Mississippi Morbidity Report

Volume 33, Number 3 November 2017

Annual Summary
Selected Reportable Diseases
Mississippi – 2014 & 2015

Mississippi State Department of Health

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Table of Contents

Return to Table of Contents

Preface

Public health surveillance involves the systematic collection, analysis and dissemination of data regarding adverse health conditions. The data are used to monitor trends and identify outbreaks in order to assess risk factors, target disease control activities, establish resource allocation priorities and provide feedback to the medical community and the public. These data support public health interventions for both naturally occurring and intentionally spread disease.

Statistics incorporated into tables, graphs and maps reflect data reported from health care providers who care for Mississippi residents. Cases counted have met the surveillance case definitions of the CDC and the Council of State and Territorial Epidemiologists (CSTE), available at https://wwwn.cdc.gov/nndss/conditions/search/. Unless otherwise noted all rates are per 100,000 population. Data are based on "event" date of the case with the exception of TB in which the case confirmation date is used. The "event" date is defined as the earliest known date concerning a case and is hierarchical (onset, diagnosis, laboratory date or date of report to the health department).

Mississippi law (Section 41-3-17, Mississippi Code of 1972 as amended) authorized the Mississippi State Board of Health, under which MSDH operates, to establish a list of diseases which are reportable. The reportable disease list and the Rules and Regulations Governing Reportable Diseases and Conditions may be found online at http://www.msdh.state.ms.us/msdhsite/_static/14,0,194.html. Class 1A diseases, reportable by telephone within 24 hours of first knowledge or suspicion, are those to which the MSDH responds immediately to an individual case. Class 1B diseases are those that require individual case investigation but do not require an immediate public health response and can therefore be reported by telephone within one business day of first knowledge or suspicion. Class 2 diseases are reportable within a week of diagnosis, and Class 3 diseases are reportable only by laboratories.

To report a case of any reportable disease or any outbreak, please call 601-576-7725 during working hours in the Jackson area, or 1-800-556-0003 outside the Jackson area. For reporting tuberculosis, you also may call 601-576-7700, and for reporting STD's or HIV/AIDS, you may call 601-576-7723. For emergency consultation or reporting Class 1A diseases or outbreaks afterhours (nights, holidays and weekends) please call 601-576-7400.

The data included in the following document have come from physicians, nurses, clinical laboratory directors, office workers and other health care providers across the state who called or sent in reports. Without these individuals, public health surveillance and response would be incapacitated. For your dedication to this important part of public health information, we thank you.

Paul Byers, MD
State Epidemiologist

Return to Table of Contents

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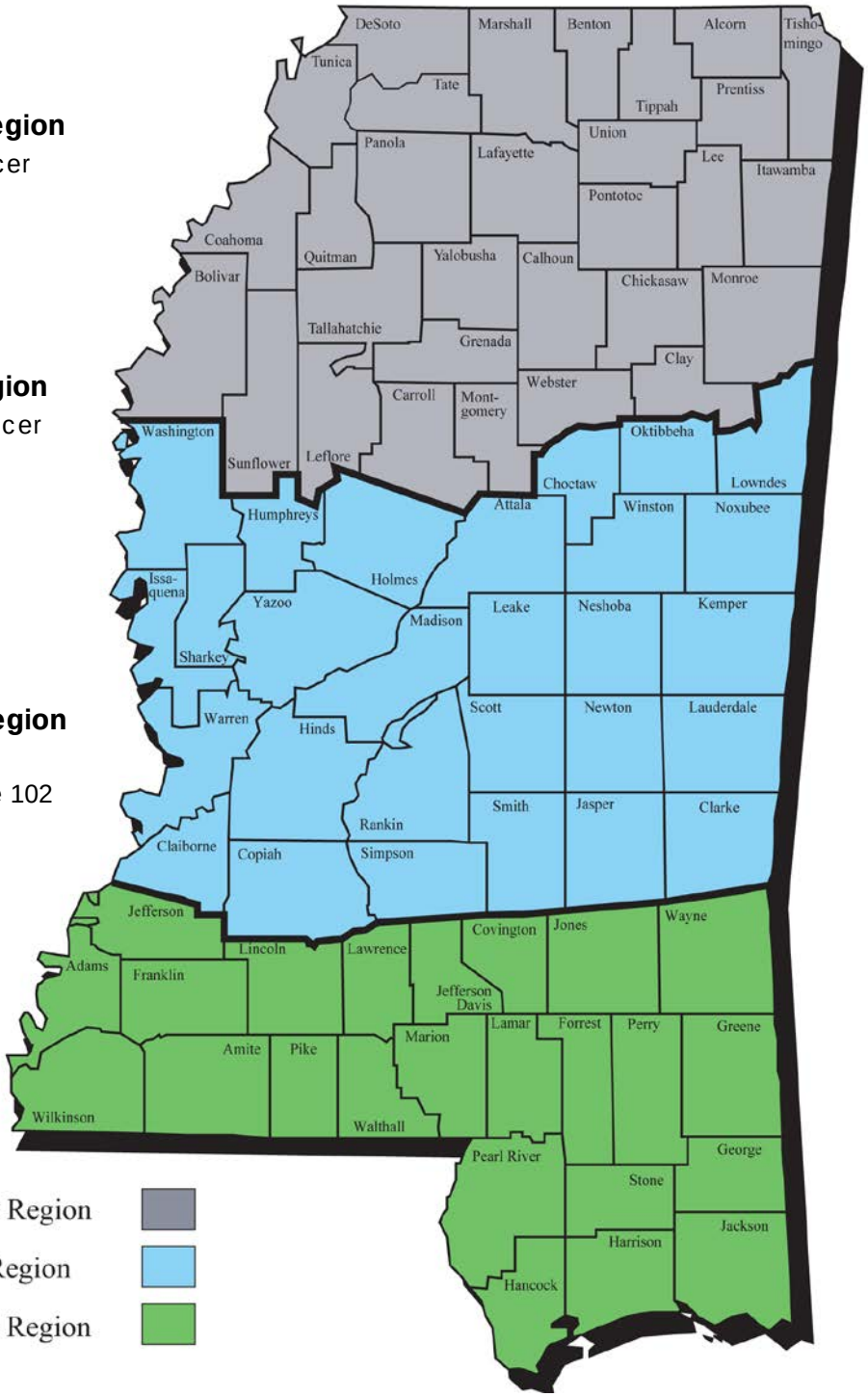
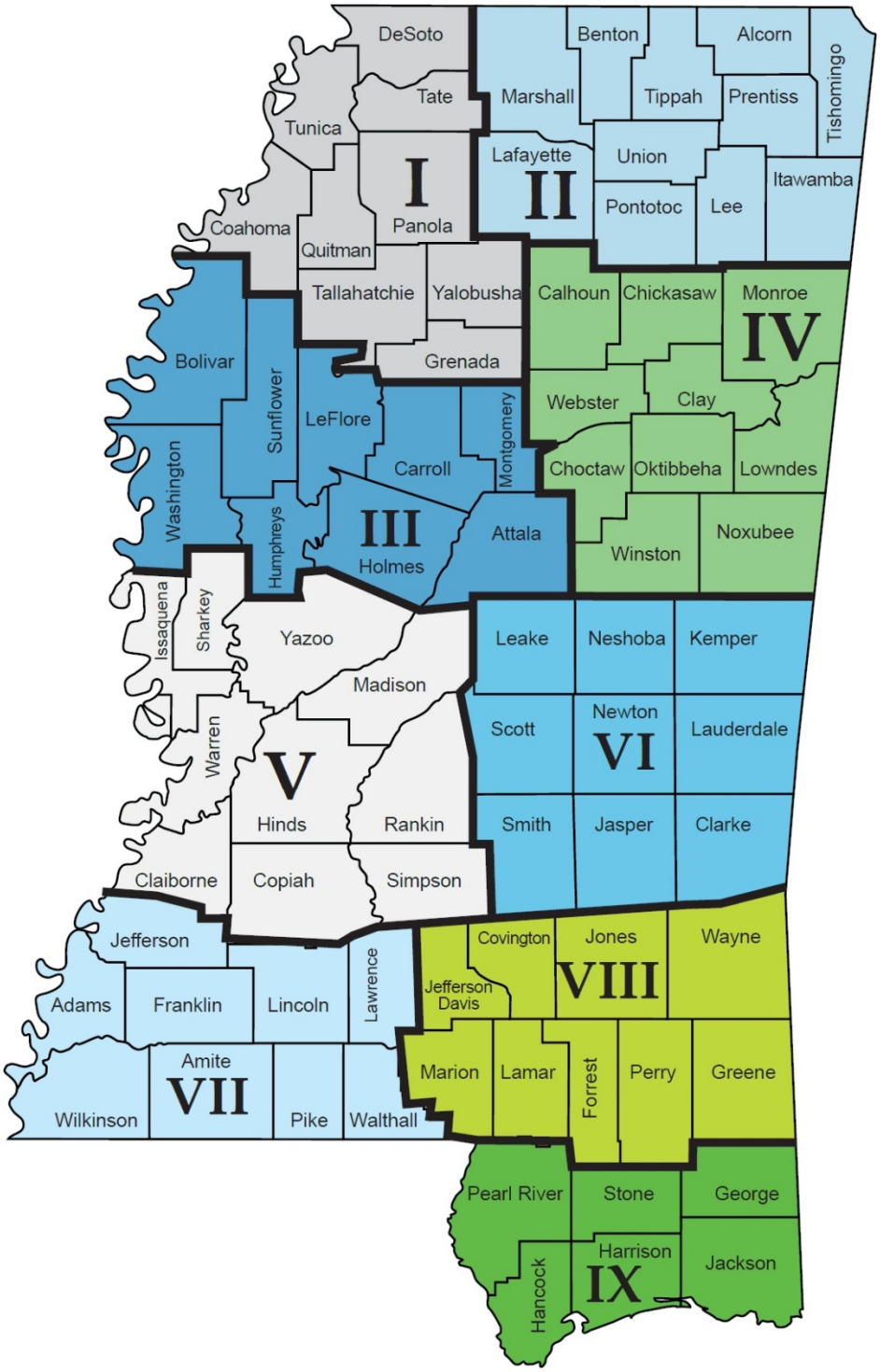


Return to Table of Contents

Mississippi Public Health Districts*

*Until June 30, 2017, Mississippi was divided into nine public health districts functioning under MSDH leadership. This district map is provided for reference purposes only. Please see the map on the previous page for current regional locations and contact information.



Return to Table of Contents

Reportable Disease List

Mississippi State Department of Health
List of Reportable Diseases and Conditions
Reporting Hotline: 1-800-556-0003
Monday - Friday, 8:00 am - 5:00 pm
To report inside Jackson telephone area or for consultative services
Monday - Friday, 8:00 am - 5:00 pm: (601) 576-7725

	Phone	Fax
Epidemiology	**(601) 576-7725**	**(601) 576-7497**
STD/HIV	**(601) 576-7723**	
TB	**(601) 576-7700**	

Mail reports to: Office of Epidemiology, Mississippi State Department of Health, Post Office Box 1700, Jackson, Mississippi 39215-1700

Class 1A Conditions should be reported within 24 hours (nights, weekends and holidays by calling: (601) 576-7400)

Class 1A: Diseases of major public health importance which shall be reported directly to the Department of Health by telephone within 24 hours of first knowledge or suspicion. Class 1A diseases and conditions are dictated by requiring an immediate public health response. Laboratory directors have an obligation to report laboratory findings for selected diseases (refer to Appendix B of the Rules and Regulations Governing Reportable Diseases and Conditions).

Any Suspected Outbreak (including foodborne and waterborne outbreaks)		
Anthrax	Hepatitis A	Rabies (human or animal)
Botulism (including foodborne, infant or wound)	Influenza-associated pediatric mortality (<18 years of age)	Ricin intoxication (castor beans)
Brucellosis	Measles	Smallpox
Diphtheria	Melioidosis	Tuberculosis
Escherichia coli O157:H7 and any shiga toxin-producing *E. coli* (STEC)	*Neisseria meningitidis* Invasive Disease†‡	Tularemia
Glanders	Pertussis	Typhus fever
Haemophilus influenzae Invasive Disease†‡	Plague	Viral hemorrhagic fevers (filoviruses [e.g. Ebola, Marburg] and arenaviruses [e.g.,Lassa, Machupo])
Hemolytic uremic syndrome (HUS), post-diarrheal	Poliomyelitis	
	Psittacosis	
	Q fever	
Any unusual disease or manifestation of illness, including but not limited to the appearance of a novel or previously controlled or eradicated infectious agent, or biological or chemical toxin.		
†Usually presents as meningitis or septicemia, or less commonly as cellulitis, epiglottitis, osteomyelitis, pericarditis or septic arthritis.		
‡Specimen obtained from a normally sterile site.		

Class 1B Conditions should be reported within 24 hours (within one business day)

Class 1B: Diseases of major public health importance which shall be reported directly to the Department of Health by telephone within one business day after first knowledge or suspicion. Class 1B diseases and conditions require individual case investigation, but not an immediate public health response. Laboratory directors have an obligation to report laboratory findings for selected diseases (refer to Appendix B of the Rules and Regulations Governing Reportable Diseases and Conditions).

Arboviral infections including but not limited to: California encephalitis virus Chikungunya virus Dengue Eastern equine encephalitis virus LaCrosse virus Western equine encephalitis virus St. Louis encephalitis virus West Nile virus	Chancroid Cholera Encephalitis (human) HIV infection, including AIDS Legionellosis Non-cholera *Vibrio* disease *Staphylococcus aureus*, vancomycin resistant (VRSA) or vancomycin intermediate (VISA)	Syphilis (including congenital) Typhoid fever Varicella infection, primary, in patients >15 years of age Yellow fever

Class 2: Diseases or conditions of public health importance of which individual cases shall be reported by mail, telephone, fax or electronically, within 1 week of diagnosis. In outbreaks or other unusual circumstances they shall be reported the same as Class 1A. Class 2 diseases and conditions are those for which an immediate public health response is not needed for individual cases.

Chlamydia trachomatis, genital infection	HIV infection in pregnancy	Rocky Mountain spotted fever
Creutzfeldt-Jakob Disease, including new variant	Listeriosis	Rubella (including congenital)
Ehrlichiosis	Lyme disease	Spinal cord injuries
Enterococcus, invasive infection‡, vancomycin resistant	Malaria	*Streptococcus pneumoniae*, invasive infection‡
Gonorrhea	Meningitis other than Meningococcal or *Haemophilus influenzae*	Tetanus
Hepatitis (acute, viral only) **Note** - Hepatitis A requires Class 1A Report	Mumps	Trichinosis
Hepatitis B infection in pregnancy	*M. tuberculosis* infection (positive TST or IGRA*)	Viral encephalitis in horses and ratites****
	Poisonings** (including elevated blood lead levels***)	

‡Specimen obtained from a normally sterile site.

*TST- tuberculin skin test; IGRA- Interferon-Gamma Release Assay (to include size of TST in millimeters and numerical results of IGRA testing).

**Reports for poisonings shall be made to Mississippi Poison Control Center, UMMC 1-800-222-1222.

***Elevated blood lead levels (as designated below) should be reported to the MSDH Lead Program at (601) 576-7447.

Blood lead levels (venous) ≥5µg/dL in patients less than or equal to 6 years of age.

**** Except for rabies and equine encephalitis, diseases occurring in animals are not required to be reported to the MSDH.

Class 3: Laboratory based surveillance. To be reported by laboratories only. Diseases or conditions of public health importance of which individual laboratory findings shall be reported by mail, telephone, fax or electronically within one week of completion of laboratory tests (refer to Appendix B of the Rules and Regulations Governing Reportable Diseases and Conditions).

All blood lead test results in patients ≤6 years of age	CD4 count and HIV viral load*	Hepatitis C infection
Campylobacteriosis	Chagas Disease (*American trypanosomiasis*)	Nontuberculous mycobacterial disease
Carbepenam-resistant Enterobacteriaceae (CRE) *Enterobacter* species, *E.coli* or *Klebsiella* species only	Cryptosporidiosis	Salmonellosis
	Hansen disease (Leprosy)	Shigellosis

*HIV associated CD4 (T4) lymphocyte results of any value and HIV viral load results, both detectable and undetectable.

Class 4: Diseases of public health importance for which immediate reporting is not necessary for surveillance or control efforts. Diseases and conditions in this category shall be reported to the Mississippi Cancer Registry within six months of the date of first contact for the reportable condition.

The National Program of Cancer Registries at the Centers for Disease Control and Prevention requires the collection of certain diseases and conditions. A comprehensive reportable list including ICD9CM/ICD10CM codes is available on the Mississippi Cancer Registry website, https://www.umc.edu/Administration/Outreach_Services/Mississippi_Cancer_Registry/Reportable_Diseases.aspx.

Each record shall provide a minimum set of data items which meets the uniform standards required by the National Program of Cancer Registries and documented in the North American Association of Central Cancer Registries (NAACCR).

Return to Table of Contents

Arboviral Infections (mosquito-borne)

Background

Arthropod-borne viral (arboviral) diseases in Mississippi are limited to a few types transmitted by mosquitoes. This report highlights four main arboviral infections that are locally acquired: West Nile virus (WNV), St. Louis encephalitis (SLE), eastern equine encephalitis (EEE), and LaCrosse encephalitis (LAC). WNV and SLE are members of the *Flavivirus* genus, while EEE is an *Alphavirus*, and LAC is in the California virus group of *Bunyaviruses*.

Infections do not always result in clinical disease. When illness occurs, symptoms can range from a mild febrile illness to more severe cases of neuroinvasive disease with encephalitis and/or meningitis. Neuroinvasive disease can result in long term residual neurological deficits or death. The proportion of infected persons who develop symptoms depends largely on the age of the persons and the particular virus involved.

Mosquito borne arboviral infections are typically more common in the warmer months when mosquitoes are most active, but WNV cases have been reported year round. All are transmitted by the bite of an infected mosquito, but the mosquito vectors and their habitats differ. The arboviruses discussed here are not transmitted by contact with an infected animal or other person; humans and horses are "dead end" or incidental hosts. Rare instances of WNV transmission have occurred through transplanted organs, blood transfusions, and transplacentally.

Methods of Control

The methods of controlling mosquito-borne infections are essentially the same for all the individual diseases. The best preventive strategy is to avoid contact with mosquitoes. Reduce time spent outdoors, particularly in early morning and early evening hours when mosquitoes are most active (specifically for the vector in WNV); wear light-colored long pants and long-sleeved shirts; and apply mosquito repellant to exposed skin areas. Reduce mosquito breeding areas around the home and workplace by eliminating standing or stagnant water. Larvacides are effective when water cannot be easily drained.

Mosquito Surveillance

Mosquitoes are collected throughout the state for West Nile and other arboviral testing to provide information regarding the burden and geographic distribution of infected vectors. Mosquitoes are collected by local mosquito programs and MSDH personnel and submitted as pools of 10-50 mosquitoes for testing. There were 810 mosquito pools submitted to MSDH PHL for WNV and SLE testing in 2014. In 2015, 663 mosquito pools were submitted for testing.

Arboviral Testing

The Public Health Laboratory (PHL) performs an arboviral panel consisting of IgM testing for WNV and SLE, and, for patients less than 25 years of age, LAC IgM. Clinicians are encouraged to call MSDH Epidemiology or the PHL for specifics and indications for arboviral testing. In 2014, 1,054 samples were submitted to the MSDH PHL for arboviral testing; while 886 samples were submitted to the MSDH PHL for arboviral testing in 2015.

Please refer to the individual disease summaries for information on and epidemiology of each specific arbovirus.

Eastern Equine Encephalitis (EEE)

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**0**	**2014 rate/100,000**	**0.0**

Clinical Features

Clinical illness is associated with symptoms that can range from a mild flu-like illness (fever, headache, muscle aches) to seizures and encephalitis progressing to coma and death. The case fatality rate is 30-50%. Fifty percent of those persons who recover from severe illness will have permanent mild to severe neurological damage. Disease is more common in young children and in persons over the age of 55.

Infectious Agent

Eastern equine encephalitis virus, a member of the genus *Alphavirus*.

Reservoir

Maintained in a bird-mosquito cycle. Humans and horses are incidental hosts.

Transmission

Through the bite of an infected mosquito, usually *Coquilletidia perturbans*. This mosquito, known as the salt and pepper or freshwater marsh mosquito breeds mainly in marshy areas.

Incubation

3-10 days (generally within 7 days).

Reporting Classification

Class 1B.

Epidemiology and Trends

Human cases are relatively infrequent largely because primary transmission takes place in and around marshy areas where human populations are generally limited. There were no reported cases of EEE in Mississippi in 2014 or 2015. The last two reported cases of EEE occurred in October 2002.

Horses also become ill with EEE and are dead end hosts. Infected horses can serve as sentinels for the presence of EEE, and can indicate an increased risk to humans. The Mississippi Board of Animal Health (MBAH) reports equine infections to MSDH, and in 2014 MBAH reported one EEE positive horse in Webster County. In 2015, six horses tested positive for EEE and were reported from the following counties: George (1), Harrison (1), Jackson (2), Jasper (1) and Neshoba (1). All six of the positive horses in 2015 were located in the lower half of the state, with 67% located in District IX.

LaCrosse Encephalitis

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**0**	**2014 rate/100,000**	**0.0**

Clinical Features

Clinical illness occurs in about 15% of infections. Initial symptoms of LaCrosse encephalitis infection include fever, headache, nausea, vomiting and lethargy. More severe symptoms usually occur in children under 16 and include seizures, coma, and paralysis. The case fatality rate for clinical cases of LaCrosse encephalitis is about 1%.

Infectious Agent

LaCrosse encephalitis virus, in the California serogroup of *Bunyaviruses*.

Reservoir

Chipmunks and squirrels.

Transmission

Through the bite of an infected *Ochlerotatus triseriatus* mosquito (commonly known as the tree-hole mosquito). This mosquito is commonly associated with tree holes and most transmission tends to occur in rural wooded areas. However, this species will also breed in standing water in containers or tires around the home.

Incubation

7-14 days.

Return to Table of Contents

Reporting Classification

Class 1B.

Epidemiology and Trends

Reports of LaCrosse encephalitis remain relatively rare in Mississippi, with only 19 reported cases since 1999. There were no reported cases of LaCrosse encephalitis in 2014 or 2015.

Another *Bunyavirus* in the California group, Jamestown Canyon encephalitis virus, has also been seen in Mississippi, with one reported case in 1993, one in 2006, and one in 2008. There was one reported cases of Jamestown Canyon encephalitis virus in 2014. No cases were reported in 2015.

St. Louis Encephalitis

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**2**	**2014 rate/100,000**	**0.1**

Clinical Features

Less than 1% of infections result in clinical illness. Individuals with mild illness often have only a headache and fever. The more severe illness, meningoencephalitis, is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic (but rarely flaccid) paralysis. The mortality rate from St. Louis encephalitis (SLE) ranges from 5 to 30%, with higher rates among the elderly.

Infectious Agent

St. Louis encephalitis virus, a member of the genus *Flavivirus*.

Reservoir

Maintained in a bird-mosquito cycle. Infection does not cause a high mortality in birds.

Transmission

Through the bite of an infected mosquito generally belonging to genus *Culex (Culex quinquefasciatus, Culex pipiens)*, the southern house mosquito. This mosquito breeds in standing water high in organic materials, such as containers and septic ditches near homes.

Incubation

5-15 days.

Reporting Classification

Class 1B.

Epidemiology and Trends

The number of reported SLE cases fluctuates annually. Since 2005, when nine cases and one death were reported, the occurrence of SLE has been variable. Mississippi had no reported cases of SLE in 2015, but had two reported cases in 2014; neither of which resulted in death. The 2014 cases represent the first reports of SLE in Mississippi since 2009. No positive SLE mosquito pools were identified in either 2014 or 2015.,

West Nile Virus

2015 Case Total	**38**	**2015 rate/100,000**	**1.3**
2014 Case Total	**43**	**2014 rate/100,000**	**1.3**

Clinical Features

Clinical illness occurs in approximately 20% of infected individuals. Most with clinical manifestations will develop the milder West Nile fever, which includes fever, headache, fatigue, and sometimes a transient rash. About 1 in 150 infected persons develop more severe West Nile neuroinvasive disease ranging from meningitis to encephalitis. Encephalitis is the most common form of severe illness and is usually associated with altered consciousness that may progress to coma. Focal neurological deficits and movement disorders may also occur. West Nile poliomyelitis, a flaccid paralysis syndrome, is seen less frequently. The elderly and immunocompromised are at highest risk of severe disease.

Infectious Agent

West Nile virus, a member of the genus *Flavivirus*.

Reservoir

WNV is maintained in a bird-mosquito cycle; it has been detected in more than 317 species of birds, particularly crows and jays.

Transmission

Primarily through the bite of an infected southern house mosquito *(Culex quinquefasciatus)*. This mosquito breeds in standing water with heavy organic matter.

Incubation

3-15 days.

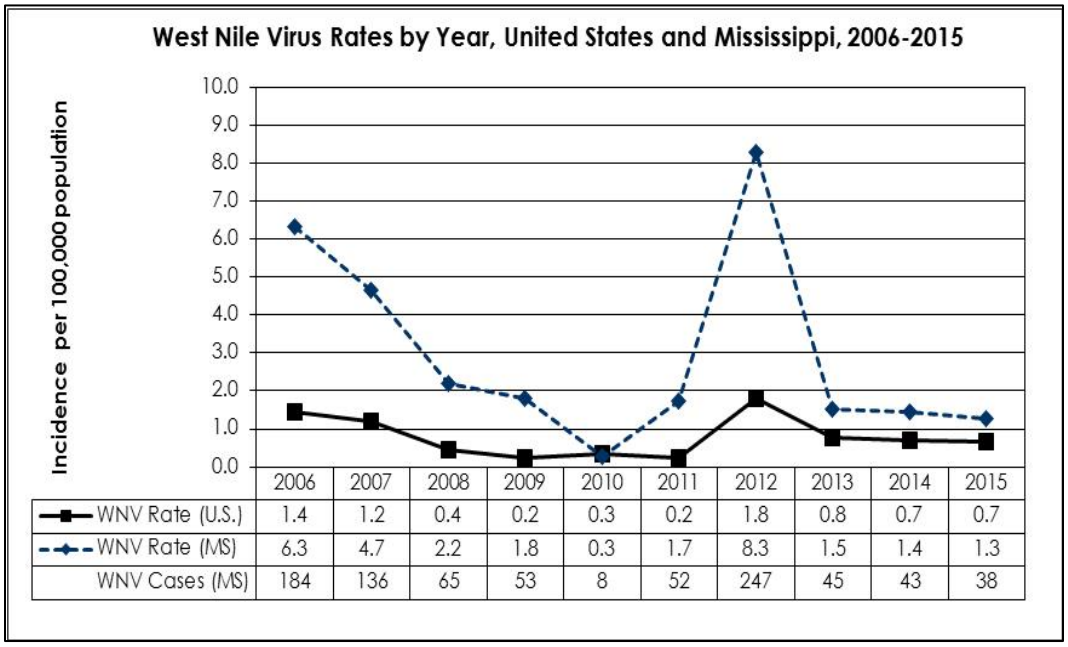
Reporting Classification

Class 1B.

Epidemiology and Trends

In Mississippi, West Nile virus was first isolated in horses in 2001 followed by human infections in 2002 with 192 cases reported. There has been some variability in the number of cases reported each year, from a low of eight cases in 2010 to a high of 247 cases in 2012. However, since 2013 (45) the annual number of cases has been relatively stable with 43 cases in 2014 and 38 in 2015 (Figure 1). There were eight deaths associated with WNV between 2014 (7) and 2015 (1). Of the 81 WNV cases in 2014 and 2015, 56% were females and 44% were males.

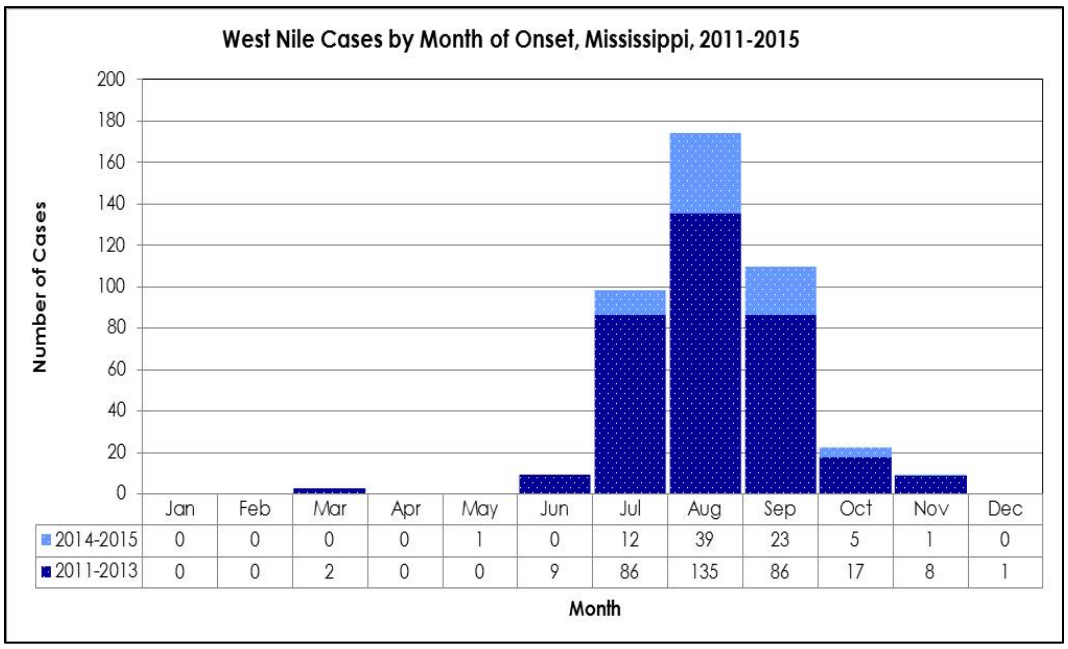
Figure 1



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
WNV Rate (U.S.)	1.4	1.2	0.4	0.2	0.3	0.2	1.8	0.8	0.7	0.7
WNV Rate (MS)	6.3	4.7	2.2	1.8	0.3	1.7	8.3	1.5	1.4	1.3
WNV Cases (MS)	184	136	65	53	8	52	247	45	43	38

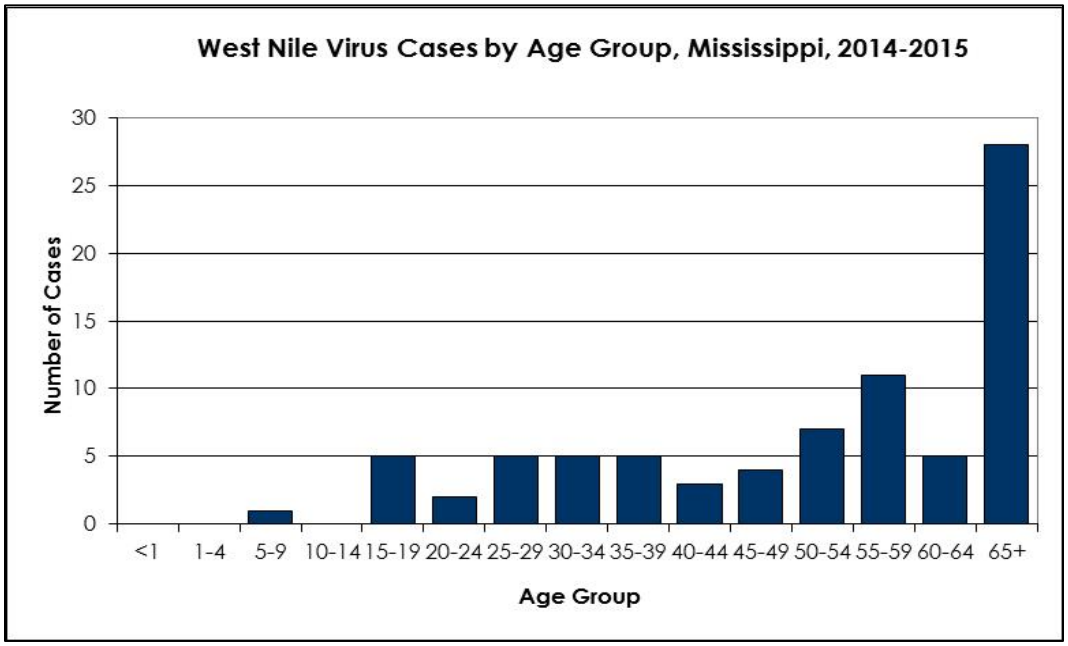
WNV is endemic in Mississippi, and the mosquito vector is present the entire year. Human illness can occur year round, but is most prevalent from June to October. July, August, and September are usually the peak months and 90% of the cases over the past five years have occurred during these three months (Figure 2).

Figure 2



Of the 81 cases reported in 2014 and 2015, 29 (36%) were classified as WNV fever and 52 (64%) were neuroinvasive. The cases ranged in age from 8 to 92 years, with a median age of 56 years (Figure 3). The eight reported deaths all presented with clinical symptoms of neuroinvasive disease and ranged in age from 54 to 85 years, with a median age of 76 years.

Figure 3

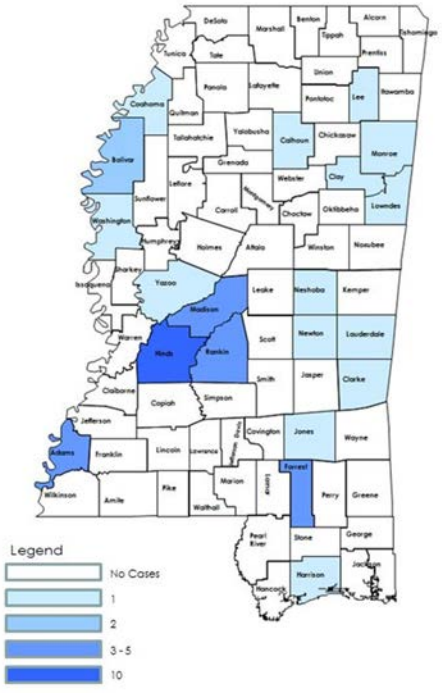


WNV infection can occur in any part of the state, and since 2001, activity (human cases, positive mosquito pools, horses or birds) has been reported in every Mississippi County except Issaquena. The cases in 2014 and 2015 were spread throughout the state with the most cases in any one county reported from Hinds County with 10 cases in 2014 (Figure 4) and 11 cases in 2015 (Figure 5).

MSDH mosquito pool testing in 2014 resulted in 67 positive pools and 44 positive for WNV in 2015. Horses may also become ill with WNV and can act as sentinels for the presence of infected mosquitoes. The Mississippi Board of Animal Health reports equine infections to MSDH. In 2014, two horses tested positive for WNV throughout Mississippi. There was an increase observed in 2015 when nine horses tested positive for WNV in Mississippi.

