

Mississippi Morbidity Report

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Annual Summary Selected Reportable Diseases Mississippi – 2009



MISSISSIPPI STATE DEPARTMENT OF HEALTH

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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 intentional spread of 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). 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 1 diseases, reportable by telephone at first knowledge or suspicion, are those to which the MSDH responds immediately to an individual case; Class 2 diseases, those reportable within a week of diagnosis, and Class 3 diseases, reportable only by laboratories, do not necessitate an immediate response to an individual case.

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 1 diseases or outbreaks nights 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

Acting State Epidemiologist

Mississippi Public Health Districts

Public Health Districts

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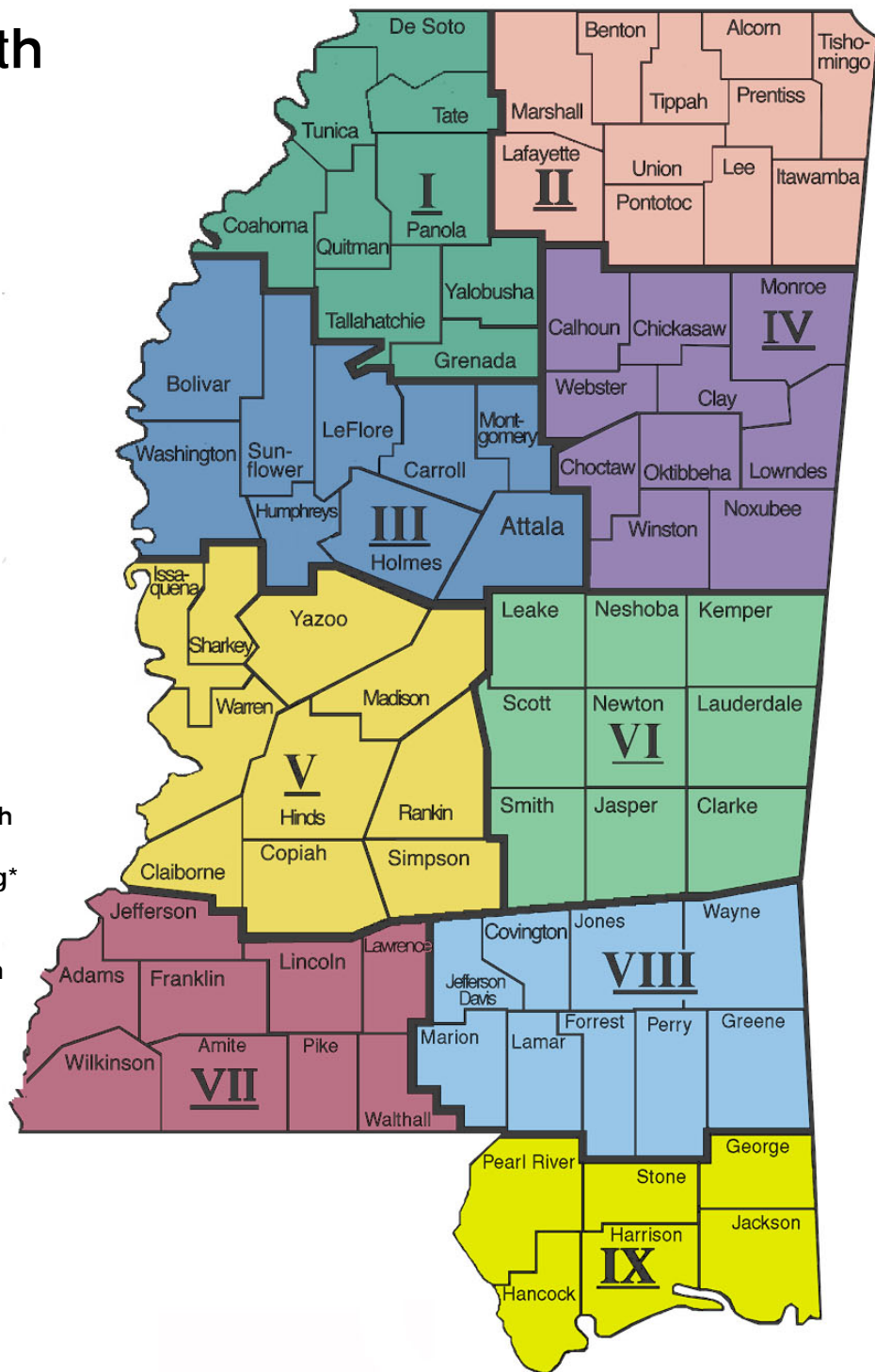
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*District Health Officer

Reportable Disease List

Mississippi State Department of Health 2008 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

Class 1 Conditions may be reported nights, weekends and holidays by calling:
(601) 576-7400

Class 1: Diseases of major public health importance which shall be reported directly to the Mississippi State Department of Health (MSDH) by telephone within 24 hours of first knowledge or suspicion. Class 1 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) (Possible biological weapon agents appear in <i>bold italics</i>)		
<i>Anthrax</i>	<i>Glanders</i>	<i>Smallpox</i>
Arboviral infections including but not limited to those due to:	Hemolytic uremic syndrome (HUS), post-diarrheal	<i>Staphylococcus aureus</i> , vancomycin resistant
California encephalitis virus	Hepatitis A	(VRSA) or vancomycin
Eastern equine encephalitis virus	HIV infection, including AIDS	intermediate (VISA)
LaCrosse virus	Influenza-associated pediatric	Syphilis (including
Western equine encephalitis virus	mortality, in patients <18 years of	congenital)
St. Louis encephalitis virus	age	Tuberculosis
West Nile virus	Invasive disease ^{††} due to:	<i>Tularemia</i>
<i>Botulism</i> (including foodborne, infant or wound)	<i>Neisseria meningitidis</i> or <i>Haemophilus influenzae</i> type b	Typhoid fever
<i>Brucellosis</i>	Measles	<i>Typhus fever</i>
Chancroid	<i>Melioidosis</i>	Varicella Infection, primary, in patients >15
Cholera	Pertussis	years of age
Creutzfeldt-Jakob disease, including new variant	<i>Plague</i>	<i>Viral hemorrhagic fevers</i>
Diphtheria	Poliomyelitis	(filoviruses [e.g., Ebola, Marburg] and
<i>Escherichia coli</i> O157:H7	<i>Psittacosis</i>	arenaviruses [e.g., Lassa, Machupo])
Encephalitis (human)	<i>Q fever</i>	Yellow fever
	<i>Ricin intoxication (castor beans)</i>	
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.		

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

<i>Chlamydia trachomatis</i> , genital infection	Malaria	Spinal cord injuries
Dengue	Meningitis other than meningococcal or <i>H. influenzae</i> type b	<i>Streptococcus pneumoniae</i> , invasive disease [†] ,
Ehrlichiosis	Mumps	Antibiotic resistant
<i>Enterococcus</i> , invasive infection [‡] , vancomycin resistant	<i>M. tuberculosis</i> infection (positive TST) in children < 15 years of age	<i>Streptococcus pneumoniae</i> ,
Gonorrhea	Noncholera vibrio disease	invasive disease [†] in children < 5 years of age
Hepatitis (acute, viral only) Note- Hepatitis A requires Class 1 Report	Poisonings* (including elevated blood lead levels**)	Tetanus
Legionellosis	Rocky Mountain spotted fever	Trichinosis
Listeriosis	Rubella (including congenital)	Viral encephalitis in horses and rabies
Lyme disease	Salmonellosis	
	Shigellosis	
† Usually presents as meningitis or septicemia, or less commonly as cellulitis, epiglottitis, osteomyelitis, pericarditis or septic arthritis.		
‡ Specimen obtained from a normally sterile site.		
*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) of ≥ 10 $\mu\text{g}/\text{dL}$ in children less than 16 years of age Blood lead levels (venous) of ≥ 25 $\mu\text{g}/\text{dL}$ in those 16 years or older		
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, 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	Cryptosporidiosis	Histoplasmosis
Blastomycosis	Hansen disease (Leprosy)	Nontuberculous mycobacterial disease
Campylobacteriosis	Hepatitis C infection	

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 codes is available on the Mississippi Cancer Registry website, <http://mcr.umc.edu/documents/Reportablecasesafter1006.pdf>.

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).

Vaccine Preventable Diseases

Haemophilus influenzae type b (Hib), invasive

2009 Case Total	0	2009 rate/100,000	0.0
2008 Case Total	4	2008 rate/100,000	0.1

Clinical Features

Haemophilus influenzae, type b (Hib) is an invasive bacterial disease, particularly among infants, that can affect many organ systems. Invasive disease usually begins as a bloodstream infection, with bacteria spreading to distant sites. 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 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 type b, a gram-negative encapsulated bacterium.

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 and 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 reported suspected Hib cases and provides prophylactic antibiotics (rifampin) for all household contacts with one or more children under one year old or in households with children 1-3 years old who are inadequately immunized. During investigation, contacts are often treated before the isolate's serotype is known. MSDH requests that all *Haemophilus influenzae* isolates be sent to the Public Health Laboratory (PHL) for serotyping.

Reporting Classification

Class 1.

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 dropped from 82 in 1989, to 5 by 1994. There have been less than 5 cases per year since 1995.

In 2009, there were no reported cases of Hib.

Hepatitis B, acute

2009 Case Total	32	2009 rate/100,000	1.1
2008 Case Total	58	2008 rate/100,000	2.0

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 fewer than 10% of children. Approximately 5% of all acute cases progress to chronic infection. Younger age at infection is a risk factor for becoming a chronic carrier with 90% of perinatally infected infants becoming 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 perinatal exposure, through contact with contaminated needles, or through 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 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 injecting 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 (HBeAg) positive. The risk of perinatal transmission is about 10% if the mother is only HBsAg positive. 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, and then tests for post-vaccine response and for possible seroconversion at 9-12 months of age. Post-exposure prophylaxis is highly effective in preventing hepatitis B vertical transmission, therefore, testing of all pregnant women for HBsAg is recommended with each pregnancy.

