by PCR in 123 (16.6%) specimens—76 novel A/H1N1 viruses and 47 non-novel influenza viruses. Of the non-novel viruses, 17 were H1, 13 were untyped A, 12 were H3, 3 were B, and one specimen was coinfected with H1 and H3. Enhanced laboratory surveillance continued past May 23 to monitor the spread of the novel A/H1N1 virus.

Pneumonia and Influenza (P&I) Mortality

KDHE's Center for Health and Environmental Statistics monitors trends in influenza-related mortality. Death certificate data is collected to determine the number of deaths caused by pneumonia or influenza (P&I). Mortality is divided among three categories: pneumonia or influenza recorded as a contributing factor of death, influenza recorded as the direct cause of death, and pneumonia recorded as the direct cause of death. Mortality data includes deaths that occurred from September 2008 through May 2009.

The largest numbers of P&I deaths were recorded in the months of December and January (Figure 5).

Figure 5: Deaths attributed to pneumonia or influenza (P&I)* by month, Kansas, 2006-2007, 2007-2008, and 2008-2009 influenza seasons



**Death certificate lists pneumonia or influenza as a contributing factor or direct cause of death. 2008-2009 data is provisional and subject to change.*

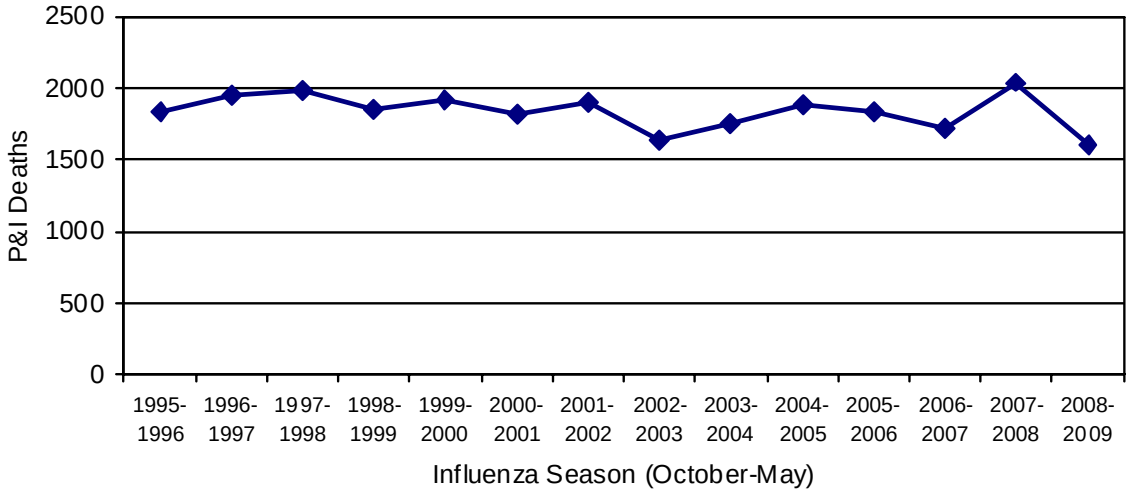
Of the total number of P&I deaths (n=1,611) recorded, 5 (0.3%) were directly attributed to influenza (Table 2).

Table 2: Pneumonia and influenza (P&I) mortality by causal relationship, Kansas, 2006-2007, 2007-2008, and 2008-2009 influenza seasons

	2006-2007 Influenza Season		**2007-2008 Influenza Season**		**2008-2009 Influenza Season**	
	N	*Percent*	*N*	*Percent*	*N*	*Percent*
Pneumonia or Influenza - Contributing factor in death	1139	66.3	1309	64.1	1143	70.9
Influenza - Direct cause of death	4	0.2	51	2.5	5	0.3
Pneumonia - Direct cause of death	575	33.5	681	33.4	463	28.7
P&I Total	1718	100.0	2041	100.0	1611	100.0

Pneumonia and influenza mortality during the 2008-2009 influenza season was lower than the previous season, which saw the greatest number of total P&I deaths as well as the greatest number of deaths directly-attributed to influenza on record in Kansas (Table 3). The 2008-2009 totals were also lower than those seen during the more typical influenza season of 2006-2007.

Table 3: Pneumonia and influenza (P&I) mortality by influenza season, Kansas, 2008-2009 influenza season and previous 13 influenza seasons



Influenza Deaths in Children Less Than 18 Years of Age

Since 2004, CDC has requested information on influenza-associated pediatric deaths; the condition was added to the list of reportable diseases in Kansas in 2006. For surveillance purposes, pediatric deaths are considered influenza-related if there was no period of complete recovery between the clinically compatible illness and death, and if the diagnosis was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test.

No confirmed influenza-associated pediatric deaths were reported in Kansas during the 2008-2009 season.

Influenza Vaccine Coverage

The CDC's Advisory Committee on Immunization Practices (ACIP) encourages all individuals to be immunized against influenza. For the 2008-2009 season, the ACIP stressed vaccination among the following groups at high risk for influenza complications:

- All children aged 6-59 months
- All persons aged 50 years and older
- Children and adolescents 6 months - 18 years of age receiving long-term aspirin therapy who therefore might be at risk for experiencing Reye syndrome after influenza virus infection
- Women who will be pregnant during the influenza season
- Adults and children who have chronic pulmonary (including asthma), cardiovascular (except hypertension), renal, hepatic, hematological or metabolic disorders (including diabetes mellitus)
- Adults and children who have immunosuppression (including immunosuppression caused by medications or by human immunodeficiency virus)
- Adults and children who have any condition (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders) that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for aspiration
- Residents of nursing homes and other chronic-care facilities
- Health-care personnel
- Healthy household contacts (including children) and caregivers of children aged <5 years and adults aged 50 years and older, with particular emphasis on vaccinating contacts of children aged <6 months
- Healthy household contacts (including children) and caregivers of persons with medical conditions that put them at higher risk for severe complications from influenza

Vaccine coverage levels are measured by the Kansas Behavioral Risk Factor Surveillance System (BRFSS). Self-reported vaccine coverage levels among all Kansans were higher during 2008 compared to the previous year, although coverage among certain priority groups decreased (Table 4). The coverage levels among other priority groups cannot be examined due to limitations of the BRFSS survey.

Table 4: Percentage of Kansans reporting trivalent inactivated influenza vaccination in the past 12 months*

	2003	2004	2005	2006	2007	2008
Age 50 and older	54.1	54.6	45.3	53.9	56.0	55.4
Age 65 and older	70.8	68.1	65.9	72.5	73.5	72.0
Adults with asthma	37.5	41.0	35.2	41.6	47.5	44.2
Adults with diabetes	61.3	61.9	56.8	59.0	63.7	63.9
All ages	35.4	35.7	27.3	34.3	38.1	38.9

Table 5: Percentage of Kansans reporting intranasal influenza vaccination in the past 12 months*

	2004	2005	2006	2007	2008
All ages	0.6	0.7	0.7	0.9	0.8

The influenza vaccine coverage rates measured by the 2008 BRFSS are difficult to interpret. The survey, conducted throughout the 2008 calendar year, asks if respondents have received a flu shot within the past twelve months. In effect, this measures the coverage rate from January 2007 through December 2008. If the respondent was interviewed from January 2007 to the summer of 2008, his or her vaccine was administered for the 2007-2008 influenza season; if the interview was conducted during the fall of 2008, the vaccine was administered in anticipation of the 2008-2009 season.

The 2008 BRFSS results, then, are weighted toward the influenza vaccine coverage rate for the 2007-2008 season.

Discussion

Influenza-like Illness activity during the 2008-2009 season was less severe than the previous season. The percentage of visits due to ILI was below 2.5% for all but the final week of February (4.1%) and the first week of March (3.9%). It is important to note, however, that the number and type of sentinel sites reporting ILI has changed each of the past four influenza seasons. (For example, KDHE gathered data from only one hospital emergency department in 2003-2004. Five hospital emergency departments served as sentinel providers during 2008-2009.) Yearly changes in the sentinel network preclude direct comparison to data collected in previous influenza seasons.

The influenza season followed a common pattern until April, when a novel strain of swine-origin A/H1N1 influenza was identified in California. The virus was first detected in Kansas on April 25, 2009. By June 11, 98 confirmed cases had been identified within Kansas, and the World Health Organization raised the pandemic alert level to Phase 6, indicating a global pandemic was underway.

Both the total number of pneumonia and influenza deaths as well as the number of deaths directly attributed to influenza returned to average levels, one year after record highs were reported.