Figure 4

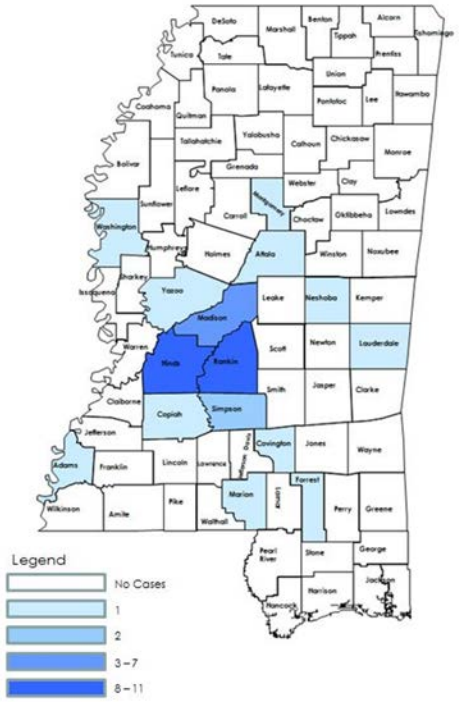
West Nile Virus Cases by County, Mississippi, 2014



Return to Table of Contents

Figure 5

West Nile Virus Cases by County, Mississippi, 2015



Campylobacteriosis

2015 Case Total	**195**	**2015 rate/100,000**	**6.5**
2014 Case Total	**106**	**2014 rate/100,000**	**3.5**

Clinical Features

Campylobacteriosis is a zoonotic bacterial disease of variable severity ranging from asymptomatic infections to clinical illness with fever, diarrhea (may be bloody), abdominal pain, and nausea and vomiting. Symptoms typically resolve after one week, but may persist for weeks if untreated. Rare post-infectious syndromes include reactive arthritis and Guillain-Barré syndrome (GBS).

Infectious Agent

Campylobacter jejuni (C. jejuni) causes most cases of diarrheal illness in humans.

Reservoir

Commonly present in cattle and poultry.

Transmission

Transmission mainly occurs through ingestion of undercooked meat, usually poultry, but occasionally contaminated food, water, or raw milk. The number of organisms required to cause infection is low.

Incubation

Average incubation is 2-5 days, with a range from 1-10 days.

Period of Communicability

Person to person transmission does not typically occur, though the infected individual may shed organisms for up to 7 weeks without treatment.

Methods of Control

Disease prevention includes promotion of proper food handling, good hand washing, particularly after handling raw meats, and after contact with feces of dogs and cats. Pasteurizing milk and chlorinating water are also important. Symptomatic individuals should be excluded from food handling or care of patients in hospitals or long term care facilities.

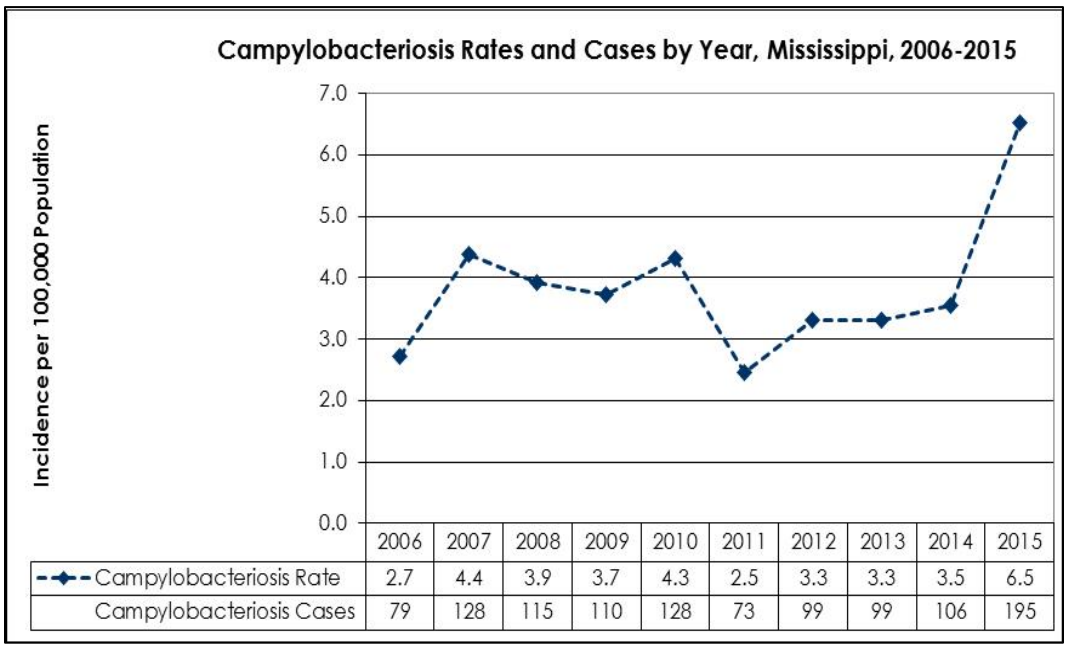
Reporting Classification

Class 3.

Epidemiology and Trends

In 2014 and 2015 there were a total of 301 reported cases of campylobacteriosis in Mississippi. The 106 reported cases in 2014 were comparable to the number of cases in 2013. In 2015, the number of reported cases increased 84% to 195 cases (Figure 6). The 2014 and 2015 cases were not associated with any reported outbreaks. The increase in the number of cases in 2015 may represent an increased utilization of culture-independent diagnostic tests (CIDT) that have greater sensitivity compared to standard culture.

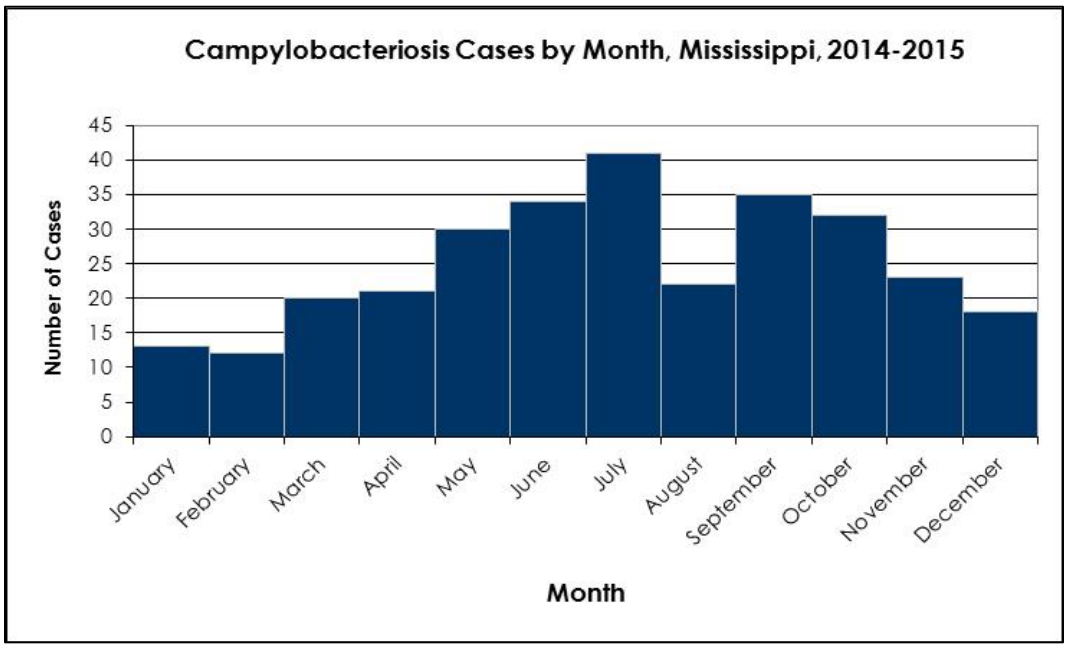
Figure 6



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Campylobacteriosis Rate	2.7	4.4	3.9	3.7	4.3	2.5	3.3	3.3	3.5	6.5
Campylobacteriosis Cases	79	128	115	110	128	73	99	99	106	195

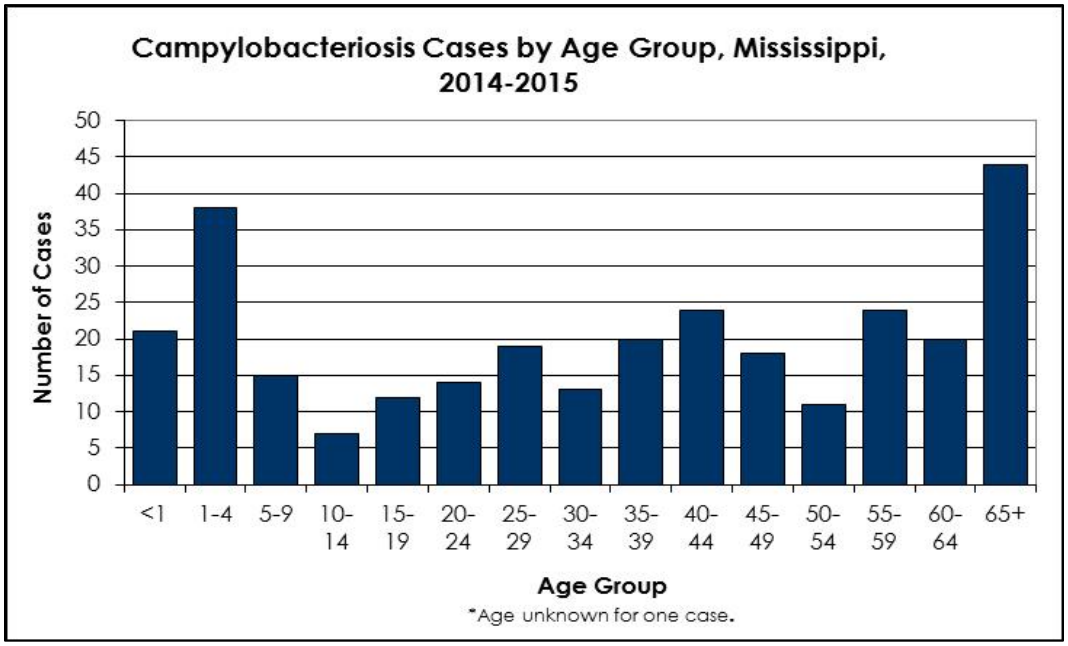
Campylobacter infections are typically more common in the warmer months, as are many enteric illnesses; however in 2014 – 2015, there was a slight drop in the number of cases in August, and the case counts remained slightly elevated through early fall (Figure 7). In 2014 and 2015 children less than five years of age and adults 65 years of age and older accounted for 34% of the overall cases, in which age was known (Figure 8).

Figure 7



Return to Table of Contents

Figure 8



Chlamydia

2015 Case Total	**17,371**	**2015 rate/100,000**	**580.5**
2014 Case Total	**19,603**	**2014 rate/100,000**	**654.7**

Clinical Features

Chlamydia is a sexually transmitted bacterial infection causing urethritis in males and cervicitis in females. Urethritis in males presents with scant to moderate mucopurulent urethral discharge, urethral itching, and dysuria. Cervicitis presents as a mucopurulent endocervical discharge, often with endocervical bleeding. The most significant complications in women are pelvic inflammatory disease and chronic infections, both of which increase the risk of ectopic pregnancy and infertility. Perinatal transmission occurs through infant exposure to the infected cervix during birth resulting in chlamydial pneumonia or conjunctivitis. Asymptomatic infections can occur in 1%-25% of sexually active men and up to 70% of sexually active women.

Infectious Agent

Chlamydia trachomatis, an obligate intracellular bacteria. Immunotypes D through K have been identified in 35-50% of nongonococcal urethritis.

Reservoir

Humans.

Transmission

Transmitted primarily through sexual contact.

Incubation

Incubation period is poorly defined, ranging from 7 to 14 days or longer.

Period of Communicability

Unknown.

Methods of Control

Prevention and control of chlamydia are based on behavior change, effective treatment, and mechanical barriers. Condoms and diaphragms provide some degree of protection from transmission or acquisition of chlamydia. Effective treatment of the infected patient and their partners, from 60 days prior to the onset of symptoms, is recommended.

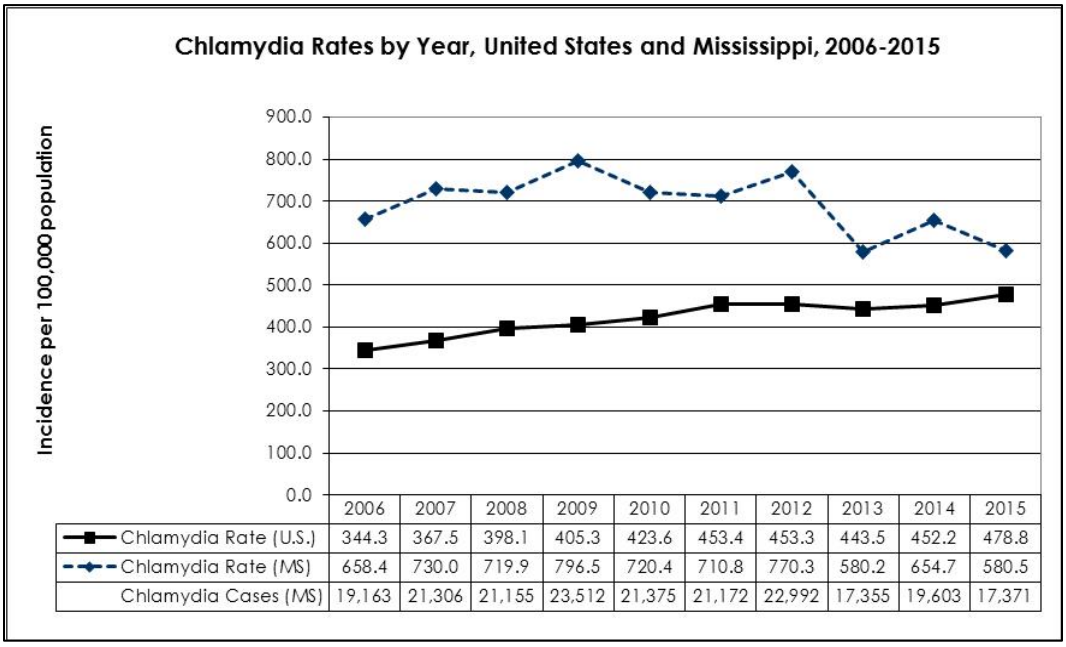
Reporting Classification

Class 2.

Epidemiology and Trends

Chlamydia is the most frequently reported bacterial sexually transmitted disease in the United States and in Mississippi. From 2014 to 2015, the number of chlamydia cases in Mississippi decreased 11% (from 19,603 to 17,371 cases), resulting in a case rate of 580.5 per 100,000 population (Figure 9). The Mississippi rate has been above the national rate for several years. In 2015, Mississippi had the fifth highest case rate of chlamydia in the United States.

Figure 9



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Chlamydia Rate (U.S.)	344.3	367.5	398.1	405.3	423.6	453.4	453.3	443.5	452.2	478.8
Chlamydia Rate (MS)	658.4	730.0	719.9	796.5	720.4	710.8	770.3	580.2	654.7	580.5
Chlamydia Cases (MS)	19,163	21,306	21,155	23,512	21,375	21,172	22,992	17,355	19,603	17,371

In 2014 and 2015, chlamydia was reported in every public health district, with the highest incidence noted in Public Health District III (Figures 10 and 11).

Figure 10

Chlamydia Incidence by Public Health District, Mississippi, 2014

District	Cases	Rate*
I	2,141	658.1
II	1,829	494.9
III	2,425	1162.2
IV	1,559	635.6
V	4,927	769.0
VI	1,582	653.9
VII	1,166	681.1
VIII	1,762	570.4
IX	2,212	458.4
Statewide	**19,603**	**654.7**

***per 100,000 population**

Return to Table of Contents

Figure 11

Chlamydia Incidence by Public Health District, Mississippi, 2015

District	Cases	Rate*
I	1,930	590.5
II	1,584	427.8
III	1,938	940.7
IV	1,377	562.9
V	4,387	684.2
VI	1,359	567.8
VII	949	558.0
VIII	1,706	554.1
IX	2,141	440.6
Statewide	**17,371**	**580.6**

*per 100,000 population

Chlamydia infections were reported over a range of age groups, but the largest proportion was reported among 15-24 year olds, accounting for over 70% of reported cases in 2014 (74%)and 2015 (73%) (Figure 12). In 2014 and 2015, African Americans accounted for 82% of the reported cases in which race was known (Figure 13). In 2014 and 2015, the rate of chlamydia infections for African Americans was more than seven times the rate for whites (1,119.5 versus 153.9 per 100,000 and 990.3 versus 126.9 per 100,000, respectively).

Figure 12

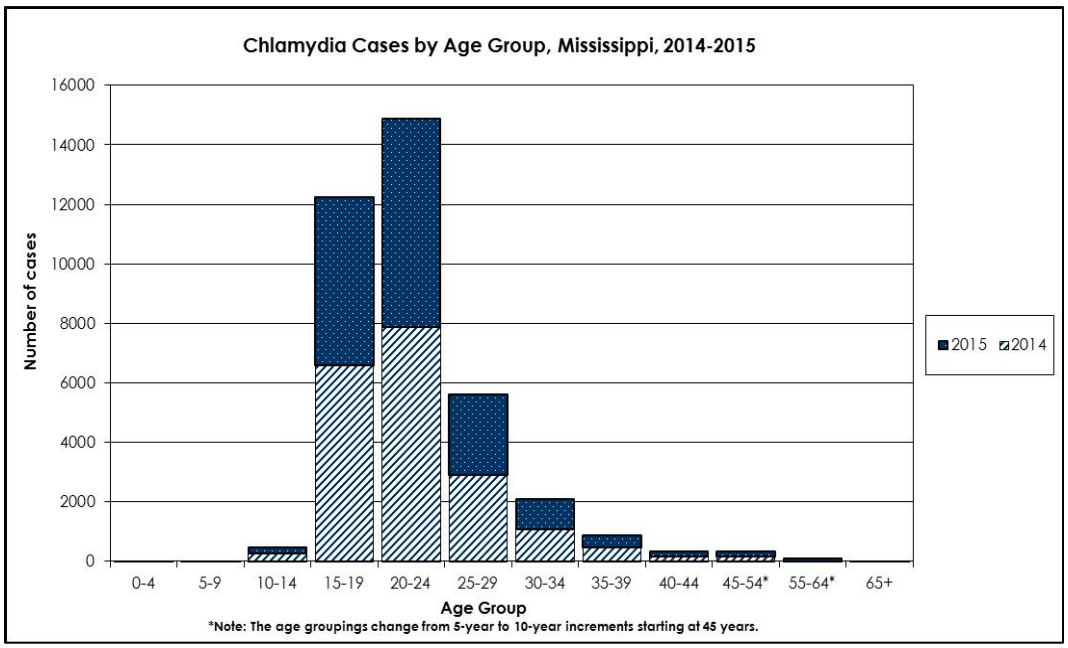
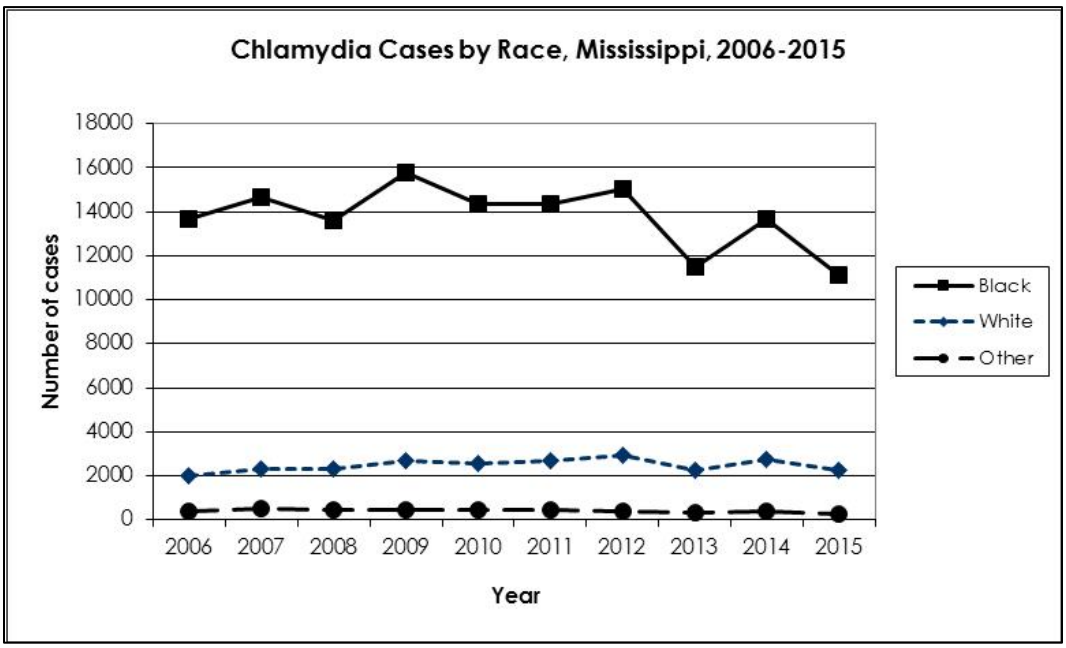


Figure 13



Return to Table of Contents

Cryptosporidiosis

2015 Case Total	**34**	**2015 rate/100,000**	**1.1**
2014 Case Total	**66**	**2014 rate/100,000**	**2.2**

Clinical Features

Cryptosporidiosis is a parasitic infection characterized by profuse, watery diarrhea associated with abdominal pain. Less frequent symptoms include anorexia, weight loss, fever, and nausea and vomiting. Symptoms often wax and wane and but generally disappear in 30 days or less in healthy people. Asymptomatic infections do occur and can serve as a source of infection to others. The disease may be prolonged and fulminant in immunodeficient individuals unable to clear the parasite. Children under 2, animal handlers, travelers, men who have sex with men, and close personal contacts of infected individuals are more prone to infection.

Infectious Agent

Cryptosporidium parvum, a coccidian protozoan, is associated with human infection.

Reservoir

Humans, cattle and other domesticated animals.

Transmission

Transmission is fecal-oral, which includes person-to-person, animal-to-person, waterborne (including recreational use of water) and foodborne transmission. Oocysts are highly resistant to chemicals used to purify drinking water and recreational water (swimming pools, water parks). The infectious dose can be as low as 10 organisms.

Incubation

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.

Methods of Control

Education of the public regarding appropriate personal hygiene, including handwashing. Symptomatic individuals with a diagnosis of cryptosporidiosis should not use public recreational water (e.g., swimming pools, lakes, ponds) while they have diarrhea and for at least 2 weeks after symptoms resolve. It is recommended that infected individuals be restricted from handling food, and symptomatic children be

restricted from attending daycare until free of diarrhea. Prompt investigation of common food or waterborne outbreaks is important for disease control and prevention.

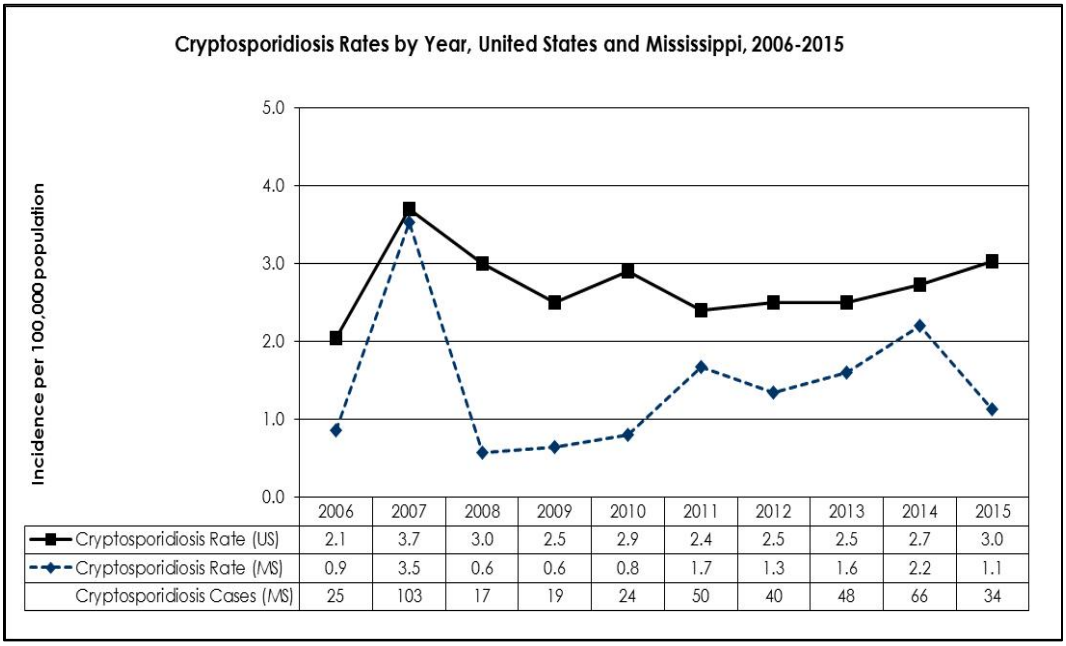
Reporting Classification

Class 3.

Epidemiology and Trends

There were 66 reported cases of cryptosporidiosis in 2014 and 34 reported cases in 2015 (Figure 14). The number of reported cases in 2014 was higher than the three year average of 46 cases from 2011 to 2013. However, in 2015 there was a 48% decrease in the number of reported cases (34), which was below average for the previous three years (51 case average from 2012 to 2014). There were no common source outbreaks identified during 2014 or 2015.

Figure 14



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cryptosporidiosis Rate (US)	2.1	3.7	3.0	2.5	2.9	2.4	2.5	2.5	2.7	3.0
Cryptosporidiosis Rate (MS)	0.9	3.5	0.6	0.6	0.8	1.7	1.3	1.6	2.2	1.1
Cryptosporidiosis Cases (MS)	25	103	17	19	24	50	40	48	66	34

E. coli O157:H7/ STEC / HUS

2015 Case Total	**23**	**2015 rate/100,000**	**0.8**
2014 Case Total	**33**	**2014 rate/100,000**	**1.1**

Clinical Features

Escherichia coli (E. coli) O157:H7 is the most virulent serotype of the Shiga toxin-producing *E. coli* (STEC), and is associated with diarrhea, hemorrhagic colitis, hemolytic-uremic syndrome (HUS), and post-diarrheal thrombotic thrombocytopenic purpura

(TTP). Symptoms often begin as nonbloody diarrhea but can progress to diarrhea with occult or visible blood. Severe abdominal pain is typical, and fever is usually absent. The very young and the elderly are more likely to develop severe illness and HUS, defined as microangiopathic hemolytic anemia, thrombocytopenia, and acute renal dysfunction. HUS is a complication in about 8% of *E. coli* O157:H7 infections. Supportive care is recommended as antibiotic use may increase the risk of progression to HUS. Other serotypes of *E. coli* are capable of producing Shiga toxins (STEC) that can lead to illness and HUS.

Infectious Agent

E. coli are gram negative bacilli. *E. coli* O157:H7 is thought to cause more than 90% of all diarrhea-associated HUS. Other non-O157 STEC serogroups include O26, O111, and O103.

Reservoir

Cattle, to a lesser extent other animals, including sheep, deer, and other ruminants. Humans may also serve as a reservoir for person-to-person transmission.

Transmission

Mainly through ingestion of food contaminated with ruminant feces, usually inadequately cooked hamburgers; also contaminated produce or unpasteurized milk. Direct person-to-person transmission can occur in group settings. Waterborne transmission occurs both from contaminated drinking water and from recreational waters.

Incubation

2-10 days, with a median of 3-4 days.

Period of Communicability

Duration of excretion is typically 1 week or less in adults but can be up to 3 weeks in one-third of children. Prolonged carriage is uncommon.

Methods of Control

Education regarding proper food preparation and handling and good hand hygiene is essential in prevention and control. Pasteurization of milk and juice is important.

MSDH investigates all reported cases of HUS and *E. coli* O157:H7 infections. All isolates should be submitted to the Public Health Laboratory (PHL) for molecular subtyping, or DNA “fingerprinting”, with pulsed-field gel electrophoresis (PFGE). Isolate information is submitted to a national tracking system (PulseNet), a network of public health and food regulatory agencies coordinated by the CDC. This system facilitates early detection of

common source outbreaks, even if the affected persons are geographically far apart, and assists in rapidly identifying the source of outbreaks.

Reporting Classification

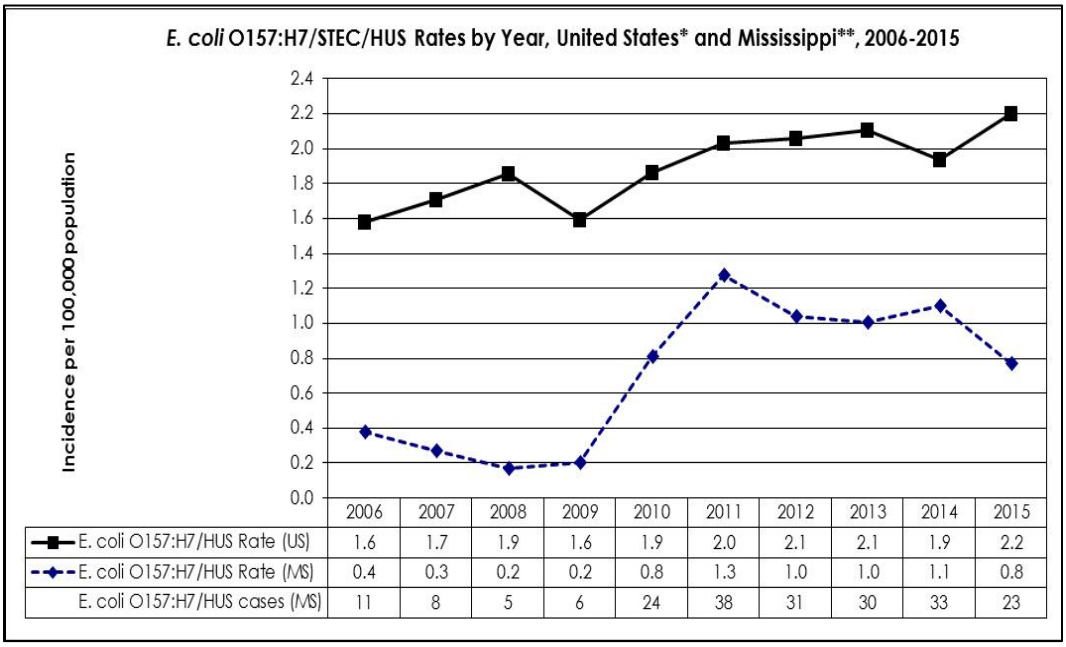
Class1A (includes *E. coli* O157:H7, non O157:H7 STEC and post-diarrheal HUS).

Epidemiology and Trends

In Mississippi, all *E. coli* O157:H7 infections, non O157:H7 STEC infections (added to the List of Reportable Diseases and conditions in late 2010) and cases of post-diarrheal HUS are reportable. In 2014 and 2015, 56 cases were reported to MSDH; 19 *E. coli* O157:H7, 34 non O157:H7 STEC, and three post-diarrheal HUS (Figure 15).

The 34 non O157:H7 STEC cases were due to serogroups O103 (9), O111 (8), O26 (7), O145 (2), and O121 (1). The serogroups of the remaining seven STEC cases were unknown. Two of the *E. coli* O157:H7 cases also developed HUS. There were no deaths reported in Mississippi during 2014 and 2015.

Figure 15



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
E. coli O157:H7/HUS Rate (US)	1.6	1.7	1.9	1.6	1.9	2.0	2.1	2.1	1.9	2.2
E. coli O157:H7/HUS Rate (MS)	0.4	0.3	0.2	0.2	0.8	1.3	1.0	1.0	1.1	0.8
E. coli O157:H7/HUS cases (MS)	11	8	5	6	24	38	31	30	33	23

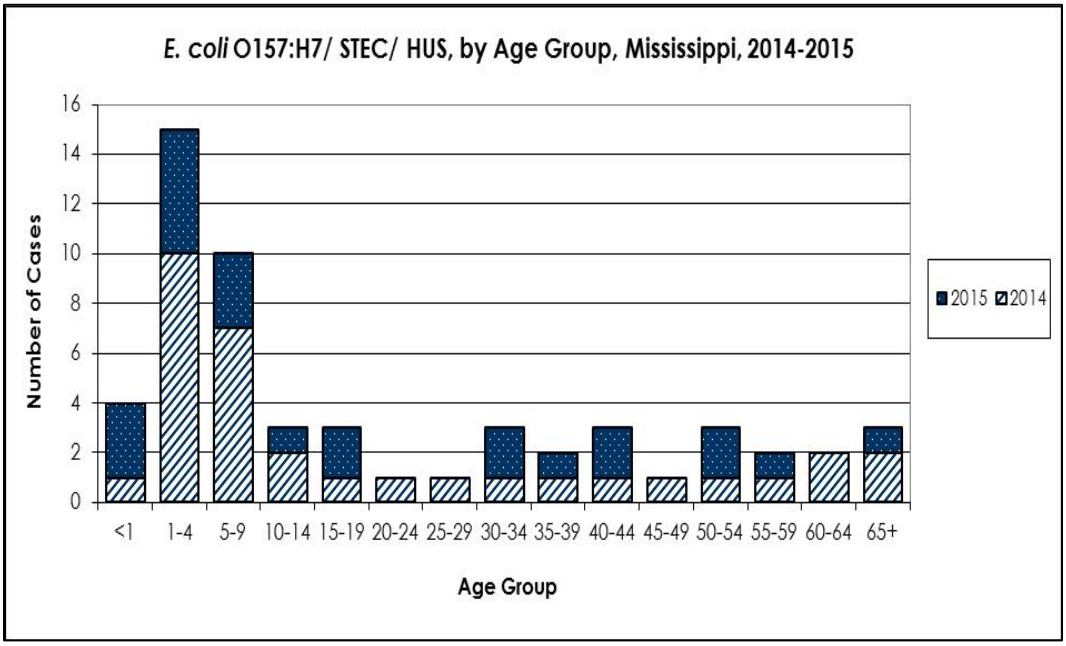
*U.S. rate includes *E. coli* O157:H7; shiga toxin positive, serogroup non-O157; and shiga toxin positive, not serogrouped.

**Mississippi rate includes *E. coli* O157:H7; shiga toxin positive, serogroup non-O157; shiga toxin positive, not serogrouped, and post-diarrheal HUS.

The 2014 and 2015 *E. coli* O157:H7/STEC/HUS cases ranged in age from 4 months to 86 years with a median of 10 years of age. Of the 56 cases of *E. coli* O157:H7/STEC/HUS that were reported to MSDH in 2014 and 2015, 52% occurred in children less than 10

years of age (Figure 16). Children and the elderly are at higher risk for the development of severe illness and HUS as a result of infection.

Figure 16



None of the 56 cases of *E. coli* O157:H7/STEC/HUS were associated with a national or in-state outbreak during 2014 or 2015.

Gonorrhea

2015 Case Total	**5,775**	**2015 rate/100,000**	**193.0**
2014 Case Total	**5,629**	**2014 rate/100,000**	**188.0**

Clinical Features

Gonnorhea is a sexually transmitted bacterial infection that primarily targets the urogenital tract leading to urethritis in males and cervicitis in females. Other less common sites of infection include the pharynx, rectum, conjunctiva, and blood. Urethritis presents with mucopurulent discharge and dysuria, while cervicitis often presents with vaginal discharge and postcoital bleeding. Asymptomatic infections do occur.

Complications associated with gonorrhea infection in males include epididymitis, penile lymphangitis, penile edema, and urethral strictures. The primary complication associated with gonorrhea infection in females is pelvic inflammatory disease, which produces symptoms of lower abdominal pain, cervical discharge, and cervical motion

pain. Pregnant women infected with gonorrhea may transmit the infection to their infants during a vaginal delivery. Infected infants can develop conjunctivitis leading to blindness if not rapidly and adequately treated. Septicemia can also occur in infected infants.