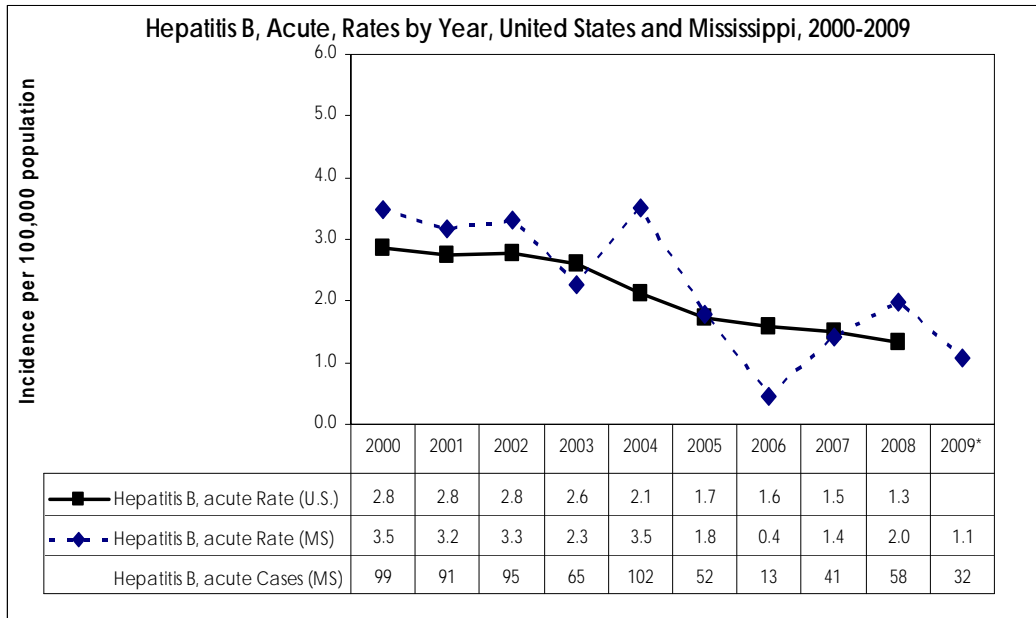
Reporting Classification

Class 2.

Epidemiology and Trends

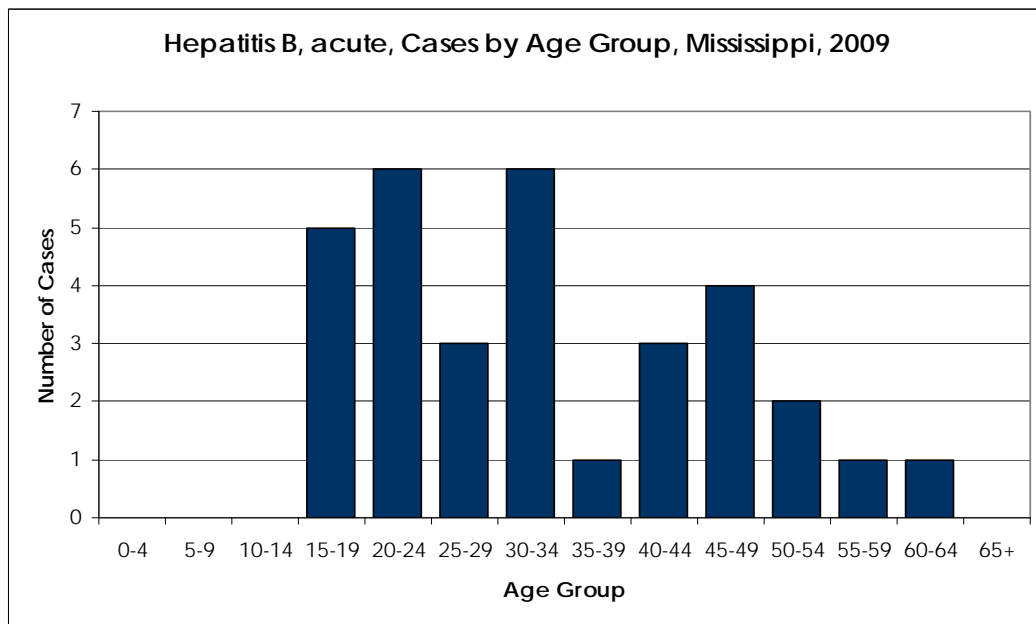
In 2009, 32 cases of acute hepatitis B were reported. This was lower than the 58 cases reported in 2008, and the three year average (2006-2008) of 37 cases reported annually (Figure 1). Twenty (63%) of the 32 reported cases occurred in individuals aged 15-34 years. Overall, the cases ranged in age from 16 to 64 years old (Figure 2).

Figure 1



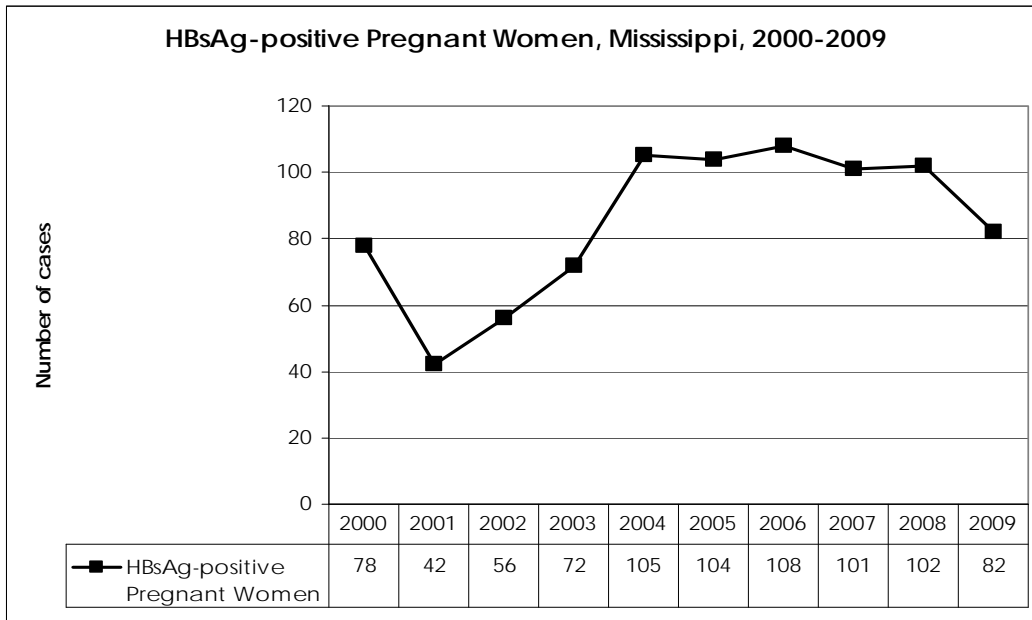
*2009 U.S. data not available.

Figure 2



In 2009, 82 HBsAg positive pregnant women were reported to the Perinatal Hepatitis B Program. This is lower than the 102 reported in 2008 and the three year average of 104 (Figure 3). There were no reported cases of HBsAg-positive infants born to HBsAg positive mothers in 2009. This was similar to 2008; however, in 2007 there were two cases of perinatal transmission.

Figure 3



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. In a typical influenza season, persons aged 65 years and older, young children, pregnant and postpartum women, and persons at any age with chronic underlying illnesses are at highest risk of complications. In the recent pandemic caused by 2009 H1N1, the highest risk of complications were in pregnant and postpartum women, young children and persons of any age with chronic underlying illnesses. Pneumonia due to secondary bacterial infections is the most common complication of any influenza infection. In a recent report issued by the CDC, during the period 1976—2007, estimated influenza deaths ranged from a low of 3,349 to a high of 48,614 per year in the United States.

Infectious Agent

Influenza is caused by an RNA virus. There is usually one predominant subtype of influenza virus causing the majority of infection each influenza season; however influenza A subtypes and influenza B can circulate causing infection each season.

Reservoir

Humans.

Transmission

Transmission occurs person to person by direct or indirect contact with virus laden droplets or respiratory secretions.

Incubation

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

Period of Communicability

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

Methods of Control

Yearly vaccination is recommended with either trivalent inactivated vaccine (TIV) or live attenuated influenza vaccine (LAIV). A separate vaccine was developed for the pandemic strain, 2009 H1N1, but was not available in adequate quantities for distribution to the general public until after the 2009 peak incidence of disease in Mississippi (see Epidemiology and Trends). Education on basic personal hygiene, specifically transmission from unprotected coughs and sneezes and from hand to mucous membrane is highly important in preventing or slowing transmission of influenza. Antivirals, amantadanes (amantadine and rimantadine) and neuraminidase inhibitors (oseltamivir and zanamivir), can also be used to prevent and treat influenza. High levels of resistance to the adamantanes persist among influenza A (2009 H1N1) and A (H3N2) viruses circulating globally. The adamantanes are not effective against influenza B viruses. Fortunately, influenza A (2009 H1N1) and A (H3N2), as well as influenza B viruses continue to be sensitive to the neuraminidase inhibitors. Consult the Centers for Disease Control and Prevention (CDC) MMWR July 31, 2009, Vol. 58, No. RR—08, "Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009" for vaccine recommendations and guidelines.