KHEL detected three circulating influenza virus subtypes prior to the emergence of novel H1N1: seasonal A/H1, B/Malaysia, and B/Florida. The B/Malaysia virus did not match the type of B virus included in the 2008-2009 influenza vaccine. After increasing influenza testing to detect additional cases of novel H1N1, KHEL identified circulating A/H3 in addition to novel H1N1.

As of July, 2009, KDHE continues to conduct enhanced laboratory surveillance, as well as increased surveillance in hospital and outpatient settings, to track the H1N1 influenza pandemic.

Acknowledgements

KDHE acknowledges the following ILINet sites for their important contributions during the 2008-2009 influenza season.

Arbor Creek Family Care
Ashley Clinic
Barton Community College
Cloud County Health Center
Community Health Center of Southeast Kansas
Community Health Center of Southeast Kansas - Columbus Clinic
Emporia State Student Health
Family Practice Associates
Goodland Family Health Center
Greenwood County Hospital
Hess Clinic
Irwin Army Community Hospital
Lafene Student Health Center
Pediatric Partners
Pratt Regional Medical Center
Susan B Allen Memorial Hospital
Ulysses Family Physicians
Wichita County Health Center
Wichita State University Student Health
William Newton Hospital

SUMMARY OF OUTBREAK INVESTIGATIONS, 2008

JANUARY

Outbreak of Norovirus Gastroenteritis Associated with Barley's Brewhaus, Johnson County

The Kansas Department of Health and Environment (KDHE) was notified of a possible outbreak of gastrointestinal illness in a group of consultants that at a meal Barley's Brewhaus. In response to this report, an outbreak investigation was initiated by the Johnson County Health Department and the Kansas Department of Health and Environment (KDHE). A questionnaire was developed and administered to the group. Thirty out of 47 (63%) individuals responded to the questionnaire with twenty-five reporting illness. An inspection of the facility revealed eight critical violations: (1) improper hand washing procedure; (2) hand washing violations; (3) improper reheating for hot-holding; (4) improper beverage storage; (5) improper segregation of raw fish and beef; (6) lack of food preparation knowledge; (7) improper storage of food service materials; and (8) damaged food service equipment. Five employees reported gastrointestinal illness on the survey form, with one employee stating that they continued to work while having gastrointestinal symptoms. This employee also worked on the day that the group of consultants ate at the restaurant. One stool specimen was submitted and tested positive for norovirus. This outbreak was most likely caused by norovirus. To confirm the etiological agent of the outbreak two specimens must be tested per CDC guidelines.

Outbreak of Norovirus Gastroenteritis Associated with Pin-Up Bowl, Johnson and Wyandotte Counties

The Unified Government of Wyandotte County Public Health Department (WCHD) was notified of a possible foodborne outbreak related to The Pin-Up Bowl. Preliminary information suggested that a group of individuals from a medical group in Johnson County had eaten foods served at The Pin-Up Bowl and later became ill with gastrointestinal symptoms. In response to this complaint, an outbreak investigation was initiated by WCHD, Johnson County Health Department, and the Kansas Department of Health and Environment (KDHE). Two questionnaires were developed and administered to the group. The first questionnaire assessed illness information and the second questionnaire assessed food histories and additional information regarding their illness. A total of 26 persons (100%) completed the initial survey and 21 (81%) completed the second survey. Twenty individuals meet the case definition for the outbreak. When food histories were assessed, eating from the fruit tray was associated with illness; however, there was no statistically significant association with individual fruit tray items (this could be due to the small sample size). An inspection of the facility revealed five violations: (1) no date markings on food containers, (2) dirty spray nozzles and mold present on the holder of the soda machine, (3) manual washing sanitizing system was not set up, (4) the mechanical washing sanitizing system had inadequate chlorine level, and (5) a knife had chipping paint. Gastrointestinal surveys were given to the employees to complete and two of the eleven employees reported gastrointestinal illness prior to the outbreak. One of these ill employees had prepared the foods served to the medical group, and the other reported working

on the day the medical group was at the facility while still ill. A third employee reported onset of vomiting two days after the medical group was at the facility; this employee had also reported consuming some food that had been prepared for this event. Two stool specimens were collected and tested positive for norovirus. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

FEBRUARY

Acute Gastroenteritis Outbreak Associated with a Catered Lunch, Shawnee County

The Kansas Department of Health and Environment's Bureau of Consumer Health (KDHE-BCH) notified KDHE's Office of Surveillance and Epidemiology (KDHE-OSE) of a possible foodborne illness outbreak among coworkers in Shawnee County. The complainant stated that 15 coworkers experienced gastrointestinal illness after eating sandwiches catered by Jersey Mike's Subs. KDHE-OSE and the Shawnee County Health Agency initiated an outbreak investigation to determine the source of the illness and to ensure appropriate control and prevention measures were implemented. A cohort study was conducted on the coworkers that attended the lunch. A self-administered questionnaire, focusing on clinical information and food exposure, was developed and distributed to the coworkers. A case was defined as an individual who became ill with vomiting and/or diarrhea after eating food served at the lunch. While 14 of the 15 individuals (93%) reported some kind of illness, only eleven (73%) met the case definition. Catering receipts from Jersey Mike's were obtained to determine if illness occurred among other restaurant patrons. Contact information was available for four of the six additional groups and there was no reported illness for three of these groups. No stool specimens were collected from ill individuals; all of the complainants had recovered prior to notifying KDHE, and none were willing to provide a specimen. No food samples were available for testing, because all of the food had been consumed. KDHE-BCH conducted an inspection of the restaurant and found one critical violation; an unapproved oven cleaning agent was observed in the facility. No employees reported illness. The epidemiologic and clinical data collected during this investigation are consistent with a point-source outbreak of norovirus. With no clinical or food specimens available for laboratory testing, KDHE-OSE was unable to confirm norovirus as the cause of gastroenteritis.

MARCH

Outbreak of Norovirus Associated with Tasso's Restaurant, Johnson County

The Johnson County Health Department (JCHD) was notified by an infection control nurse at a local hospital of a possible outbreak of gastrointestinal illness among hospital employees. The hospital employees reported eating foods catered by the Tasso's Restaurant. Nine of the hospital employees subsequently experienced gastrointestinal symptoms, including diarrhea, vomiting, abdominal cramps and nausea. The JCHD and the Kansas Department of Health and Environment Office of Surveillance and Epidemiology launched an investigation. During the

course of the investigation, the public health officials discovered that Tasso's Restaurant had catered meals for eight other groups in both Kansas and Missouri on the same day as the reported complaint. The groups were located in Missouri as well as other counties in Kansas. A questionnaire was developed and administered to the groups, 137 persons participated in the meals served at the eight locations. Of these, a total of 53 (39%) persons completed the questionnaire. No single food item was statistically associated with illness. An inspection of the restaurant was conducted by the Bureau of Consumer Health; no violations were noted and no employee reported gastrointestinal illness. Five stool specimens were collected and all tested positive for norovirus genogroup II. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

Outbreak of Norovirus Gastroenteritis Associated with Pizza Shoppe, Johnson County

Johnson County Environmental Department (JCED) was notified of a possible outbreak of gastrointestinal illness among a group from a local business who had eaten at the Pizza Shoppe restaurant. In response to this report an outbreak investigation was initiated by JCED and the Kansas Department of Health and Environment Bureau of Surveillance and Epidemiology (OSE). A questionnaire was developed and administered to the group. A total of 13 employees had eaten food prepared by the restaurant; ten of the employees completed the questionnaire. All ten reported a gastrointestinal illness. An inspection of the facility was conducted and three critical violations were noted: (1) two dented cans of pizza sauce (2) no date marked on food items (3) bare hand contact with ready to eat foods. One employee reported illness with an onset four days before the group ate at the facility. A stool specimen was collected from the ill Pizza Shoppe employee but it tested negative for *Campylobacter*, shiga toxin-producing *E.coli*, *Salmonella*, *Shigella*, and norovirus. Four stool specimens were collected from the group and three of the specimens tested positive for norovirus. No food items were statistically associated with illness. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

APRIL

Acute Gastroenteritis Outbreak Associated with an Elementary School, Reno County

The Reno County Health Department (RCHD) notified the Kansas Department of Health and Environment Office of Surveillance and Epidemiology (OSE) of a potential foodborne outbreak in Haven Elementary School. The report indicated that 75 out of 268 students were ill with vomiting, diarrhea, nausea, abdominal cramps and fever. OSE developed a questionnaire and it was sent home for students and staff to complete. A total of 110 questionnaires were returned and 34 meet the definition of a case (developed vomiting and/or diarrhea). An inspection of the kitchen yielded no violations, and no kitchen staff reported any illness. No food items were statistically associated with illness. Two stool specimens were submitted for testing and they

were both positive for norovirus genogroup I. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