Infectious Agent

Neisseria gonorrhoeae, an intracellular gram-negative diplococcus.

Reservoir

Humans.

Transmission

Gonorrhea is transmitted primarily by sexual contact, but transmission to an infant delivered through an infected cervical canal also occurs.

Incubation

In males the incubation period is primarily 2-5 days, but may be 10 days or longer. In females it is more unpredictable, but most develop symptoms less than 10 days after exposure.

Period of Communicability

In untreated individuals, communicability can last for months; but if an effective treatment is provided communicability ends within hours.

Methods of Control

Prevention and control of gonorrhea are based on education, effective treatment, and mechanical barriers. Condoms and diaphragms provide some degree of protection from transmission or acquisition of gonorrhea. Effective treatment of the infected patient and their partners from 60 days prior to the onset of symptoms is recommended.

Reporting Classification

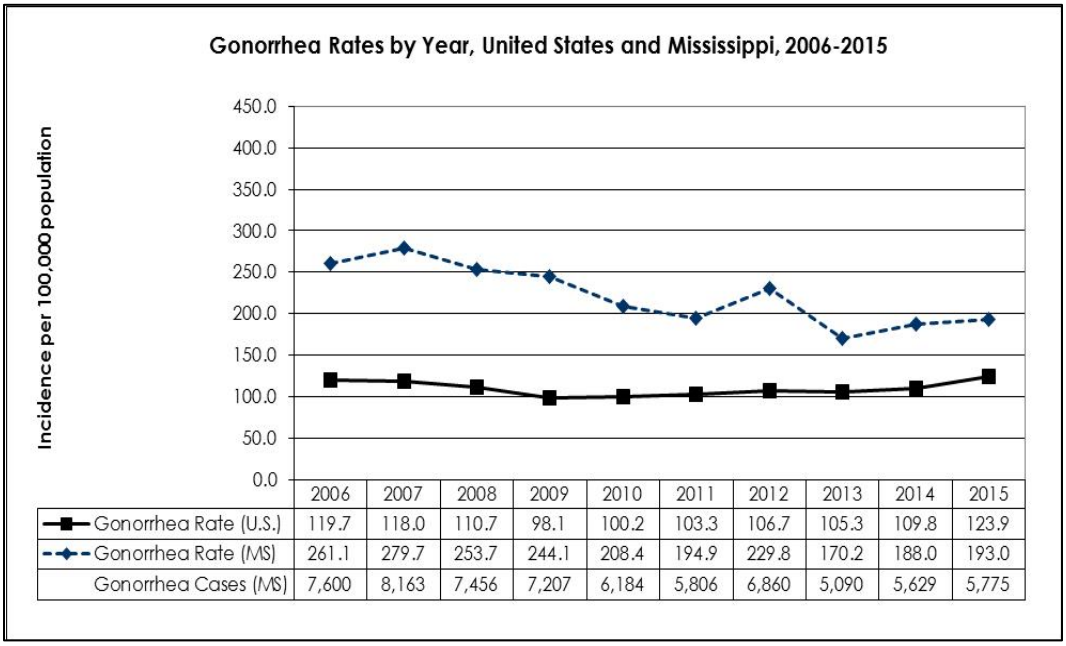
Class 2.

Epidemiology and Trends

Gonorrhea is the second most commonly reported notifiable disease in the United States. From 2007 through 2011, there was a steady decline in the rate and number of cases of gonorrhea in Mississippi. The number of cases during that time period decreased 29%. From 2011 to 2012, reported cases of gonorrhea increased 18%; however in 2013, reported cases decreased 26% to 5,090 cases. Since then, reported cases have increased 3 % (from 5,629 in 2014 to 5,775 in 2015) (Figure 17). In 2014 and

2015, the rate of gonorrhea cases was 188.0 and 193.0, respectively. In 2015, Mississippi had the third highest case rate of gonorrhea in the United States.

Figure 17



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gonorrhea Rate (U.S.)	119.7	118.0	110.7	98.1	100.2	103.3	106.7	105.3	109.8	123.9
Gonorrhea Rate (MS)	261.1	279.7	253.7	244.1	208.4	194.9	229.8	170.2	188.0	193.0
Gonorrhea Cases (MS)	7,600	8,163	7,456	7,207	6,184	5,806	6,860	5,090	5,629	5,775

In 2014 and 2015, gonorrhea was reported in every public health district, with the highest incidence noted in Public Health District III (Figure 18 and Figure 19).

Figure 18

Gonorrhea Incidence by Public Health District, Mississippi, 2014

District	Cases	Rate*
I	378	116.2
II	395	106.9
III	561	268.9
IV	445	181.4
V	1,666	260.0
VI	509	210.4
VII	302	176.4
VIII	679	219.8
IX	694	143.8
Statewide	**5,629**	**188.0**

*per 100,000 population

Figure 19

Gonorrhea Incidence by Public Health District, Mississippi, 2015

District	Cases	Rate*
I	520	159.1
II	397	107.3
III	625	303.5
IV	471	192.3
V	1,498	233.6
VI	428	178.8
VII	313	184.0
VIII	777	252.3
IX	746	153.5
Statewide	**5,775**	**193.0**

*per 100,000 population

Although the disease impacted individuals across all age groups, more than two-thirds (68% in 2014 and 67% in 2015) of reported cases were among 15-24 year olds (Figure 20). From 2006 through 2015, the number of reported cases among whites has remained stable, but has decreased 28% (from 5,850 to 4,202) among African Americans. In 2014 and 2015, African Americans accounted for 88% and 86% of the reported cases in which race was known (Figure 21). The rate of gonorrhea infections for African Americans was nearly twelve times the rate of whites in 2014 (367.4 versus 31.0 per 100,000) and nearly eleven times the rate of whites in 2015 (375.5 versus 34.4 per 100,000).

Figure 20

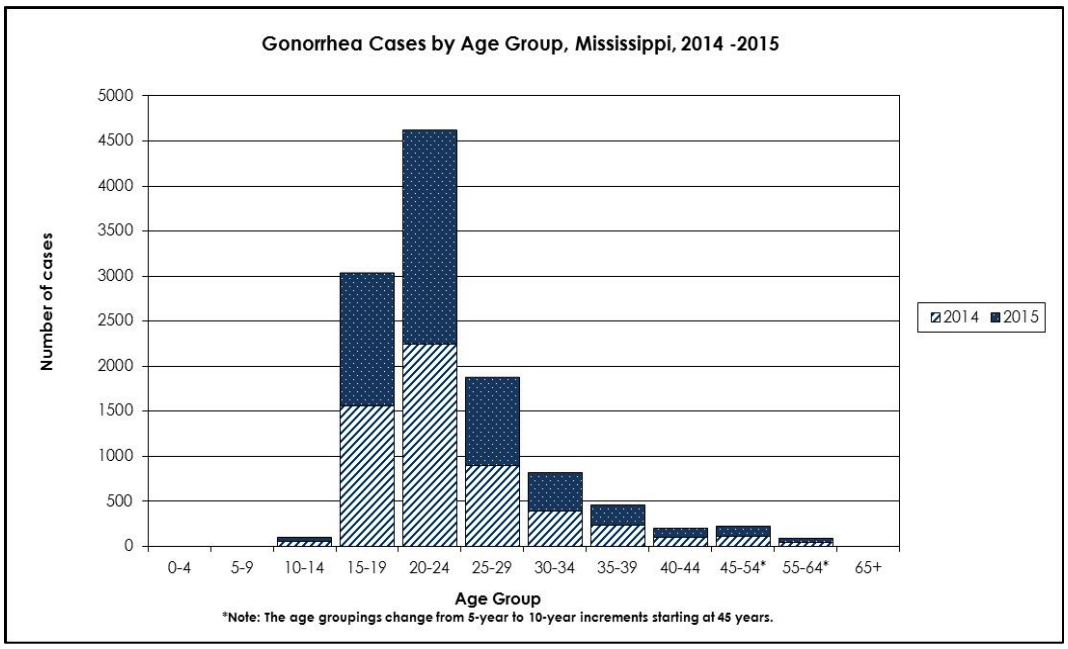
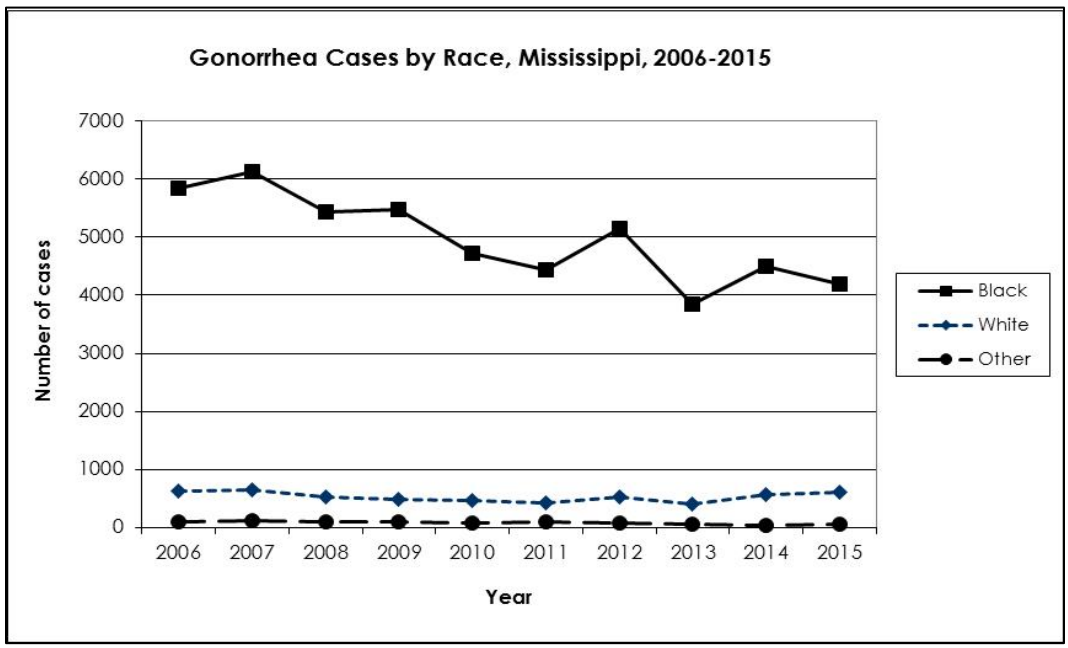


Figure 21



Haemophilus influenzae, invasive disease

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**1**	**2014 rate/100,000**	**0.0**

Clinical Features

Haemophilus influenzae (H. influenzae) is an invasive bacterial disease, particularly among infants, that can affect many organ systems. There are six identifiable types of *H. influenzae* bacteria (a through f). Type b (Hib) is the most pathogenic and is responsible for the majority of invasive infections. Meningitis is the most common manifestation of invasive disease. Epiglottitis, pneumonia, septic arthritis, and septicemia are other forms of invasive disease. Hib meningitis presents with fever, decreased mental status and nuchal rigidity. Neurologic sequelae can occur in 15-30% of survivors, with hearing impairment as the most common. Case fatality rate is 2-5% even with antimicrobial therapy. Peak incidence is usually in infants 6-12 months of age; Hib disease rarely occurs beyond 5 years of age. In the prevaccine era, meningitis accounted for 50-60% of all cases of invasive disease. Since the late 1980's, with the licensure of Hib conjugate vaccines, Hib meningitis has essentially disappeared in the U.S.

Infectious Agent

Haemophilus influenzae (H. influenzae), a gram-negative encapsulated bacterium. Serotypes include a through f.

Reservoir

Humans, asymptomatic carriers.

Transmission

Respiratory droplets and contact with nasopharyngeal secretions during the infectious period.

Incubation

Uncertain; probably short, 2-4 days.

Period of Communicability

As long as organisms are present; up to 24-48 hours after starting antimicrobial therapy.

Methods of Control

Two Hib conjugate vaccines are licensed for routine childhood vaccination. The number of doses in the primary series is dependent on the type of vaccine used. A primary series of PRP-OMP (PedvaxHIB®) vaccine is two total doses, at 2 and 4 months of age; the primary series with PRP-T (ActHIB®) requires three total doses, given at 2, 4 and 6 months of age. A booster dose at 12-15 months of age is recommended

regardless of which vaccine is used for the primary series. Vaccination with Hib containing vaccines may decrease the carriage rate, decreasing the chances of infection in unvaccinated in children. Immunization is not recommended for children over 5 years of age.

The Mississippi State Department of Health (MSDH) investigates all reports of suspected or confirmed invasive disease due to *H. influenzae* to determine serotype and the need for prophylactic antibiotics for contacts. For Hib cases MSDH provides prophylactic antibiotics (rifampin) for all household contacts with one or more children under one year of age or in households with children 1-3 years old who are inadequately immunized. Although the protection of contacts is only recommended after exposure to cases of Hib disease, contacts are often treated before the isolate's serotype is known in order to facilitate rapid provision of post-exposure prophylaxis . MSDH requests that all *H. influenzae* isolates be sent to the Public Health Laboratory (PHL) for serotyping.

Reporting Classification

Class 1A: *Haemophilus influenzae*, invasive disease.

Epidemiology and Trends

Prior to the development and widespread use of Hib conjugate vaccines in the late 1980's and early 1990's, Hib was the most common cause of bacterial meningitis in children < 5 years of age. In Mississippi, conjugate vaccine was first offered to 18 month olds in 1989, to 15 month olds in 1990, and as a primary series, starting at 2 months of age, with a 12-15 month booster, in January 1991. With the institution of vaccination, the number of reported cases of invasive disease due to Hib dropped from 82 in 1989, to 5 by 1994. There have been fewer than 5 cases of Hib per year since 1995.

Only one case of Hib invasive disease was reported in 2014 in an 85 year old female with septicemia. No Hib cases were reported in 2015.

An additional 76 cases of non-type b invasive infections were reported in 2014 and 2015, with a total of 6 deaths over the two year period. Five of the six deaths occurred in individuals over the age of 60, and one death was in a 20 year old female.

Of the overall cases (both Hib, and non-type b), 73 presented as septicemia (95%), three presented as other invasive infections (4%), and one presented as meningitis (1%). Ages ranged from newborn to 94 years, with a median of 69 years. The invasive *H. influenzae* cases were identified as being type b (1%), not type b (92%), and unknown (6%).

Return to Table of Contents

Hepatitis A

2015 Case Total	**1**	**2015 rate/100,000**	**0.0**
2014 Case Total	**3**	**2014 rate/100,000**	**0.1**

Clinical Features

Hepatitis A is a viral illness with an abrupt onset of fever, malaise, anorexia, nausea, vomiting, and abdominal pain, followed by jaundice in a few days. The disease varies in intensity from a mild illness of 1-2 weeks, to a severe disease lasting several months. Most cases among children are asymptomatic and the severity of illness increases with age; the case fatality rate is low—0.1%-0.3%. No chronic infection occurs.

Infectious Agent

Hepatitis A virus (HAV), an RNA virus.

Reservoir

Humans, rarely chimpanzees and other primates.

Transmission

Transmission occurs through the fecal-oral route either by person to person contact or ingestion of contaminated food or water. Common source outbreaks may be related to infected food handlers. Many younger children are asymptomatic, but shed virus and are often sources of additional cases.

Incubation

Average 28-30 days, (range 15-50 days).

Period of Communicability

Infected persons are most likely to transmit HAV 1-2 weeks before the onset of symptoms and in the first few days after the onset of jaundice, when viral shedding in the stool is at its highest. The risk of transmission then decreases and becomes minimal after the first week of jaundice.

Methods of Control

In the prevaccine era, hygienic measures and post-exposure immune globulin were the primary means of preventing infection. Vaccine was first introduced in 1995, and following successful vaccination programs in high incidence areas, the Advisory Committee on Immunization Practices (ACIP) recommended routine vaccination for all children in 2005. Children aged 12-23 months of age should receive one dose of

hepatitis A vaccine followed by a booster 6-18 months later, with catch up vaccination for children not vaccinated by 2 years of age.

Post-exposure prophylaxis is recommended within two weeks of exposure for all susceptible individuals who are close personal contacts to the case or who attend daycare with infected individuals, or are exposed to hepatitis A virus through common source outbreaks. Hepatitis A vaccine (with completion of the series) is recommended for post-exposure prophylaxis for all healthy persons aged 12 months to 40 years. Immune globulin should be considered for children less than 12 months of age, adults over 40 years of age, and those in whom vaccination is contraindicated. Use of both simultaneously can be considered with higher risk exposures. Post-exposure prophylaxis is not generally indicated for healthcare workers who care for patients infected with hepatitis A unless epidemiological investigation indicates ongoing transmission in the facility.

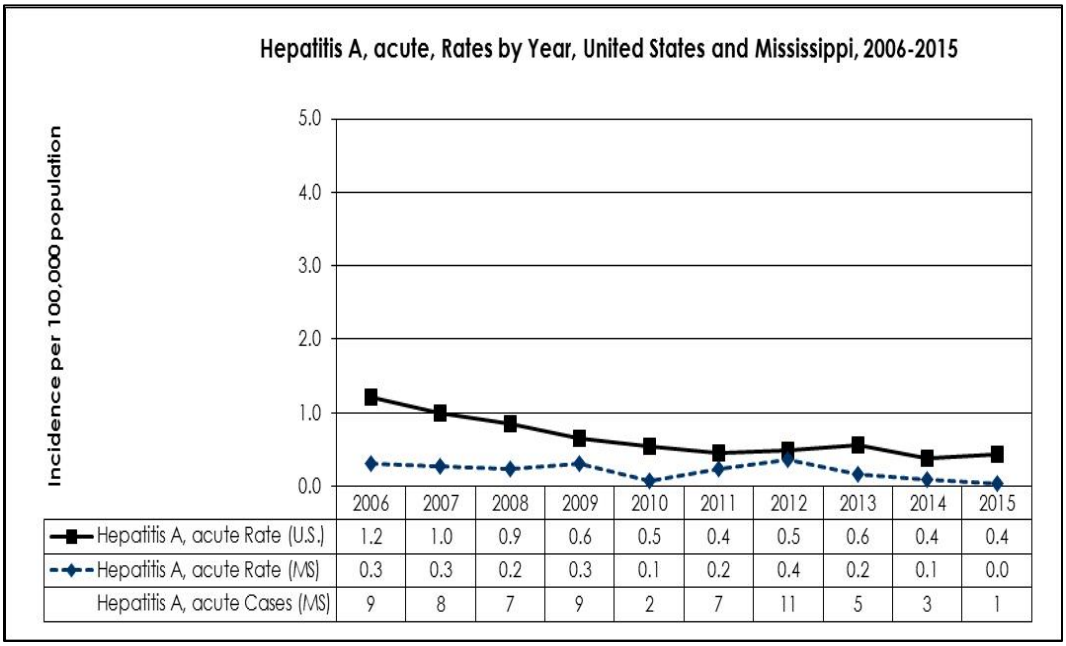
Reporting Classification

Class 1A.

Epidemiology and Trends

The rate of hepatitis A in Mississippi has been below the national rate for more than a decade. During 2014 and 2015 there were only four cases of acute hepatitis A reported in Mississippi; less than both the five cases reported in 2013 and the three year (2011-2013) average of seven annual cases (Figure 22). No common source exposures or outbreaks of hepatitis A were reported between 2014 and 2015.

Figure 22



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Hepatitis A, acute Rate (U.S.)	1.2	1.0	0.9	0.6	0.5	0.4	0.5	0.6	0.4	0.4
Hepatitis A, acute Rate (MS)	0.3	0.3	0.2	0.3	0.1	0.2	0.4	0.2	0.1	0.0
Hepatitis A, acute Cases (MS)	9	8	7	9	2	7	11	5	3	1

Return to Table of Contents

Hepatitis B, acute

2015 Case Total	**50**	**2015 rate/100,000**	**1.7**
2014 Case Total	**47**	**2014 rate/100,000**	**1.6**

Clinical Features

An acute viral illness characterized by the insidious onset of anorexia, abdominal discomfort, nausea and vomiting. Clinical illness is often unrecognized because jaundice occurs in only 30-50% of adults and less than 10% of children. Approximately 5% of all acute cases progress to chronic infection. Ninety percent of all perinatally infected infants become chronic carriers. Chronic cases may have no evidence of liver disease, or may develop clinical illness ranging from chronic hepatitis, to cirrhosis, liver failure or liver cancer. Hepatitis B infections are the cause of up to 80% of hepatocellular carcinomas worldwide.

Infectious Agent

Hepatitis B virus, a hepadnavirus.

Reservoir

Humans.

Transmission

Transmission occurs through parenteral or mucosal exposure to body fluids of hepatitis B surface antigen (HBsAg) positive persons, such as through perinatal exposure, contact with contaminated needles, or sexual contact. Blood and blood products, saliva, semen, and vaginal secretions are known to be infectious. The three main groups at risk for hepatitis B infection are heterosexuals with infected or multiple partners, injection-drug users, and men who have sex with men.

Incubation

45-180 days, average 60-90 days.

Period of Communicability

As long as HBsAg is present in blood. In acute infections, surface Ag can be present 1-2 months after the onset of symptoms.

Methods of Control

Routine hepatitis B vaccination series is recommended for all children beginning at birth, with catch-up at 11-12 years of age if not previously vaccinated. The usual three dose schedule is 0, 1-2, and 6-18 months. Vaccination is also recommended for high

risk groups, including those with occupational exposure, household and sexual contacts of HBsAg positive individuals (both acute and chronic infections), and injection drug users.

Transmission of hepatitis B can be interrupted by identification of susceptible contacts and HBsAg positive pregnancies, and the timely use of post-exposure prophylaxis with vaccine and/or immune globulin.

Perinatal transmission is very efficient in the absence of post-exposure prophylaxis, with an infection rate of 70-90% if the mother is both HBsAg and hepatitis B *e* antigen (HB*e*Ag) positive. The risk of perinatal transmission is about 10% if the mother is only HBsAg positive. Post-exposure prophylaxis, consisting of hepatitis B immune globulin and vaccine, is highly effective in preventing hepatitis B vertical transmission, therefore, testing of all pregnant women for HBsAg is recommended with each pregnancy. MSDH, through the Perinatal Hepatitis B Program, tracks HBsAg positive pregnant women, provides prenatal HBsAg testing information to the delivery hospitals when available, and monitors infants born to infected mothers to confirm completion of the vaccine series by 6 months of age, with testing for post-vaccine response and for possible seroconversion at 9-12 months of age. As an addition to the existing reporting requirement of acute hepatitis B infection, in 2011 hepatitis B infection in pregnancy was added to the list of reportable diseases. This addition was made to facilitate identification of hepatitis B infected women and ensure the provision of appropriate vaccination for the affected infant.

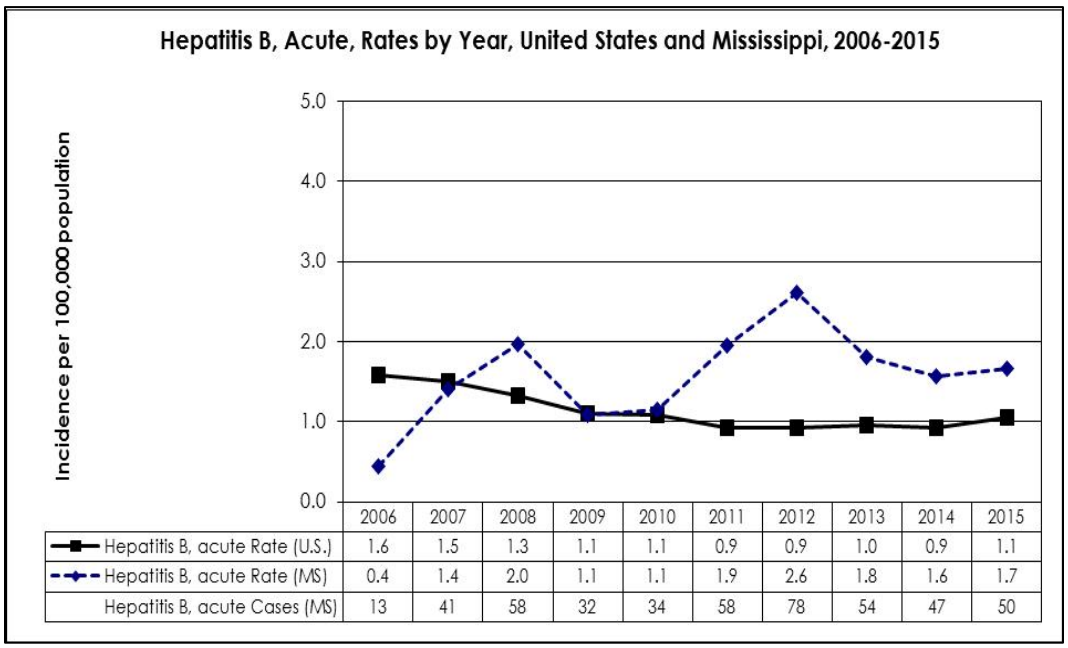
Reporting Classification

Class 2; any acute hepatitis B infection and any hepatitis B infection in pregnancy

Epidemiology and Trends

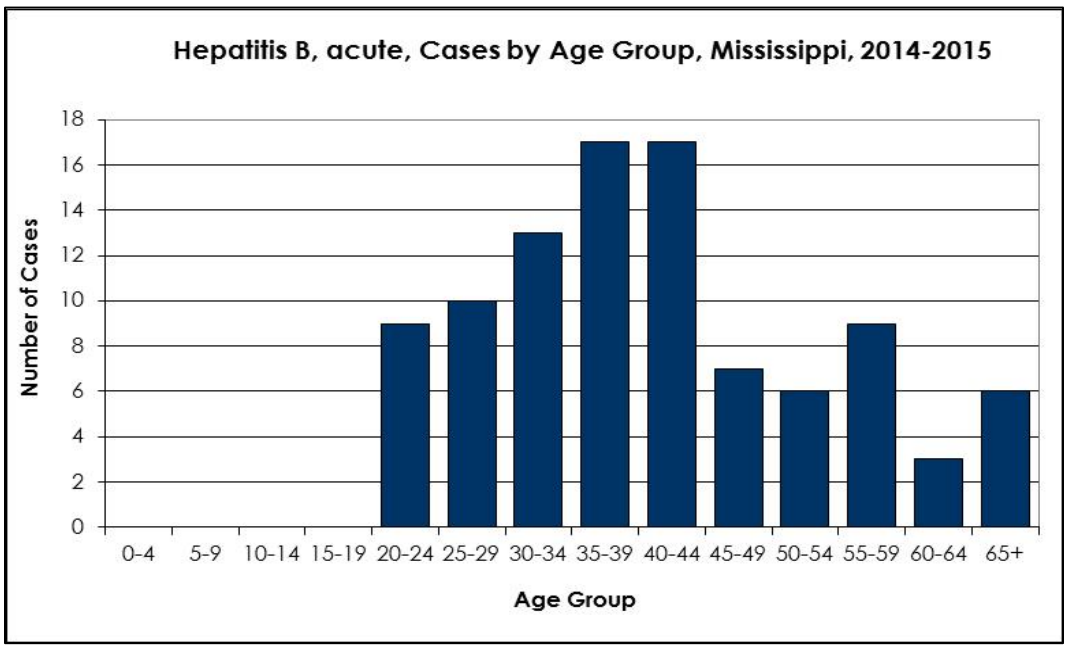
During 2014 and 2015, 97 cases of acute hepatitis B were reported to MSDH, with 47 reported cases in 2014 and 50 reported cases in 2015 (Figure 23). Both the 2014 and 2015 reported case counts were lower than the previous three year averages (63 and 60, respectively), but were comparable to the number of cases reported in 2013 (54). Fifty-seven (59%) of the 97 reported cases occurred in individuals aged 25-44 years (Figure 24). Overall, the cases ranged in age from 20 years to 80 years old, with a median age of 39 years.

Figure 23



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Hepatitis B, acute Rate (U.S.)	1.6	1.5	1.3	1.1	1.1	0.9	0.9	1.0	0.9	1.1
Hepatitis B, acute Rate (MS)	0.4	1.4	2.0	1.1	1.1	1.9	2.6	1.8	1.6	1.7
Hepatitis B, acute Cases (MS)	13	41	58	32	34	58	78	54	47	50

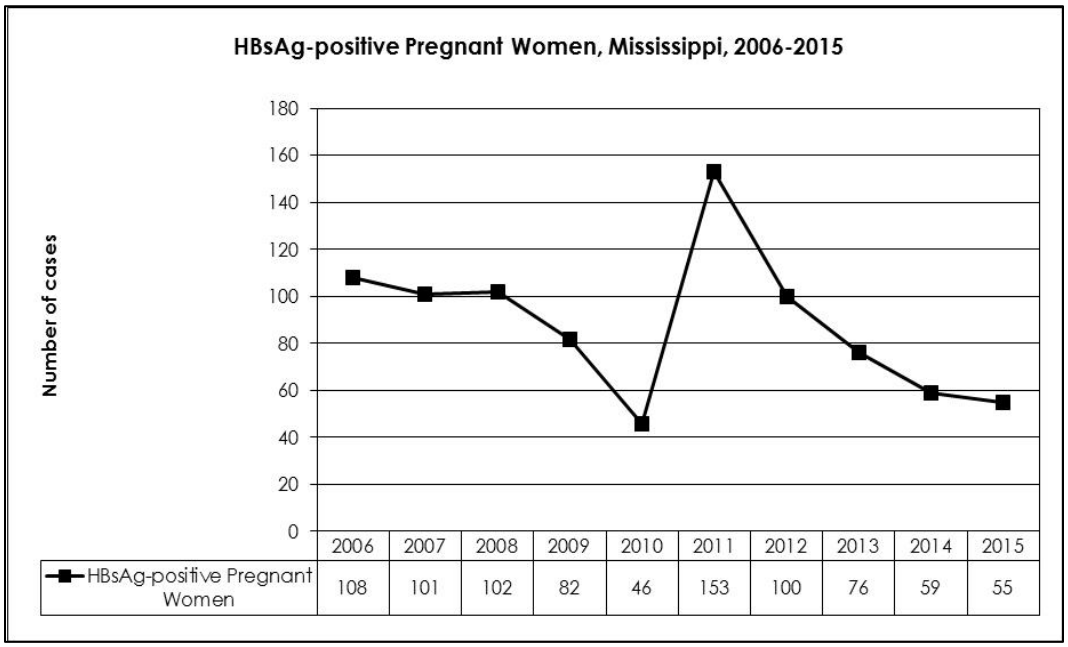
Figure 24



A comprehensive strategy to eliminate hepatitis B virus transmission was recommended in 1991. The strategy includes prenatal testing of pregnant women for Hepatitis B surface antigen (HBsAg) to identify newborns that require immunoprophylaxis, identification of household contacts who should be vaccinated, the routine vaccination of infants, the vaccination of adolescents, and the vaccination of adults at high risk for infection.

In 2014 and 2015, 114 HBsAg positive pregnant women were reported to the Perinatal Hepatitis B Prevention Program (Figure 25). The number of cases reported in both 2014 (59) and 2015 (55) was below both the number of cases reported in 2013 (76) and the three year average (2011 – 2013) of 110. There were no reported cases of HBsAg positive infants born to HBsAg positive mothers in either 2014 or 2015. The last cases of perinatal transmission occurred in 2007, when two cases were reported.

Figure 25



HIV Disease

2015 Case Total	**511**	**2015 rate/100,000**	**17.1**
2014 Case Total	**487**	**2014 rate/100,000**	**16.3**

Clinical Features

The clinical spectrum of human immunodeficiency virus (HIV) infection varies from asymptomatic infections to advanced immunodeficiency with opportunistic complications. One half to two thirds of recently infected individuals have manifestations of an infectious mononucleosis-like syndrome in the acute stage. Fever, sweats, malaise, myalgia, anorexia, nausea, diarrhea, and non-exudative pharyngitis are prominent symptoms in this stage. Constitutional symptoms of fatigue and wasting may occur in the early months or years before opportunistic disease is diagnosed. Over time, HIV can weaken the immune system, lowering the total CD4 count and leading to opportunistic infections and the diagnosis of Acquired Immunodeficiency syndrome (AIDS).

Infectious Agent

Human immunodeficiency virus is a retrovirus with two known types, HIV-1 and HIV-2. These two types are serologically distinct and have a different geographical distribution, with HIV-1 primarily responsible for the global pandemic and the more pathogenic of the two.

Reservoir

Humans.

Transmission

HIV infection can be transmitted from person to person during sexual contact, by blood product transfusion, sharing contaminated needles or infected tissue or organ transplant. Breast feeding is also a known vehicle of mother to infant transmission of HIV. Without appropriate prenatal treatment, 15-30% of infants born to HIV positive mothers are infected through maternal fetal transmission. Transmission by contact with body secretions like urine, saliva, tears or bronchial secretions has not been recorded.

Incubation

The time from infection to the detection of antibodies to HIV is usually less than one month. The period from the time of infection to the development of AIDS ranges from 1 year up to 15 years or longer. The availability of effective anti-HIV therapy has greatly reduced the development of AIDS in the U.S.

Period of Communicability

Individuals become infectious shortly after infection and remain infectious throughout the course of their lives, however, successful therapy with antiretroviral drugs can lower the viral load in blood, semen and vaginal secretions to undetectable levels, substantially decreasing the transmission probability of HIV.

Methods of Control

Abstinence is the only sure way to avoid sexual HIV transmission; otherwise mutual monogamy with partners known to be uninfected and the use of latex condoms are known to reduce the risk of infection. Confidential HIV testing and counseling and testing of contacts, prenatal prevention by counseling and testing all pregnant women, and early diagnosis and treatment with appropriate anti-retroviral therapy can reduce transmission. Post-exposure prophylaxis for health care workers exposed to blood or body fluids suspected to contain HIV is an important worksite preventive measure. In recent years, a number of biomedical interventions including male circumcision, pre-exposure, and post-exposure prophylaxis have proven to be effective in decreasing the rate of acquisition of HIV among high risk individuals. MSDH performs contact

investigation, counseling and testing for each reported case of HIV infection in addition to facilitating linkage to care of infected individuals.

Pre-exposure prophylaxis, or PrEP, is a prevention option for those individuals at high risk for HIV infection. Taken consistently, PrEP has been shown to substantially reduce the risk of infection, especially if combined with condoms and other prevention methods.