Reporting Classification

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

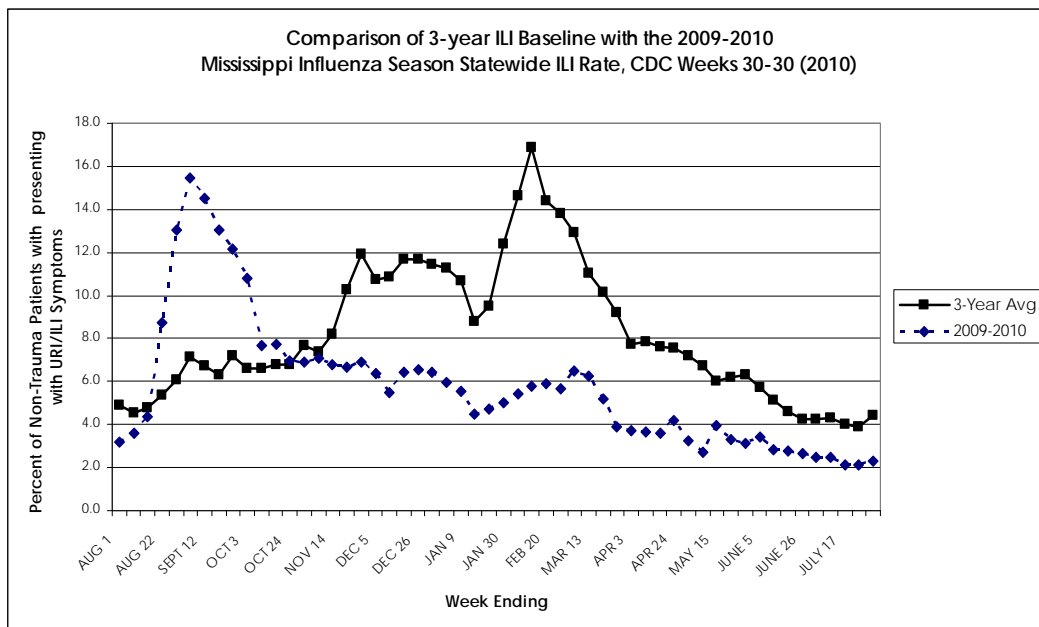
Epidemiology and Trends

Influenza activity usually occurs from December through March or April each season, but infections can be seen earlier or later. Peak activity is typically from February to March. 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 an active syndromic surveillance program reported by sentinel providers. In the 2009-2010 influenza season, 70 sentinel providers in 42 counties were enrolled in this system, representing hospital emergency departments, urgent care and primary care clinics, and college and university student health centers. These providers reported weekly numbers of nontrauma patient visits consistent with an influenza-like illness (ILI), defined as fever > 100°F 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).

2009 was unusual in that the usual 2008-2009 influenza season was followed by a pandemic of influenza A (2009 H1N1). The first confirmed case of 2009 H1N1 in Mississippi occurred on May 15, 2009, however, influenza activity remained low in Mississippi until the week ending 8/22/2009, approximately one week after the opening of schools in most parts of the state. Then ILI activity increased and peaked during the week ending 9/5/2009. It then declined and remained lower than the 3 year average for the remainder of the 2009-2010 season (Figure 4).

Figure 4



Positive PCR samples were reported throughout the state, with a mixture of influenza A (H1N1-seasonal), influenza A (H3N2) and influenza B occurring through May 2009 (Figure 5). Beginning in May 2009, Pandemic influenza A (2009 H1N1) appeared with increasing frequency and became the dominant subtype by June (Figure 6). From July through

the end of 2009, greater than 98% of sub-typeable virus specimens were 2009 H1N1 Pandemic Influenza A.

Figure 5

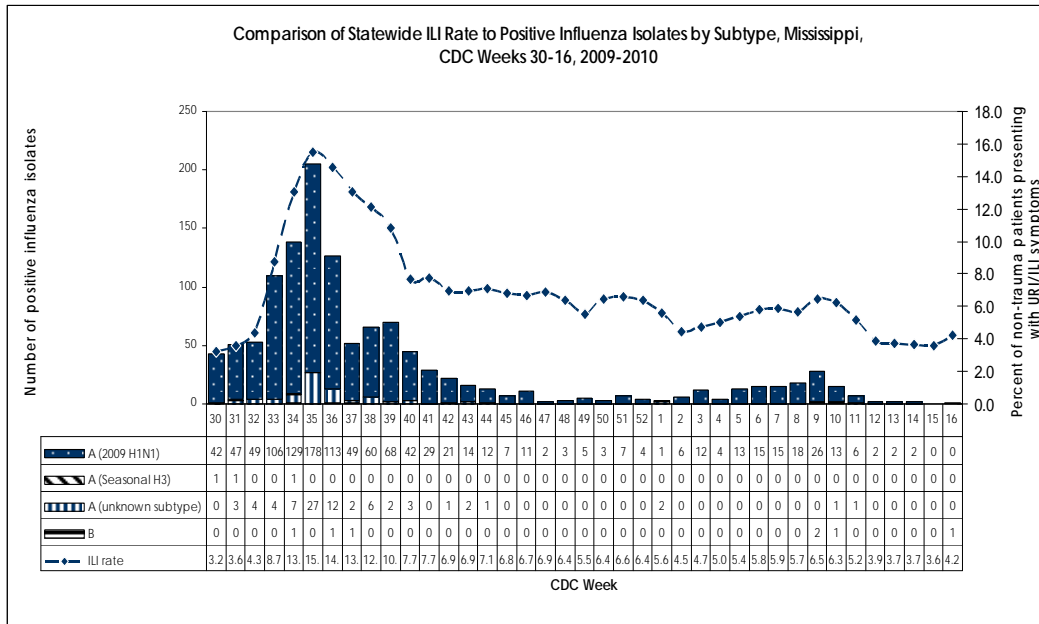
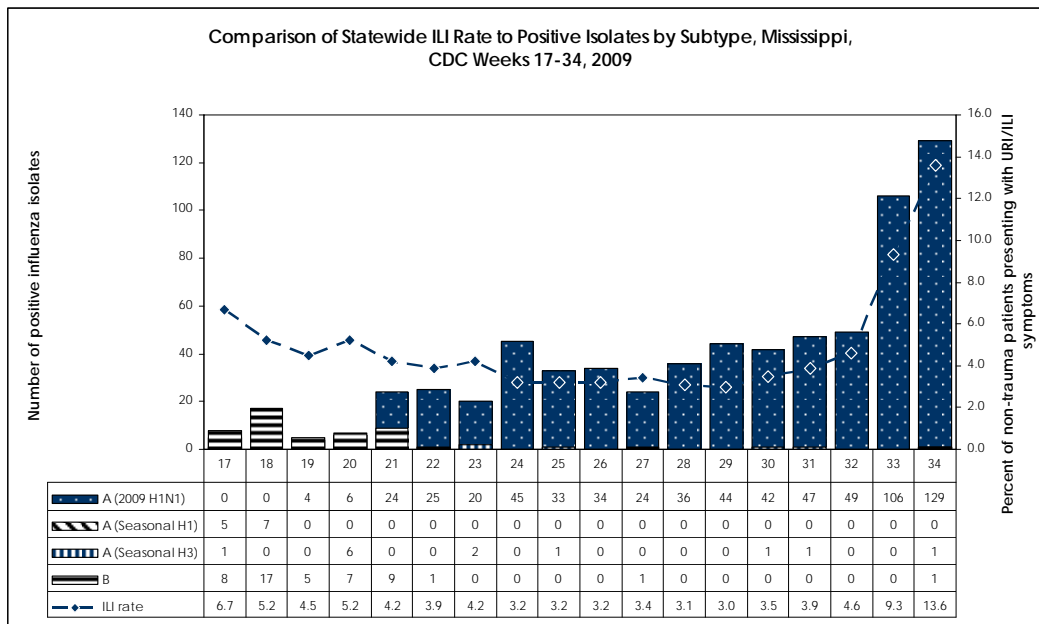


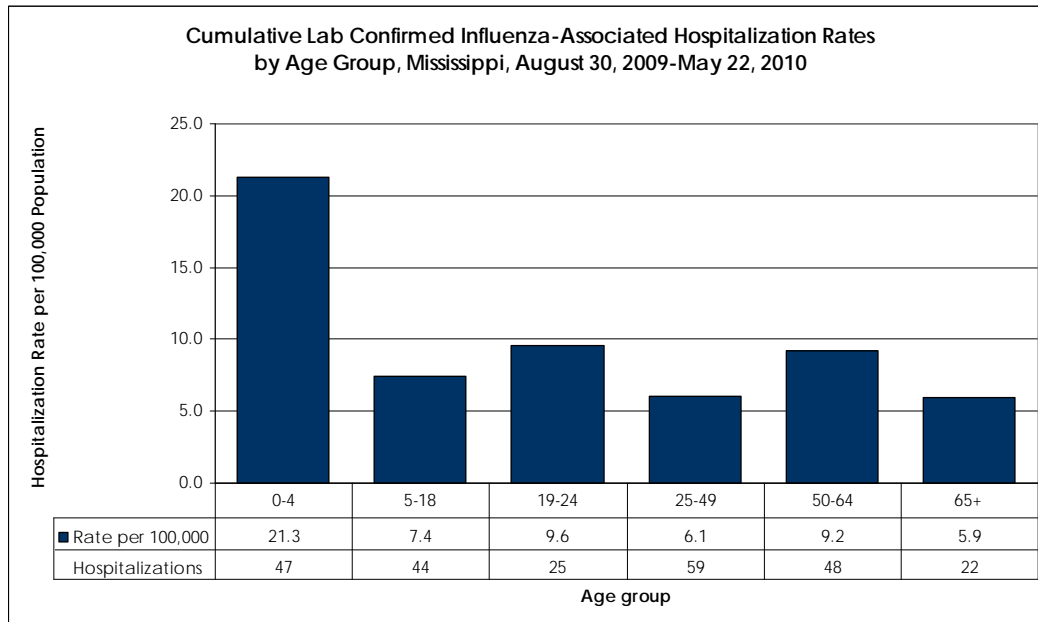
Figure 6



The age groups most affected by Pandemic influenza A (2009 H1N1) differed from those seen with seasonal influenza. Seasonal influenza has its greatest impact in those over age 65 and in children under age 4. However, persons over age 65 appeared to be less susceptible to infection with 2009 Pandemic influenza A (H1N1), so that rates of

hospitalization with Pandemic influenza A (2009 H1N1) were greatest in young people (Figure 7).

Figure 7



Measles

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 direct contact with large infectious droplets or, less commonly, by airborne spread. Measles is highly contagious, and all persons without previous disease or vaccination are susceptible.

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 to 15 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.

Reporting Classification

Class 1.

Epidemiology and Trends

Measles occurs throughout the world with peak incidence usually in late winter and spring. 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.

Widespread measles immunization has led to the interruption of endemic transmission of measles in the United States and Mississippi. However, measles continues to be endemic or has become endemic again in several countries, particularly in Europe, due in part to dropping immunization rates. Sporadic outbreaks are reported in the U.S. and are largely due to imported cases. Transmission from these cases easily occurs in communities with high numbers of unvaccinated persons. 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.