Outbreak of Norovirus at Silver Lake Elementary School, Shawnee County

Shawnee County Health Agency (SCHA) and Kansas Department of Health and Environment (KDHE) were notified of widespread gastrointestinal (GI) illness among students of Silver Lake Elementary School. Over 60 students were absent because of gastrointestinal symptoms that included vomiting, diarrhea and abdominal cramps. A questionnaire was developed by KDHE, to collect demographic information, food histories and information on symptoms and outcomes of illness. Of the 363 questionnaires, 134 persons met the case definition for illness (vomiting or diarrhea between April 14 and April 22). Five food items were statistically associated with illness. The Bureau of Consumer Health conducted an inspection of the facility and found one critical violation. In addition, one food handler had reported illness but not until after the outbreak had already begun. Two stool specimens were collected and both tested positive for norovirus genogroup II. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, strict adherence to no bare hand contact with ready to eat foods, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

Outbreak of Norovirus Gastroenteritis Associated with a School, Seward County

The Seward County Health Department (SCHD) notified the Office of Surveillance and Epidemiology (OSE) of an unusually high number of absent students from the Cottonwood Intermediate School. Predominate symptoms reported for absent students and staff was vomiting, diarrhea, abdominal cramps and fever. A retrospective cohort study was conducted among all students and staff to determine if illness was associated with any specific food items served in the school cafeteria during breakfast or lunch. A questionnaire was developed in English and Spanish and distributed to students and staff. A case was defined as illness in a student or teacher who had vomiting or diarrhea (3 or more loose stools within a 24-hour period) on or after the evening of Monday, March 31. Of the 545 individuals completing surveys, 215 were completed (39%). Ninety-two individuals met the case definition. Four clinical specimens were submitted for testing; three stool specimens and one vomitus specimen tested positive for norovirus genogroup I. The only food item that was associated with illness was served at lunch on Monday, March 31. Of the 134 students that reported eating a pancake-on-a-stick, 40 (30%) became ill. Statistical analysis demonstrated that eating the pancake-on-a-stick was significantly associated with illness. During the environmental assessment, two hand-washing violations were noted at the intermediate school and at least one employee did report illness on their survey. Specific clinical information about employee illness is not known because some of the employee surveys were not filled out completely. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, strict adherence to no bare hand contact with ready to eat foods, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

Norovirus-Associated Gastroenteritis Outbreak among Hotel Guests, McPherson County

The Kansas Department of Health and Environment's Bureau of Consumer Health (KDHE-BCH) notified KDHE's Office of Surveillance and Epidemiology (KDHE-OSE) of a possible waterborne illness outbreak. The complainants, four Riley County families, stated that eight children experienced gastrointestinal illness after swimming in a Days Inn hotel pool on April 19. KDHE and the Riley County Health Department (RCHD) initiated an outbreak investigation. RCHD interviewed the eight ill and determined five individuals met the definition for a case. Reported symptoms included abdominal cramps (n=5, 100%), vomiting (n=5, 100%), and diarrhea (n=1, 20%). One individual reported an onset of symptoms the day before swimming occurred at the hotel. Three individuals submitted stool specimens and all were positive for norovirus genogroup I. An inspection of the facility by KDHE-BCH found inadequate disinfectant levels in the pool and hot tub, no log to track disinfectant levels, and pH levels were inadequate. Simple hygienic measures, including good hand washing after using the bathroom and not swimming while ill, are recommended to prevent illness in others.

MAY

An Acute Gastroenteritis Outbreak of Unknown Etiology Associated with Montana Mike's Steakhouse Restaurant, McPherson County

A complaint received by the Bureau of Consumer Health at the Kansas Department of Health and Environment (BCH) indicated that several patrons became ill with vomiting and nausea after eating at Montana Mike's Steakhouse Restaurant. An investigation by the Kansas Department of Health and Environment Office of Surveillance and Epidemiology (OSE) and McPherson County Health Department (MCHD) was initiated. Initial interviews were conducted by MCHD and after credit card receipts were obtained. KDHE's Behavioral Risk Factor Surveillance Survey staff conducted additional telephone interviews. A case was defined as a patron who dined at Montana Mike's from May 29 to June 1 and developed vomiting or diarrhea (3 or more loose stools within a 24-hour period) within 24 hours. A total of 191 individuals were interviewed with twenty individuals reporting illness (10%). Nausea and diarrhea were the most frequently reported symptoms followed by vomiting, abdominal cramps, headache, and muscle aches. No clinical specimens or food specimens were submitted for testing. Menu items were analyzed to determine if any were statistically associated with illness; it was determined that salads approached statistical significance (P value = 0.06), and that consuming ranch dressing was statistically significant (P value = 0.019). BCH conducted an inspection of the facility and found one critical violation. Five employees reported illness and two of the five reported consuming ranch dressing and becoming ill. The epidemiologic and clinical data collected during this outbreak are consistent with a point-source outbreak. The short incubation period and clinical symptoms are indicative of a bacterial intoxication possibly caused by *Staphylococcus aureus*. Intoxication by *S. aureus* is characterized by an abrupt onset of vomiting and/or diarrhea with symptoms occurring within a few minutes to eight hours after ingestion of the toxin-contaminated food.

JUNE

Outbreak of *Salmonella* Enteritidis Associated with Acapulco Restaurant, Harvey County

This was an outbreak of *Salmonella* Enteritidis associated with a Mexican restaurant. Harvey County Health Department (HCHD) notified the Office of Surveillance and Epidemiology (OSE) at the Kansas Department of Health and Environment (KDHE) that six cases of *Salmonella* had been reported by the medical center and a physician's office. Staff at HCHD interviewed the patients and discovered that most had eaten at the Acapulco Restaurant in Newton, KS prior to their onset of illness. HCHD in conjunction with KDHE began an outbreak investigation to determine the source of illness and to implement appropriate control and prevention measures. A case-control study was conducted among patrons who ate at the Acapulco Restaurant anytime from June 1 to June 10. A case was defined as a patron who dined at the Acapulco Restaurant anytime from June 1 until June 10 and subsequently became ill with vomiting or diarrhea (3 or more loose stools within a 24-hour period). A total of 61 individuals were interviewed. Thirty-one individuals reported illness (51%). Of those that reported illness, 26 were laboratory confirmed and 5 had symptoms consistent with salmonellosis, but were not laboratory confirmed. Pulse field gel electrophoresis (PFGE) was performed on 25 isolates. Twenty-two isolates had matching Xbal patterns (JEGX01.0005) and three isolates differed from this primary Xbal pattern by one band (JEGX01.0030). Eighteen of the isolates (15 from the primary pattern JEGX01.0005 and 2 from the secondary pattern JEGX01.0030) were analyzed using Bln 1 and all were indistinguishable Bln1 patterns (JEGA26.0004). Three isolates that had the JEGX01.0005 Xbal pattern and three isolates that had the JEGX01.0030 Xbal pattern were sent to CDC for MLVA testing. All 6 had indistinguishable MLVA patterns. The case-control study identified consuming chicken, pico de gallo, or guacamole were each statistically significant with becoming ill. Consumption of jalapenos approached significance with a P value of 0.08. An ingredient-based analysis was conducted, and only eating tomatoes was still significantly associated with illness. During this same time period an outbreak of *Salmonella* Saintpaul was being investigated with a link to tomatoes. A traceback of the tomatoes was conducted; however, KDHE was unable to determine when the tomatoes could have become contaminated.

Outbreak of Gastroenteritis Associated with La Familia Café and Cantina, Douglas County

The Kansas Department of Health and Environment was notified by an ill patron that three people from two different households became ill after eating a meal at the La Familia Café and Cantina Restaurant. The Lawrence-Douglas County Health Department conducted interviews of the ill patrons. No other common exposures were reported during the interviews, and no ill patron was willing to submit a stool specimen for testing. The restaurant was inspected and five critical violations were noted: (1) improper hand washing procedure; (2) inconvenient hand washing facility location; (3) inadequate level of chemical sanitizer in mechanical warewashing equipment; (4) unclean food contact surfaces; and (5) eating or drinking in a non-designated area. No employee reported illness during the time frame in question. Clinical information obtained from the patrons suggests their illness could have been caused by norovirus.