Reporting Classifications

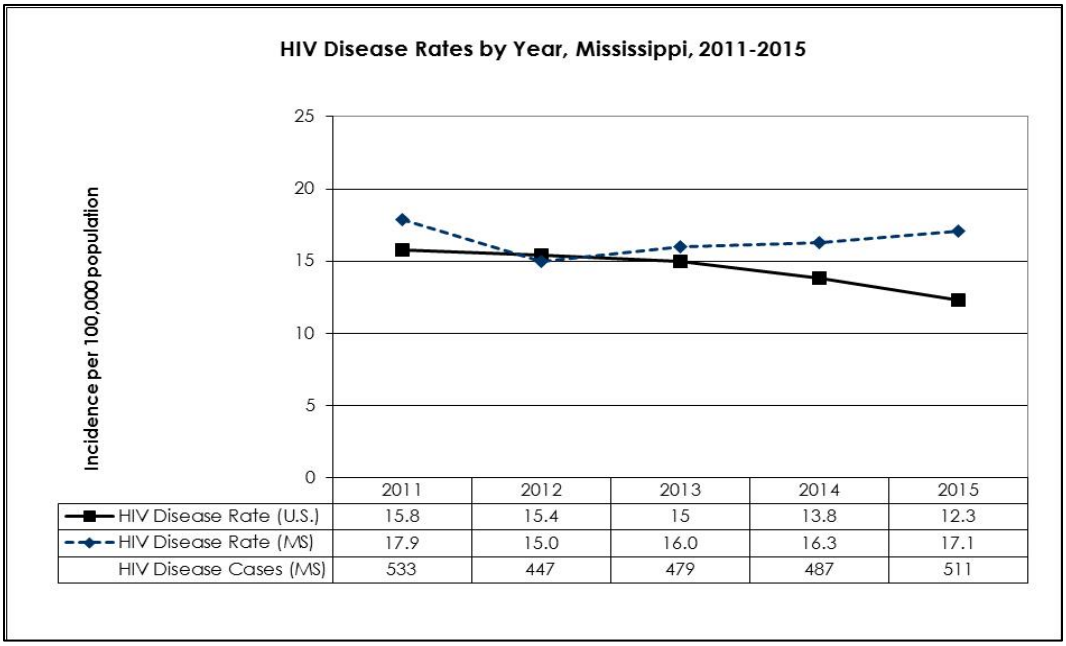
Class 1B; HIV infection-including AIDS

Class 3; CD4 count and HIV viral load.

Epidemiology and Trends

Both HIV infection and AIDS are reportable at the time of diagnosis, so many patients may be reported twice (once at first diagnosis of HIV infection, and again when developing an AIDS defining illness). The epidemiologic data that follows is regarding the initial report of HIV disease, whether first diagnosed as HIV infection or AIDS. Over the past few years, there has been a marked decrease in HIV disease trends in the United States; however, the diagnosis rates of HIV infection in the state of Mississippi have generally remained above national rates. Mississippi reported the 10th highest rate of new diagnoses of HIV infection in the US in 2014 and the 6th highest rate in 2015 (Figure 26).

Figure 26

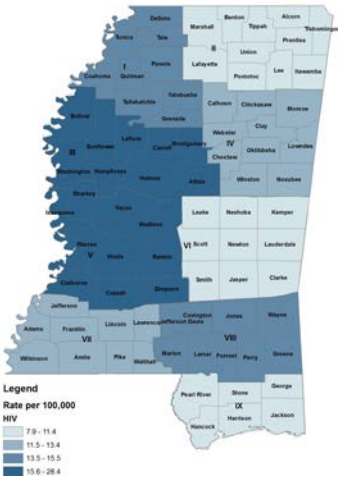


	2011	2012	2013	2014	2015
HIV Disease Rate (U.S.)	15.8	15.4	15	13.8	12.3
HIV Disease Rate (MS)	17.9	15.0	16.0	16.3	17.1
HIV Disease Cases (MS)	533	447	479	487	511

Individuals from every Public Health District were impacted by this disease. During 2014 and 2015, Public Health District V reported the highest case rate statewide, followed by District III (Figure 27 and Figure 28).

Figure 27

HIV Disease Incidence by Public Health District, Mississippi, 2014

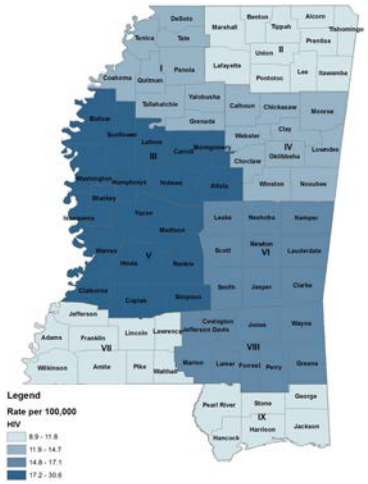


District	Cases	Rate*
I	48	14.8
II	37	10.0
III	45	21.6
IV	30	12.2
V	182	28.4
VI	19	7.9
VII	23	13.4
VIII	48	15.5
IX	55	11.4
Statewide	**487**	**16.3**

***per 100,000 population**

Figure 28

HIV Disease Incidence by Public Health District, Mississippi, 2015



District	Cases	Rate*
I	44	13.5
II	33	8.9
III	36	17.5
IV	36	14.7
V	196	30.6
VI	41	17.1
VII	20	11.8
VIII	48	15.6
IX	57	11.7
Statewide	**511**	**17.1**

***per 100,000 population**

HIV disease was reported among all age groups. The 20-29 year old age group had the highest number of new diagnoses in 2014 (n=210) and 2015 (n=227). In 2014 and 2015, 20-29 year olds accounted for approximately 44% of the new HIV cases reported, followed by 30 to 39 year olds who accounted for nearly 20% (Figure 29).

African Americans were disproportionately impacted by HIV disease. In 2014 and 2015, approximately 80% of new cases were among African Americans in which race was known (Figure 30).

Figure 29

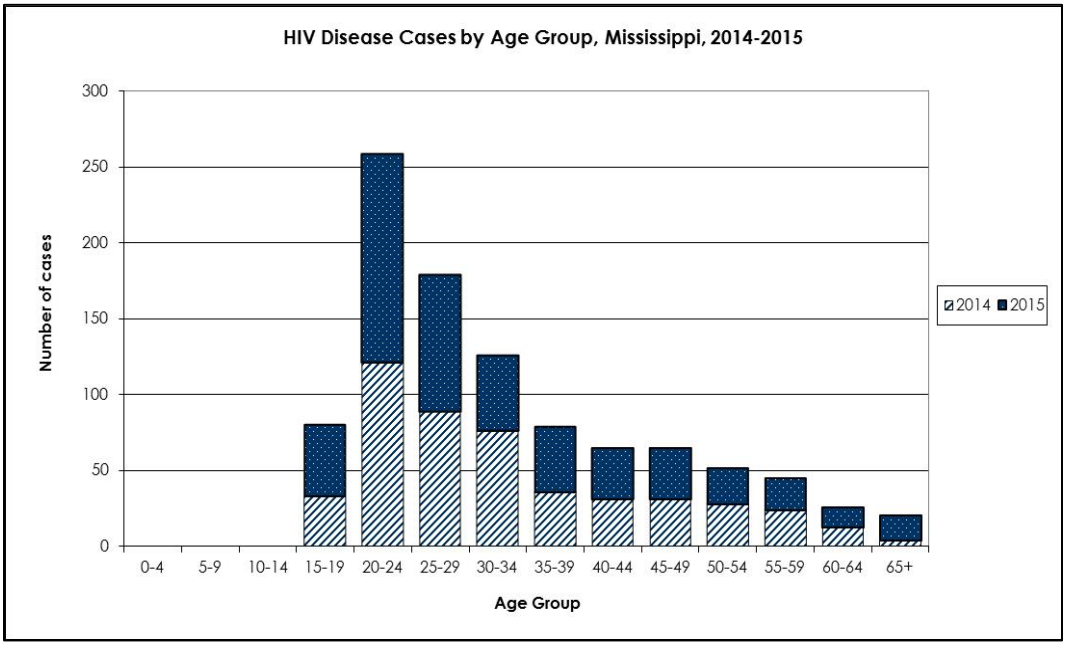
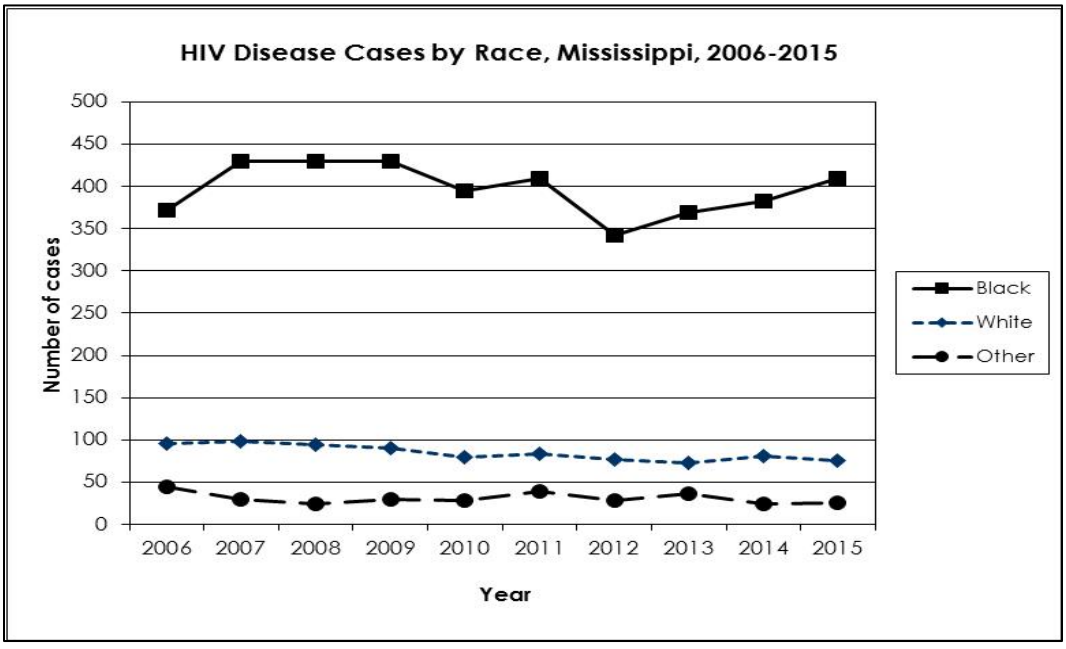


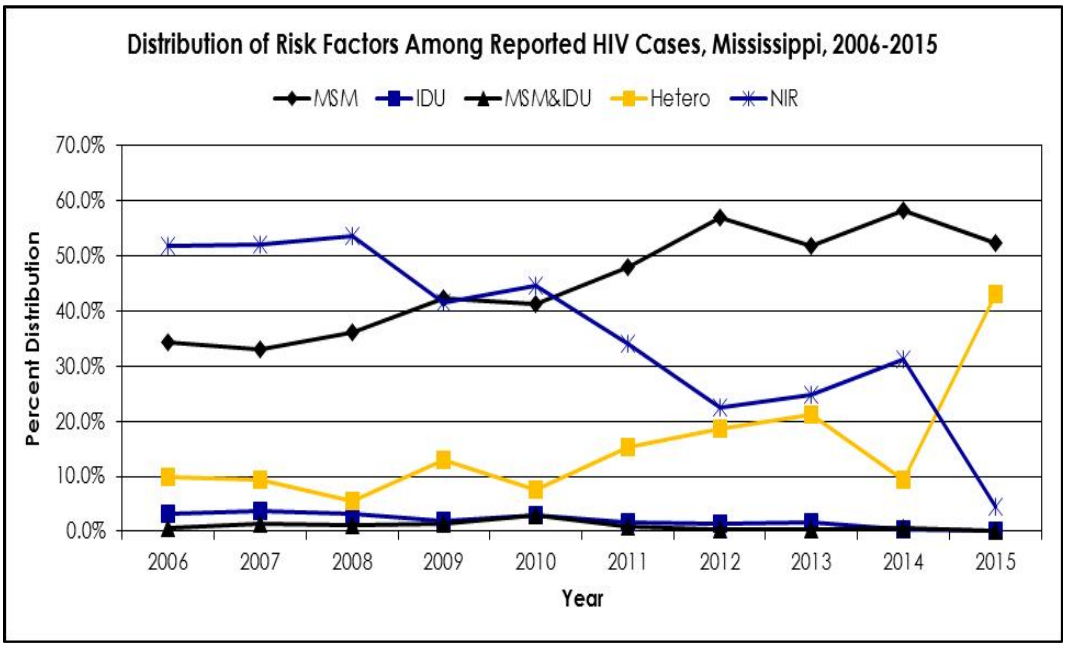
Figure 30



There are a number of identifiable risk factors associated with HIV infection, including male-to-male sexual contact (MSM), heterosexual contact (hetero), and injection drug

use (IDU). Cases in persons with no reported exposure to HIV through any routes listed in the hierarchy of transmission categories are classified as "no risk factor reported or identified" or NIR. For the last several years, the percentage of new HIV cases identified as MSM has been the highest of any other transmission category. While there was a decrease in the percentage of cases attributed to MSM from 2014 to 2015 (58% in 2014 to 52% in 2015), there was a drastic increase in the percentage of cases attributed to heterosexual contact (9% in 2014 to 43% in 2015) (Figure 31).

Figure 31



Additional References:

- Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services. Available at http://aidsinfo.nih.gov/contentfiles/lvguidelines/AdultandAdolescentGL.pdf.

- Centers for Disease Control and Prevention. Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents. MMWR 2009;58 (No. RR-4) April 10, 2009

- Centers for Disease Control and Prevention. Guidelines for the Prevention and Treatment of Opportunistic Infections Among HIV-Exposed and HIV-Infected Children. MMWR 2009; 58 (No. RR-11) September 4, 2009

- Centers for Disease Control and Prevention. HIV Surveillance Report, 2015; v Treatment of Opportunistic Infections Among HIV-Exposed and HIV-Infected Children. MMWR 2009; 58 (No. RR-11) September 4, 2009

- Centers for Disease Control and Prevention. *HIV Surveillance Report, 2015*; vol. 27. http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Published November 2016.

Influenza

Clinical Features

An acute viral infection of the respiratory tract characterized by sudden onset of fever, often with chills, headache, malaise, diffuse myalgia, and nonproductive cough. The highest risks for complications from seasonal influenza are in persons aged 65 years and older, young children, pregnant and postpartum women, and persons at any age with chronic underlying illnesses. Pneumonia due to secondary bacterial infections is the most common complication of influenza. Estimated influenza deaths range from a low of 3,000 to a high of 49,000 per year in the United States.

Infectious Agent

Influenza viruses are RNA viruses. Each season both influenza A and B virus strains circulate and cause illness but there is usually one predominant type or subtype of influenza virus that causes the majority of infections.

Reservoir

Humans are the reservoir for seasonal influenza. Wild aquatic birds, domestic poultry and domestic pigs can serve as reservoirs for emerging variant influenza strains.

Transmission

Transmission occurs person to person by direct or indirect contact with virus laden droplets or respiratory secretions. Transmission of variant strains is usually the result of direct contact with an infected animal, such as pigs or domestic poultry.

Incubation

The incubation period usually is 1 to 4 days, with a mean of 2 days.

Period of Communicability

From 1 day before up to 3-5 days after clinical onset in adults; and up to 7-10 days after clinical onset in young children.

Methods of Control

Routine annual influenza vaccination is recommended for all persons aged ≥6 months, and is the single most effective method for the prevention of infection. Additionally,

basic personal hygiene, including handwashing, and respiratory etiquette should be reinforced.

Antivirals can also be used to prevent and treat influenza. The neuraminidase inhibitors (oseltamivir and zanamivir) are effective against all forms of influenza. While sporadic resistance to oseltamivir has been identified in some influenza strains neuraminidase inhibitors are still recommended for the treatment of influenza A (H1N1) and A (H3N2) and influenza B virus infections. Treatment with antivirals within the first 48 hours of can be effective in reducing the duration of illness, and is recommended for individuals who are hospitalized or at higher risk of severe complications from influenza infections. Adamantanes (amantadine and rimantadine) are not effective against influenza B viruses and are not recommended for influenza A viruses due to high levels of resistance.

For the most current guidelines available at the date of this publication, please see the Centers for Disease Control and Prevention (CDC) Recommendations and Reports, "Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices—United States, 2017-2018". MMWR 66(No. RR-2):1-20; August 25, 2017, available online at http://dx.doi.org/10.15585/mmwr.rr6602a1.

For guidelines on the use of antivirals see the CDC website at: http://www.cdc.gov/flu/professionals/antivirals/antiviral-use-influenza.htm and the CDC report "Antiviral Agents for the Treatment and Chemoprophylaxis of Influenza" available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6001a1.htm.

Reporting Classification

Class 1A: Influenza-associated pediatric deaths (<18 years of age).

Epidemiology and Trends

A typical influenza season usually peaks anywhere from December through March but influenza activity can occur earlier or later. The risk of complications depends on many factors, including age and underlying medical conditions. Vaccination status and the match of vaccine to circulating viruses affect both the susceptibility to infection and the possibility of complications. Outbreaks can occur in group settings, such as nursing homes.

MSDH monitors seasonal influenza activity statewide through a syndromic surveillance program reported by sentinel providers. In the 2014 – 2015 influenza season, 56 sentinel providers in 43 counties were enrolled in this system. This was comparable to the number of providers enrolled during the 2015 – 2016 influenza season (54) and the number of counties represented (42). The sentinel providers included hospital

emergency departments, urgent care and primary care clinics, and college and university student health centers. Each season, enrolled providers report weekly numbers of non-trauma patient visits consistent with an influenza-like illness (ILI), defined as fever $\geq$100ºF and cough and/or sore throat in the absence of a known cause other than influenza. MSDH uses this information to estimate the magnitude of the state's weekly influenza activity. These data are also used to estimate the geographic spread of influenza within the state, ranging from no activity to widespread activity. This terminology represents a geographic estimate rather than an indication of severity of the season. ILI providers are also supplied with kits for PCR influenza testing at the Public Health Laboratory (PHL).

2014 – 2015 Season

Influenza activity began increasing nationally in November and peaked in late December 2014. Influenza A (H3N2) was the predominant virus in the US, although influenza B activity increased later in the influenza season. The 2014 – 2015 season was moderately severe, with overall high levels of outpatient illness, high levels of hospitalization and a relatively high percentage of deaths attributed to pneumonia and influenza. Hospitalization data from CDC indicated people 65 years and older were more severely impacted by the 2014 – 2015 season, relative to other age groups and relative to previous seasons.

In Mississippi, influenza activity also peaked in late December 2014 at 11.0%. The 2014 – 2015 season followed the same seasonal pattern as the 2012 – 2013 influenza season (Figure 32). Both seasons were predominated by the influenza A (H3N2) virus early in the season, followed by influenza B isolates identified later in the season. Influenza A (2009 H1N1) was also identified throughout the season (Figure 33). There was one influenza-associated pediatric death reported in Mississippi during the 2014 – 2015 season. This death was associated with an influenza B virus and occurred in an unvaccinated 16 year old with no known underlying health conditions.

Figure 32

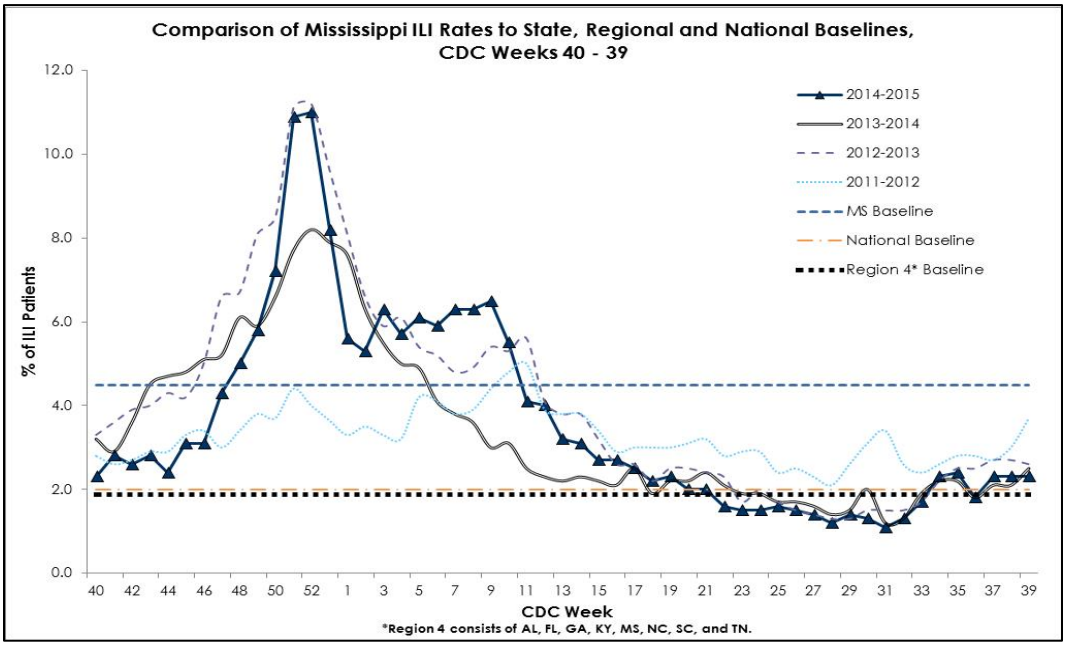
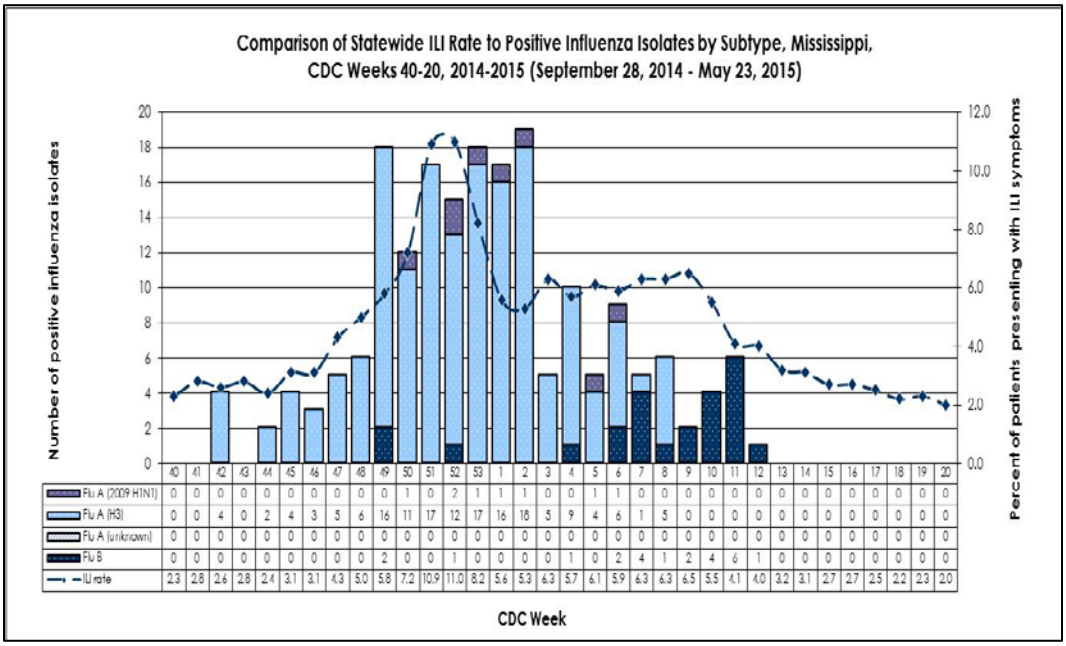


Figure 33



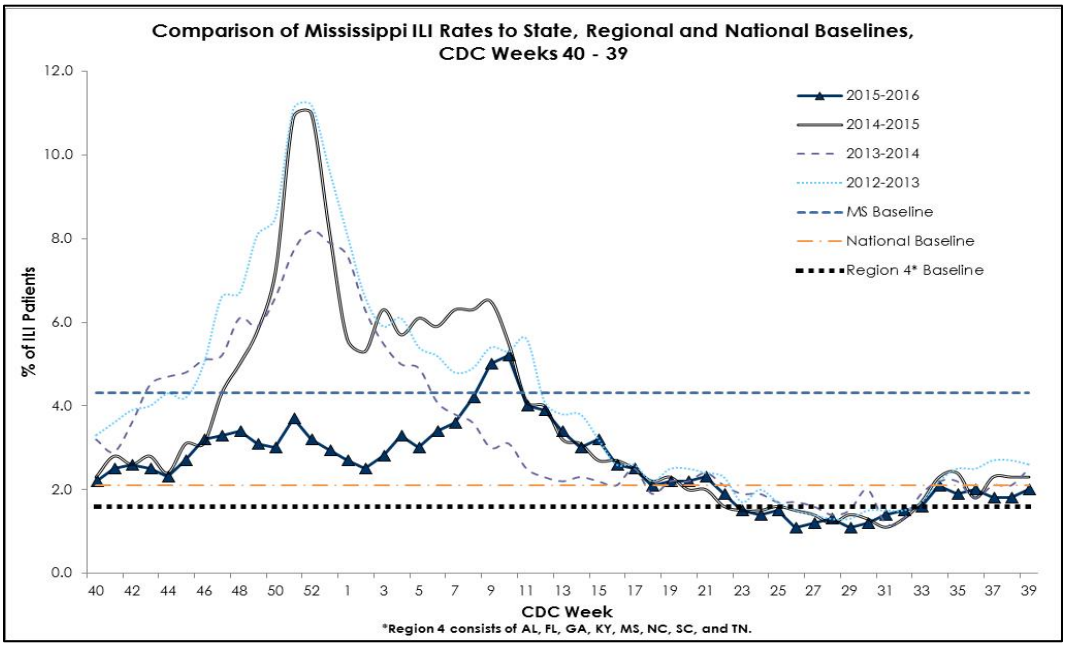
2015 – 2016 Season

Influenza activity peaked in mid-March 2016 in the U.S. This is one of only three seasons (2015 – 2016, 2011 – 2012 and 2005 – 2006) to have peaked this late when reviewing the past 18 seasons. No season has peaked later than March. Influenza A (2009 H1N1) was the predominant virus in the US, although influenza A (H3N2) predominated early in the

season. Overall the 2015 – 2016 season was milder than the previous three seasons, even though there were reports of severe flu illnesses and deaths.

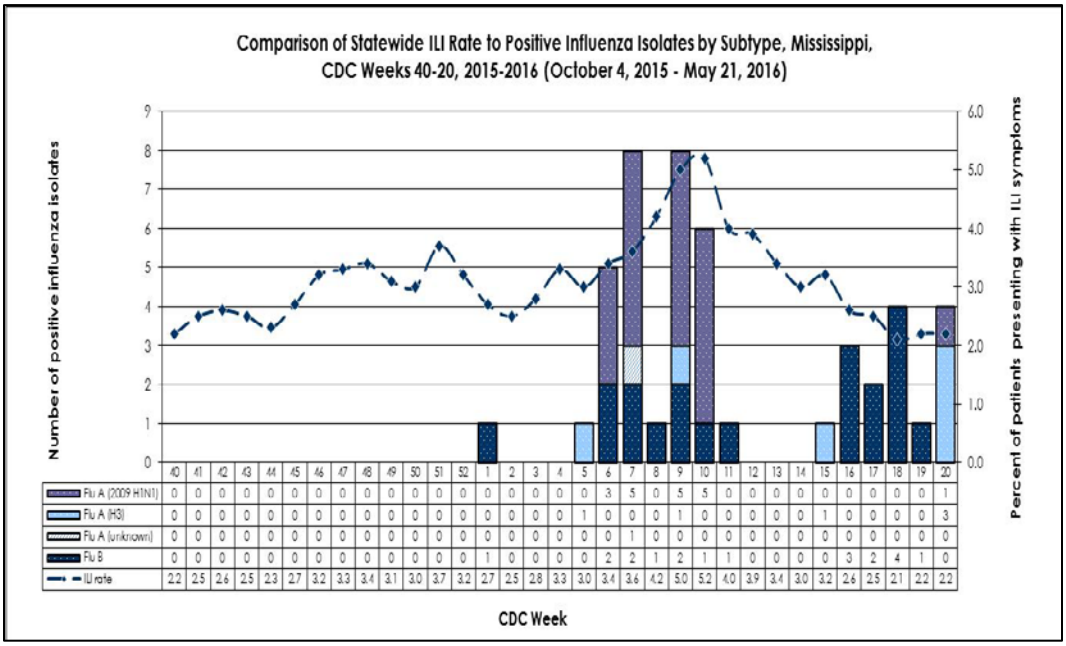
In Mississippi, influenza activity also peaked in mid-March 2016 at 5.2%, and was only above the state baseline for two weeks during the entire 2015 – 2016 season (Figure 34). Unlike the national trend, both influenza A (2009 H1N1) and influenza B were the predominant viruses in Mississippi. Influenza A (2009 H1N1) predominated during the middle of the season, while influenza B predominated at the end of the season (Figure 35). There was one influenza-associated pediatric death reported in Mississippi during the 2015 – 2016 season. This death was associated with an influenza B virus and occurred in an unvaccinated 13 year old with no known underlying health conditions.

Figure 34



Return to Table of Contents

Figure 35



Legionellosis

2015 Case Total	**39**	**2015 rate/100,000**	**1.3**
2014 Case Total	**32**	**2014 rate/100,000**	**1.1**

Clinical Features

Legionellosis is an acute bacterial infection that has two clinical syndromes; Legionnaires' disease and Pontiac fever. Both syndromes can present with fever, headache, diarrhea and generalized myalgias. Those with Legionnaires' disease develop a non-productive cough and pneumonia that can be severe and progress to respiratory failure. Even with improved diagnosis and treatment, the case fatality rate for Legionnaires' disease remains at approximately 15%. Pontiac fever is a self-limited febrile illness that does not progress to pneumonia or death.

Infectious Agent

Legionella pneumophila (L. pneumophila), a gram negative bacillus with 18 serogroups. *L. pneumophila* serogroup 1 is the most common serogroup associated with illness.

Reservoir

Legionellosis is a waterborne disease. The best conditions for growth of the bacteria are warm water temperatures, stagnation, sediment and low levels of biocide.

Transmission

Airborne transmission occurs when water sources contaminated with *L. pneumophila* are aerosolized. Common sources of outbreaks are potable water systems, whirlpools/spas and cooling towers.

Incubation

Legionnaires' disease — 2-10 days, most commonly 5-6 days.
Pontiac Fever — 5-72 hours, most commonly 24-48 hours.

Period of Communicability

Legionellosis is not transmitted person to person.

Reporting Classification

Class 1B.

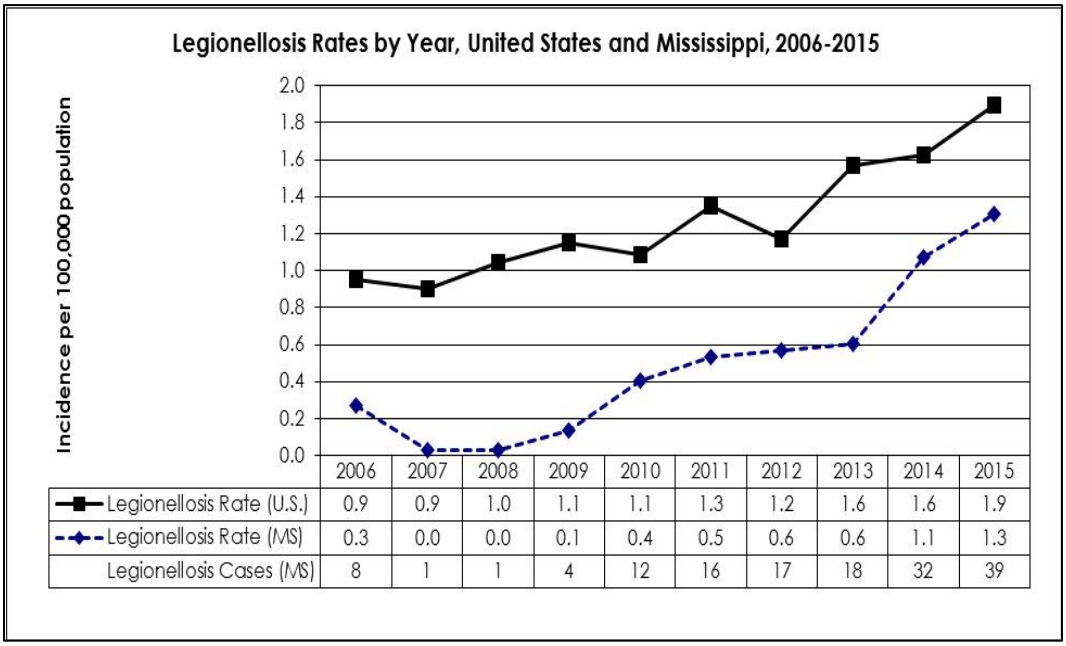
Epidemiology and Trends

There were 71 cases of legionellosis reported in Mississippi during 2014 and 2015 (32 in 2014 and 39 in 2015). This represents an increase in annually reported cases when compared with the three year average (2011-2013) of 17 cases per year (Figure 36). The 2014 and 2015 cases ranged in age from 28 to 102 years, with a median age of 57 years.

There were two deaths reported during 2014 and 2015. The death in 2014 occurred in a 48 year old male, and the 2015 death occurred in an 85 year old female. None of the 2014 and 2015 cases were epidemiologically linked and no outbreaks were reported during these years.

Return to Table of Contents

Figure 36



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Legionellosis Rate (U.S.)	0.9	0.9	1.0	1.1	1.1	1.3	1.2	1.6	1.6	1.9
Legionellosis Rate (MS)	0.3	0.0	0.0	0.1	0.4	0.5	0.6	0.6	1.1	1.3
Legionellosis Cases (MS)	8	1	1	4	12	16	17	18	32	39

Listeriosis

2015 Case Total	**6**	**2015 rate/100,000**	**0.2**
2014 Case Total	**6**	**2014 rate/100,000**	**0.2**

Clinical Features

Listeriosis is a bacterial illness that in immunocompetent adults may present as an acute, mild febrile illness. In the elderly, immunocompromised persons, diabetics, alcoholics and in newborns, illness may present as meningoencephalitis and/or septicemia. The onset of meningoencephalitis can be sudden with fever, intense headache, nausea, vomiting and signs of meningeal irritation. Infected pregnant women may be asymptomatic or experience only a mild febrile illness; however, infection during pregnancy can lead to miscarriage or stillbirth, premature delivery, or infection of the newborn. The case fatality rate is as high as 30-50% in newborns.

Infectious Agent

Listeria monocytogenes, a gram-positive, rod-shaped bacterium.

Reservoir

Mainly occurs in soil, forage, water, mud and silage. Animal reservoirs include domestic and wild mammals, fowl and people. Asymptomatic fecal carriage is as high as 10% in humans.

Transmission

Ingestion of unpasteurized or contaminated milk and soft cheeses, as well as vegetables and ready-to-eat meats, such as deli meats or hot dogs. Unlike most other foodborne pathogens, *Listeria* tends to multiply in contaminated foods that are refrigerated. In neonates, infection can be transmitted in utero or by passage through the infected birth canal.

Incubation

Variable, estimated median incubation is 3 weeks (range 3-70 days)

Period of Communicability

Mothers of infected newborns can shed the bacterium in vaginal discharges and urine for 7-10 days post-delivery. Infected individuals can shed the bacteria in their stools for several months.

Methods of Control

Education for proper food handling and preparation. Avoid unpasteurized (raw) milk or foods made from unpasteurized milk, such as soft cheeses, which can support the growth of organisms during ripening. Consume perishable and ready-to-eat foods as soon as possible after purchase, and cook hot dogs thoroughly before consumption. These recommendations are especially important during pregnancy. MSDH investigates all reported cases for rapid identification of common source outbreaks.