Meningococcal disease, invasive

2009 Case Total	5	2009 rate/100,000	0.2
2008 Case Total	12	2008 rate/100,000	0.4

Clinical Features

Invasive meningococcal disease is an acute bacterial illness characterized by meningitis and/or meningococemia 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 and mental retardation.

Infectious Agent

Neisseria meningitidis (*N. meningitidis*), a gram negative aerobic 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, children aged 13-18 years not previously vaccinated, and any person aged 2-55 years with increased risk for meningococcal disease (terminal complement deficiencies, functional or anatomic asplenia, college freshman living in dormitories, and travelers 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.

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 1.

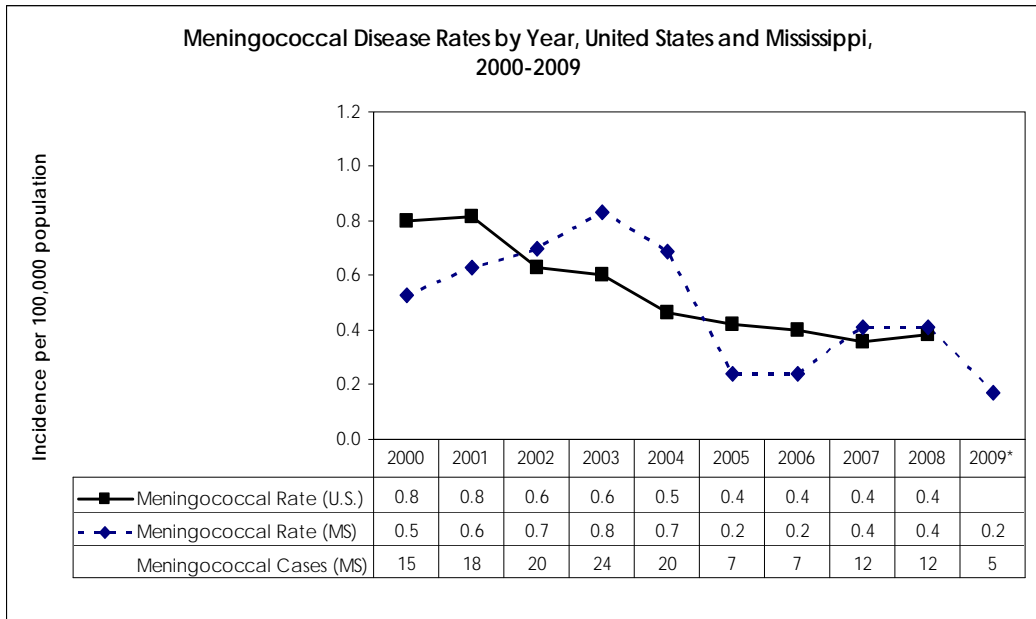
Epidemiology and Trends

In 2009, there were five reported cases of invasive meningococcal disease. This is a decline of more than half the cases from 2008. Typically, over the last decade, 7-24 cases are reported annually in Mississippi (Figure 8). 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 2009 MS cases ranged in age from 15 months to 63 years, with 60% of cases in the adolescent years and younger (Figure 9).

MSDH requests that all isolates be submitted to the PHL for typing. One of the confirmed cases in 2009 was typed as serogroup Y. The serogroups for the other four cases were unknown.

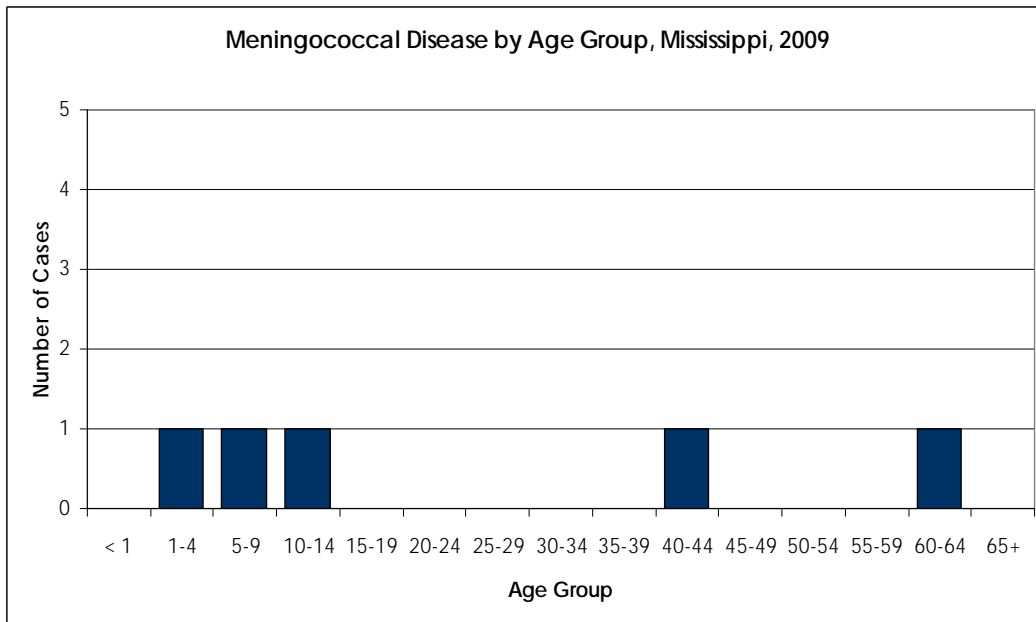
In total, rifampin prophylaxis was provided for 37 contacts of meningococcal disease cases in 2009. There were no confirmed deaths reported in 2009 from meningococcal disease.

Figure 8



*2009 U.S. data not available.

Figure 9



Mumps

Clinical Features

A viral illness with 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.

Method 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

In Mississippi, there are typically 1-2 cases reported annually. In 2009 there was one reported mumps case, compared to zero cases in 2008.

Pertussis			
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2009 Case Total	80	2009 rate/100,000	2.7
2008 Case Total	104	2008 rate/100,000	3.5

Clinical Features

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

Bordetella pertussis, an aerobic gram negative rod.

Reservoir

Humans. Adolescents and adults are 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 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. A pertussis containing vaccine (Tdap) was recently approved for the vaccination of adolescents and adults. Adolescents and adults should receive a single dose of Tdap to replace a single dose of tetanus (Td).

MSDH investigates each reported case and provides prophylactic antibiotics (erythromycin, azithromycin) for all household contacts where there is a child less than one year of age or a pregnant woman in the last three weeks of her pregnancy in the home.

Reporting Classification

Class 1.

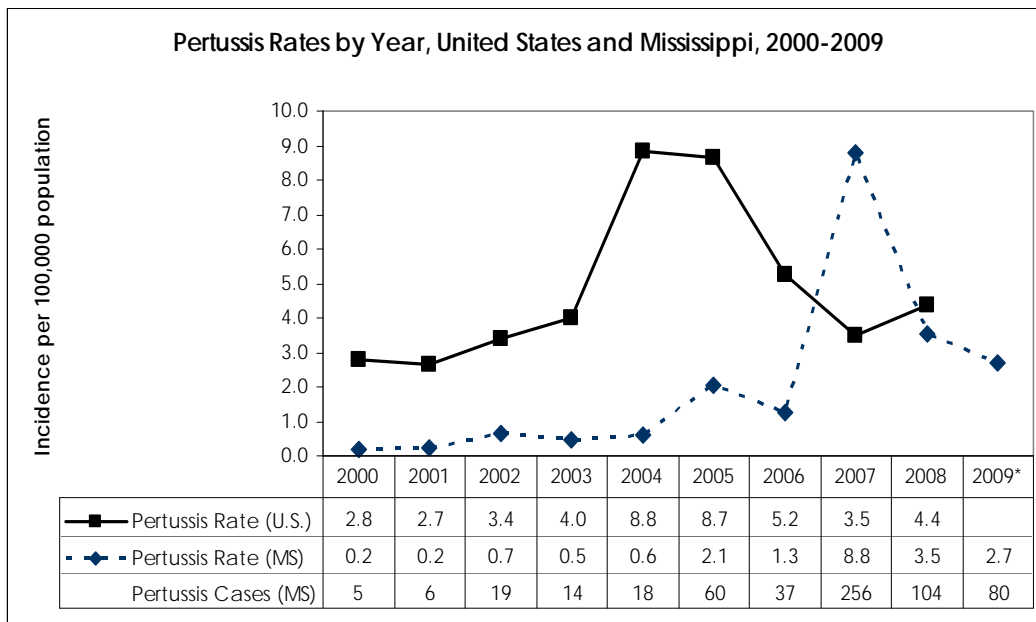
Epidemiology and Trends

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 nonimmunized persons is universal.

In 2009, there were 80 reported cases of pertussis infections. This is a slight decrease from 2008, with 104 reported cases. The three year average for 2006-2008 was 132 cases (Figure 10).

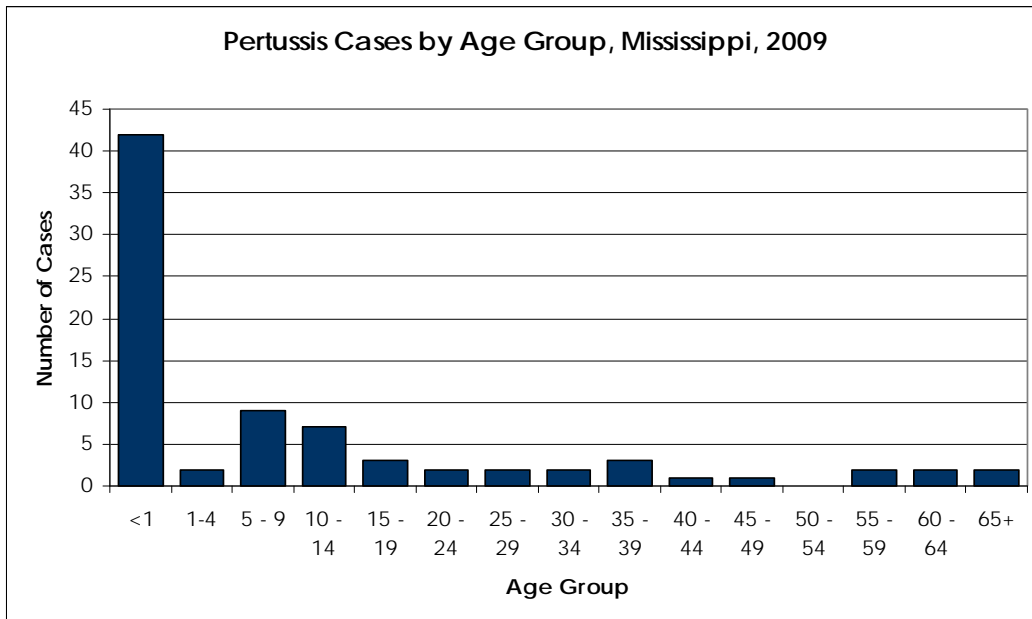
Over half of the cases in 2009 were among children under 12 months of age (Figure 11). No pertussis deaths were reported in 2009.