AUGUST

Outbreak Gastrointestinal Illness Associated with Attendance at a Conference, Johnson County

This was an outbreak of a gastrointestinal illness associated with attendance at a conference. A case was defined as an individual who attended the conference on August 5 – August 7, 2008 and became ill with vomiting or diarrhea (three or more loose stools within a 24-hour period) during or after the conference. An online survey was launched to determine the cause of the outbreak. The epidemiologic and clinical data collected for this outbreak are consistent with a point-source outbreak. A majority of individuals who became ill had onset dates of illness on August 6, which was one day after the beginning of the conference. Three human clinical specimens were collected, and one specimen tested positive for norovirus genogroup II. The other two specimens tested negative for norovirus, but these specimens were collected after both individuals had recovered. Statistical analysis of the data did not implicate a specific risk factor or food vehicle as the source of the outbreak. The small number of ill persons and recall bias may account for the difficulty in identifying a source. Person-to-person transmission is also a plausible explanation, especially considering the slight increase in illness observed two and three days after the conference ended. The Johnson County Environmental Department conducted an inspection of the convention center and found four critical violations were noted during the environmental assessment, however none of them were likely to contribute to the norovirus infections. Simple measures, including correct handling of cold foods, strict hand washing after using the bathroom and before handling food items, and excluding employees with gastrointestinal illness from food handling may substantially reduce foodborne transmission of noroviruses.

OCTOBER

Outbreak of *Cryptosporidium hominis* Associated with Swimming in a Motel Pool, Saline County

The Kansas Department of Health and Environment, Office of Surveillance and Epidemiology (KDHE-OSE) was notified by a Nebraska resident that fourteen members of her extended family had stayed at the Super 8 Motel located in Salina, KS on October 10 – 12 and that ten members subsequently became ill with gastrointestinal symptoms. KDHE-OSE began a joint investigation of the outbreak with the Kansas Department of Agriculture, the Salina-Saline County Health Department, and the Nebraska Department of Health and Human Services (NDHHS). Initial interviews were conducted by the NDHHS. A retrospective cohort study was conducted. The motel provided a list of patrons with contact information that had utilized the facility from October 1-12th. Letters were mailed to the patrons and they were asked to complete an online survey. A case was defined as an individual who stayed at the motel anytime from October 1 – October 12, 2008 and became ill with diarrhea (three or more loose stools within a 24-hour period) either during or after staying at the motel. A total of 339 letters were mailed and 53 patrons responded, of those 23 reported gastrointestinal illness with 22 meeting the case

definition. Of the 22 cases, 18 (82%) reported swimming during their stay at the motel. An additional six individuals also reported swimming, but did not report illness. Most of the cases reported swimming either the first or the second weekend in October. Statistical analysis demonstrated that swimming in the motel pool was significantly associated with illness (Odds Ratio = 50.25; 95% confidence interval=12.79 – 197.35). Two stool specimens tested positive for *Cryptosporidium* spp. One was sub-typed as *Cryptosporidium hominis*. The second specimen could not be typed because it had been collected in formalin, which can interfere with the assay used to type *Cryptosporidium*. Pool water samples were collected, but no *Cryptosporidium* spp. were detected in the backwash samples. KDA conducted an environmental inspection of the facility and noted three critical violations that could have contributed to the outbreak; the most significant violation was inappropriate pool chemistry. The pool was closed and hyperchlorinated.

NOVEMBER

Outbreak of Foodborne Illness Associated with a Catered Lunch, Shawnee County

A complaint received by the Shawnee County Health Agency (SCHA) indicated that three individuals became ill after attending a luncheon held by a private trade organization on November 5, 2008. The Kansas Department of Health and Environment initiated an investigation based on the information obtained from the complaint. The investigation included telephone interviews of lunch attendees regarding foods consumed and illness history, clinical laboratory testing, and an environmental investigation of the caterer. Two stool specimens were collected and tested negative for *Campylobacter*, shiga toxin-producing *E.coli*, *Salmonella*, *Shigella*, and norovirus. Fifteen of the sixty attendees developed gastroenteritis. All 15 (100%) ill persons experienced diarrhea, 13 (87%) experienced abdominal cramps, 2 (13%) experienced nausea and 1 (7%) experienced fever. No one reported seeking medical assistance. The incubation period ranged from 3-21 hours with a median of 14 hour reported. The caterer of this event was unlicensed. Though not confirmed, the circumstances of the outbreak (including home-based, inadequate food preparation and storage, type of foods served, incubation period, symptoms, and illness duration) strongly suggest *Clostridium perfringens* foodborne intoxication.

JANUARY – DECEMBER

Outbreak-associated Cases of Varicella, Statewide

From January 1 to December 31, 881 probable and confirmed cases of varicella were reported to (OSE) and 373 (42%) were outbreak related. OSE identified eight new outbreaks after September 30. A total of 45 outbreaks have been recognized among children (daycare through high school) in 13 different counties. Over half of the outbreaks were located in four large urban counties. The number of cases associated with an outbreak ranged from 2 to 44 cases. Seventy percent of the outbreak-associated cases were vaccinated with at least one dose of varicella vaccine. Of those vaccinated, 91% had one dose of vaccine and only 5% had the recommended two doses of vaccine. The cases vaccinated with at least one dose of vaccine were more likely to

have a mild disease compared to those who were not vaccinated. For the unvaccinated outbreak associated cases, almost half had no reason listed for not being vaccinated.

From January 1 to December 31, 881 probable and confirmed cases of varicella were reported to the Office of Surveillance and Epidemiology (OSE) and 373 (42%) were outbreak-related (defined as 2 or more cases in a setting). Gender among the outbreak-associated cases was approximately even; females comprised 53% of the cases. The majority (86%) of cases were white. Fifty-nine percent of cases' reported ethnicity was "Not Hispanic/Latino", but this information was missing on 24% of the cases. Most of the cases were aged 5 to 9 years of age, with a range of 3 months to 36 years.

A total of 60 outbreaks were reported among children (daycare through high school) in 18 different counties. Two outbreaks affected teachers in addition to children. Over half of the outbreaks (n=35, 60%) were located in four large urban counties (Douglas County, 5 outbreaks; Johnson County, 17 outbreaks; Sedgwick County, 7 outbreaks; Wyandotte County, 6 outbreaks). The number of cases associated with an outbreak ranged from 2 to 44 cases.

Almost 68% of the outbreak-associated cases were vaccinated with at least one dose of varicella vaccine. Of those vaccinated, 91% had one dose of vaccine and only 7% had the recommended two doses of vaccine. For the unvaccinated outbreak-associated cases, almost half had no reason listed for not being vaccinated. The cases vaccinated with at least one dose of vaccine were more likely to have a mild disease compared to those who were not vaccinated. Sixty-two percent of the 97 unvaccinated children reported moderate to severe infections (more than 50 varicella lesions), while 21% of the 239 children who received one or two doses of vaccine reported moderate to severe infections.

SECTION THREE - APPENDICES

KANSAS NOTIFIABLE DISEASE FORM

Today's Date: ____ / ____ /____

Patient's Name: _____
Last First Middle

Day Phone: _____ **Evening Phone:** _____

Residential Address: _____

City: _____ **Zip:** _____ **County:** _____

Ethnicity: Hispanic or Latino Not Hispanic or Latino Unknown

Race: ***(Circle all that apply)***

American Indian/Alaska Native Asian Black or African American

Native Hawaiian or Other Pacific Islander White Unknown

Sex: M F **Date of Birth:** _____ / _____ / _____ **Age if DOB unknown:** _____

Disease Name: _____

Symptoms: Onset: ___ / ___ /____ **List the 3 most prominent symptoms**:

Symptom 1: _____ Symptom 2:_____ Symptom 3:_____

Outbreak associated? Y N **Died?** Y N **Hospitalized?** Y N

Institutional Residence? None Nursing Home Correctional Residential Hospital Psych

Physician Name: _____ **Physician Phone:** _____

Laboratory Information:

Specimen Collection Date: _____ / _____ / _____ Date Reported To You: _____ / _____ / _____

Name of Test Performed: _____ Results of Test: _____

Name of Laboratory: _____ Laboratory Results Attached? Y N

Treatment Information:

Date of Treatment: _____ / _____ / _____ Treatment Type and Dosage: _____

Treatment Status: Complete On-going Discontinued

Name of person reporting: _____ **Phone:** _____

Comments: _____

Mail or fax reports to your local health department and/or to:
KDHE Office of Surveillance and Epidemiology, 1000 SW Jackson, Suite 210, Topeka, KS 66612-1274
Fax: 877-427-7318 (toll-free) Epidemiology Hotline: 877-427-7317 *(Revised 07/2008)*

REPORTABLE DISEASES IN KANSAS for health care providers, hospitals, and laboratories
(K.S.A. 65-118, 65-128, 65-6001 - 65-6007, K.A.R. 28-1-2, 28-1-4, and 28-1-18. Changes effective as of 4/28/2006)

☎ - Indicates that a telephone report is required by law within four hours of *suspect* or *confirmed* cases to KDHE toll-free at 877-427-7317

ⓘ - Indicates that an isolates must be sent to: Division of Health and Environmental Laboratories
Forbes Field, Building #740, Topeka, KS 66620-0001
Phone: (785) 296-1633

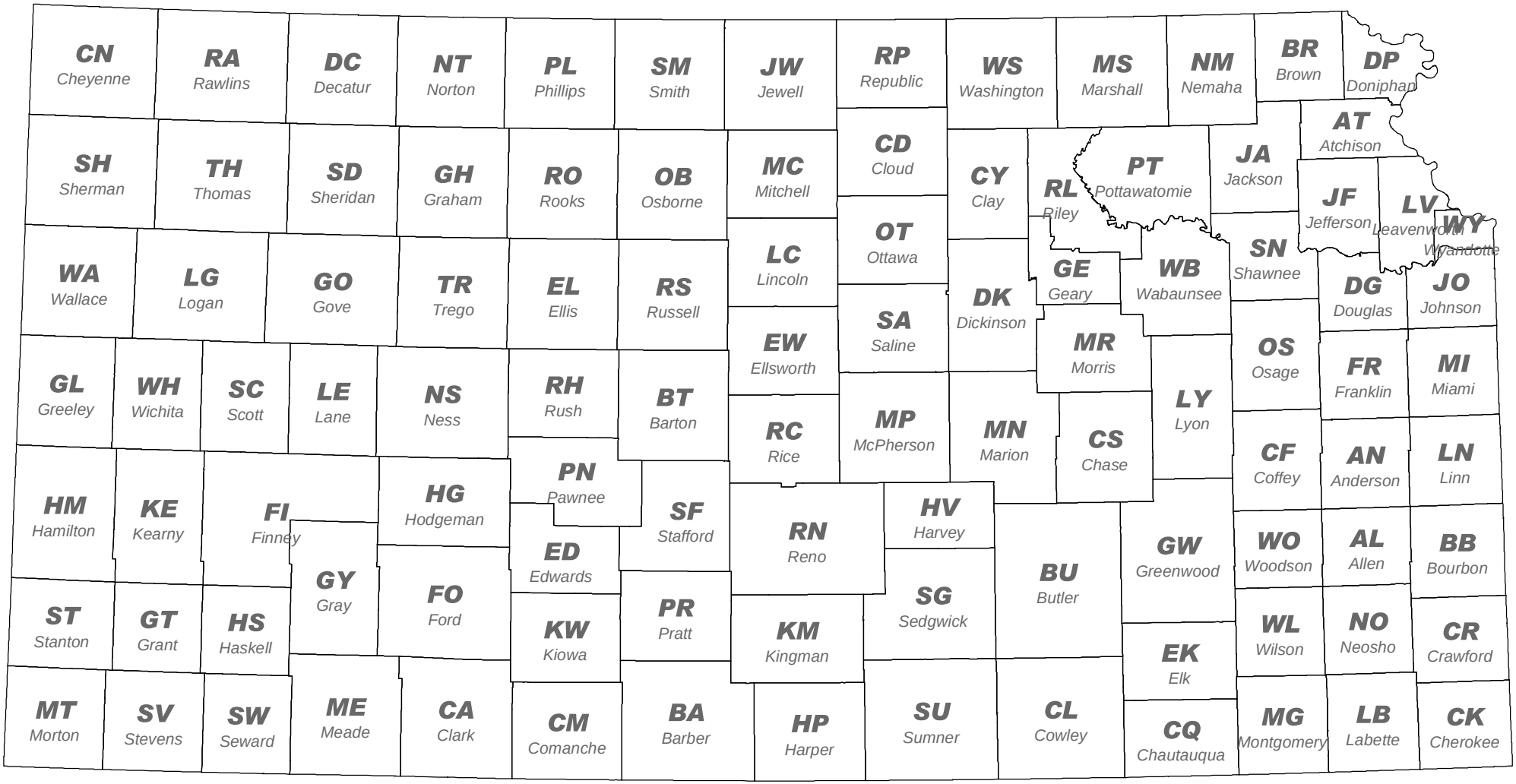
Acquired Immune Deficiency Syndrome (AIDS)
Amebiasis
Anthrax ☎
Arboviral disease (including West Nile virus, Western Equine encephalitis (WEE) and St. Louis encephalitis (SLE)) - indicate virus whenever possible
Botulism ☎
Brucellosis
Campylobacter infections
Chancroid
Chlamydia trachomatis genital infection
Cholera ☎
Cryptosporidiosis
Cyclospora infection
Diphtheria
Ehrlichiosis
Escherichia coli O157:H7 (and other shiga-toxin producing E. coli, also known as STEC) ⓘ
Giardiasis
Gonorrhea
Haemophilus influenza, invasive disease
Hantavirus Pulmonary Syndrome
Hemolytic uremic syndrome, postdiarrheal
Hepatitis, viral (acute and chronic)
Hepatitis B during pregnancy
Human Immunodeficiency Virus (HIV) (includes Viral Load Tests)
Influenza deaths in children <18 years of age
Legionellosis
Leprosy (Hansen disease)
Listeriosis
Lyme disease
Malaria
Measles (rubeola) ☎
Meningitis, bacterial ☎
Meningococcemia ⓘ☎
Mumps ☎
Pertussis (whooping cough) ☎
Plague *(Yersinia pestis)*☎
Poliomyelitis ☎
Psittacosis
Q Fever *(Coxiella burnetii)* ☎
Rabies, human and animal ☎
Rocky Mountain Spotted Fever
Rubella, including congenital rubella syndrome ☎
Salmonellosis, including typhoid fever ⓘ
Severe Acute Respiratory Syndrome (SARS) ⓘ☎
Shigellosis ⓘ
Smallpox ☎
Streptococcal invasive, drug-resistant disease from Group A *Streptococcus* or *Streptococcus pneumoniae* ⓘ
Syphilis, including congenital syphilis
Tetanus
Toxic shock syndrome, streptococcal and staphylococcal
Transmissible Spongioform Encephalopathy (TSE) or prion disease (includes CJD)
Trichinosis
Tuberculosis, active disease ⓘ☎
Tuberculosis, latent infection
Tularemia
Varicella (chickenpox)
Viral hemorrhagic fever ☎
Yellow fever

In addition, laboratories must report:
- Viral load results of reportable diseases
- ALL blood lead levels, as of 12/2002 (KCLPPP/ABLES)
- CD4+ T-lymphocyte count < 500/ µl or CD4+ T-lymphocytes <29% of total lymphocytes

Outbreaks, unusual occurrence of any disease, exotic or newly recognized diseases, and suspect acts of terrorism should be reported within 4 hours by telephone to the Epidemiology Hotline: 877-427-7317

Mail or fax reports to your local health department and/or to:
KDHE Office of Surveillance and Epidemiology, 1000 SW Jackson, Suite 210, Topeka, KS 66612-1274
Fax: 877-427-7318 (toll-free)