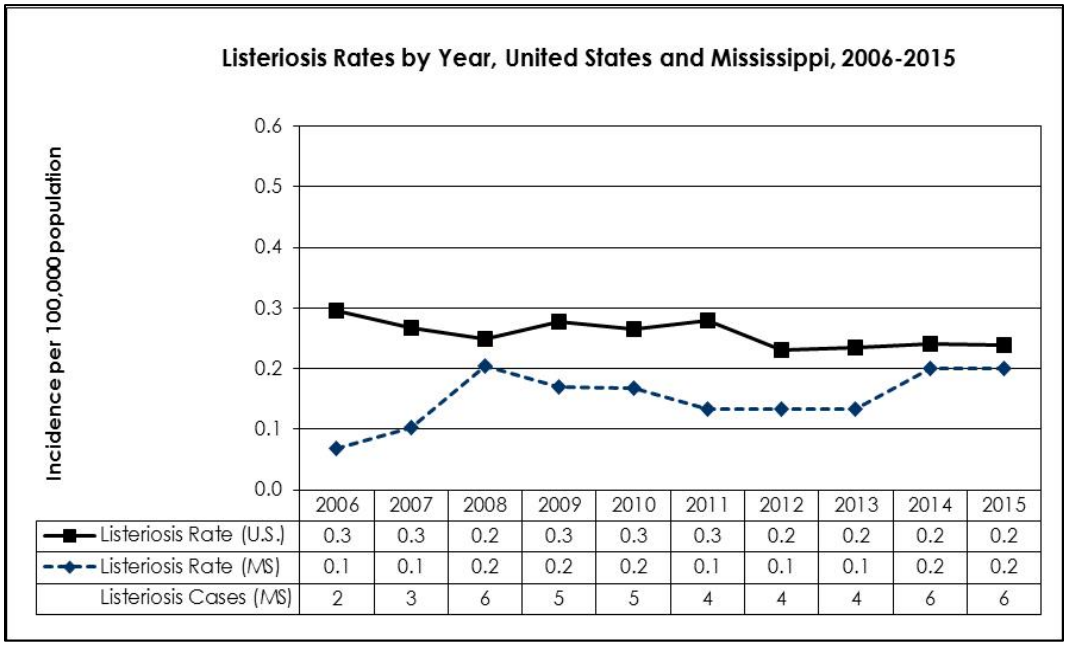
Reporting Classification

Class 2.

Epidemiology and Trends

There were six reported cases of listeriosis in Mississippi in both 2014 and 2015, which was comparable to the number reported in 2013 (4) and to the average number of four cases reported annually from 2011 through 2013. The incidence rate in the state has remain relatively constant since 2006 and has remained at or below national rates since *Listeria* was added to the National Notifiable Disease List in 2000 (Figure 37).

Figure 37



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Listeriosis Rate (U.S.)	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2
Listeriosis Rate (MS)	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2
Listeriosis Cases (MS)	2	3	6	5	5	4	4	4	6	6

There were no neonatal infections reported in 2014 or 2015. The 12 reported cases ranged in age from 18 to 88 years, with a median age of 79 years. No deaths were reported in either 2014 or 2015. None of the infections were epidemiologically linked or associated with common source outbreaks.

Lyme Disease

2015 Case Total	**4**	**2015 rate/100,000**	**0.1**
2014 Case Total	**2**	**2014 rate/100,000**	**0.1**

Clinical Features

Lyme disease is a tick-borne bacterial disease characterized primarily by a distinct "bull's-eye" rash (erythema migrans) in the early stage of the infection. The rash is present in up to 60%-80% of patients. Accompanying symptoms may include malaise, fever, headache, stiff neck, myalgias, migratory arthralgias and/or lymphadenopathy. In untreated patients, chronic or late manifestations may include musculoskeletal symptoms (joint swelling or chronic arthritis), neurological manifestations (aseptic meningitis, cranial neuritis, facial palsy, rarely encephalomyelitis), and cardiac abnormalities (specifically 2nd or 3rd degree atrioventricular conduction defects).

Infectious Agent

Borrelia burgdorferi, a spirochete.

Reservoir

Small mammals, mainly mice. Deer are efficient maintenance hosts and play an important role in transporting ticks.

Transmission

Transmission occurs through the bite of an infected *Ixodes scapularis* tick (black-legged tick). Nymphs are more likely to transmit disease, and they feed primarily on small mammals. Studies indicate the tick usually must be attached 24 hours or longer to efficiently transmit the bacteria. No person to person transmission or maternal fetal transmission has been confirmed.

Incubation

2-30 days after tick exposure for erythema migrans, however, early infection may be unapparent and patients may present weeks to months after exposure with late manifestations.

Methods of Control

Avoid tick infested areas when possible. When unavoidable, use tick repellant and measures to decrease tick exposure. After leaving tick prone areas examine body well and remove any ticks. It is important to promptly remove any attached ticks; it is not necessary to remove the head.

Reporting Classification

Class 2.

Epidemiology and Trends

Most cases of Lyme disease occur in late spring and summer. Lyme disease is not considered endemic in Mississippi. Although the vector is present in the state, definitive transmission within the state of Mississippi has not been clearly demonstrated.

There were two cases of Lyme disease reported in 2014, and four cases reported in 2015, compared to no cases of Lyme disease reported in 2013.

Both 2014 cases were reported in persons less than 18 years of age with travel histories to Mid-Atlantic states within the month prior to the onset of illness. The cases were confirmed with IgM positive Western blots.

In 2015, three of the four Lyme cases reported to MSDH were in persons less than 18 years of age. The fourth case was in a 61 year old. All four cases reported travel to either Mid-Atlantic or New England states prior to illness onset and had confirmed IgM positive Western blots.

Return to Table of Contents

Measles

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**0**	**2014 rate/100,000**	**0.0**

Clinical Features

Measles is a highly contagious viral illness characterized by cough, coryza, conjunctivitis (3 C's), fever, an erythematous maculopapular rash, and a pathognomonic enanthema (Koplik spots). Complications are seen more frequently in children younger than 5 years of age and in adults 20 years of age and older. Diarrhea, pneumonia and encephalitis are the most common complications seen. The risk of death is higher in these age groups as well; the most common cause of death is pneumonia in children, and acute encephalitis in adults. Subacute sclerosing panencephalitis is a rare degenerative central nervous system disease that is thought to be due to persistent measles infection of the brain, and typically presents approximately 7 years after initial infection.

Infectious Agent

Measles virus, in the paramyxovirus family.

Reservoir

Humans.

Transmission

Transmitted by airborne spread through aerosolized droplet nuclei; droplet nuclei can remain suspended and infectious for up to 2 hours after a person with measles has occupied the area.

Incubation

Eight to ten days.

Period of Communicability

Three to five days before to four days after rash onset.

Methods of Control

Measles, mumps and rubella (MMR) vaccine is recommended for all children at 12 to15 months of age with a second dose at school entry (4 to 6 years of age). Appropriate two dose vaccination induces immunity in 99% of individuals.

MSDH investigates all reported cases and provides prophylaxis for all contacts as appropriate. Measles vaccine administered within 72 hours of exposure may provide protection in some cases. Immunoglobulin, given within six days of exposure, can prevent or modify measles in susceptible persons who are at high risk for complications.

Because measles remains endemic in much of the world, international travelers should be up-to-date on vaccinations. Most international travelers should receive 1 to 2 doses of measles containing vaccine, including infants aged 6 months through 11 months of age who should receive a single dose of MMR when traveling internationally (still require routine doses at 12 months and 4 to 6 years of age).

Reporting Classification

Class 1A.

Epidemiology and Trends

There have been no reported cases of measles in Mississippi since 1992, when there were 17 reported cases. Fifteen of those cases were associated with an outbreak at the University of Mississippi and the index case's infection in that outbreak was traced to an exposure in Europe. Following this outbreak, a history of 2 doses of MMR was required to attend public universities in Mississippi.

Measles occurs throughout the world with peak incidence usually in late winter and spring. In 2000 widespread measles immunization led to the interruption of endemic measles transmission in the United States. However, measles incidence has increased worldwide, with outbreaks and increased transmission in several countries, particularly in Europe, due in part to dropping immunization rates. Importation of measles to the U.S. has resulted in a number of cases and outbreaks, particularly in unvaccinated populations.

In 2014 the U.S. experienced 23 measles outbreaks in 2014, including one large outbreak of 383 cases, occurring primarily among unvaccinated Amish communities in Ohio. Many of the cases in the U.S. in 2014 were associated with cases brought in from the Philippines, which experienced a large measles outbreak. The United States experienced a record number of measles cases, with 667 cases from 27 states reported to CDC's National Center for Immunization and Respiratory Diseases (NCIRD); this is the greatest number of cases since measles elimination was documented in the U.S. in 2000.

In 2015, 188 people from 24 states and the District of Columbia were reported to have measles. That same year, the United States experienced a large, multi-state measles outbreak linked to an amusement park in California. The outbreak likely started from a traveler who became infected overseas with measles, then visited the amusement park

while infectious; however, no source was identified. Analysis by CDC scientists showed that the measles virus type in this outbreak (B3) was identical to the virus type that caused the large measles outbreak in the Philippines in 2014.

Continued high vaccine rates in the U.S. and in Mississippi are important to provide appropriate population immunity and decrease the risk to those who are too young to receive vaccine or have medical contraindications to vaccination.

Additional References:

- CDC. Measles Cases and Outbreaks. Available online at http://www.cdc.gov/measles/cases-outbreaks.html.

Meningococcal disease, invasive

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**1**	**2014 rate/100,000**	**0.0**

Clinical Features

Invasive meningococcal disease is an acute bacterial illness characterized by meningitis and/or meningococcemia that may rapidly progress to purpura fulminans, shock and death. Symptoms include rapid onset of fever, severe headache, stiff neck, nausea and vomiting, and possibly a petechial rash. The case fatality rate, even with the use of antibiotics and improved supportive measures, remains high at 8-15%. Long term sequelae occur in 10-20% of survivors and include hearing loss, mental retardation and the loss of the use of a limb.

Infectious Agent

Neisseria meningitidis (*N. meningitidis*), an aerobic gram negative diplococcus. The most common serogroups in the United States are B, C, W-135, and Y. Licensed vaccines are not protective against serogroup B**.**

Reservoir

Humans. Up to 5-10% of the population may be asymptomatic carriers.

Transmission

Transmission of *N. meningitidis* is person to person by direct contact with respiratory droplets from the nose and throat of infected individuals or carriers. Less than 1% of colonized individuals will progress to invasive disease.

Incubation

The incubation period is 2-10 days, commonly 3-4 days.

Period of Communicability

Individuals remain contagious until meningococci are no longer present in nasal or throat secretions, usually 24 hours after antibiotic treatment has begun.

Methods of Control

Vaccination and post-exposure prophylaxis are effective in preventing invasive meningococcal disease. Routine vaccination with the quadrivalent meningococcal conjugate vaccine (MCV4) is recommended for all children aged 11-12 years (and children aged 13-18 years not previously vaccinated) with a booster dose at 16 years of age. Additionally, previously unvaccinated persons with persistent complement component deficiency or anatomic/functional asplenia should receive two doses at least eight weeks apart, with a booster dose every five years thereafter. MCV4 is also recommended for persons who travel to countries in which *N. meningitidis is* hyperendemic or epidemic. Use of the meningococcal polysaccharide vaccine (MPSV) should be limited to persons older than 55 years of age, or used when MCV4 is not available. Both MCV4 and MPSV4 are recommended for use in the control of meningococcal outbreaks caused by vaccine-preventable serogroups (A, C, Y and W-135).

MSDH investigates each reported case and provides prophylactic antibiotics (rifampin) for household contacts and other appropriate close contacts. Health care workers are not usually at risk unless there is direct contact with nasopharyngeal secretions (mouth-to-mouth resuscitation).

Reporting Classification

Class 1A.

Epidemiology and Trends

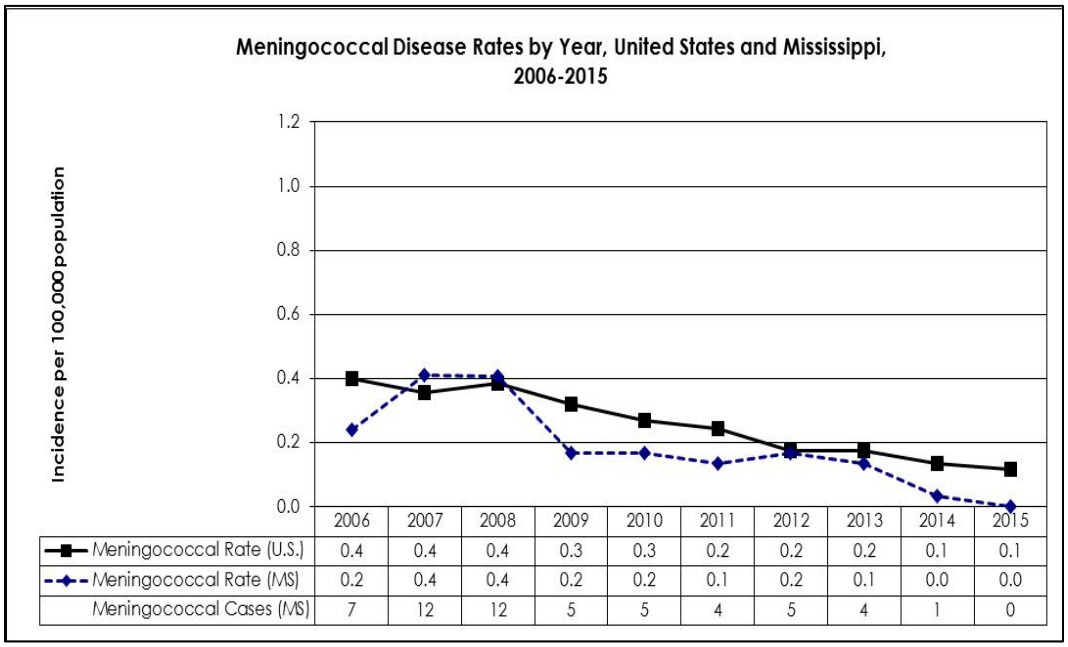
There was one reported case of invasive meningococcal disease in 2014. No cases were reported during 2015. The annual number of reported cases has decreased over the last several years, from 24 cases in 2003, to less than five cases per year since 2013 (Figure 38). Case numbers in 2014 (1) and 2015 (0) continued this downward trend in Mississippi. The decrease in Mississippi's incidence rate is comparable to the decrease in the national meningococcal incidence rates from 2013-2015. Nationally, infants less than 12 months of age have the highest incidence of invasive disease. In the U.S., rates of disease decline in early childhood, increase during adolescence and early adulthood, then decrease again in older adults. The 2014 Mississippi case occurred in a

child less than one year of age. From 2011 – 2015, 43% of the cases occurred in children less than five years of age (Figure 39).

MSDH requests the submission of all isolates to the PHL for typing. The 2014 case was not able to be subtyped.

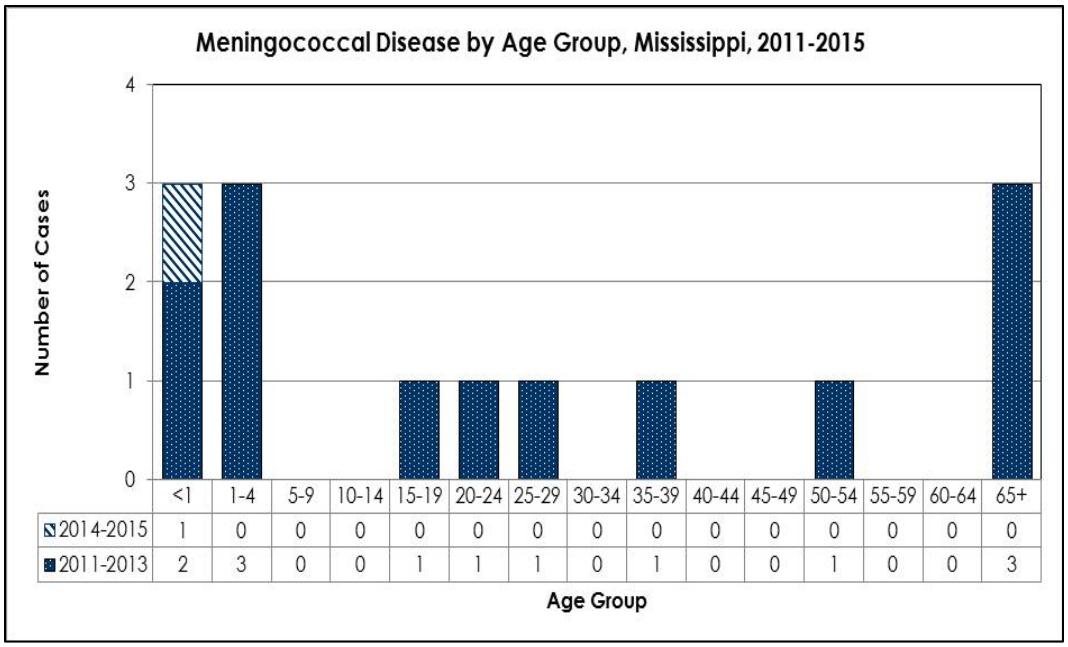
There were no reported deaths in 2014 or 2015.

Figure 38



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Meningococcal Rate (U.S.)	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1
Meningococcal Rate (MS)	0.2	0.4	0.4	0.2	0.2	0.1	0.2	0.1	0.0	0.0
Meningococcal Cases (MS)	7	12	12	5	5	4	5	4	1	0

Figure 39



	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
2014-2015	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011-2013	2	3	0	0	1	1	1	0	1	0	0	1	0	0	3

Return to Table of Contents

Mumps

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**0**	**2014 rate/100,000**	**0.0**

Clinical Features

Mumps is a vaccine preventable viral illness characterized by an acute onset of fever, tenderness and swelling in one or more of the salivary glands. Parotitis is the most common presentation, but asymptomatic infections do occur. Symptoms typically resolve within 7-10 days. Orchitis in postpubertal males and oophoritis in postpubertal females are the most frequent complications.

Infectious Agent

Mumps virus, in the paramyxovirus family.

Reservoir

Humans.

Transmission

Spread through airborne transmission or by direct contact with infected droplet nuclei or saliva.

Incubation

About 16 – 18 days (range 14 – 25).

Period of Communicability

Three days before to four days after onset of symptomatic disease. Virus has been isolated from saliva up to 7 days before and 9 days after onset of parotitis.

Methods of Control

Measles, mumps and rubella (MMR) vaccine routinely given at 12 – 15 months of age with a second dose at 4 – 6 years. Immunization of susceptible contacts may be helpful in prevention of infection.

Reporting Classification

Class 2.

Epidemiology and Trends

Mumps is not common in Mississippi or in the US. There can be significant variability in the number of cases reported in the US each year; there were 584 cases reported in

2013 versus 1,223 in 2014. In 2015, however, the number of cases remained relatively constant with 1,329 cases reported nationally.

In Mississippi, there are typically fewer than 5 cases reported annually. In 2014 and 2015, there were no reported mumps cases.

Pertussis

2015 Case Total	**12**	**2015 rate/100,000**	**0.4**
2014 Case Total	**64**	**2014 rate/100,000**	**2.1**

Clinical Features

Pertussis is an acute bacterial disease of the respiratory tract distinguished by prolonged paroxysmal coughing with a characteristic inspiratory "whoop." There are three clinical stages: catarrhal stage, paroxysmal cough stage, and a convalescent stage. Post-tussive vomiting is common in the paroxysmal stage. Infants under 6 months of age, vaccinated children, adolescents and adults often do not have whoop or paroxysms. Pneumonia is the most frequent complication; the majority of fatalities occur in children under 6 months of age. Adults and adolescents may have a mild illness which often is undiagnosed, but serve as a source of infection for unvaccinated or incompletely vaccinated children.

Infectious Agent

Bordatella pertussis, an aerobic gram negative rod.

Reservoir

Humans. Adolescents and adults serve as reservoirs for *B. pertussis* and are often the source of infection in infants.

Transmission

Direct contact with respiratory secretions by airborne route, probably via droplets.

Incubation

Average 9-10 days. (Range 6-20 days).

Period of Communicability

Most transmissible in the catarrhal stage (which lasts about 1 week) and then during the first 2 weeks after onset of paroxysmal cough, or a total of 21 days after symptom onset. Communicability then gradually decreases and becomes negligible. Individuals are no longer considered contagious after 5 days of appropriate antibiotic treatment.

Methods of Control

Vaccination and post-exposure prophylaxis are effective in preventing pertussis. Pertussis vaccine is combined with diphtheria and tetanus toxoids (DTaP); the primary series consists of four doses given between the ages of 2 months and 18 months, with a booster at 4-6 years of age.

Pertussis immunity wanes 5-10 years after the booster vaccine, leaving adolescents and adults more vulnerable to infection. ACIP recommends a single dose of Tdap (pertussis containing vaccine for use in those >11 years of age) for all adolescents aged 11 through 18 years. All pregnant women should receive Tdap in the third trimester of each pregnancy. Adults who do not receive Tdap as an adolescent or during pregnancy should receive one dose of Tdap in the place of a booster dose of Td (Td booster recommended every 10 years). Tdap is especially important for any person who has close contact with infants less than 12 months of age (for example, grandparents, child care providers and healthcare workers).

MSDH investigates each reported case and provides prophylactic antibiotics (azithromycin) for all household contacts and contacts at high risk of severe illness or who will have contact with a person at high risk of severe illness..

Reporting Classification

Class 1A.

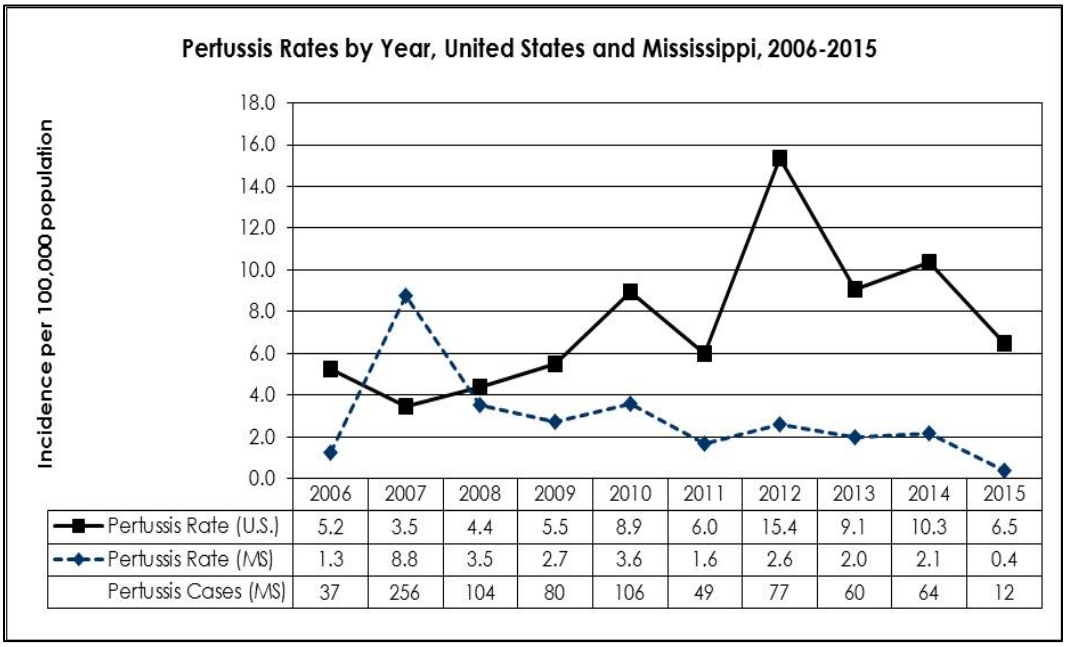
Epidemiology and Trends

Among the diseases for which universal childhood vaccination is recommended, pertussis is consistently the one that has the highest number of cases annually. Susceptibility of unimmunized persons is universal. Infants less than one year of age, who are at greatest risk for severe disease and death, continue to have the highest reported rate of pertussis.

Between 2014 and 2015, 76 cases of pertussis infections were reported to the Mississippi State Department of Health, with 64 reported in 2014 and 12 reported in 2015 (Figure 40). The 2014 case count was comparable to the average number of reported cases between 2011 and 2013 (62). During 2014, the pertussis case definition was edited to include an additional stipulation for infants less than one year of age which affected the 2015 case count. The case definition for a probable case now states that, for surveillance purposes, infants less than one year of age must be polymerase chain reaction (PCR) positive for pertussis or have had contact with a laboratory-confirmed case of pertussis. Even with the additional stipulations to the case definition, MSDH still treats contacts associated with suspect pertussis cases for those less than one year of age.

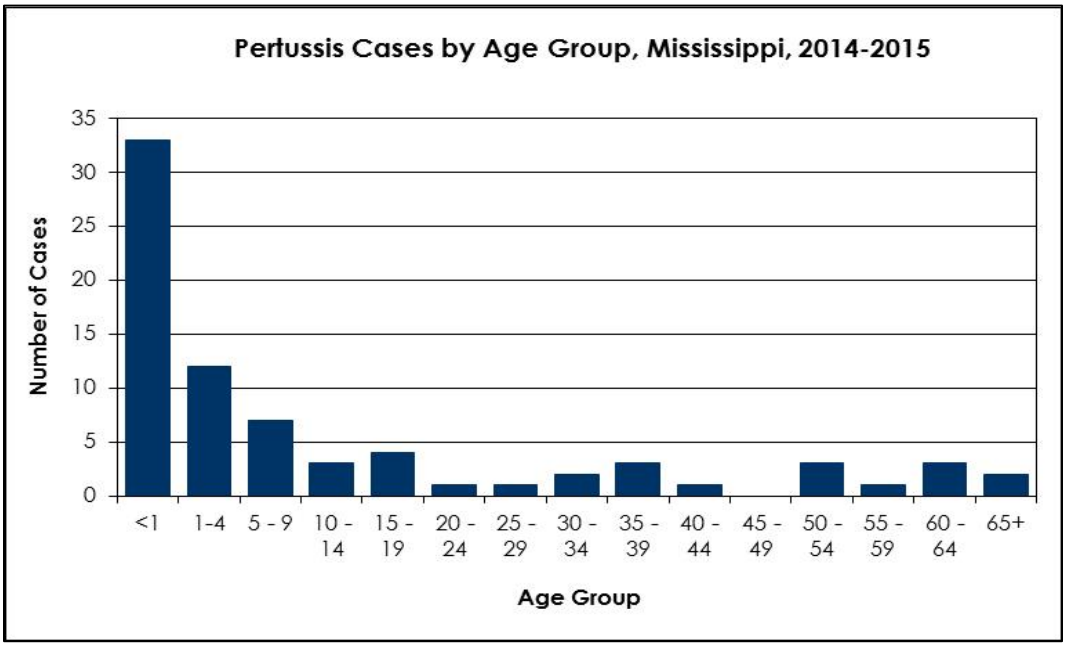
Thirty-three (43%) of the cases in 2014 and 2015 occurred among children less than one year of age (Figure 41), with 20 (61%) of these cases occurring in one- to two-month old infants. No pertussis deaths were reported in either 2014 or 2015. The last reported death in Mississippi was a two month old infant in 2012.

Figure 40



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Pertussis Rate (U.S.)	5.2	3.5	4.4	5.5	8.9	6.0	15.4	9.1	10.3	6.5
Pertussis Rate (MS)	1.3	8.8	3.5	2.7	3.6	1.6	2.6	2.0	2.1	0.4
Pertussis Cases (MS)	37	256	104	80	106	49	77	60	64	12

Figure 41



Return to Table of Contents

Pneumococcal disease, invasive

2015 Case Total (all ages)	**250**	**2015 rate/100,000**	**8.4**
2015 Case Total (under 5)	**27**	**2015 rate/100,000**	**0.9**
2014 Case Total (all ages)	**249**	**2014 rate/100,000**	**8.3**
2014 Case Total (under 5)	**21**	**2014 rate/100,000**	**0.7**

Clinical Features

Streptoccous pneumoniae invasive disease typically presents as septicemia or meningitis. Septicemia is the most common clinical presentation, with a case fatality rate as high as 60% among the elderly. Pneumococcal meningitis has a case-fatality rate of 30%, but may be as high as 80% in elderly persons. Symptoms of meningitis include abrupt onset of high fever, headache, lethargy, vomiting, irritability, and nuchal rigidity. It is the leading cause of bacterial meningitis in children less than 5 years of age. Neurologic sequelae are common among meningitis survivors.

Infectious Agent

Streptococcus pneumoniae (S. pneumoniae), a gram-positive diplococcus. Most strains causing severe forms of disease are encapsulated; there are 90 known capsular serotypes. *S. pneumoniae* is considered "**invasive**" when it is found in the blood, spinal fluid or other normally sterile sites.

Reservoir

The nasopharynx of asymptomatic human carriers. Carriage is more common in children than adults.

Transmission

Droplet spread and contact with respiratory secretions.

Incubation

Unknown; probably short, 1-4 days.

Period of Communicability

Period of communicability is unknown, but it is presumed that transmission can occur as long as *S. pneumoniae* occurs in respiratory secretions.

Methods of Control

Conjugate (PCV13 or Prevnar 13®) and polysaccharide vaccines (PPSV23 or Pneumovax®) are available for the prevention of pneumococcal disease.

Pneumococcal conjugate vaccine is recommended as routine vaccination for all children younger than two years of age, all adults 65 years or older, and persons two through 64 years old with certain medical conditions that place them at increased risk for pneumococcal disease. Pneumococcal polysaccharide vaccine is recommended for all adults 65 years or older, persons two through 64 years old who are at increased risk for disease due to certain medical conditions, and adults 19 through 64 years old who smoke cigarettes.

Reporting Classification

Class 2; invasive infection.

Epidemiology and Trends

Between 2014 and 2015, 499 cases of invasive *S. pneumoniae* infections were reported to MSDH. The reported cases ranged in age from newborn to 105 years of age, with a median age of 61 years.

Forty-eight of the reported cases (21 in 2014 and 27 in 2015) were in children less than 5 years of age; which was comparable to the 20 cases reported in 2013. Of these 48 cases, 45 had septicemia, one had meningitis, one had *S. pneumoniae* isolated from pleural fluid, and one had *S. pneumoniae* isolated from an unspecified sterile site. Ages ranged from newborn to four years of age. Over the past five years, the majority (86%) of *S. pneumoniae* invasive infections in children less than 5 years of age have presented as septicemia (Figure 42).

Eighty-eight percent of the 499 reported *S. pneumoniae* cases between 2014 and 2015 presented with septicemia, with 315 (72%) of the cases occurring in individuals fifty years of age and older. Twenty-five (6%) of the 438 septicemia infections also had *S. pneumoniae* isolated from another normally sterile site. Eleven of the cases presented with meningitis, while seven of the cases had *S. pneumoniae* isolated from other normally sterile sites (pleural fluid (n=4), synovial fluid (n=2), or bone (n=1). The remaining 43 cases had *S. pneumoniae* isolated from an unspecified sterile site (Figure 43).

Figure 42

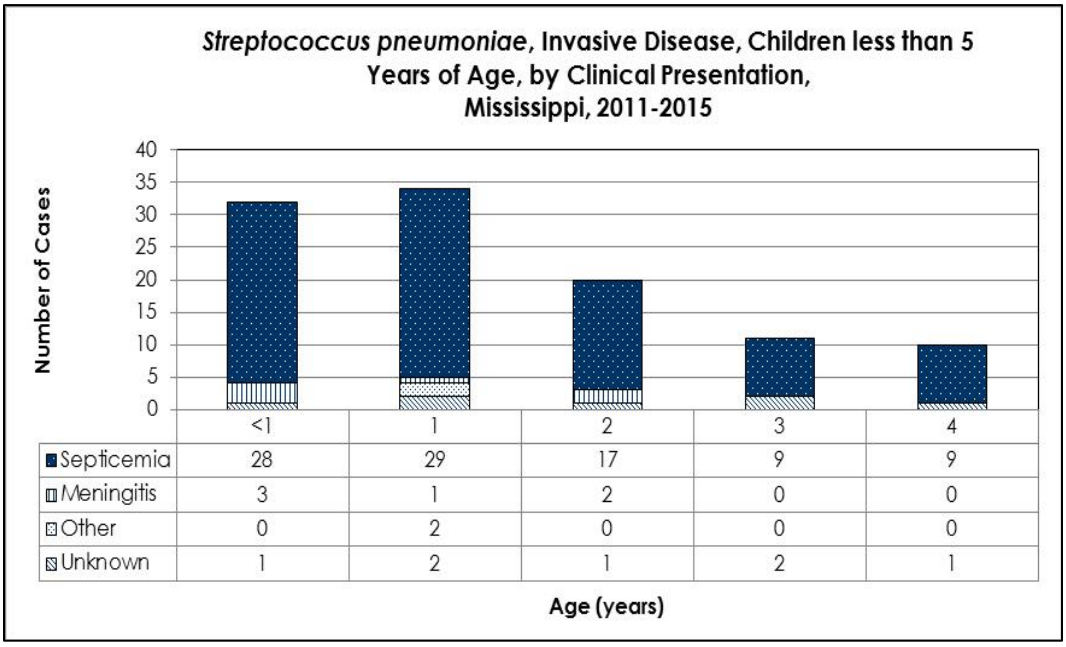
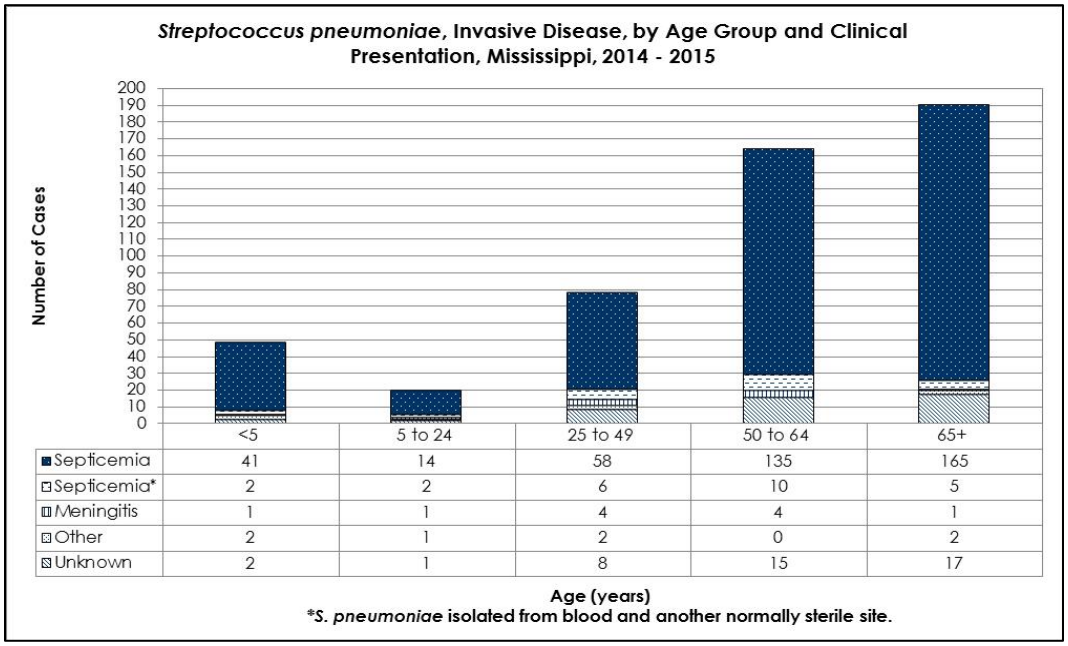


Figure 43



Rabies

Clinical Features

Rabies is an acute fatally progressive disease that affects the central nervous system. Early signs include anxiety, discomfort or paresthesia at the site of the bite of an

infected animal, primarily wild carnivores and bats in the U.S. Progression to symptoms of cerebral dysfunction such as confusion, agitation, delirium, hallucinations, and insomnia occurs within a few days of symptom onset. This is followed by generalized paralysis, coma and death within 2 to 10 days.