Figure 10



*2009 U.S. data not available.

Figure 11



Pneumococcal disease, invasive

Clinical Features

An acute bacterial infection with two clinical invasive syndromes: septicemia and 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, a gram-positive diplococcus. Most strains causing severe forms of disease are encapsulated; there are 90 known capsular serotypes.

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 and polysaccharide vaccines are available for the prevention of pneumococcal disease. The conjugate vaccine (PCV7) is approved for children younger than 24 months of age and children 24-59 months of age at risk for invasive disease. PCV7 is administered at 2, 4, 6, and 12-15 months of age. The polysaccharide vaccine (PPV23) is recommended for all adults 65 years of age and older and any person 2 years of age or older at high risk for invasive pneumococcal disease (chronic disease such as cardiovascular disease, pulmonary disease or diabetes, and individuals with cochlear implants).

Reporting Classification

Class 2; invasive disease in children less than 5 years of age and all antibiotic resistant invasive disease.

Epidemiology and Trends

In 2009 there were 28 reported cases of invasive disease caused by *S. pneumoniae* in children less than 5 years of age. This was comparable to the 27 reported cases in 2008 (Figure 12). Of these 28 cases, 24 manifested as septicemia, two had meningitis, and two had *S. pneumoniae* isolated from pleural fluid. Ages ranged from 1 month to 4 years of age. Twelve of the 28 invasive *S. pneumoniae* cases were antibiotic resistant. Of those 12 cases, 10 of the invasive infections were infected with organisms that exhibited resistance to one or more antibiotics.

A total of 56 cases of antibiotic resistant invasive *S. pneumoniae* infections were reported in 2009, compared to 29 cases reported in 2008. This total included 12 children less than 5 years of age with drug resistant invasive disease. Of the 56 cases in 2009, 48 (86%) were septic, six cases (11%) had meningitis, and two (4%) had *S. pneumoniae* isolated from pleural fluid. Reported cases of antibiotic resistant invasive disease ranged in age from 2 months to 96 years, with 37 cases (66%) occurring in individuals age 40 or older (Figure 13). Antibiotic resistance to penicillin was documented in 80%; resistance to trimethoprim/sulfamethoxazole and erythromycin (61% and 66%, respectively) were also noted. One *S. pneumoniae* meningitis death was reported in a 73 year old male. The antibiotic resistance pattern of this case had intermediate resistance to penicillin.

Figure 12

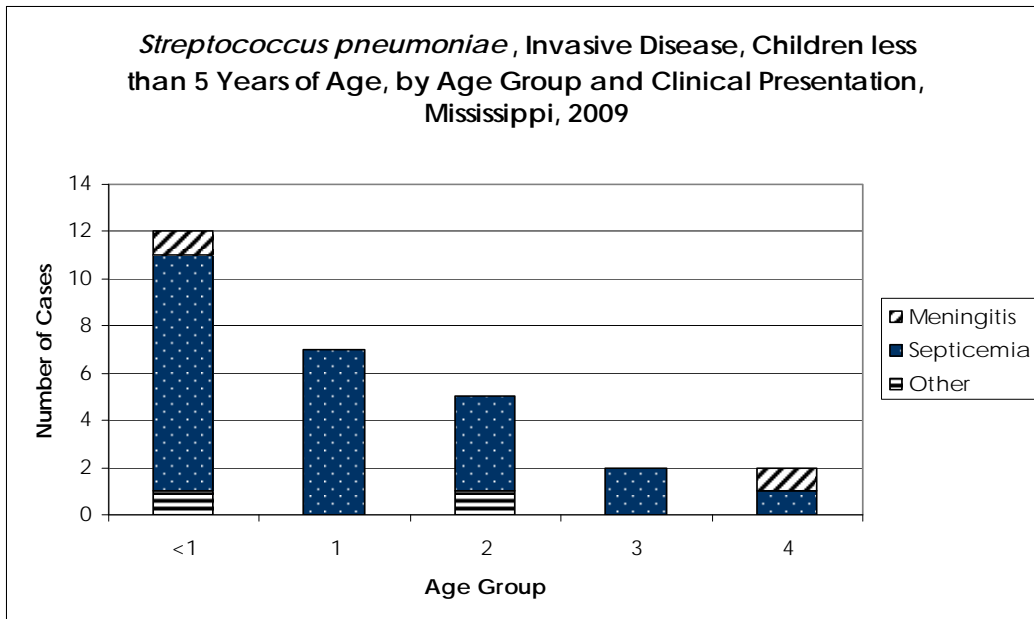
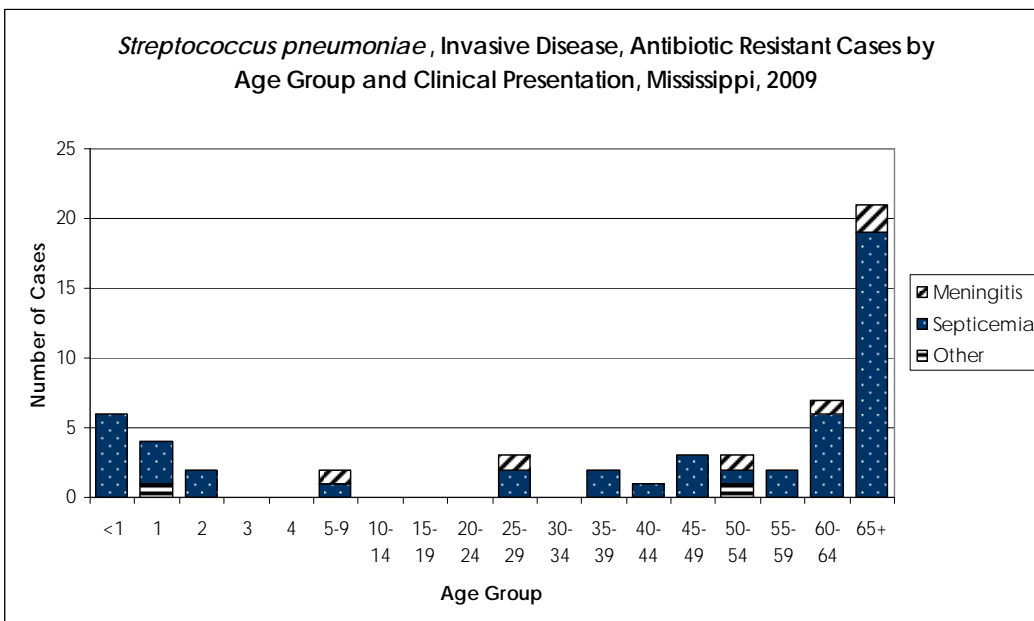


Figure 13



Rubella

Clinical Features

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

There were no reported cases of rubella in Mississippi in 2009. The last reported case in the state, in a 4 year old, was in 1986.

Varicella

2009 Case Total	5	2009 rate/100,000	0.2
2008 Case Total	14	2008 rate/100,000	0.5

Clinical Features

An acute viral disease with 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, usually appears first on the head, and is 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 droplet or 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 recommended for all susceptible healthcare workers. The

vaccine can also be used to prevent disease, or at least modify severity of illness, in susceptible persons if give within 3 days of exposure to an infected individual.

In 2006, FDA approved herpes zoster vaccine for persons 60 years of age and older. Clinical trials indicate vaccine efficacy of 64%, with less severe disease in those who developed zoster, and 66% less postherpetic neuralgia.

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

Epidemiology and Trends

In 2009, there were five reported cases of varicella infection in patients 15 years of age or older. The cases ranged in age from 15-52 years. None of these cases were epidemiologically linked. The three year average from 2006 to 2008 was six cases of varicella per year.

Sexually Transmitted Diseases

Chlamydia

2009 Case Total	23,592	2009 rate/100,000	799.2
2008 Case Total	21,261	2008 rate/100,000	723.5

Clinical Features

A sexually transmitted bacterial infection causing urethritis in males and cervicitis in females. Urethritis in men 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 of chlamydia occurs when an infant is exposed to the infected cervix during birth resulting in chlamydial pneumonia or conjunctivitis. Asymptomatic infection may be found in 1%-25% of sexually active men. Up to 70% of sexually active women with chlamydial infections may also be asymptomatic.

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.