Kansas Counties



KANSAS COUNTY ABBREVIATIONS

AL	Allen	**GL**	Greeley	**OB**	Osborne
AN	Anderson	**GW**	Greenwood	**OT**	Ottawa
AT	Atchison	**HM**	Hamilton	**PN**	Pawnee
BA	Barber	**HP**	Harper	**PL**	Phillips
BT	Barton	**HV**	Harvey	**PT**	Pottawatomie
BB	Bourbon	**HS**	Haskell	**PR**	Pratt
BR	Brown	**HG**	Hodgeman	**RA**	Rawlins
BU	Butler	**JA**	Jackson	**RN**	Reno
CS	Chase	**JF**	Jefferson	**RP**	Republic
CQ	Chautauqua	**JW**	Jewell	**RC**	Rice
CK	Cherokee	**JO**	Johnson	**RL**	Riley
CN	Cheyenne	**KE**	Kearny	**RO**	Rooks
CA	Clark	**KM**	Kingman	**RH**	Rush
CY	Clay	**KW**	Kiowa	**RS**	Russell
CD	Cloud	**LB**	Labette	**SA**	Saline
CF	Coffey	**LE**	Lane	**SC**	Scott
CM	Comanche	**LV**	Leavenworth	**SG**	Sedgwick
CL	Cowley	**LC**	Lincoln	**SW**	Seward
CR	Crawford	**LN**	Linn	**SN**	Shawnee
DC	Decatur	**LG**	Logan	**SD**	Sheridan
DK	Dickinson	**LY**	Lyon	**SH**	Sherman
DP	Doniphan	**MN**	Marion	**SM**	Smith
DG	Douglas	**MS**	Marshall	**SF**	Stafford
ED	Edwards	**MP**	McPherson	**ST**	Stanton
EK	Elk	**ME**	Meade	**SV**	Stevens
EL	Ellis	**MI**	Miami	**SU**	Sumner
EW	Ellsworth	**MC**	Mitchell	**TH**	Thomas
FI	Finney	**MG**	Montgomery	**TR**	Trego
FO	Ford	**MR**	Morris	**WB**	Wabaunsee
FR	Franklin	**MT**	Morton	**WA**	Wallace
GE	Geary	**NM**	Nemaha	**WS**	Washington
GO	Gove	**NO**	Neosho	**WH**	Wichita
GH	Graham	**NS**	Ness	**WL**	Wilson
GT	Grant	**NT**	Norton	**WO**	Woodson
GY	Gray	**OS**	Osage	**WY**	Wyandotte

KANSAS COUNTY POPULATIONS

National Center for Health Statistics' vintage 2007 bridged-race postcensal population estimates

Allen	13,414	Greeley	1,297	Osborne	3,871
Anderson	7,908	Greenwood	6,993	Ottawa	6,006
Atchison	16,571	Hamilton	2,632	Pawnee	6,415
Barber	4,786	Harper	5,819	Phillips	5,356
Barton	27,768	Harvey	33,493	Pottawatomie	19,396
Bourbon	14,803	Haskell	4,032	Pratt	9,426
Brown	10,068	Hodgeman	1,971	Rawlins	2,558
Butler	63,045	Jackson	13,420	Reno	63,145
Chase	2,882	Jefferson	18,467	Republic	4,901
Chautauqua	3,806	Jewell	3,198	Rice	10,080
Cherokee	21,337	Johnson	526,319	Riley	69,083
Cheyenne	2,801	Kearny	4,148	Rooks	5,160
Clark	2,094	Kingman	7,826	Rush	3,211
Clay	8,685	Kiowa	2,953	Russell	6,737
Cloud	9,382	Labette	21,973	Saline	54,583
Coffey	8,454	Lane	1,746	Scott	4,568
Comanche	1,888	Leavenworth	73,603	Sedgwick	476,026
Cowley	34,251	Lincoln	3,285	Seward	23,109
Crawford	38,860	Linn	9,767	Shawnee	173,476
Decatur	2,955	Logan	2,628	Sheridan	2,493
Dickinson	18,957	Lyon	35,981	Sherman	5,959
Doniphan	7,756	Marion	29,196	Smith	3,951
Douglas	113,488	Marshall	12,238	Stafford	4,387
Edwards	3,106	McPherson	10,186	Stanton	2,162
Elk	3,040	Meade	4,403	Stevens	5,061
Ellis	27,464	Miami	31,078	Sumner	23,888
Ellsworth	6,310	Mitchell	6,307	Thomas	7,314
Finney	38,295	Montgomery	34,511	Trego	2,927
Ford	33,340	Morris	5,967	Wabaunsee	6,870
Franklin	26,479	Morton	3,038	Wallace	1,456
Geary	25,150	Nemaha	10,201	Washington	5,840
Gove	2,637	Neosho	16,228	Wichita	2,200
Graham	2,607	Ness	2,991	Wilson	9,807
Grant	7,497	Norton	5,422	Woodson	3,318
Gray	5,641	Osage	16,459	Wyandotte	153,956

DENOMINATORS USED FOR RATE CALCULATIONS

Rate calculations were performed when the reported disease count was 50 or more. Denominators were taken from the vintage 2007 bridged-race postcensal population estimates provided by the National Center for Health Statistics.

	Rate per 100,000	
Kansas Rate	#.#	**Denominator** = 2,775,997
U.S. Rate (2007)	#.#	Taken from: **www.cdc.gov/mmwr/summary**
Gender		
Male	#.#	**Denominator** = 1,376,311
Female	#.#	**Denominator** = 1,399,686
Race		
White	#.#	**Denominator** = 2,492,671
Black	#.#	**Denominator** = 184,044
Asian/Pacific Islander	#.#	**Denominator** = 67,771
Native American	#.#	**Denominator** = 31,511
Ethnicity		
Hispanic	#.#	Denominator = 244,306
Non-Hispanic	#.#	Denominator = 2,531,691
County of Residence		
Urban County	#.#	**Numerator** = cases from DG, JO, SN, SG, WY counties Denominator = 1,443,265
Non-Urban County	#.#	Numerator = cases ***NOT*** from DG, JO, SN, SG, WY counties Denominator = 1,332,732

Rate denominators by age group

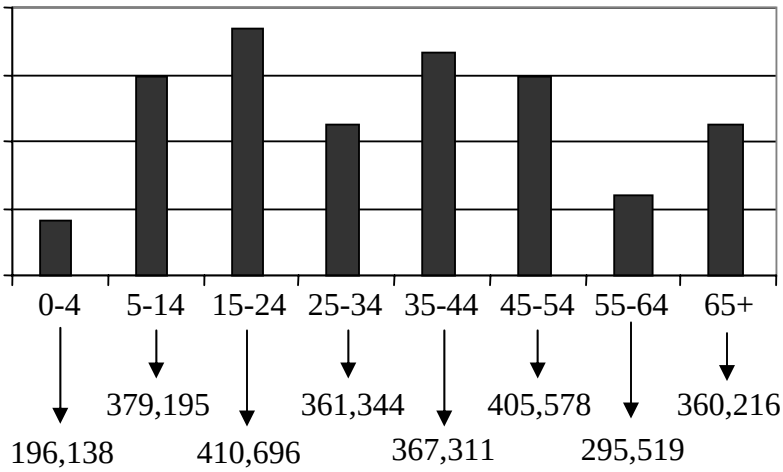


TABLE 1. Reportable disease cases by year, Kansas, 1999-2008

DISEASE	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Amebiasis	9	5	2	4	4	0	7	4	3	4
Anthrax	0	0	0	0	0	0	0	0	0	0
Arboviral Disease										
Saint Louis Encephalitis	0	0	0	0	1	1[§]	0	0	0	0
Western Equine Encephalitis	0	0	0	0	0	0[§]	0	0	0	0
West Nile Virus[⊥]	0	0	0	22	90	9[§]	9	12	5	5
Botulism										
Foodborne	0	0	0	0	0	0	0	0	0	0
Infant	0	0	0	1	0	1	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0
Brucellosis	0	1	1	0	0	1	1	3	0	0
Campylobacteriosis	290	355	286	284	339	348	335	316	416	399
Chancroid	0	0	0	0	0	0	0	0	0	0
Chlamydia	6093	6057	6172	6758	7150	7495	7419	7832	8210	9187
Cholera	0	0	0	0	0	0	0	0	0	0
Cryptosporidiosis	2	9	4	16	174	31	40	82	144	84
Cyclospora infections	*	*	*	*	0	0	0	0	0	0
Diphtheria	0	0	0	0	0	0	0	0	0	0
Diarrhea-causing *E. coli*	31	31	28	32	47	48	49[§]	25	52	52
Ehrlichiosis	*	0	5	3	2	1	0	0	1	0[§]
Giardiasis	220	205	178	193	233	221	214	198	184	162
Gonorrhea	2665	2795	2761	2701	2595	2544	2605	2208	2289	2268
H. influenzae										
Invasive Disease	8	5	2	5	15	8	18	20	12	20
Serotype B Meningitis	2	0	0	1	0	0	0	1	0	0
Hansen's Disease	1	0	0	0	0	0	0	0	0	0

[*]Not reportable during this year.
[§]Case definition altered during this year.
[⊥]Not endemic to North America until 1999.