Infectious Agent

Lyssavirus, family Rhabdoviridae; an RNA virus. Variants occur among animal species and geographic location, but all of the members of the genus are antigenically related.

Reservoir

Rabies has both an urban and a wild cycle. The urban cycle (maintained by rabid dogs) has been reduced greatly in the U.S., but carnivores (primarily raccoons, wild canids, and skunks) and several species of insectivorous bats maintain the wild cycle in areas of the U.S. **The only reservoir identified in Mississippi over the last several decades is bats.**

Transmission

The most common mode of rabies virus transmission is through the bite of an infected mammal. All mammals are susceptible to varying degrees, but not all mammals efficiently transmit infection. Since the 1990's virtually 100% of human rabies cases in the US have been due to exposure to infected bats. Transmission has also been documented through organ transplantation, specifically corneal transplants from a donor dying of undiagnosed rabies.

Incubation

The incubation period can be up to six months or longer. The incubation period is longer the farther away the bite is from the CNS.

Period of Communicability

Rabies is transmissible once it reaches the CNS and can be found in the salivary glands. The animal is usually exhibiting abnormal behavior and other clinical signs by this time.

Methods of Control

The best method of control is prevention. Domestic animal rabies vaccination programs, as well as pre- and post-exposure rabies vaccination in humans have significantly decreased the human risk and deaths from rabies in the United States. People who are bitten by animals that are known reservoirs of rabies exhibiting abnormal behavior, such as unprovoked aggressiveness, increased drooling or paralysis

should be considered at higher risk, and consideration should be given to the use of post-exposure vaccination.

Recommendations for the prevention and control of rabies in animals can be found in the Compendium of Animal Rabies Prevention and Control, at http://avmajournals.avma.org/doi/pdf/10.2460/javma.248.5.505

Rabies can be prevented with the initiation of appropriate medical intervention following high risk animal exposures (primarily bats in Mississippi, but wild animal species such as raccoons, skunks, coyotes and foxes should also be considered higher risk exposures). Prompt wound care and post-exposure prophylaxis consisting of rabies immune globulin (RIG) and rabies vaccine are highly effective in preventing rabies following high risk animal exposures. Recommendations for prevention of rabies in humans can be found in the document by the Advisory Committee on Immunization Practices (ACIP) entitled Human Rabies Prevention—United States, 2008, at http://www.cdc.gov/mmwr/pdf/rr/rr57e507.pdf. Updated vaccine dosing recommendations are available at http://www.cdc.gov/mmwr/PDF/rr/rr5902.pdf .

Reporting Classification

Class 1A (human or animal).

Epidemiology and Trends

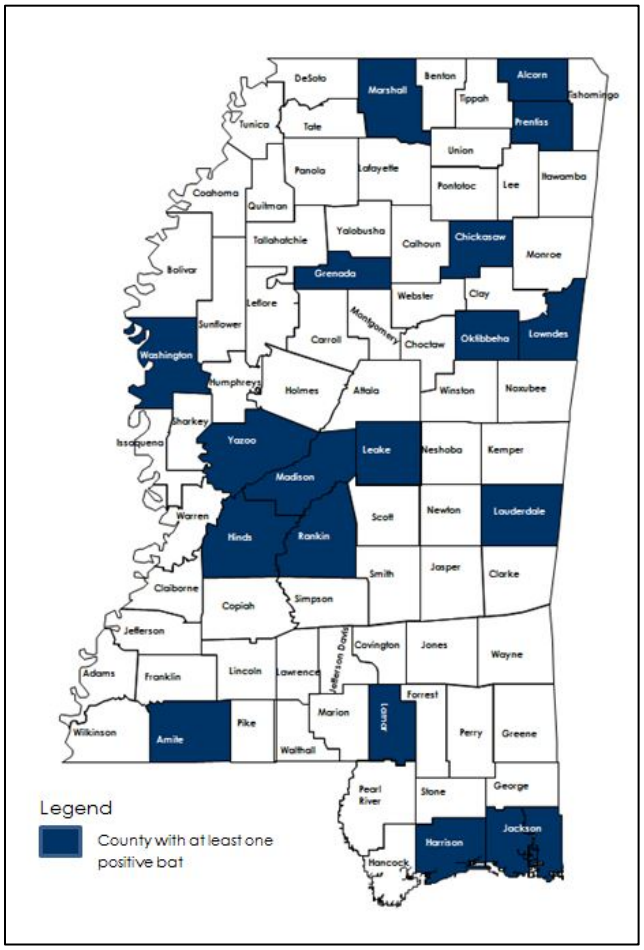
In the U.S. in the 1940s and 1950s, canines were the predominant reservoir and cause of human rabies. By 2006, however, approximately 92% of animal rabies cases were in wildlife, and only 8% were in domestic animals. This change is attributed to concerted, targeted rabies vaccination campaigns and stray animal control that have reduced the number of canine rabies cases from 6,947 in 1947 to 59 in 2014. Currently, most human cases in the United States are caused by bat strains of rabies. In the U.S., bats are now the second most reported rabid animal behind raccoons. While bats are the primary reservoir for rabies in Mississippi, rabid raccoons, skunks and foxes are routinely identified in states contiguous to Mississippi.

In 2015, there was an indigenous terrestrial animal (land) rabies case reported in Mississippi, representing the first land animal rabies case in the state since 1961. The MSDH Public Health Lab (PHL) identified the positive rabies case in August in a feral cat from Starkville, MS. Human contact with the rabid cat was reported both in the downtown area of Starkville and in a remote area in the general vicinity of developed portions of the Thad Cochran Research Park near the Mississippi State University campus. No human rabies cases were reported from this incident. The most recently reported human case of rabies in Mississippi was due to a bat strain identified in a 10 year old boy in 2005. Prior to the 2005 human case, the last reported human rabies case in Mississippi was in 1953 and this was transmitted by a terrestrial animal.

The MSDH PHL is the only laboratory in Mississippi that tests for rabies in animals. Aside from the positive cat in 2015, bats are the only animals that have tested positive for rabies in Mississippi since 1962. Usually, several bats test positive each year. In 2014, however, only one bat tested positive out of the 41 bats tested that year. The positive bat was submitted from Rankin County. There were three positive bats out of 41 tested in the PHL in 2015. The positive bats were submitted from Chickasaw, Jackson and Yazoo counties. Since 2006, there has been a wide geographic distribution of positive bats, with 36 reported positives in 19 counties (Figure 44).

Rabies in Bats by County, Mississippi, 2006-2015

Figure 44



Return to Table of Contents

Rocky Mountain spotted fever

2015 Case Total	**99**	**2015 rate/100,000**	**3.3**
2014 Case Total	**51**	**2014 rate/100,000**	**1.7**

Clinical Features

Rocky Mountain spotted fever (RMSF) is a tickborne rickettsial illness with an acute onset of fever, severe headache, malaise, myalgia, nausea, vomiting, and may include a macular or maculopapular rash on the extremities, including the palms and soles, which usually spreads over the entire body. A petechial rash often follows. Prompt recognition and treatment are paramount; if RMSF is suspected based on clinical presentation and/or a history of tick exposure, treatment with appropriate antibiotics (doxycycline) should not be delayed for laboratory confirmation. Doxycycline is the treatment of choice for any age. In untreated cases the case fatality is between 20 to 80%. Risk factors associated with severe disease and death include delayed treatment and age over 40. Early stages of RMSF are often confused with ehrlichiosis and meningococcemia.

Infectious Agent

Rickettsia rickettsii, a gram-negative coccobacillus.

Reservoir

Small rodents (chipmunks, squirrels, white-footed mice).

Transmission

Through the bite of an infected *Dermacentor variabilis* tick (American dog tick). A 4-6 hour attachment is required for transmission.

Incubation

3-14 days (most occurring between 5-7 days).

Period of Communicability

No evidence of person to person transmission.

Methods of Control

Avoid tick infested areas when possible. When unavoidable, use tick repellant and measures to decrease tick exposure. After leaving tick prone areas, examine body well and remove any ticks; removing the embedded head of the tick is not necessary.

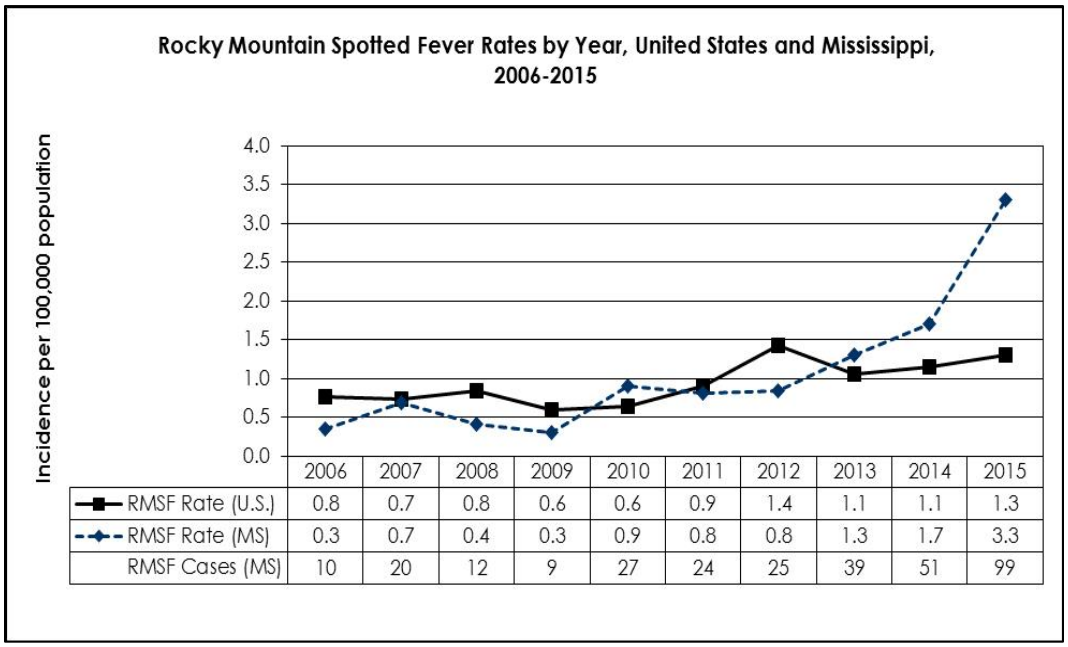
Reporting Classification

Class 2.

Epidemiology and Trends

In 2014, there were 51 cases of RMSF reported in Mississippi and 99 cases reported in 2015. Both years showed an increase in the number of reported cases that was higher than both the three year (2011- 2013) average of 29 cases and the number of reported cases in 2013 (39) (Figure 45). The 2014 and 2015 cases ranged in age from 5 to 91 years, with a median age of 50 years. There were no reported deaths due to RMSF in Mississippi in either 2014 or 2015.

Figure 45

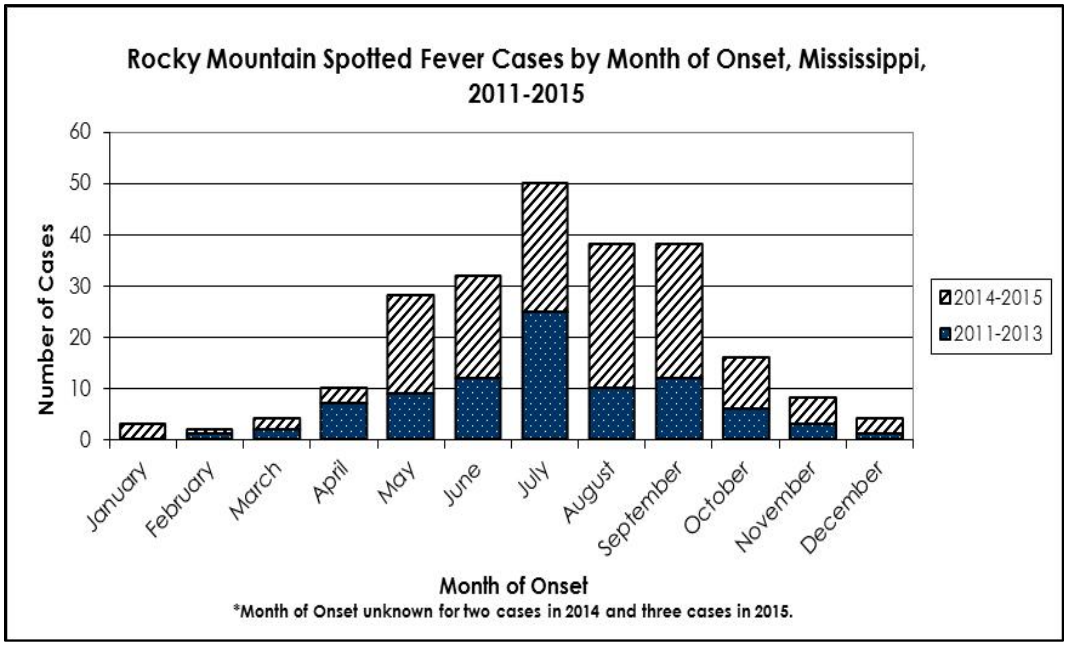


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RMSF Rate (U.S.)	0.8	0.7	0.8	0.6	0.6	0.9	1.4	1.1	1.1	1.3
RMSF Rate (MS)	0.3	0.7	0.4	0.3	0.9	0.8	0.8	1.3	1.7	3.3
RMSF Cases (MS)	10	20	12	9	27	24	25	39	51	99

Both in Mississippi and the U.S., the majority of Rocky Mountain spotted fever cases occurred between April and September. In Mississippi over the past five years, 84% of the reported cases have occurred during this time frame (Figure 46).

Return to Table of Contents

Figure 46



Rubella

2015 Case Total	**0**	**2015 rate/100,000**	**0.0**
2014 Case Total	**0**	**2014 rate/100,000**	**0.0**

Clinical Features

Rubella is a mild, febrile viral disease characterized by a 3 day maculopapular rash. Children often have few signs or symptoms other than the rash. The rash, typically fainter than a measles rash, appears on the face initially and progresses distally. Adults may have a febrile prodrome and lymphadenopathy. Up to 50% of all rubella infections are subclinical or asymptomatic. Complications occur most often in adults and include arthritis and encephalitis. Infection during pregnancy, especially in the first trimester, may result in congenital rubella syndrome (CRS), causing fetal death, prematurity or birth defects.

Infectious Agent

Rubella virus is classified as a togavirus, genus *Rubivirus.*

Reservoir

Humans.

Transmission

Direct contact with nasopharyngeal secretions of infected persons or by droplet spread. Rubella is moderately contagious. Maternal-fetal transmission causes CRS.

Incubation

Usually 14 days, with a range of 12-23 days.

Period of Communicability

The period of communicability is about 1 week before and up to 5-7 days after onset of the rash. Infants with congenital rubella syndrome may shed the virus for months after birth.

Methods of Control

Vaccination is the most effective method in preventing rubella. Rubella vaccine is available combined with measles and mumps vaccines as MMR. The first dose of MMR is recommended at 12-15 months, followed by a second dose at 4-6 years. All susceptible adolescents and adults, especially women of child bearing age, should be vaccinated with MMR vaccine.

Reporting Classification

Class 2.

Epidemiology and Trends

In the last major rubella epidemic in the United States, during 1964–1965, an estimated 12.5 million rubella virus infections resulted in 11,250 therapeutic or spontaneous abortions, 2,100 neonatal deaths, and 20,000 infants born with CRS. In 2004, after implementation of a universal vaccination program, elimination of endemic rubella virus transmission was documented in the United States. However, rubella virus continues to circulate elsewhere in the world, especially in regions where rubella vaccination programs have not been established (e.g., the African Region), placing the United States at risk for imported cases of rubella and CRS.

There were no reported cases of rubella in Mississippi in either 2014 or 2015. The last reported case in the state was in a 4 year old in 1986. During 2014 and 2015, there were 11 cases of rubella and two cases of CRS reported nationally.

Return to Table of Contents

Salmonellosis

2015 Case Total	**1,067**	**2015 rate/100,000**	**35.7**
2014 Case Total	**983**	**2014 rate/100,000**	**32.8**

Clinical Features

Salmonellosis is a bacterial disease that commonly presents as acute enterocolitis, with sudden onset of headache, abdominal pain, diarrhea, nausea and sometimes vomiting. Fever is almost always present. Dehydration may occur in infants and the elderly, and septicemia occasionally results from infection.

Infectious Agent

Salmonella organisms are gram negative bacilli. The genus *Salmonella* is divided into two species: *S. enterica* (divided into six subspecies) and *S. bongori*. Subspecies are further divided into multiple serotypes. Almost all of the serotypes pathogenic for humans are in one subspecies of *S. enterica*. Currently, there are more than 2460 identified *Salmonella* serotypes. The predominant isolates in Mississippi are *Salmonella* serotypes Javiana, Mississippi, Newport and Typhimurium.

Reservoir

Domestic and wild animals, including poultry, swine, cattle, and rodents, and many reptiles. Humans are also reservoirs, especially in mild and unrecognized cases. Chronic carriers are prevalent in animals and birds.

Transmission

Salmonella is transmitted through ingestion of organisms in food derived from infected animals or food or water contaminated by feces from an infected animal. Person to person transmission by fecal oral route also occurs. Although *S.* serotype Enteritidis is not commonly seen in Mississippi, this serotype can be passed trans-ovarially from infected hens to their eggs and transmission can then occur when eggs are not fully cooked.

Incubation

From 6 to 72 hours, usually about 12-36 hours.

Period of Communicability

Throughout the course of infection; extremely variable, several days to several weeks. A temporary carrier state occasionally continues for months, especially in infants.

Methods of Control

Transmission of *Salmonella* can be controlled with proper food preparation and sanitary measures for food processing, proper hand hygiene, and clean water supplies. MSDH investigates all possible common source food or waterborne outbreaks. The Public Health Laboratory (PHL) requests isolate submission for molecular subtyping with pulsed-field gel electrophoresis (PFGE). The DNA pattern, or "fingerprint", is submitted to PulseNet, a national tracking network coordinated by the CDC. This system facilitates early detection of common source outbreaks, even if the affected persons are geographically far apart, often allowing the source to be more rapidly identified.

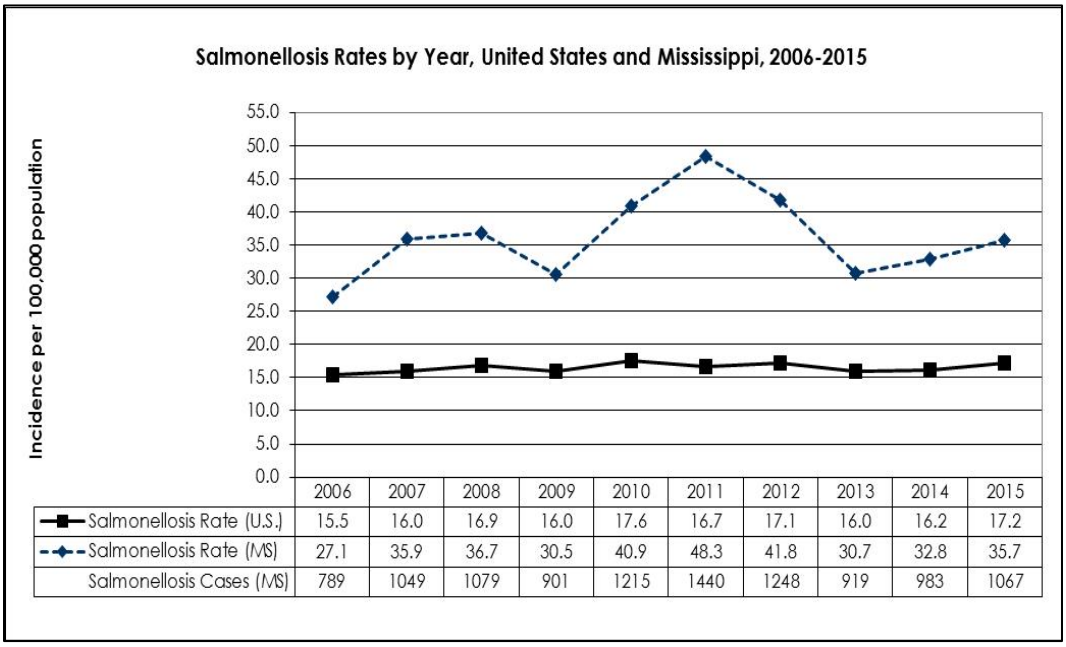
Reporting Classification

Class 3.

Epidemiology and Trends

In Mississippi, 2,050 cases of salmonellosis were reported to MSDH in 2014 (983) and 2015 (1,067) (Figure 47). Five *Salmonella* serotypes accounted for 76% of the total serotyped isolates (1,249) seen in Mississippi: Newport (21%), Typhimurium (18%), Javiana (17%), Mississippi (13%), and Enteritidis (6%).

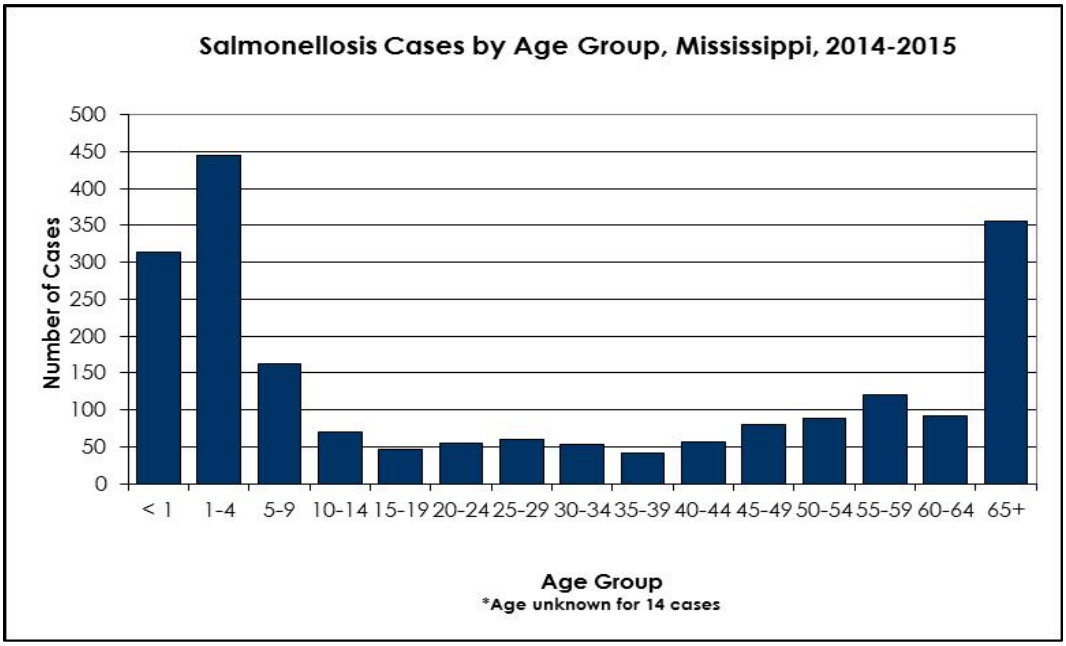
Figure 47



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Salmonellosis Rate (U.S.)	15.5	16.0	16.9	16.0	17.6	16.7	17.1	16.0	16.2	17.2
Salmonellosis Rate (MS)	27.1	35.9	36.7	30.5	40.9	48.3	41.8	30.7	32.8	35.7
Salmonellosis Cases (MS)	789	1049	1079	901	1215	1440	1248	919	983	1067

Infections occur in people of all ages, but there is higher incidence in infants and small children. In 2014 and 2015, 757 (37%) of the cases were in children less than 5 years of age (Figure 48) in which age was known.

Figure 48



Nineteen multistate outbreaks were identified utilizing PFGE analysis in 2014 (10) and 2015 (9). Of those, Mississippi residents were linked to four outbreaks with association to specific products or other exposures. In February 2014, an outbreak of *Salmonella* Infantis, *Salmonella* Newport, and *Salmonella* Hadar was reported that was attributed to contact with live poultry. This outbreak had a total of 363 cases from 43 states, with two cases in Mississippi residents.

In January 2015, multistate outbreaks of *Salmonella* Enteritidis, Hadar, Indiana, Muenchen, and Muenster were reported in which contact with chicks, ducklings, and other live poultry from multiple hatcheries was associated with infection. These outbreaks affected 43 states and 252 individuals, with 13 cases of *Salmonella* Indiana in Mississippi linked to these outbreaks. In March 2015, an outbreak of *Salmonella* Paratyphi B and Weltevreden with 65 cases across 11 states was reported with one case in a Mississippi resident. In this outbreak, frozen raw tuna was identified as the likely source. Also in 2015, national outbreaks of *Salmonella* Sandiego and Poona were reported that were attributed to contact to small turtles or their habitat. There were 133 reported cases in 26 states; one Mississippi case of *Salmonella* Sandiego was associated with this outbreak.

Return to Table of Contents

Shigellosis

2015 Case Total	**99**	**2015 rate/100,000**	**3.3**
2014 Case Total	**196**	**2014 rate/100,000**	**6.5**

Clinical Features

Shigellosis is an acute bacterial illness characterized by loose, often bloody stools (dysentery), fever, nausea and vomiting, abdominal cramping and tenesmus. Asymptomatic infections do occur. The illness is usually self-limited, lasting an average of 4-7 days; however infection with *Shigella dysenteriae (S. dysenteriae)* can lead to a severe illness with a case fatality rate of 20% among hospitalized patients. All age groups are susceptible, with the peak incidence in 1-4 year olds. Children in daycares, persons in institutions, and in facilities where adequate hand washing is difficult to maintain are at high risk for outbreaks of shigellosis.

Infectious Agent

Genus *Shigella*, a gram negative bacterium comprising four serogroups: Group A, *S. dysenteriae*; Group B, *S. flexneri*; Group C, *S. boydii*; and Group D, *S. sonnei*. In Mississippi, Group D, *S. sonnei* are the predominant isolates.

Reservoir

Humans are the primary reservoir.

Transmission

Primarily person to person by direct or indirect fecal oral contact. Infection may also occur after ingestion of contaminated food or water. *Shigella* is highly infectious with an infective dose as low as 100-200 organisms.

Incubation

Ranges from 12 hours to 7 days, with an average of 2-4 days.

Period of Communicability

Communicable until the bacteria are no longer present in feces. This is usually 4 weeks after cessation of symptoms, but asymptomatic carriers may transmit infection for months or longer.

Methods of Control

Disease prevention includes promotion of good hand washing, exclusion from work for food handlers or from school or daycare for children until symptom free for at least 24

hours. MSDH performs prompt investigation of common source food or waterborne outbreaks.

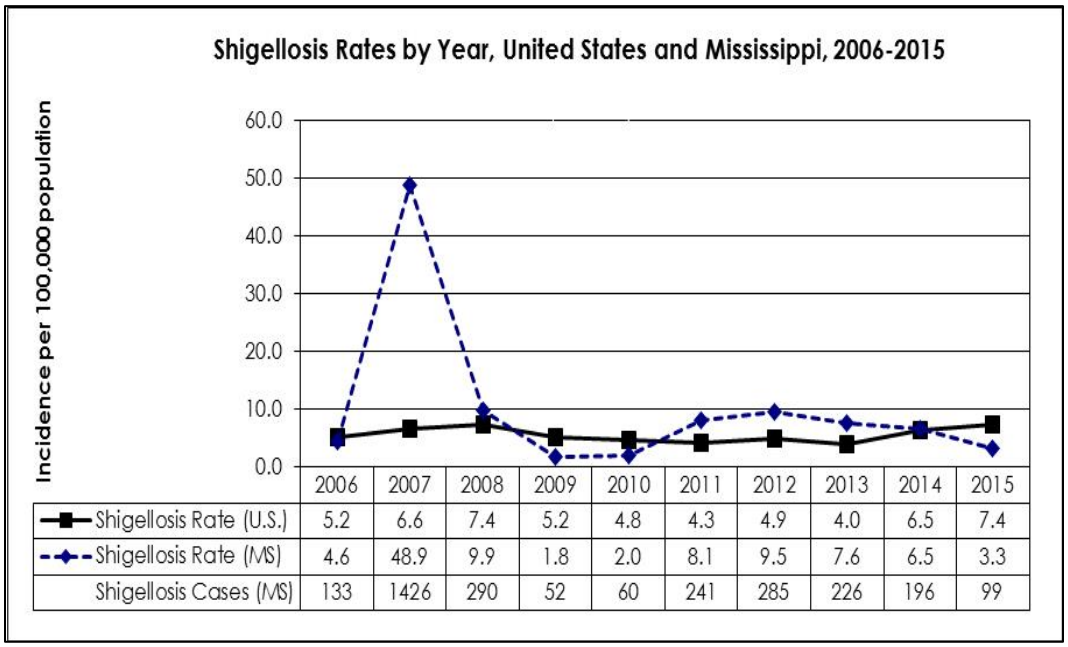
Reporting Classification

Class 3.

Epidemiology and Trends

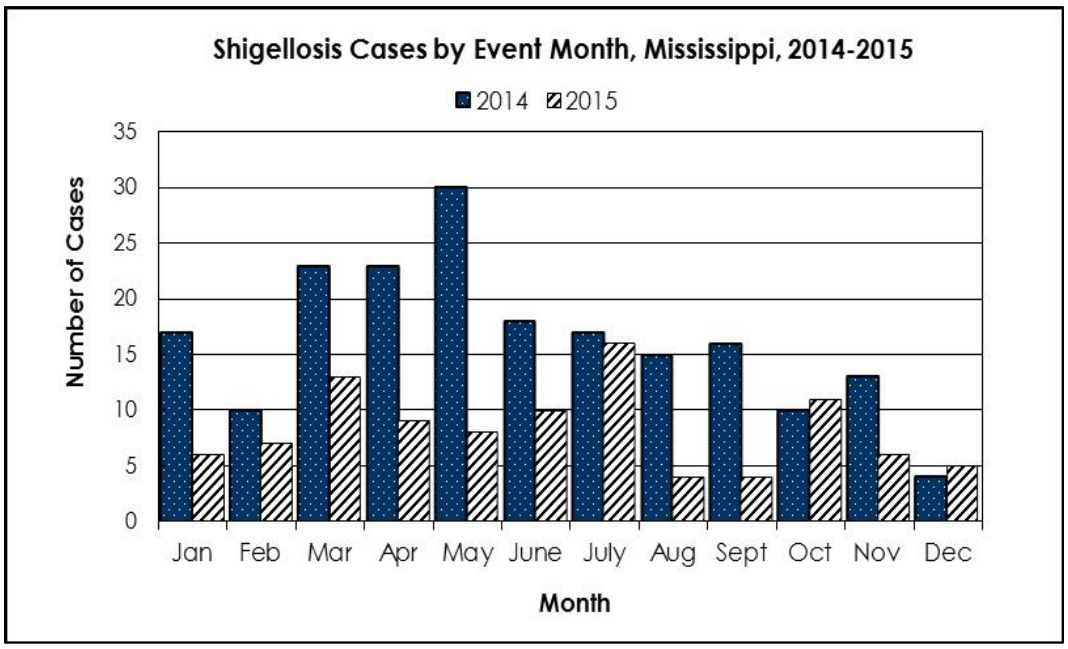
In 2014, there were 196 Shigellosis cases reported to MSDH, while 2015 saw a 49% decrease in reported cases to 99(Figure 49). There is variability in the number of yearly reported cases, with a peak of 1,426 cases in 2007 associated with a large outbreak that occurred in the Jackson metropolitan area and along the Gulf Coast. Although Shigellosis is usually a summer month illness, 48% of the 2014 cases occurred in the spring between March and June. This was in contrast to the 2015 cases that were more evenly distributed throughout the year (Figure 50).

Figure 49



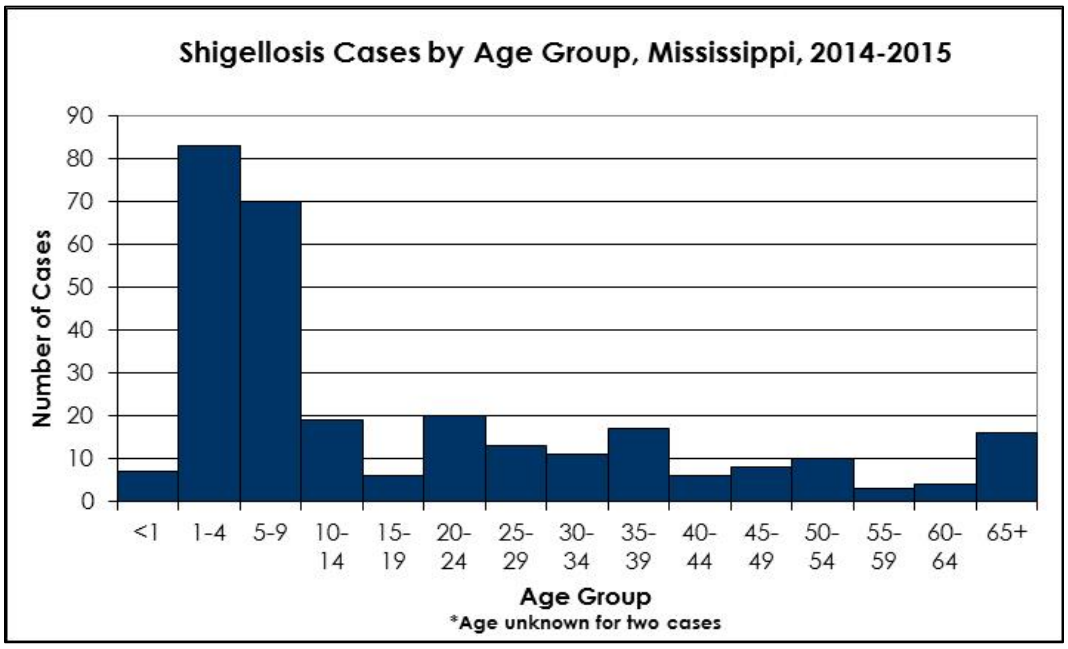
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Shigellosis Rate (U.S.)	5.2	6.6	7.4	5.2	4.8	4.3	4.9	4.0	6.5	7.4
Shigellosis Rate (MS)	4.6	48.9	9.9	1.8	2.0	8.1	9.5	7.6	6.5	3.3
Shigellosis Cases (MS)	133	1426	290	52	60	241	285	226	196	99

Figure 50



Shigella typically impacts children disproportionately. Between 2014 and 2015, the reported cases in which age was known ranged from 16 days to 87 years, with 55% occurring in children less than 10 years of age (Figure 51).

Figure 51



Return to Table of Contents

Syphilis

Primary and Secondary Syphilis

2015 Case Total	**219**	**2015 rate/100,000**	**7.3**
2014 Case Total	**192**	**2014 rate/100,000**	**6.4**

Early Latent Syphilis

2015 Case Total	**405**	**2015 rate/100,000**	**13.5**
2014 Case Total	**339**	**2014 rate/100,000**	**11.3**

Clinical Features

Syphilis is a bacterial infection that has three stages: primary, secondary, and tertiary. The primary lesion (chancre) is a painless indurated ulcer that develops at the sight of initial infection, usually on the external genitalia. Even without treatment, the primary lesion resolves in 4-6 weeks. Secondary syphilis may then develop and is characterized by a generalized symmetrical maculopapular rash that often involves the soles and palms. It may be accompanied by generalized lymphadenopathy, fever, malaise, sore throat, headache and arthalgia. Clinical manifestations of secondary syphilis usually resolve without treatment in weeks to months. Tertiary syphilis will develop years later in 15-40% if untreated, primarily as cardiovascular or neurosyphilis, or as skin, bone, visceral or mucosal surface gummas. Latent syphilis, a period of seroreactivity without clinical disease, is classified as early (infection acquired within the preceding year) or late (infection of more than a year's duration).