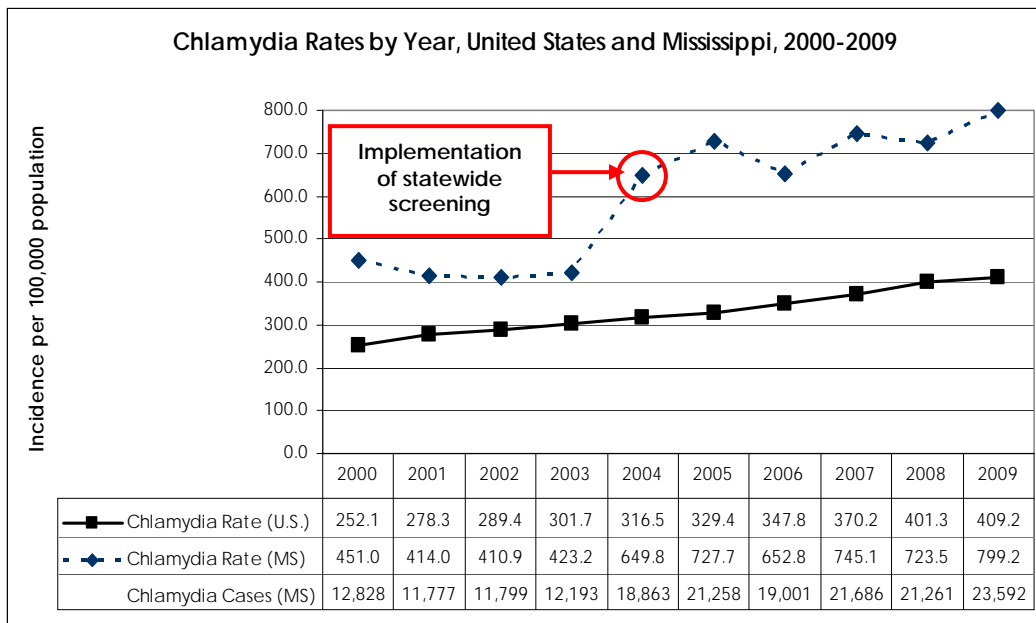
Reporting Classification

Class 2.

Epidemiology and Trends

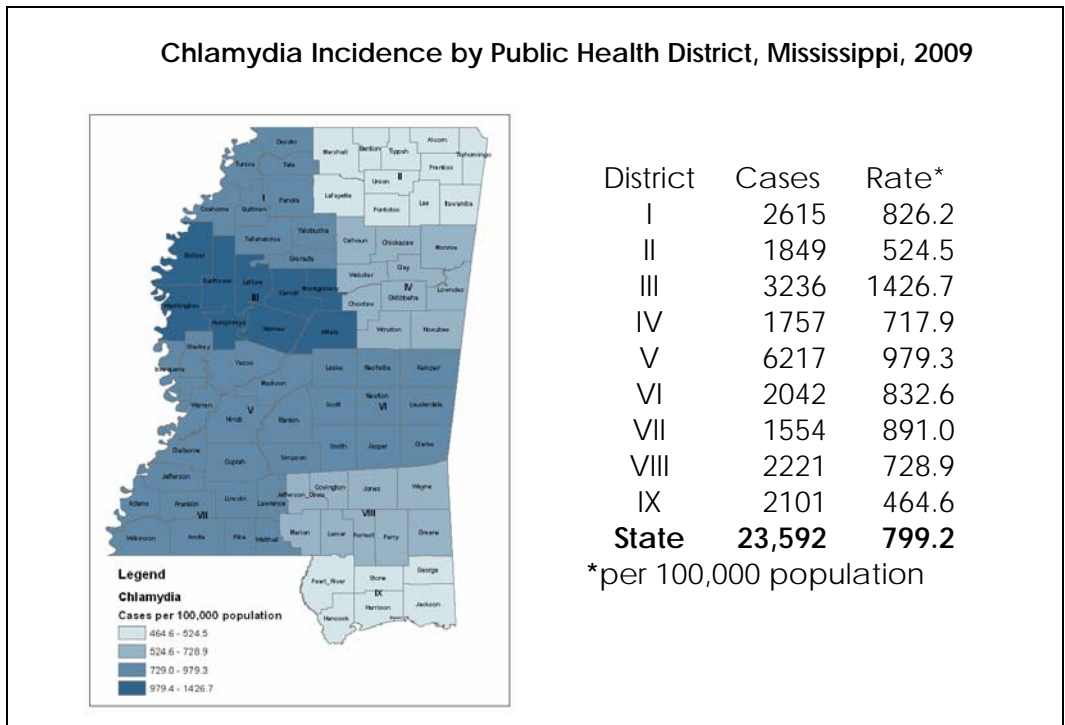
Chlamydia is the most frequently reported bacterial sexually transmitted disease in the United States and in Mississippi. In 2009, 23,592 cases of chlamydia were reported in Mississippi, an increase of 11% from 2008 (21,261). Mississippi has reported case rates higher than the United States average (Figure 14) for several years, and when compared to other states, Mississippi has the country's highest rate. The overall increase in cases can be partially attributed to aggressive statewide screening for chlamydia in all MSDH STD, family planning, and prenatal clinics beginning April 2004.

Figure 14



Chlamydia was reported in every public health district, with the highest incidence rates noted in Public Health District III (Figure 15).

Figure 15



Chlamydia infections were reported over a range of age groups, but the largest proportion was reported among 15-24 year olds, accounting for 76% of the reported cases (Figure 16). African Americans accounted for 83% of the reported cases in which race was known (Figure 17). In 2009, the rate of chlamydia infections for African Americans (1399.6) was nine times the rate for whites (150.3).

Figure 16

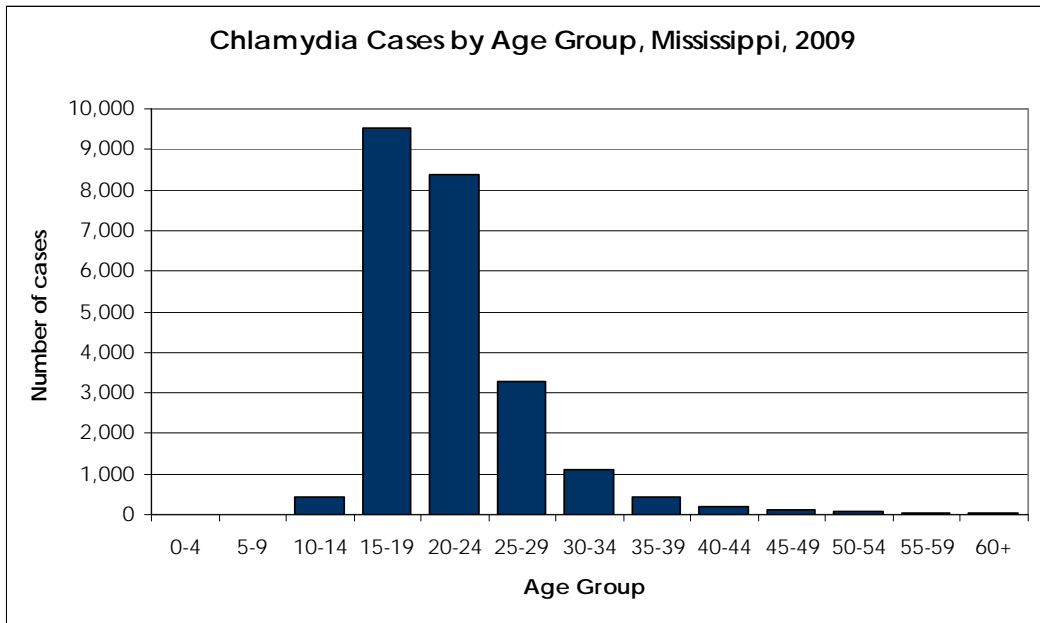
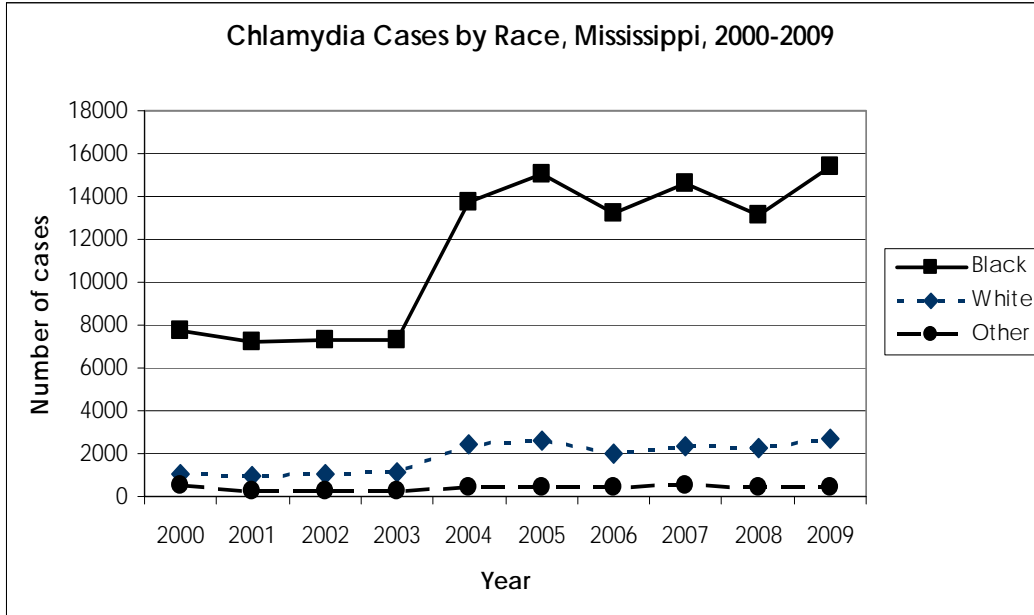


Figure 17



Gonorrhea

2009 Case Total	7,241	2009 rate/100,000	245.3
2008 Case Total	7,497	2008 rate/100,000	255.1

Clinical Features

A bacterial infection associated primarily with infection of the urogenital tract producing symptoms of discharge and dysuria. Other less common sites of infection include: pharynx, rectum, conjunctiva, and blood.

Complications associated with gonorrhea infection in men consist of epididymitis, penile lymphangitis, penile edema, and urethral strictures. The primary complication associated with gonorrhea infection in women is pelvic inflammatory disease, which produces symptoms of lower abdominal pain, cervical discharge, and cervical motion pain. Asymptomatic infections do occur. 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 from the infected cervix to an infant during birth occurs.

Incubation

In men, the incubation period is primarily 2-5 days, but may be 10 days or longer. In women, 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. In Mississippi, from 2003-2007, the number of gonorrhea cases increased 31.4%, from 6,328 to 8,315 cases (Figure 18). Although there was a slight decrease in cases in 2008 and 2009, Mississippi had the highest case rate of gonorrhea in the United States.