TABLE 1. Reportable disease cases by year, Kansas, 1999-2008

DISEASE	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Hantavirus Pulmonary Syndrome	2	1	0	1	2	1	1	0	0	0
Hemolytic Uremic Syndrome	*	1	0	1	0	2	2	1	0	3
Hepatitis, Viral, Acute										
A	66	111[§]	181	70	26	22	16	27	11	15
B	17	27[§]	14	24	18	18	32	10	9	9
C	1	9	8	5	0	0	3	0	0[§]	1
HIV / AIDS	127	289	158	137	126	138	166	189	223	221[§]
Influenza-associated Pediatric Mortality	*	*	*	*	*	*	*	2	1	0
Legionellosis	0	4	1	1	10	6	4[§]	10	10	2
Listeriosis	*	0	5	1	3	0	7	4	4	6
Lyme Disease	16	17	2	7	4	3	3	4	7	16[§]
Malaria	5	7	6	13	12	9	7	8	4	9
Measles	0	2	0	0	0	0	0	1	0[§]	0
Meningitis, non-HiB, non-*Neisseria*	28	22	22	14	27	8	12	2	4	3
Meningococcal Disease	23	11	15	15	15	14	11[§]	5	10	8
Mumps	3	0	2	2	1	4	0	207	7	2
Pertussis	49	18	11	38	23	98	239	141	39	57
Plague	0	0	0	0	0	0	0	0	0	0
Poliomyelitis	0	0	0	0	0	0	0	0	0	0
Psittacosis	0	0	0	0	0	0	0	0	0	0
Q Fever	*	*	0	2	1	0	0	1	2	1
Rabies										
Animal	107	97	100	153	165	99	80	83	111	68
Human	0	0	0	0	0	0	0	0	0	0
Rocky Mountain Spotted Fever	2	3	0	0	1	0	4	1	1	0[§]

*Not reportable during this year.
§Case definition altered during this year.
⊥Not endemic to North America until 1999.

TABLE 1. Reportable disease cases by year, Kansas, 1999-2008

DISEASE	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rubella										
Congenital	0	0	0	0	0	0	0	0	0[§]	0
Non-congenital	0	0	1	0	0	0	0	1	0[§]	0
Salmonellosis	333	378	314	354	291	394	369[§]	369	402	467
Severe Acute Respiratory Syndrome	*	*	*	*	0	0	0	0	0	0
Shigellosis	89	255	76	92	124	81	272[§]	138	26	67
Smallpox	*	0	0	0	0	0	0	0	0	0
Streptococcal Invasive Disease										
Group A *Streptococcus*	6	17[§]	51	41	31	40	40	53	32	41
Drug-resistant *S. pneumoniae*	9	13	*	*	*	*	*	69	89[§]	79
Syphilis										
Congenital	0	1	2	0	0	0	0	0	0	0
Primary and Secondary	14	6	26	24	20	24	19	27	28	30
Early Latent	19	9	18	15	17	13	18	18	25	56
Tetanus	1	1	2	0	0	0	0	0	1	0
Toxic Shock Syndrome	5	6	4	1	1	0	1	2	0	0
TSE / Prion Disease	*	*	*	*	*	*	*	*	2	4
Trichinosis	1	0	0	0	0	0	0	0	0	0
Tuberculosis										
Active Disease	69	77	80	89	75	63	61	82	59	57
Latent Infection	*	*	*	*	*	2611	2561	3074	2742	2812
Tularemia	2	11	7	2	3	9	5	7	4	2
Typhoid Fever	1	1	0	1	0	1	1	1	1	3
Varicella	*	*	*	*	*	259	478	372	586	481
Viral Hemmorrhagic Fever	*	*	0	0	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	0	0	0	0

[*] *Not reportable during this year.*
[§] *Case definition altered during this year.*
[⊥] *Not endemic to North America until 1999.*