Fetal transmission occurs through the placenta in untreated women with early syphilis, resulting in congenital syphilis. Congenital syphilis can lead to abortions, stillbirths or death shortly after birth. An infected infant may be asymptomatic for the first few weeks of life; however, late manifestations may occur resulting in CNS involvement or other conditions such as Hutchinson teeth, saddlenose, periostitis, interstitial keratitis or deafness.

Infectious Agent

Treponema pallidum, a spirochete.

Reservoir

Humans.

Transmission

Syphilis is transmitted primarily by sexual contact with an infected individual with early syphilis (the first year of infection), especially during primary and secondary syphilis. Transplacental infection of the fetus occurs during the pregnancy of an infected woman, resulting in congenital syphilis. Transmission can also occur from a blood transfusion if the donor is in the early stages of infection.

Incubation

The average incubation period for syphilis before clinical manifestations is 3 weeks but ranges from 3 – 90 days.

Period of Communicability

In untreated individuals, communicability can last for up to two years. Syphilis is most communicable during the primary and secondary stages. Maternal-fetal transmission is more likely in early syphilis, but may occur at any stage.

Methods of Control

Mechanical barriers, early detection, and effective treatment of the patient and their partners are effective methods in prevention and control of syphilis. MSDH performs contact investigation and treatment for each reported case of syphilis.

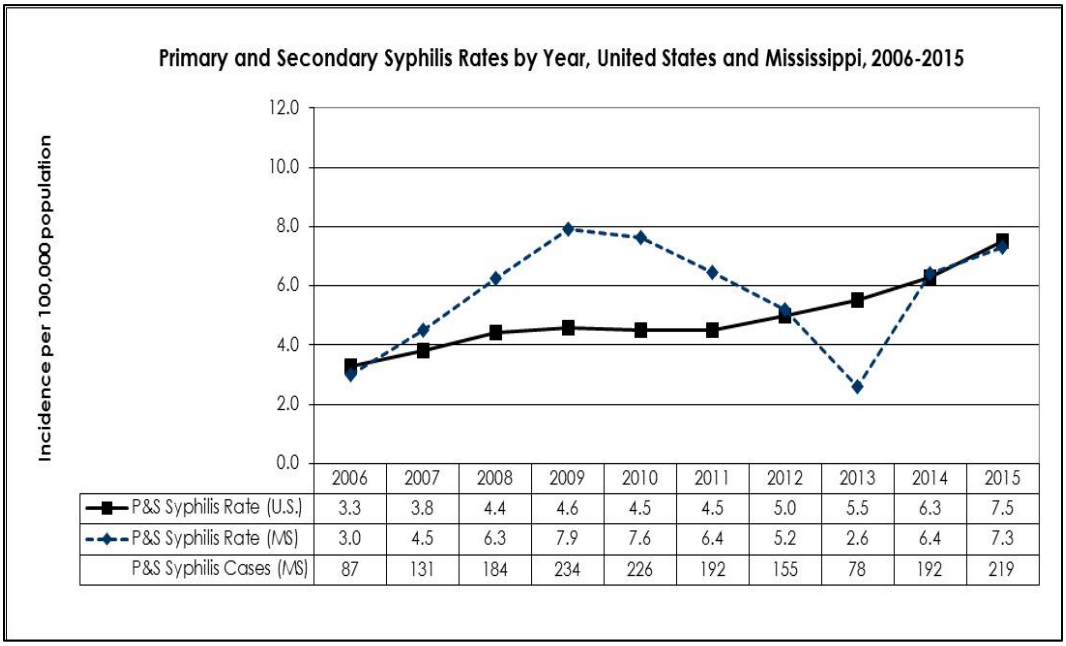
Reporting Classification

Class 1B.

Epidemiology and Trends

Mississippi saw a nearly five-fold increase in primary and secondary (P&S) syphilis cases from 2005-2010 (from 51 to 226 cases), with a subsequent 65% decrease from 2010 to 2013 (from 226 to 78 cases) (Figure 52). In 2014, however, the number of P&S cases increased once again by 146% and continued the upward trend into 2015. In 2015, Mississippi ranked twelfth nationally among P& S syphilis case rates.

Figure 52



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
P&S Syphilis Rate (U.S.)	3.3	3.8	4.4	4.6	4.5	4.5	5.0	5.5	6.3	7.5
P&S Syphilis Rate (MS)	3.0	4.5	6.3	7.9	7.6	6.4	5.2	2.6	6.4	7.3
P&S Syphilis Cases (MS)	87	131	184	234	226	192	155	78	192	219

In 2014 and 2015, Districts V and VIII had the highest incidence of P&S syphilis (Figures 53 and 54). In 2014, the majority of P&S syphilis cases were among 20-29 year olds (61%) and African Americans (87%). In 2015, 53% of P&S syphilis cases occurred among 20-29 year olds (Figure 55) and 82% of cases in which race was known were among African Americans (Figure 56). The rate of P&S syphilis infections for African Americans was twelve times the rate of whites in 2014 (14.6 versus 1.2 per 100,000) and eight times the rate of whites in 2015 (15.4 versus 1.9 per 100,000).

Figure 53

Primary and Secondary Syphilis Incidence by Public Health District, Mississippi, 2014

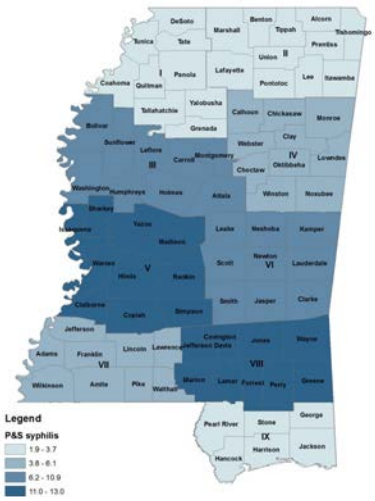
District	Cases	Rate*
I	11	3.4
II	4	1.1
III	6	2.9
IV	16	6.5
V	76	11.9
VI	12	5.0
VII	14	8.2
VIII	34	11.0
IX	19	3.9
Statewide	**192**	**6.4**

*per 100,000 population

Return to Table of Contents

Figure 54

Primary and Secondary Syphilis Incidence by Public Health District, Mississippi, 2015



District	Cases	Rate*
I	12	3.7
II	7	1.9
III	18	8.7
IV	15	6.1
V	76	11.9
VI	26	10.9
VII	7	4.1
VIII	40	13.0
IX	18	3.7
Statewide	**219**	**7.3**

*per 100,000 population

Figure 55

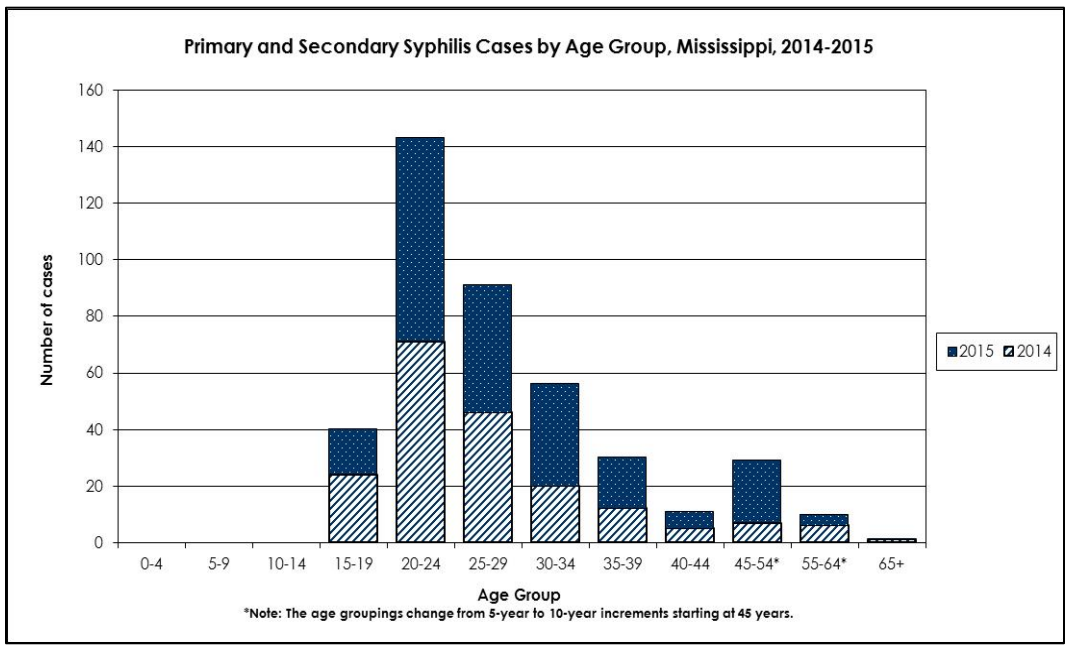
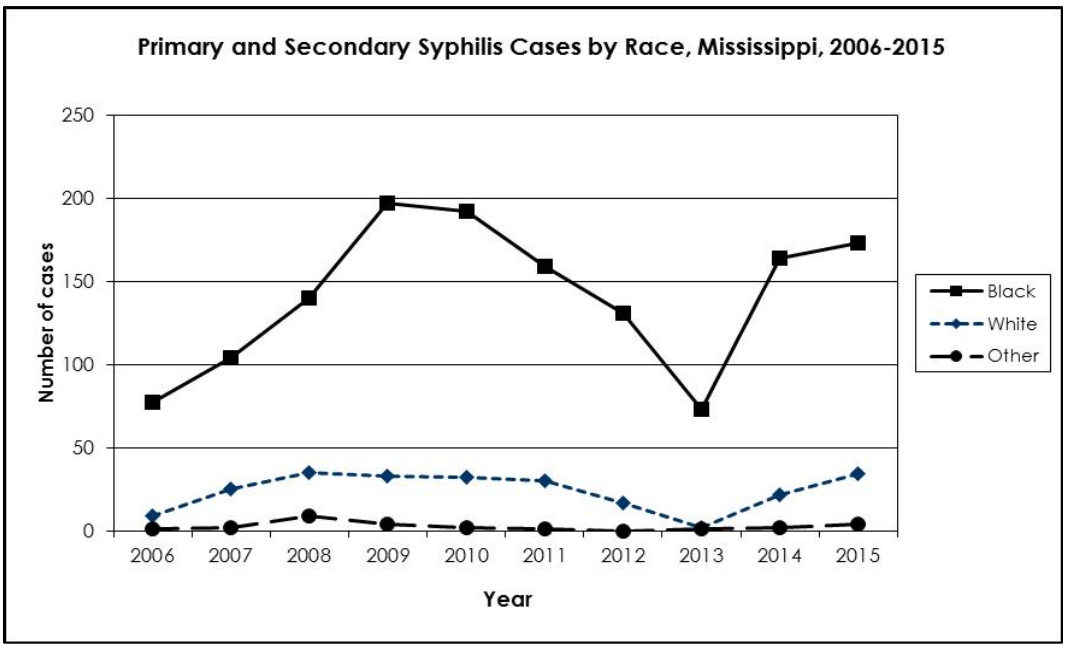
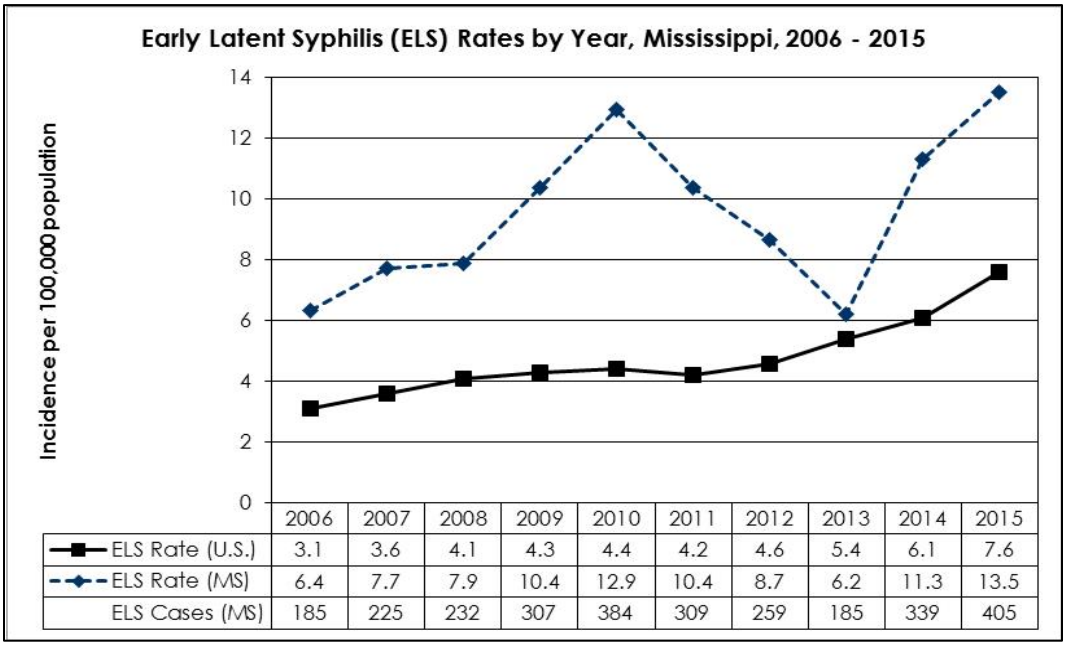


Figure 56



For more than a decade, Mississippi has had rates higher than the national average for early latent syphilis (acquired within the previous 12 months). During 2004-2010, the rate and number of reported early latent syphilis cases increased each year, peaking at 384 cases in 2010. From 2010 to 2013, there was a 52% decrease in the number of cases (from 384 to 185 cases) (Figure 57). Since that time, there has been a 119% increase in the number of cases (from 185 in 2013 to 405 cases in 2015). In 2015, Mississippi ranked fifth nationally among early latent syphilis case rates.

Figure 57



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ELS Rate (U.S.)	3.1	3.6	4.1	4.3	4.4	4.2	4.6	5.4	6.1	7.6
ELS Rate (MS)	6.4	7.7	7.9	10.4	12.9	10.4	8.7	6.2	11.3	13.5
ELS Cases (MS)	185	225	232	307	384	309	259	185	339	405

Early latent syphilis was reported in every district. In 2014 and 2015, District V had the highest case rates in the state, followed by District III (Figures 58 and 59).

Figure 58

Early Latent Syphilis Incidence by Public Health District, Mississippi, 2014

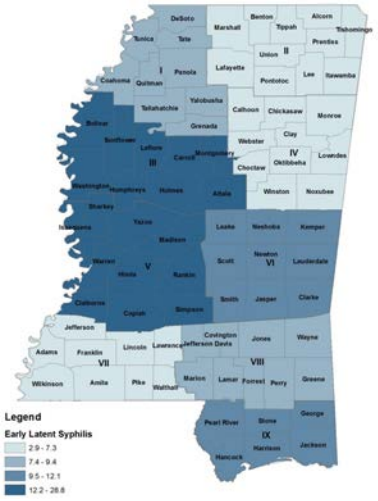
District	Cases	Rate*
I	25	7.7
II	21	5.7
III	25	12.0
IV	19	7.7
V	156	24.3
VI	8	3.3
VII	5	2.9
VIII	32	10.4
IX	48	9.9
Statewide	**339**	**11.3**

*per 100,000 population

Return to Table of Contents

Figure 59

Early Latent Syphilis Incidence by Public Health District, Mississippi, 2015



District	Cases	Rate*
I	28	8.6
II	26	7.0
III	30	14.6
IV	18	7.3
V	185	28.8
VI	29	12.1
VII	5	2.9
VIII	29	9.4
IX	55	11.3
Statewide	**405**	**13.5**

***per 100,000 population**

In 2014 and 2015, more than half (51 % and 52%, respectively) of reported cases were among 20-29 year olds (Figure 60). African Americans are disproportionately affected, accounting for 85% of cases in 2014 and 83% of cases in 2015 for which race was known (Figure 61). In 2014 and 2015, African Americans had rates that were more than eight times greater than the rate among whites (23.8 versus 2.6 per 100,000 and 28.0 versus 3.3 per 100,000, respectively)

Figure 60

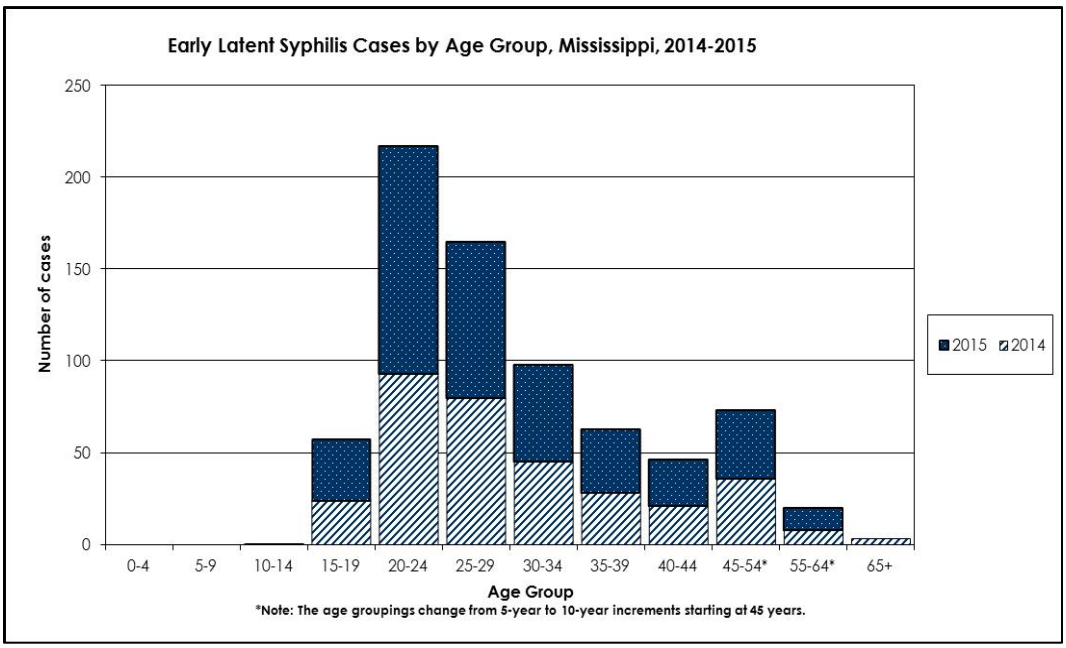
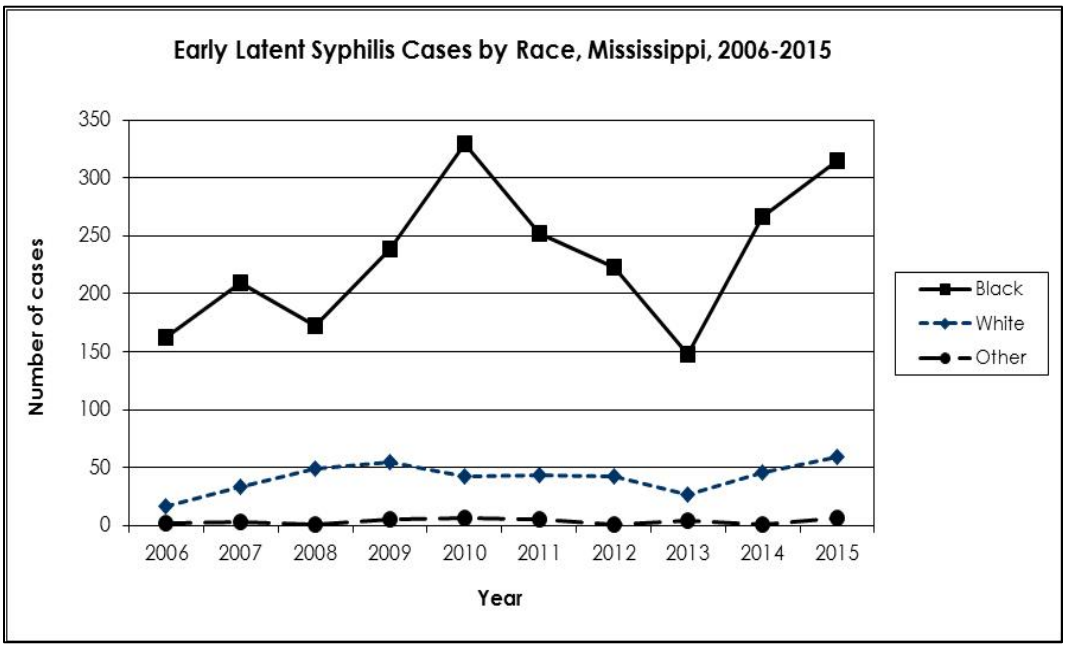


Figure 61



Return to Table of Contents

Tuberculosis

2015 Case Total	**73**	**2015 rate/100,000**	**2.4**
2014 Case Total	**74**	**2014 rate/100,000**	**2.5**

Clinical Features

Pulmonary tuberculosis (TB) is the most common form of active TB disease; but, disease can also be extrapulmonary and involve many organ systems. Symptoms are dependent on the site of infection. Pulmonary TB generally presents with cough (dry and later productive), pleuritic chest pains, hemoptysis, shortness of breath, fever, malaise, weakness, night sweats, and anorexia and weight loss. Individuals with Tuberculosis infection without disease (TBI) are asymptomatic and non-infectious.

Infectious Agent

Mycobacterium tuberculosis complex, an acid-fast bacillus

Reservoir

Primarily humans, rarely primates; in some areas, diseased cattle, badgers, swine and other mammals are infected.

Transmission

Exposure to tubercle bacilli in airborne droplet nuclei, 1 to 5 microns in diameter. The risk of infection with the tubercle bacillus is directly related to the degree of exposure.

Incubation

TB interferon gamma release assay (IGRA) or TB skin test conversion, indicating TBI, occur 2-10 weeks after exposure to active TB disease, if infected. Ten percent of persons with TBI will develop active disease, with the first 12-24 months after infection constituting the most hazardous period. HIV infection increases the risk and shortens the interval for development of active disease following infection with TB. In children, those under 5 years of age have the highest risk of developing disease. Smokers, diabetics, persons taking immunosuppressive drugs or TNF inhibitors, and persons with certain other chronic diseases have a higher risk of progression to active TB disease.

Period of Communicability

The degree of communicability depends on the number of bacilli discharged, virulence of the bacilli, adequacy of ventilation, exposure of bacilli to sun or UV light, and opportunities for aerosolization. Antimicrobial chemotherapy usually eliminates communicability within 2-4 weeks. Young children with primary tuberculosis are generally not infectious. TBI is not infectious.

Methods of Control

Prompt identification, diagnosis, follow-up, and treatment of potentially infectious patients with TB disease are necessary to interrupt continued transmission. MSDH performs contact investigations, targeted TB testing in high risk areas, and provides treatment for all active TB disease and TB infections.

Reporting Classification

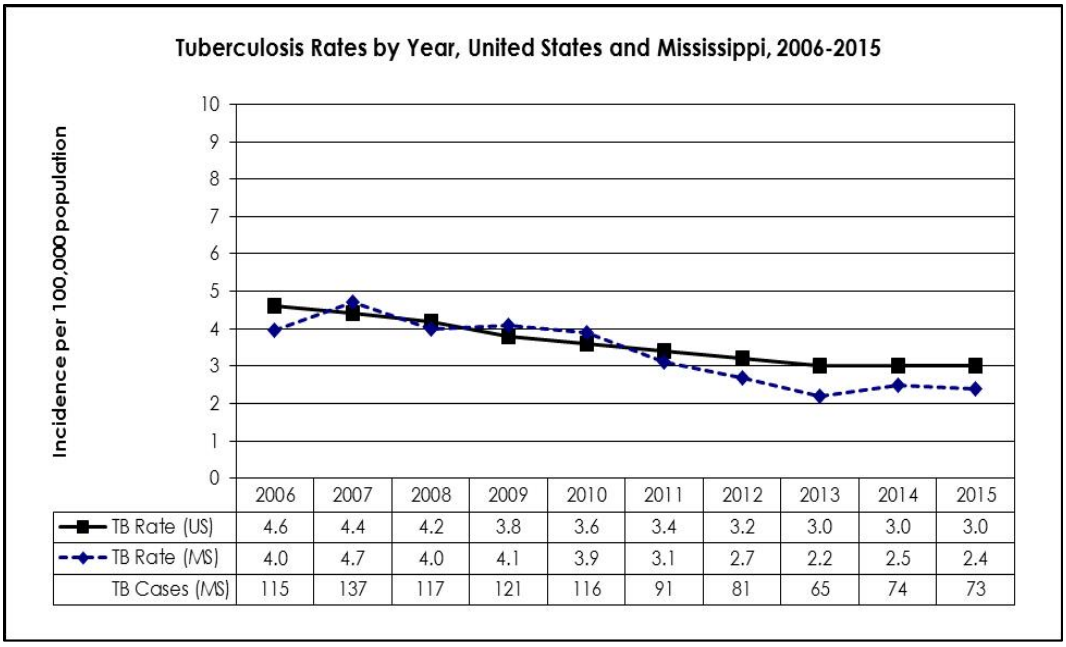
Class 1A; Tuberculosis

Class 2; *M. tuberculosis* infection (positive PPD or Interferon-Gamma Release Assay)

Epidemiology and Trends

From 2007 to 2015 there has been an overall gradual decline in active TB cases reported in Mississippi, with 74 cases reported in 2014, and 73 cases in 2015. Since 2011, the Mississippi case rate has been below the US case rate (Figure 62).

Figure 62



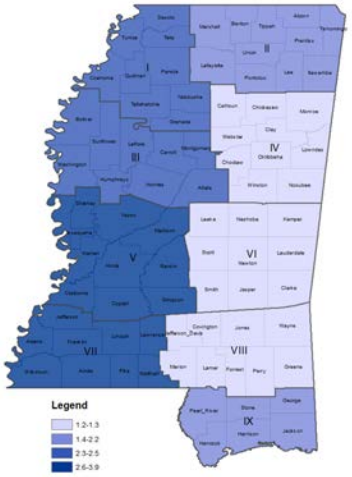
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TB Rate (US)	4.6	4.4	4.2	3.8	3.6	3.4	3.2	3.0	3.0	3.0
TB Rate (MS)	4.0	4.7	4.0	4.1	3.9	3.1	2.7	2.2	2.5	2.4
TB Cases (MS)	115	137	117	121	116	91	81	65	74	73

Geographically, TB was reported in every public health district, with the highest incidence noted in Public Health Districts V and VII in 2014 (Figure 63) and Districts III and V in 2015 (Figure 64).

Return to Table of Contents

Figure 63

Tuberculosis Incidence by Public Health District, Mississippi, 2014

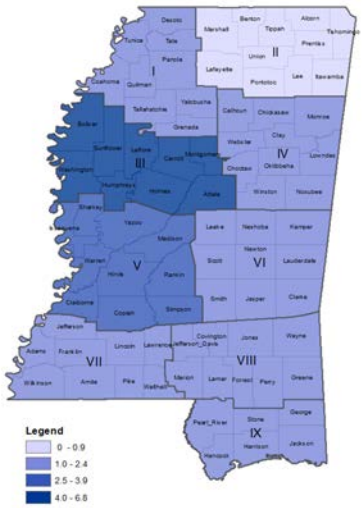


District	Cases	Rate*
I	8	2.5
II	8	2.2
III	5	2.4
IV	3	1.2
V	25	3.9
VI	3	1.2
VII	9	5.3
VIII	4	1.3
IX	9	1.9
Statewide	**74**	**2.5**

***per 100,000 population**

Figure 64

Tuberculosis Incidence by Public Health District, Mississippi, 2015

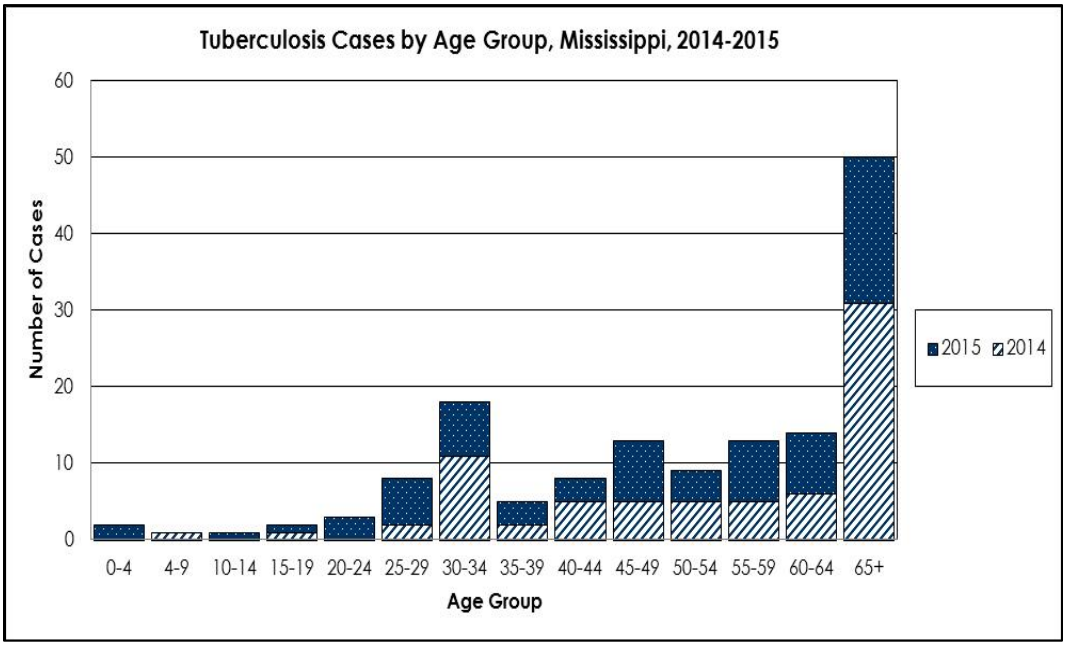


District	Cases	Rate*
I	5	1.5
II	3	0.8
III	14	6.8
IV	5	2.0
V	25	3.9
VI	4	1.7
VII	4	2.4
VIII	6	1.9
IX	7	1.4
Statewide	**73**	**2.4**

***per 100,000 population**

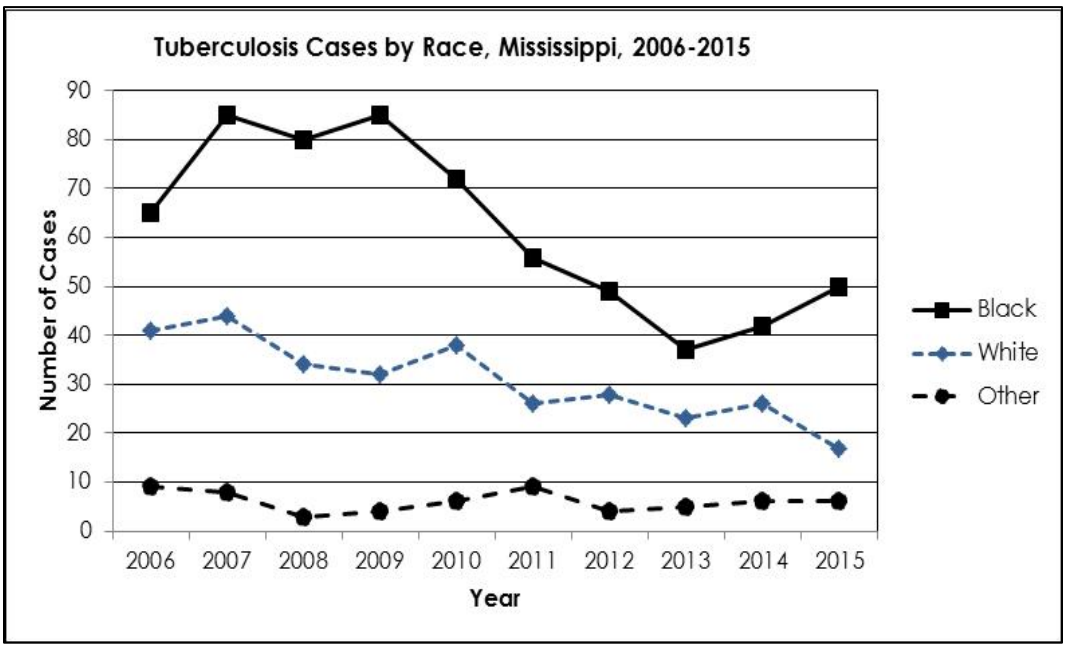
Disease occurred across all age groups during 2014 and 2015, with 67% of cases (99/147) occurring in individuals 45 years of age and older (Figure 65).

Figure 65



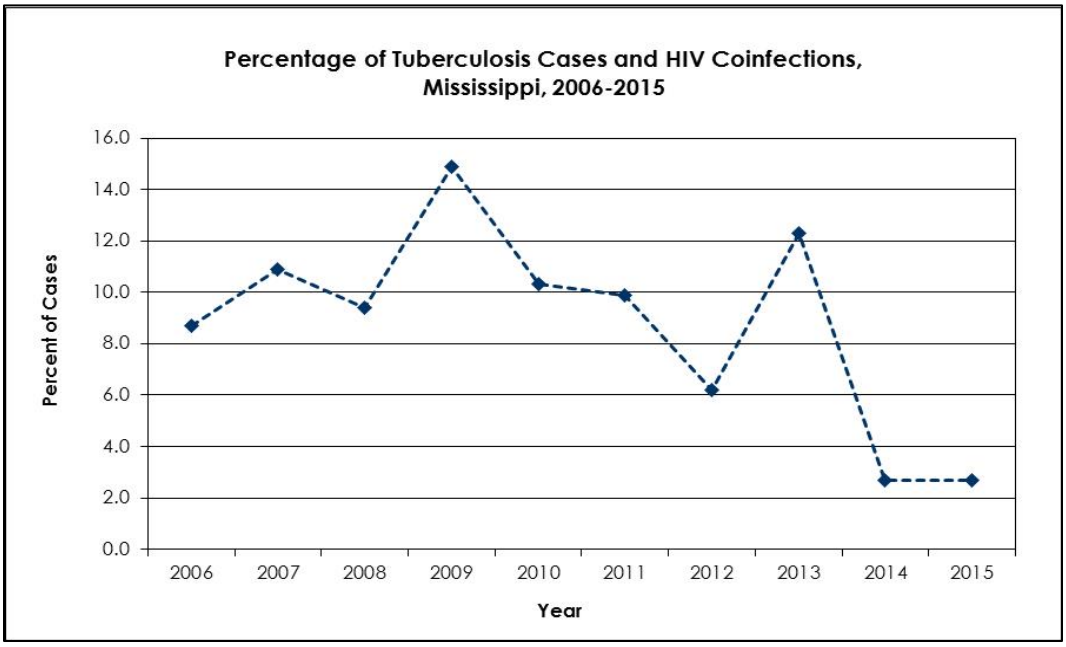
The number of cases in the African American and white population groups has steadily decreased over the last several years, while rates among other racial groups have fluctuated, but remained below 10%. Although there has been an overall decrease in rates among the African American population, this population remains disproportionately affected as the number of cases rose in 2014 (42) and 2015 (50). Since 2010, disease in the African American population has accounted for 61% of the reported cases. Between 2014 and 2015, 63% (92/147) of the cases were in this group (Figure 66).