Gonorrhea was reported in every public health district, with the highest incidence noted in Public Health District III (Figure 19).

Although the burden of disease impacted individuals in most of the age groups, 69% of reported cases were among 15-24 year olds (Figure 20). African Americans accounted for 91% of the reported cases in which race was known (Figure 21). In 2009, the rate of gonorrhea infections for African Americans (488.7) was eighteen times the rate of whites (27.4).

Figure 18

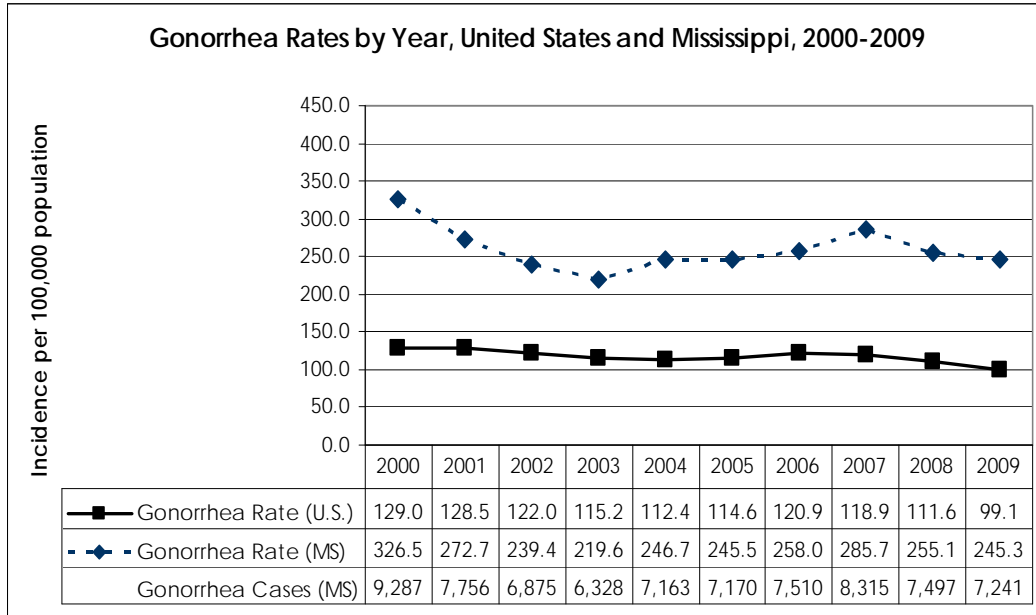


Figure 19

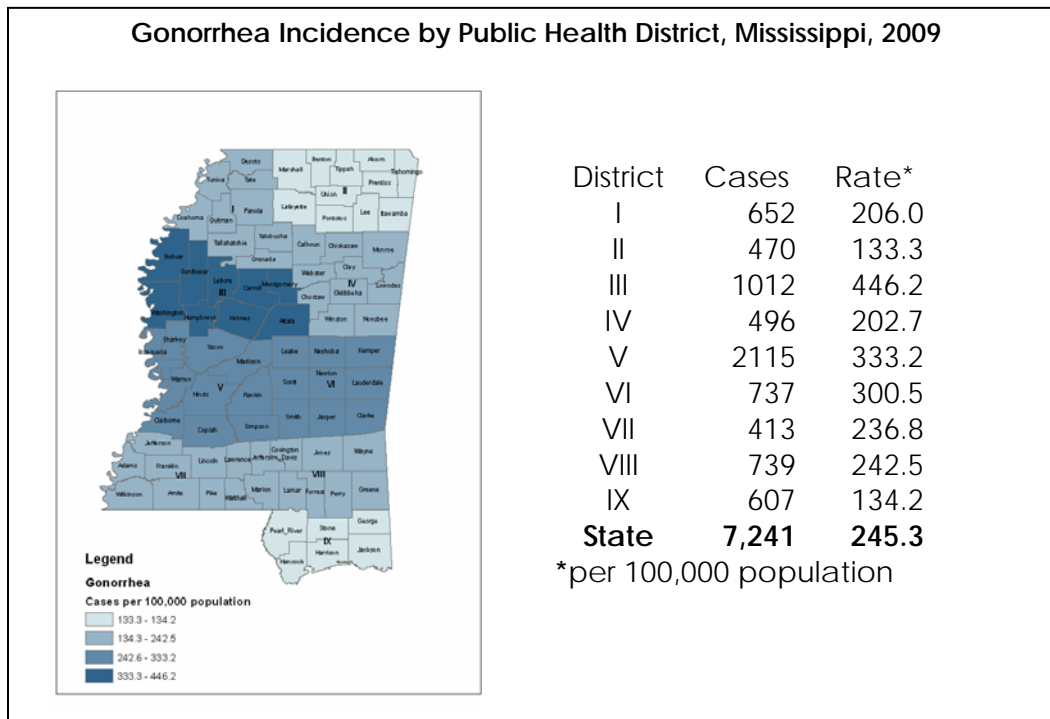


Figure 20

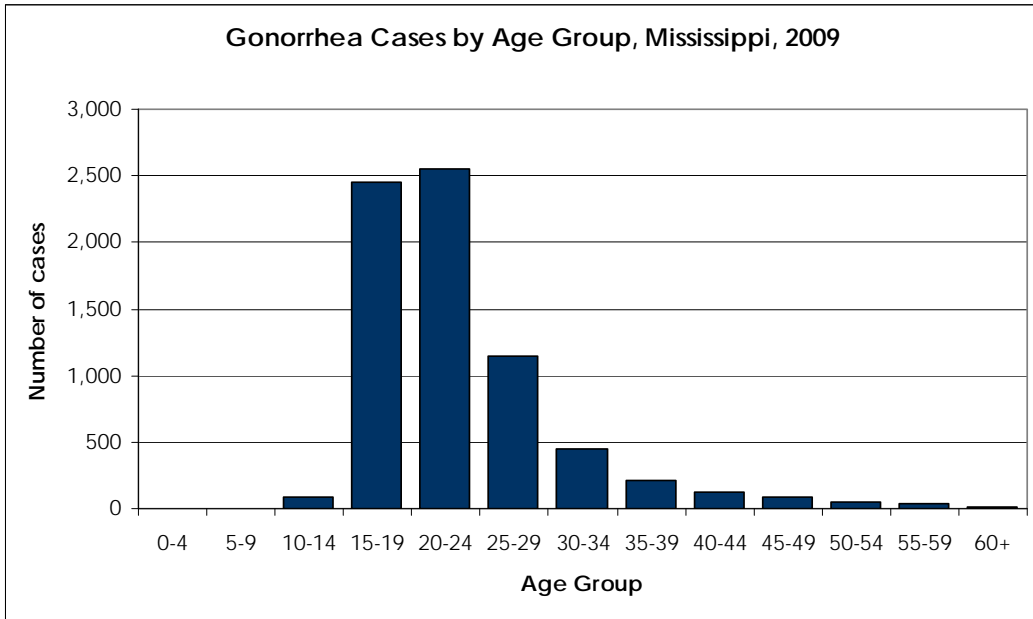
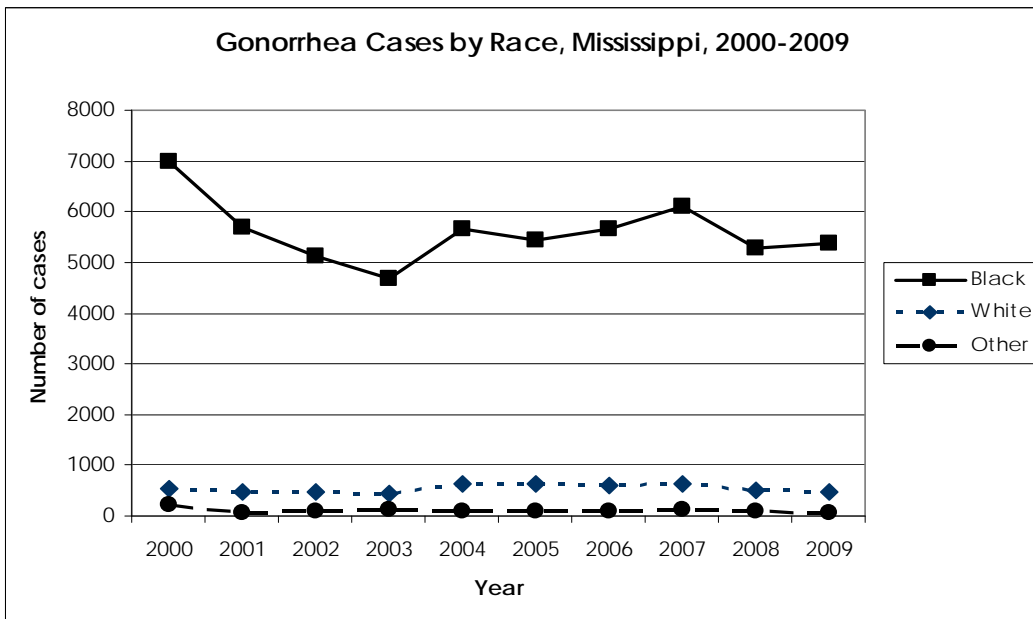


Figure 21



HIV Disease

2009 Case Total	610	2009 rate/100,000	20.7
2008 Case Total	606	2008 rate/100,000	20.6

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 being 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. Transmission by contact with body secretions like urine, saliva, tears or bronchial secretions has not been recorded. Without appropriate prenatal treatment, 15-30% of infants born to HIV positive mothers are infected. Breast feeding is also a known cause of mother to infant transmission of HIV.

Incubation

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.

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. Abstinence and a mutually monogomas relationship with an uninfected partner are the only ways to completely avoid risk of sexual HIV transmission. Consistent and correct condom use and as well as treatment of HIV infected individuals to reduce the viral load, are good risk reduction methods. 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. MSDH performs contact investigation, counseling and testing around each reported case of HIV infection.