TABLE 2. Reportable disease cases by county, Kansas, 2008

	AL	AN	AT	BA	BT	BB	BR	BU	CS	CO	CK	CN	CA	CY	CD	State Total
Amebiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Arboviral Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Campylobacteriosis	2	1	1	0	6	4	3	4	1	1	3	4	1	0	0	399
Chlamydia	29	19	38	3	73	37	24	103	0	0	36	0	0	9	10	9187
Cryptosporidiosis	0	0	0	0	3	1	1	4	0	0	2	0	0	0	0	84
Diarrhea-causing *E. coli*	0	0	0	0	0	0	1	0	2	0	1	0	0	0	0	52
Giardiasis	0	1	1	0	4	1	1	3	0	0	3	0	1	0	1	162
Gonorrhea	3	2	6	0	7	2	3	17	0	1	11	0	0	1	0	2268
H. influenzae, invasive	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Hepatitis A	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	15
Hepatitis B, acute	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meningococcal Disease	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
Pertussis	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	57
Q Fever	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	0	0	0	0	1	0	0	0	0	0	0	3	1	0	1	68
Salmonellosis	1	0	1	3	18	3	0	8	1	0	1	0	1	2	0	467
Shigellosis	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	67
Strep., Group A invasive	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	41
S. pneumo., drug-resistant	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	79
Syphilis, 1° & 2°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Syphilis, early latent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	57
Tularemia	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Varicella	0	0	0	0	24	0	0	3	0	0	0	0	0	0	0	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	CF	CM	CL	CR	DC	DK	DP	DG	ED	EK	EL	EW	FI	FO	FR	State Total
Amebiasis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4
Arboviral Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Campylobacteriosis	2	2	6	17	0	2	3	11	3	0	3	1	6	9	4	399
Chlamydia	8	2	91	122	2	40	19	442	7	2	70	6	101	79	66	9187
Cryptosporidiosis	0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	84
Diarrhea-causing *E. coli*	0	0	0	1	0	0	0	1	0	0	1	0	2	0	1	52
Giardiasis	0	0	2	1	0	3	2	8	0	0	2	0	2	0	2	162
Gonorrhea	2	0	16	21	0	3	2	65	1	3	15	0	8	4	3	2268
H. influenzae, invasive	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hepatitis A	0	0	0	0	0	2	0	1	0	0	1	0	0	1	0	15
Hepatitis B, acute	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	7	*	*	*	*	*	*	*	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
Malaria	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Meningococcal Disease	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	0	0	0	1	0	2	0	0	2	0	0	1	0	0	0	68
Salmonellosis	0	0	6	4	2	11	0	11	4	1	9	1	5	7	4	467
Shigellosis	0	0	2	0	0	0	1	0	0	0	0	0	8	2	0	67
Strep., Group A invasive	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	41
S. pneumo., drug-resistant	0	0	1	0	0	0	0	7	0	0	0	0	0	0	0	79
Syphilis, 1° & 2°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Syphilis, early latent	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	1	1	0	0	0	3	0	0	0	0	1	0	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Varicella	0	0	26	36	0	12	0	32	0	0	0	0	0	4	0	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	GE	GO	GH	GT	GY	GL	GW	HM	HP	HV	HS	HG	JA	JF	JW	State Total
Amebiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Arboviral Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Campylobacteriosis	1	3	3	2	1	0	1	2	0	6	2	4	1	1	2	399
Chlamydia	434	1	0	16	4	1	9	4	11	45	8	2	22	21	2	9187
Cryptosporidiosis	0	0	0	0	0	1	0	1	0	0	0	0	2	4	0	84
Diarrhea-causing *E. coli*	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	52
Giardiasis	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	162
Gonorrhea	105	0	0	2	0	0	1	0	0	9	1	0	7	2	2	2268
H. influenzae, invasive	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hepatitis B, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	16
Malaria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meningococcal Disease	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	68
Salmonellosis	5	1	0	2	1	0	0	2	3	23	1	3	4	3	1	467
Shigellosis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	67
Strep., Group A invasive	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	41
S. pneumo., drug-resistant	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	79
Syphilis, 1° & 2°	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Syphilis, early latent	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Varicella	6	0	0	0	2	0	0	0	0	17	4	0	0	5	0	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	JO	KE	KM	KW	LB	LE	LV	LC	LN	LG	LY	MN	MS	MP	ME	State Total
Amebiasis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Arboviral Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Campylobacteriosis	77	0	5	0	2	0	4	2	8	1	2	1	2	4	1	399
Chlamydia	1151	4	10	1	45	0	217	4	12	2	110	10	16	64	4	9187
Cryptosporidiosis	11	0	0	0	0	0	2	0	0	0	0	0	0	0	0	84
Diarrhea-causing *E. coli*	14	0	0	0	0	0	1	0	0	0	1	0	0	0	0	52
Giardiasis	43	0	0	0	1	0	2	0	0	0	1	0	0	6	2	162
Gonorrhea	139	3	0	0	16	0	35	0	2	0	9	1	1	6	0	2268
H. influenzae, invasive	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hepatitis A	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hepatitis B, acute	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	52	*	*	*	*	*	11	*	*	*	*	*	*	*	*	221
Legionellosis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Lyme Disease	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
Malaria	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Meningitis, other	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meningococcal Disease	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	15	0	0	0	0	0	1	0	0	0	1	3	0	0	0	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	1	0	2	0	0	1	0	0	0	0	3	1	0	4	0	68
Salmonellosis	63	2	1	1	3	0	6	2	3	0	0	2	4	3	1	467
Shigellosis	9	0	1	0	0	0	2	0	0	0	1	0	0	0	0	67
Strep., Group A invasive	13	0	0	0	0	0	1	0	0	0	0	0	0	0	0	41
S. pneumo., drug-resistant	16	0	0	0	1	0	0	0	0	0	0	0	0	3	0	79
Syphilis, 1° & 2°	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Syphilis, early latent	12	0	0	0	0	0	1	0	0	0	1	0	0	0	0	56
TSE or Prion Disease	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4
Tuberculosis, active	16	0	0	0	0	0	0	0	0	0	2	0	0	0	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Typhoid Fever	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Varicella	125	0	6	0	0	0	2	0	0	0	8	0	5	0	5	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	MI	MC	MG	MR	MT	NM	NO	NS	NT	OS	OB	OT	PN	PL	PT	State Total
Amebiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4
Arboviral Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5
Campylobacteriosis	4	0	2	0	0	6	0	0	4	4	0	0	1	1	2	399
Chlamydia	39	3	68	8	4	8	36	2	5	26	1	2	4	6	32	9187
Cryptosporidiosis	1	0	0	0	0	10	0	0	1	1	1	0	0	0	1	84
Diarrhea-causing *E. coli*	2	0	1	0	0	2	1	0	0	1	0	0	0	0	2	52
Giardiasis	4	0	0	0	0	1	1	1	0	0	0	2	0	0	4	162
Gonorrhea	3	0	17	0	0	0	4	0	1	4	0	0	3	0	2	2268
H. influenzae, invasive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hepatitis B, acute	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6
Lyme Disease	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	16
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meningococcal Disease	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	0	2	0	0	0	0	0	1	0	0	1	1	2	0	0	68
Salmonellosis	4	1	2	1	1	2	2	1	3	1	3	1	1	2	0	467
Shigellosis	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	67
Strep., Group A invasive	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	41
S. pneumo., drug-resistant	0	0	2	0	0	0	2	0	0	0	0	1	0	0	1	79
Syphilis, 1° & 2°	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Syphilis, early latent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Varicella	1	0	1	2	0	0	0	3	0	0	0	0	0	0	0	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	PR	RA	RN	RP	RC	RL	RO	RH	RS	SA	SC	SG	SW	SN	SD	State Total
Amebiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Arboviral Disease	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Campylobacteriosis	0	0	3	0	2	14	1	1	4	4	4	45	3	23	1	399
Chlamydia	17	1	173	7	16	392	7	3	14	195	3	2390	64	735	1	9187
Cryptosporidiosis	0	0	10	0	1	1	0	0	0	2	0	5	0	5	0	84
Diarrhea-causing *E. coli*	0	0	0	0	1	1	0	0	0	0	0	3	2	5	1	52
Giardiasis	1	0	3	0	0	2	0	2	0	4	0	17	0	7	0	162
Gonorrhea	4	0	43	0	4	97	1	0	1	46	0	728	10	270	0	2268
H. influenzae, invasive	0	0	2	0	0	1	0	0	1	0	0	4	0	0	0	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	15
Hepatitis B, acute	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	*	*	*	*	46	*	8	*	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	6
Lyme Disease	0	0	4	0	0	1	0	0	0	1	0	3	0	0	0	16
Malaria	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Meningococcal Disease	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	0	0	0	0	0	1	0	0	0	0	0	22	0	0	0	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	1	0	2	1	0	1	2	0	2	5	5	5	0	0	0	68
Salmonellosis	1	0	32	0	2	20	0	3	1	6	0	62	6	30	0	467
Shigellosis	0	0	0	0	0	2	0	0	0	1	0	21	3	4	0	67
Strep., Group A invasive	0	0	0	0	0	0	0	0	0	1	0	9	0	2	0	41
S. pneumo., drug-resistant	0	0	12	0	0	0	0	1	0	0	1	14	0	3	0	79
Syphilis, 1° & 2°	0	0	0	0	0	0	0	0	0	0	0	11	0	1	0	30
Syphilis, early latent	0	0	0	0	0	0	0	0	0	0	0	13	0	5	0	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	0	0	0	3	0	0	0	0	0	17	2	5	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
Varicella	0	0	13	0	0	0	2	0	0	2	0	76	0	12	0	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 2. Reportable disease cases by county, Kansas, 2008

	SH	SM	SF	ST	SV	SU	TH	TR	WB	WA	WS	WH	WL	WO	WY	State Total
Amebiasis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Arboviral Disease	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	5
Campylobacteriosis	2	2	2	0	0	6	1	0	2	1	2	0	1	0	13	399
Chlamydia	5	7	7	5	8	43	9	9	10	0	4	1	14	1	1134	9187
Cryptosporidiosis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	84
Diarrhea-causing *E. coli*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	52
Giardiasis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	15	162
Gonorrhea	0	0	0	0	0	3	2	2	2	0	0	0	3	0	481	2268
H. influenzae, invasive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20
Hemolytic Uremic Syndrome (HUS)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hepatitis B, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Hepatitis C, acute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
HIV/AIDS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	41	221
Legionellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Listeriosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6
Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	16
Malaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9
Meningitis, other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Meningococcal Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pertussis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	57
Q Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rabies, animal	1	0	0	0	5	0	1	0	0	2	0	1	0	0	0	68
Salmonellosis	1	3	2	2	2	3	0	1	2	0	0	0	2	1	16	467
Shigellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	67
Strep., Group A invasive	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	41
S. pneumo., drug-resistant	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8	79
Syphilis, 1° & 2°	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	30
Syphilis, early latent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	56
TSE or Prion Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Tuberculosis, active	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57
Tularemia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Typhoid Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Varicella	3	0	0	0	0	3	0	0	1	0	0	0	1	0	39	481

***Zero to five cases reported. Not shown to protect confidentiality.**

TABLE 3
Reportable diseases with no known cases, Kansas, 2008

Disease	Year of last reported case
Anthrax	1972
Botulism	2004
Brucellosis	2006
Chancroid	1998
Cholera	1988
Cyclospora	Unknown
Diphtheria	1964
Ehrlichiosis	2007
Hansen's Disease (Leprosy)	1999
Hantavirus Pulmonary Syndrome	2005
Influenza-associated Pediatric Mortality	2007
Measles	2006
Plague	Unknown
Poliomyelitis	1967
Psittacosis	1992
Rabies, Human	1968
Rocky Mountain Spotted Fever	2007
Rubella	2006
Severe Acute Respiratory Syndrome	N/A
Smallpox	1949
Tetanus	2001
Toxic Shock Syndrome	2006
Trichinosis	1999
Viral Hemorrhagic Fever	Unknown
Yellow Fever	Unknown

REFERENCES

- Heymann D, ed. *Control of Communicable Diseases Manual*. 18th ed. Washington, D.C.: American Public Health Association; 2004.

- American Academy of Pediatrics. Pickering LK, ed. *Red Book: 2006 Report of the Committee on Infectious Diseases*. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006.

- Centers for Disease Control and Prevention. *Case definitions for infectious conditions under public health surveillance*. MMWR 1997;46(No. RR-10). Available online at: http://www.cdc.gov/epo/dphsi/casedef/index.htm

- Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases, 2007*. 10th ed.

- Centers for Disease Control and Prevention. *Summary of notifiable diseases — United States, 2007*. Published July 9, 2009, for MMWR 2009;56(No. 53). Available online at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5653a1.htm

- National Center for Health Statistics. Bridged-race Vintage 2006 postcensal estimates of the resident population of the United States as of July 1, 2000, to July 1, 2006, by year, county, single-year of age (0, 1, 2, …, 85 years and over), bridged-race (White, Black or African American, American Indian or Alaska Native, Asian or Pacific Islander), Hispanic origin (not Hispanic or Latino, Hispanic or Latino) and sex. Released online: http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm. August 16, 2007.