Figure 66



Despite an increase in 2013 (12.3%), the percentage of TB cases among patients co-infected with HIV showed an overall decline from 2009 to 2015 (Figure 67).

Figure 67



Return to Table of Contents

Varicella

2015 Case Total	**13**	**2015 rate/100,000**	**0.4**
2014 Case Total	**4**	**2014 rate/100,000**	**0.1**

Clinical Features

Varicella is an acute viral disease with a primary infection (chickenpox) characterized by a generalized pruritic rash that progresses rapidly from macules to papules to vesicular lesions before crusting. The rash will be seen in various stages of development at any given time, usually appearing first on the head and more highly concentrated on the trunk rather than extremities. Adults may have 1-2 days of fever and discomfort prior to rash onset, but the rash is frequently the first sign of disease in children. Adults may have more severe disease and have a higher incidence of complications (secondary bacterial infections, pneumonia, aseptic meningitis and encephalitis). Herpes zoster is a localized manifestation of latent varicella infection, with incidence increasing with age. Lesions usually follow unilateral dermatomal patterns, but can be widespread or disseminated. Postherpetic neuralgia occurs in up to 15% of zoster patients.

Infectious Agent

Varicella zoster virus, a member of the herpes virus group.

Reservoir

Humans.

Transmission

Person to person transmission by airborne droplets or by direct contact with the lesions. Indirect spread can occur through contact with articles freshly soiled by vesicular or respiratory secretions. Maternal-fetal transmission also occurs. Susceptible contacts to localized herpes zoster may develop chickenpox by direct contact with fluid from the lesions, but respiratory transmission can occur in disseminated zoster.

Incubation

The incubation period is 14-16 days with a range of 10-21 days.

Period of Communicability

The period of communicability can be up to 5 days before onset of the rash (usually 2 days) and continues until all lesions are crusted (about 5 days).

Methods of Control

The live attenuated varicella vaccine is effective in preventing chickenpox. Routine vaccination is recommended at 12 months with a second dose at 4-6 years of age. Two doses of vaccine are also recommended for all susceptible healthcare personnel.

In 2006, FDA approved herpes zoster vaccine for persons 60 years of age and older. Clinical trials indicate the vaccine reduces the overall incidence of shingles by 51% in adults ≥60 years (64% for adults 60-69 years and 38% for adults ≥70 years) and reduces the incidence of postherpetic neuralgia by 67%.

MSDH investigates outbreaks of varicella, and vaccine is recommended after exposure if there is no evidence of prior disease or vaccination. The vaccine is 70% - 100% effective in preventing or attenuating disease if given within 72 hours of exposure.

Reporting Classification

Class 1B; varicella infection, primary, in patients >15 years of age.

Epidemiology and Trends

In 2014, there were four reported cases of varicella infection in patients >15 years of age; however, there were 13 cases of varicella infection reported in 2015. The cases ranged in age from 17 to 32 years, with a median age of 32 years. There were no reported varicella outbreaks in 2014, while two outbreaks were reported in 2015. Both outbreaks occurred in Intermediate Care Facilities for Individuals with Intellectual Disabilities (ICF/IID). One of the 2015 varicella outbreaks accounted for six of the 13 reported cases in 2015. There were no deaths attributed to varicella infection in individuals >15 years of age in 2014, but one death was reported in 2015 in an unvaccinated adult with Down syndrome. This death occurred in an outbreak setting.

Vibrio disease

2015 Case Total	**14**	**2015 rate/100,000**	**0.5**
2014 Case Total	**11**	**2014 rate/100,000**	**0.4**

Clinical Features

There are several noncholera *Vibrio* species that can cause clinical illness in humans, primarily wound infections, septicemia or gastroenteritis. *Vibrio vulnificus* and *Vibrio parahaemolyticus* are the two most frequently reported species leading to human infections in Mississippi. Individuals with chronic liver disease, alcoholism, or immunosuppression are at higher risk for sepsis and death.

V. vulnificus infection leads to the rapid development of sepsis 12 hours to 3 days after ingestion of contaminated seafood, usually raw oysters, or after exposure of a wound to coastal waters where *Vibrio* bacteria thrive. *V. vulnificus* sepsis is characterized by the rapid onset of fever, chills, blistering skin lesions, shock and death. The case fatality rate is over 50% when septicemia occurs.

V. parahaemolyticus infection typically causes gastroenteritis accompanied by watery diarrhea with abdominal cramps, nausea, vomiting and fever, and less commonly, wound infections. Infections with *V. parahaemolyticus* can also lead to sepsis and death.

Infectious Agent

Anaerobic, gram-negative halophilic (salt requiring) bacteria found naturally in marine and estuarine environments. *V. vulnificus* and *V.parahaemolyticus* are the two most frequently reported species in Mississippi. Other species common to Mississippi are *V. mimicus*, *Grimontia hollisae* (formerly *V. hollisae*), and *V. fluvialis*. Nontoxigenic *Vibrio cholerae* serogroups (non-O1/non-O139) are also reported as non-cholera *Vibrio* infections.

Reservoir

Found free living in warm coastal waters and in fish and shellfish, particularly oysters.

Transmission

Ingestion of the organisms in raw, undercooked, or contaminated fish and shellfish, or any food or water contaminated with raw seafood. Wound infections with *V. vulnificus* occur when wounds are exposed to estuarine waters.

Incubation

Median incubation period of 23 hours, with a range of 5-92 hours.

Period of Communicability

Not typically transmitted person to person.

Methods of Control

Seafood should be cooked adequately. Wounds exposed to seawater (either occupational or accidental) should be rinsed with clean fresh water. All children and immunocompromised individuals, especially alcoholics or individuals with liver disease, should avoid eating raw seafood, especially oysters, and should avoid seawater exposure to wounds. MSDH investigates all reported cases to determine the source of infection and possible risk factors of the case.

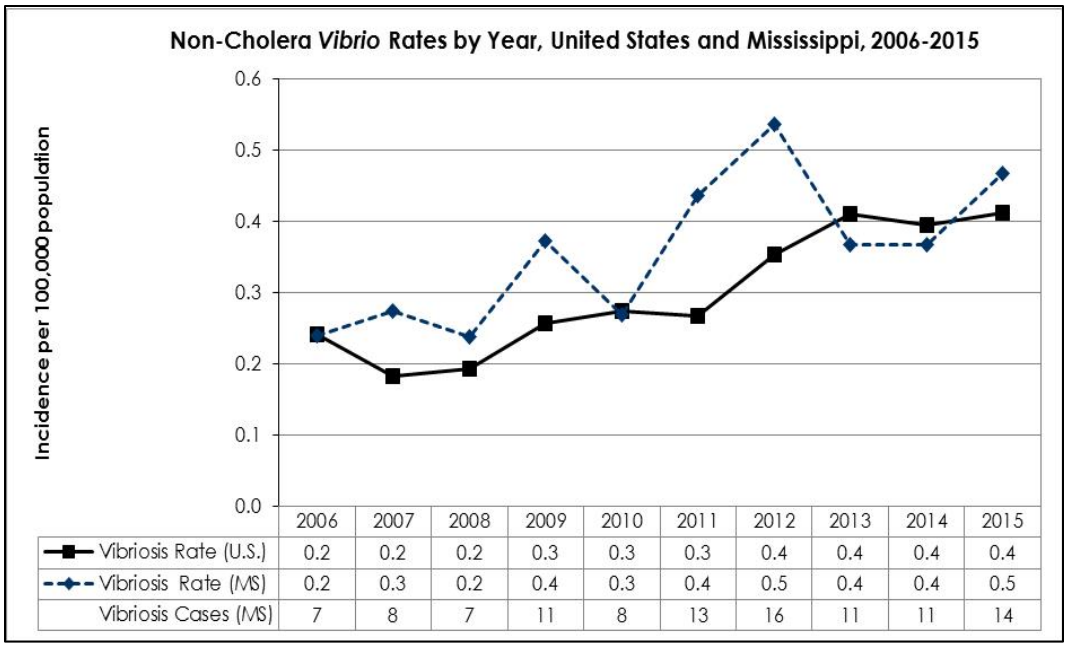
Reporting Classification

Class 1B.

Epidemiology and Trends

There were 25 *Vibrio* infections reported to MSDH between 2014 (11) and 2015 (14). The case counts during these years were comparable to the three year average of 13 cases for 2011-2013(Figure 68).

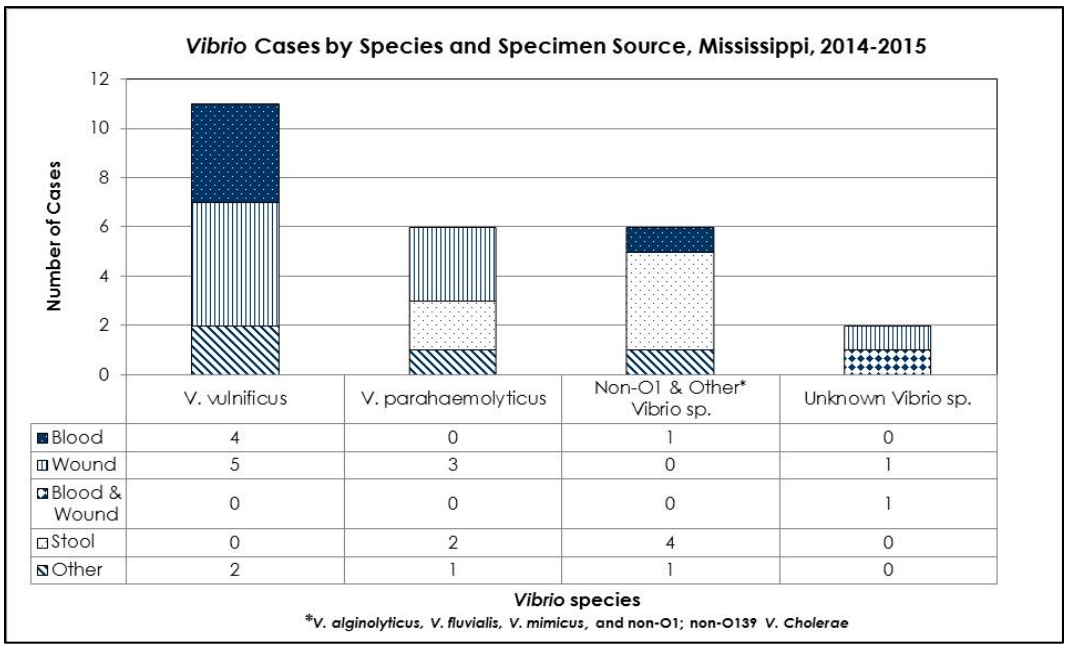
Figure 68



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Vibriosis Rate (U.S.)	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Vibriosis Rate (MS)	0.2	0.3	0.2	0.4	0.3	0.4	0.5	0.4	0.4	0.5
Vibriosis Cases (MS)	7	8	7	11	8	13	16	11	11	14

Of the 25 cases reported between 2014 and 2015, eleven (44%) were due to *V. vulnificus;* six (24%) were due to *V. parahaemolyticus*; six (24%) were due to other *Vibrio* species (*V. alginolyticus*, *V. fluvialis*, *V. mimicus*, and non-01; non-O139 *V. cholera*); and two (8%) were due to unknown *Vibrio* species. The *Vibrio* organisms were isolated from various sources, with the majority (36%) isolated from wounds (Figure 69).

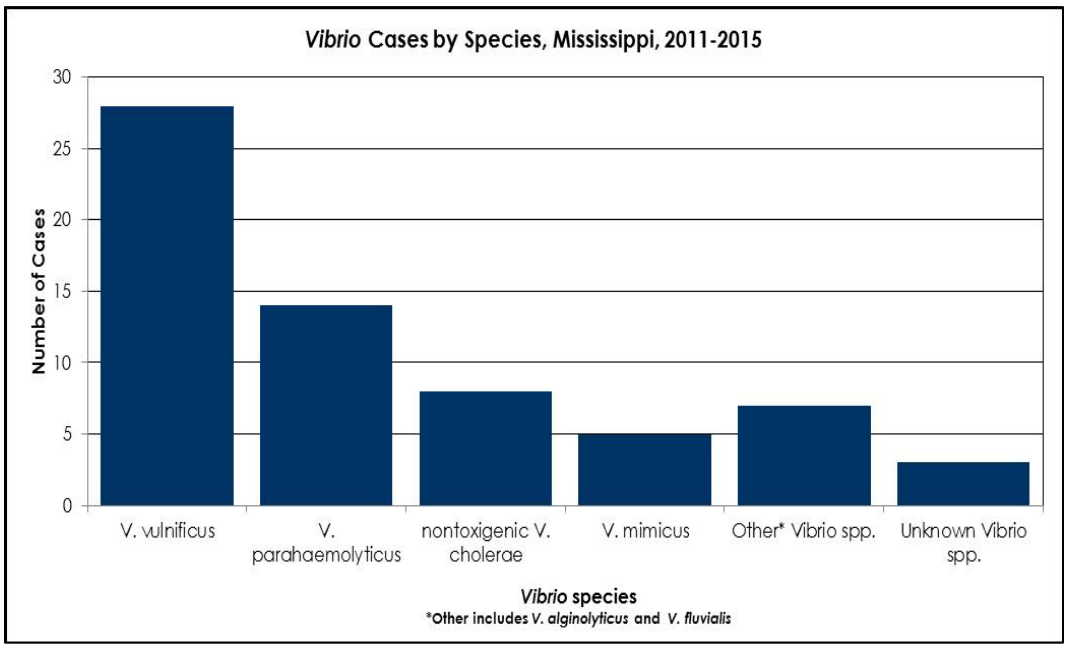
Figure 69



There were two reported deaths between 2014 and 2015. Both were due to *V. vulnificus* and presented as septicemias. One death occurred in an individual over the age of 50 who had unknown pre-existing conditions, while the other death occurred in an individual between the ages of 35-40 who had a history of alcoholism.

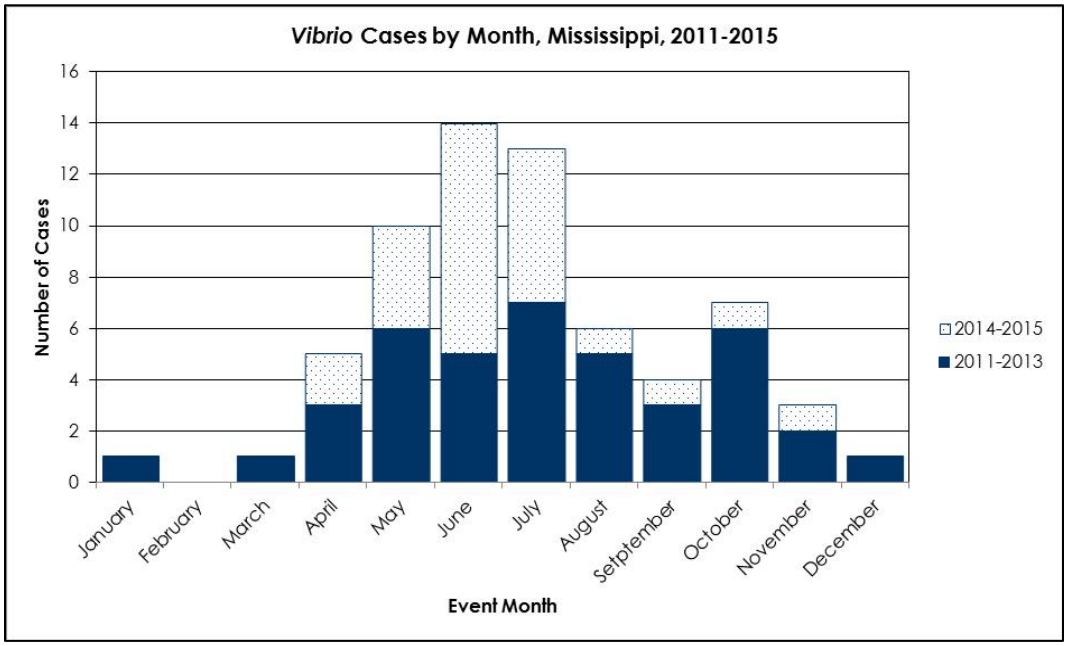
Over the past five years there have been a total of 65 cases of non-cholera *Vibrio* infections reported in Mississippi. *V. vulnificus* (28) and *V. parahaemolyticus* (14) have accounted for 65% of the total reported cases, followed by nontoxigenic *V. cholerae* (8), other *Vibrio* spp (7), *V. mimicus* (5), and unknown *Vibrio* spp (3) (Figure 70).

Figure 70



From 2011 through 2015, 66% of the reported *Vibrio* cases occurred between May and August (Figure 71).

Figure 71



Special Reports

This section of the *Annual Summary of Selected Reportable Diseases* provides reports on selected events of public health significance, including significant outbreak investigations conducted by MSDH in 2014 - 2015.

Large outbreak of adverse events related to synthetic cannabinoids ("Spice") – Mississippi, 2015

(The following is excerpted and adapted from the MSDH MMR in July 2015 entitled "Adverse Events Associated with the Use of Synthetic Cannabinoid – Mississippi, 2015"

Introduction: Synthetic cannabinoids (SC's), commonly referred to as "Spice," are man-made chemicals that target the same brain receptors as marijuana. These unregulated drugs are chemically unrelated to the psychoactive components of marijuana and the effects are unpredictable and frequently dangerous. Synthetic cannabinoids are typically sprayed onto plant material and smoked in a fashion similar to marijuana. These drugs can be sold in unlabeled bags or in packaging that suggests a false legitimacy. Common street names include "Spice," "Scooby Snax," "Mojo," "Toxin," and "Anthrax" among numerous others. Adverse clinical effects include hallucinations, a rapid heart rate, severe sweating, agitation, and in severe cases seizures, coma or death. There are numerous forms of SC's, many of which are chemically unrelated. They are not detectable on commercially available urine drug screens and are often falsely marketed as a legal analog of marijuana. All SC's are illegal substances in the state of Mississippi.

Overview and Findings: In April 2015 the Mississippi State Department of Health (MSDH) Office of Epidemiology was notified of an abnormal clustering of illnesses related to the ingestion of "Spice" by the University of Mississippi Medical Center Emergency Department (ED). In response, MSDH issued a Mississippi Health Alert Network (HAN) alert requesting healthcare providers to report any suspect case-patients to the Mississippi Poison Control Center (PCC). Enhanced surveillance activities, in collaboration with the Mississippi Poison Control Center and ED's across the state, identified 1,243 ED admissions between 4/2/2015 and 5/31/2015. Outreach to other state partners helped identify 17 deaths in Mississippi possibly attributed to SC's. Emergency room admissions peaked in mid-April through mid-May, dropping rapidly thereafter (Figure 72). Beginning in March 2015 there had been a marked increase in adverse events related to SC's but Mississippi was disproportionately impacted, accounting for 35% of all national reports in 2015; a finding likely due to a combination of the severe impact in Mississippi and enhanced surveillance efforts.

On April 22, 2015 MSDH requested a Centers for Disease Control and Prevention (CDC) Epi-AID, a state initiated request for federal support to assist in the investigation and response. A five member CDC team spent two weeks in Jackson with the objectives of better characterizing the outbreak, identifying associated deaths, determining risk factors for severe outcomes, and finding the source to stop the outbreak. A majority of counties reported at least one ED admission attributed to SC, with a predominant impact on the southern half of the state. Spice admissions were identified in 54 of the 82 Mississippi counties.

Figure 72

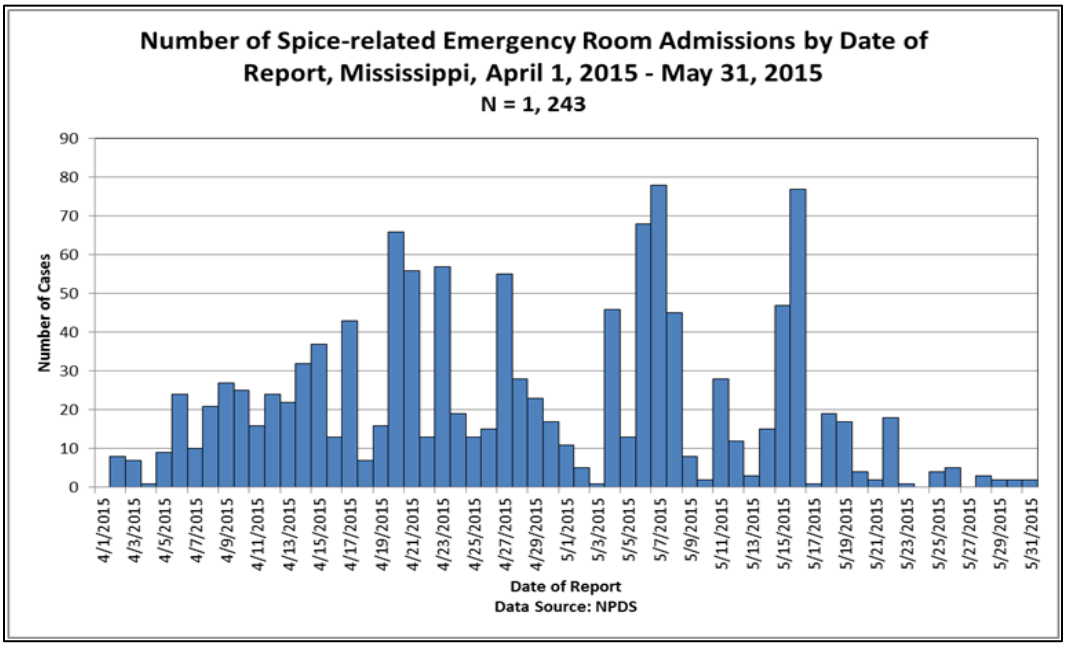
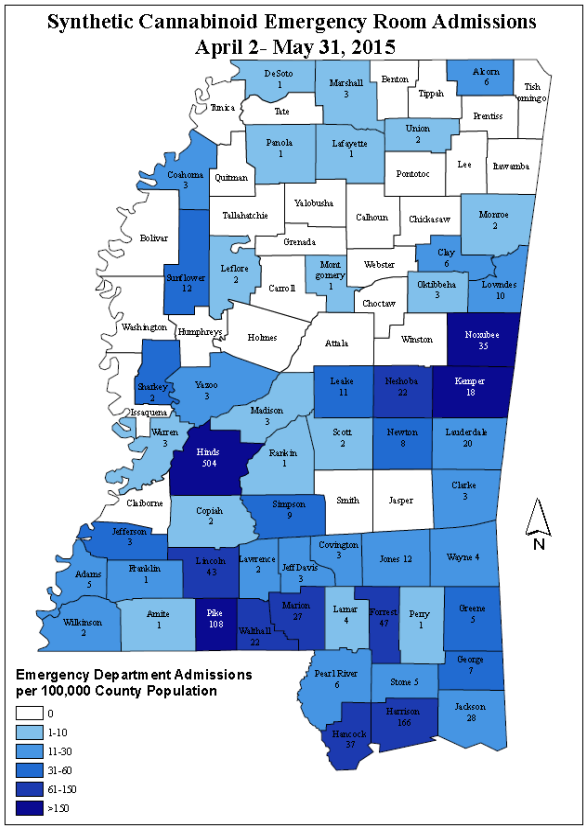


Figure 73 displays the rate of SC related emergency room admissions per 100,000 people based upon the population of the respective county. Hinds, Pike, Noxubee and Kemper counties had the highest rates in the state, all exceeding 150 per 100,000 population. The number displayed represents the total number SC related ER admissions for the county. Forty-one percent (n=504) of all cases were reported from Hinds County. Harrison (13%, n=166) and Pike (9%, n=108) counties also reported a high percentage of total cases.

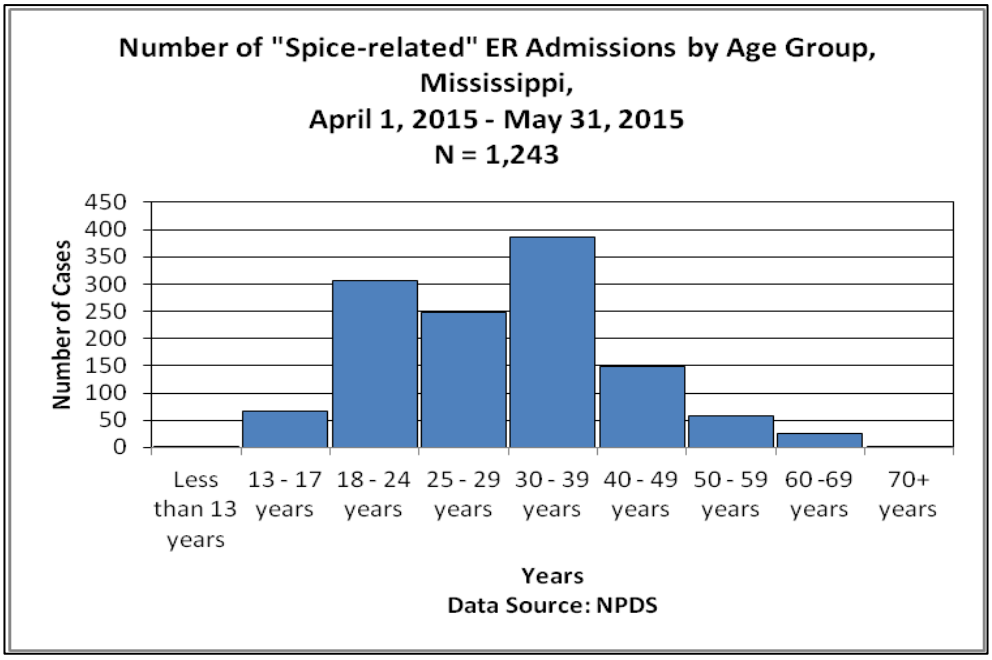
Return to Table of Contents

Figure 73



Of the 1,243 reported ER admissions, the majority were male (83%) and a there was a wide age distribution ranging between 12 to 72 years, with a majority (76%) of cases between 18 and 39 years old (Figure 74). Common symptoms included agitation (30%), violent or aggressive behavior (36%), confusion (25%), somnolence (20%), and 16% were unresponsive on admission. Hypertension and tachycardia were common clinical findings. From a subset analysis of 119 cases, twenty-one percent required hospitalization, ten percent to an intensive care unit. Of the 31 cases with samples initially sent to the Clinical and Environmental Toxicology Laboratory at the University of California San Francisco, 16 had sufficient serum or plasma for SC testing. Ten (63%) had positive findings for MAB-CHMINACA, a recently recognized SC. Four (25%) samples were positive for other controlled substances drugs, including benzodiazepines (3), opioids (2), phencyclidine (1), and mitragynine (1), a plant-based opioid. No other SC was identified and numerous additional samples have been submitted for testing.

Figure 74



Conclusions: Mississippi experienced one of the largest recorded outbreaks of adverse events related to synthetic cannabinoids (SC's) in 2015. Evidence indicates that a relatively new SC, MAB-CHMINACA, was responsible for the adverse events reported. SC's are unregulated and have unpredictable physical responses, and chemical concentration of any purchased product is likely to be highly variable. Future adverse events are likely given the popularity of these compounds. Providers should maintain awareness of these drugs and the potential adverse effects that accompany their use. All Mississippians, particularly young adults, should be educated that SC's are unregulated, unsafe, unpredictable and illegal.

Return to Table of Contents

Reportable Disease Statistics

Mississippi Reportable Disease Statistics

2014

		Public Health District									
		I	II	III	IV	V	VI	VII	VIII	IX	State Total*
Sexually Transmitted Diseases	Primary & Secondary Syphilis	11	4	6	16	76	12	14	34	19	**192**
	Early Latent Syphilis	25	21	25	19	156	8	5	32	48	**339**
	Gonorrhea	378	395	561	445	1,666	509	302	679	694	**5,629**
	Chlamydia	2,141	1,829	2,425	1,559	4,927	1,582	1,166	1,762	2,212	**19,603**
	HIV Disease	48	37	45	30	182	19	23	48	55	**487**
Myco-bacterial Diseases	Pulmonary Tuberculosis (TB)	8	6	4	1	23	3	7	1	9	**62**
	Extrapulmonary TB	0	2	1	2	3	0	2	2	0	**12**
	Mycobacteria Other Than TB	11	52	27	28	108	29	22	40	71	**388**
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	**0**
	Pertussis	8	16	0	2	9	8	9	2	10	**64**
	Tetanus	0	0	0	0	1	0	0	0	0	**1**
	Poliomyelitis	0	0	0	0	0	0	0	0	0	**0**
	Measles	0	0	0	0	0	0	0	0	0	**0**
	Mumps	0	0	0	0	0	0	0	0	0	**0**
	Hepatitis B (acute)	3	2	3	1	8	1	1	17	11	**47**
	Invasive *H. influenzae* disease	3	9	0	2	11	5	2	1	1	**34**
	Invasive Meningococcal disease	0	0	0	0	0	0	0	0	1	**1**
Enteric Diseases	Hepatitis A (acute)	1	0	0	0	1	0	0	1	0	**3**
	Salmonellosis	92	188	37	84	255	63	83	72	95	**983**
	Shigellosis	11	36	6	26	50	6	11	38	9	**196**
	Campylobacteriosis	21	14	7	6	15	9	5	13	13	**106**
	E. coli O157:H7/HUS/STEC	5	4	0	0	5	5	2	4	8	**33**
Zoonotic Diseases	Animal Rabies (bats)	0	0	0	0	1	0	0	0	0	**1**
	Lyme disease	0	0	0	0	0	0	0	2	0	**2**
	Rocky Mountain spotted fever	4	6	3	18	6	9	3	2	0	**51**
	West Nile virus	1	1	3	4	19	4	3	7	1	**43**

***Totals include reports from Department of Corrections and those not reported from a specific District.**

Return to Table of Contents

Mississippi Reportable Disease Statistics

2015

		Public Health District									
		I	II	III	IV	V	VI	VII	VIII	IX	State Total*
Sexually Transmitted Diseases	Primary & Secondary Syphilis	12	7	18	15	76	26	7	40	18	**219**
	Early Latent Syphilis	28	26	30	18	185	29	5	29	55	**405**
	Gonorrhea	520	397	625	471	1,498	428	313	777	746	**5,775**
	Chlamydia	1,930	1,584	1,938	1,377	4,387	1,359	949	1,706	2,141	**17,371**
	HIV Disease	44	33	36	36	196	41	20	48	57	**511**
Myco-bacterial Diseases	Pulmonary Tuberculosis (TB)	4	3	13	3	24	3	3	6	6	**65**
	Extrapulmonary TB	1	0	1	2	1	1	1	0	1	**8**
	Mycobacteria Other Than TB	31	47	26	15	118	31	27	42	84	**421**
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	**0**
	Pertussis	3	0	1	2	0	3	0	1	2	**12**
	Tetanus	0	0	0	0	0	0	0	0	0	**0**
	Poliomyelitis	0	0	0	0	0	0	0	0	0	**0**
	Measles	0	0	0	0	0	0	0	0	0	**0**
	Mumps	0	0	0	0	0	0	0	0	0	**0**
	Hepatitis B (acute)	5	10	1	4	4	2	3	7	14	**50**
	Invasive *H. influenzae* disease	3	8	0	5	12	3	1	6	5	**43**
	Invasive Meningococcal disease	0	0	0	0	0	0	0	0	0	**0**
Enteric Diseases	Hepatitis A (acute)	0	0	0	1	0	0	0	0	0	**1**
	Salmonellosis	126	184	47	82	229	91	80	101	127	**1,067**
	Shigellosis	2	20	1	15	32	10	3	3	13	**99**
	Campylobacteriosis	14	26	14	3	45	13	15	40	25	**195**
	E. coli O157:H7/HUS/STEC	2	3	0	1	6	4	1	2	4	**23**
Zoonotic Diseases	Animal Rabies (bats)	0	0	1	1	0	0	0	0	1	**3**
	Lyme disease	0	0	0	0	0	1	0	0	3	**4**
	Rocky Mountain spotted fever	7	8	3	21	11	23	5	16	5	**99**
	West Nile virus	0	0	3	0	28	2	1	4	0	**38**

***Totals include reports from Department of Corrections and those not reported from a specific District.**

Return to Table of Contents

Mississippi

Provisional Reportable Disease Statistics

October 2017

Figures for the current month are provisional

		Public Health District									State Totals*			
		I	II	III	IV	V	VI	VII	VIII	IX	Oct 2017	Oct 2016	YTD 2017	YTD 2016
Sexually Transmitted Diseases	Primary & Secondary Syphilis	2	0	1	2	4	1	1	1	7	**19**	34	250	277
	Total Early Syphilis	5	0	1	4	4	1	0	1	1	**17**	40	389	421
	Gonorrhea	112	161	127	96	231	85	58	98	115	**1,083**	569	7,367	5,586
	Chlamydia	315	256	264	223	567	225	137	240	269	**2,496**	1,182	16,892	15,447
	HIV Disease	3	2	1	5	18	2	3	2	1	**37**	41	393	376
Myco-bacterial Diseases	Pulmonary Tuberculosis (TB)	1	0	1	0	0	0	0	0	2	**4**	4	40	36
	Extrapulmonary TB	0	0	0	0	0	0	0	0	0	**0**	2	4	9
	Mycobacteria Other Than TB	0	7	1	4	7	4	1	2	8	**34**	42	340	330
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	**0**	0	0	0
	Pertussis	0	0	2	0	0	0	0	0	0	**2**	0	30	2
	Tetanus	0	0	0	0	0	0	0	0	0	**0**	0	0	1
	Poliomyelitis	0	0	0	0	0	0	0	0	0	**0**	0	0	0
	Measles	0	0	0	0	0	0	0	0	0	**0**	0	0	0
	Mumps	1	0	0	0	1	0	0	0	0	**2**	0	25	1
	Hepatitis B (acute)	0	1	0	0	0	0	0	0	2	**3**	5	33	25
	Invasive *H. influenzae* disease	0	1	0	0	1	1	1	0	2	**6**	4	48	51
	Invasive Meningococcal disease	0	0	0	0	0	0	0	0	0	**0**	0	2	0
Enteric Diseases	Hepatitis A (acute)	0	0	0	0	0	0	0	0	0	**0**	0	2	3
	Salmonellosis	10	28	9	19	23	11	8	11	11	**130**	145	972	1,054
	Shigellosis	0	7	2	0	5	1	0	0	1	**16**	5	134	58
	Campylobacteriosis	3	9	3	3	6	1	0	3	12	**40**	36	406	213
	E. coli O157:H7/STEC/HUS	0	0	0	0	0	0	0	0	0	**0**	4	18	20
Zoonotic Diseases	Animal Rabies (bats)	0	0	0	0	0	0	0	0	0	**0**	0	1	3
	Lyme disease	0	0	0	0	0	0	0	0	0	**0**	0	1	0
	Rocky Mountain spotted fever	0	0	0	0	0	0	0	1	0	**1**	5	150	102
	West Nile virus	1	0	0	0	2	0	0	0	0	**3**	11	62	40

***Totals include reports from Department of Corrections and those not reported from a specific District.**

Return to Table of Contents

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