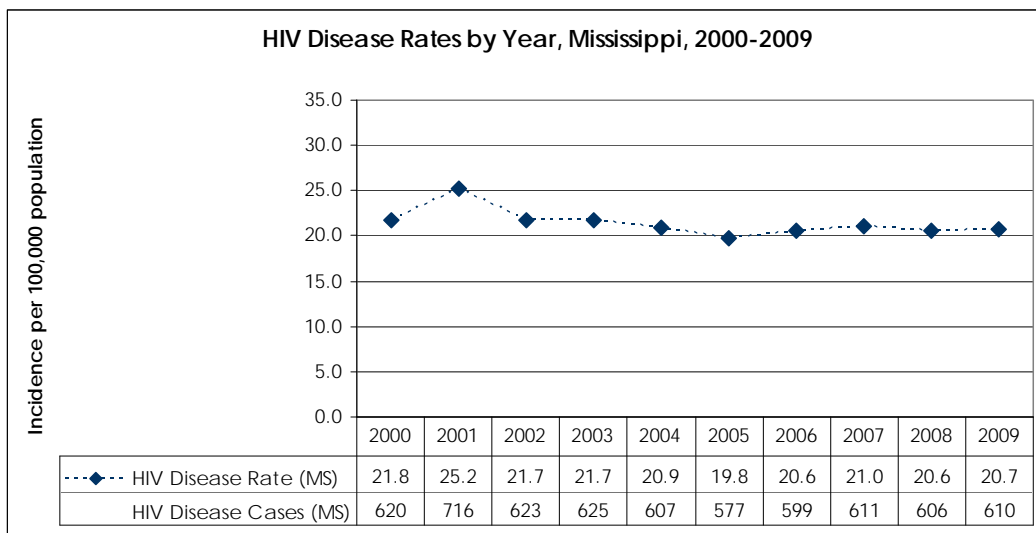
Reporting Classification

Class 1.

Epidemiology and Trends

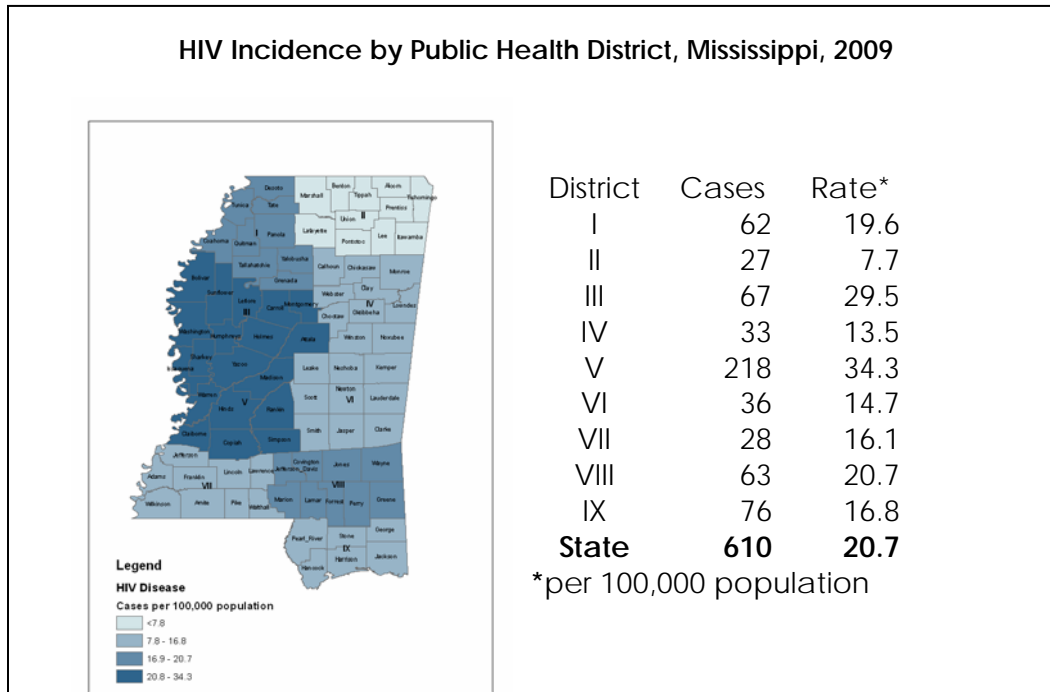
Both HIV infection and AIDS are reportable at the time of diagnosis, so many patients will be reported twice (once at first diagnosis of HIV infection, and again when developing an AIDS defining illness). The epidemiologic data that follows is regarding the initial report of HIV disease, whether first diagnosed as HIV infection or AIDS. Over the past few years, there has been little change in HIV disease trends. There were 610 cases of HIV disease reported in 2009, a less than 1% increase from 2008 (606) (Figure 22).

Figure 22



Individuals from every Public Health District were impacted by this disease. Public Health District V reported the highest case rate, statewide, followed by District III (Figure 23).

Figure 23



HIV disease was reported in all age groups, with 58% of the cases reported among 20-39 year olds (Figure 24). African Americans were disproportionately impacted by HIV disease. In 2009, 78% of new cases were among African Americans in which race was known (Figure 25).

Figure 24

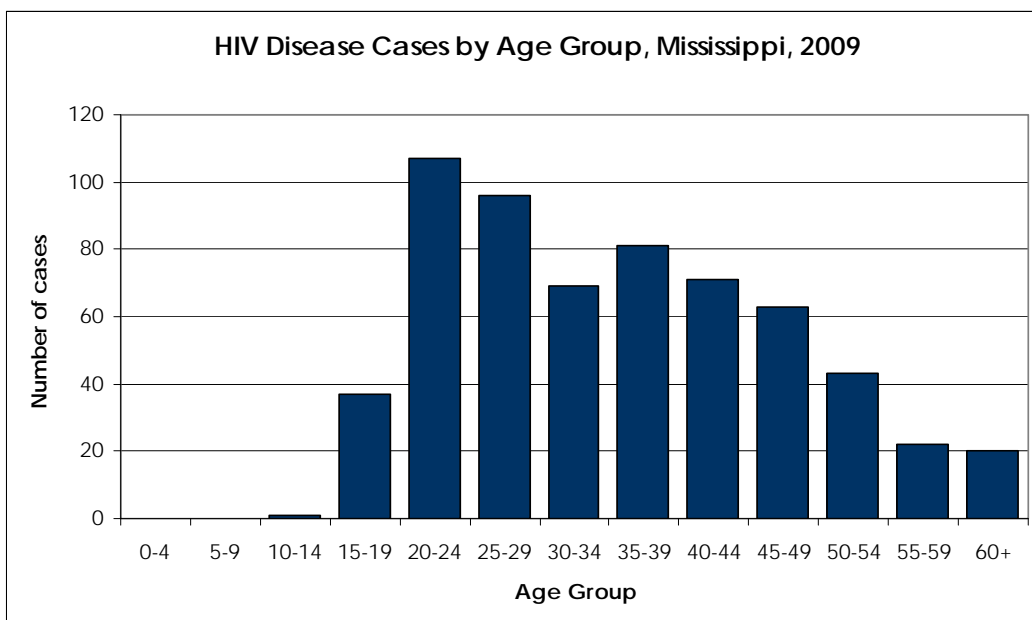
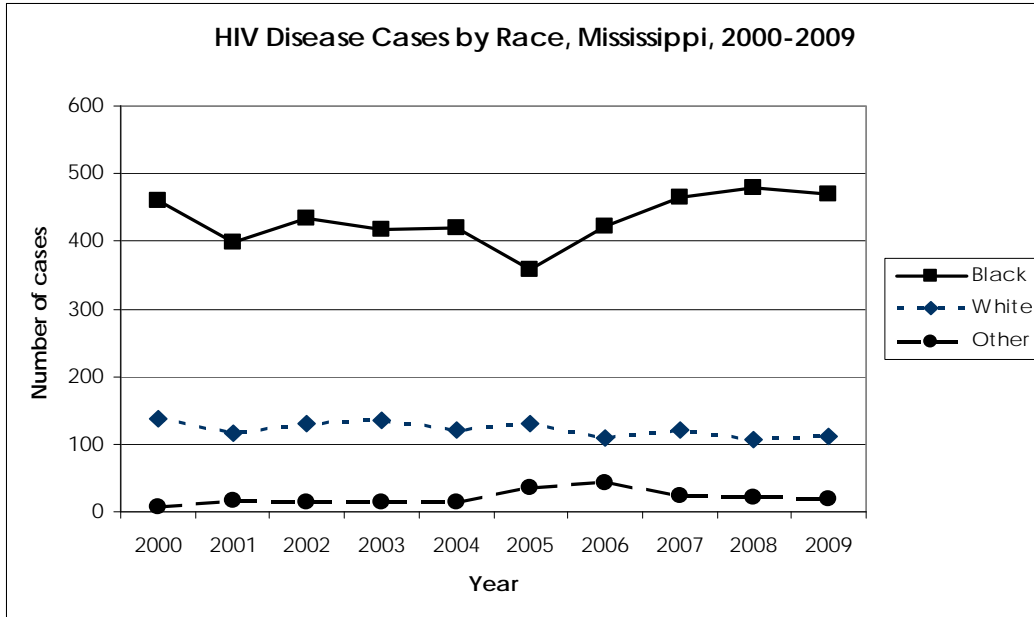


Figure 25



Additional References:

- CDC. Guidelines for national immunodeficiency virus case surveillance, including monitoring for human immunodeficiency virus infection and acquired immunodeficiency syndrome. MMWR 1999/48(RR13;1-28.
- Sterling, T. R. & Chaisson, R. E. (2005). General Manifestations of Human Immunodeficiency Virus. In G. L. Mandell, J. E. Bennett, and R. Dolin (Eds.), *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases* (6th ed.). (Vols.1-2). (pp. 1548-1549). Philadelphia, PA: Elsevier Churchill Livingstone.

Syphilis

Primary and Secondary Syphilis

2009 Case Total	235	2009 rate/100,000	8.0
2008 Case Total	185	2008 rate/100,000	6.3

Total Early Syphilis

2009 Case Total	562	2009 rate/100,000	19.0
2008 Case Total	418	2008 rate/100,000	14.2

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 site of initial infection, usually on the external genitalia. Even without treatment, this 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 arthralgia. 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 spirochaete.

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 result 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.

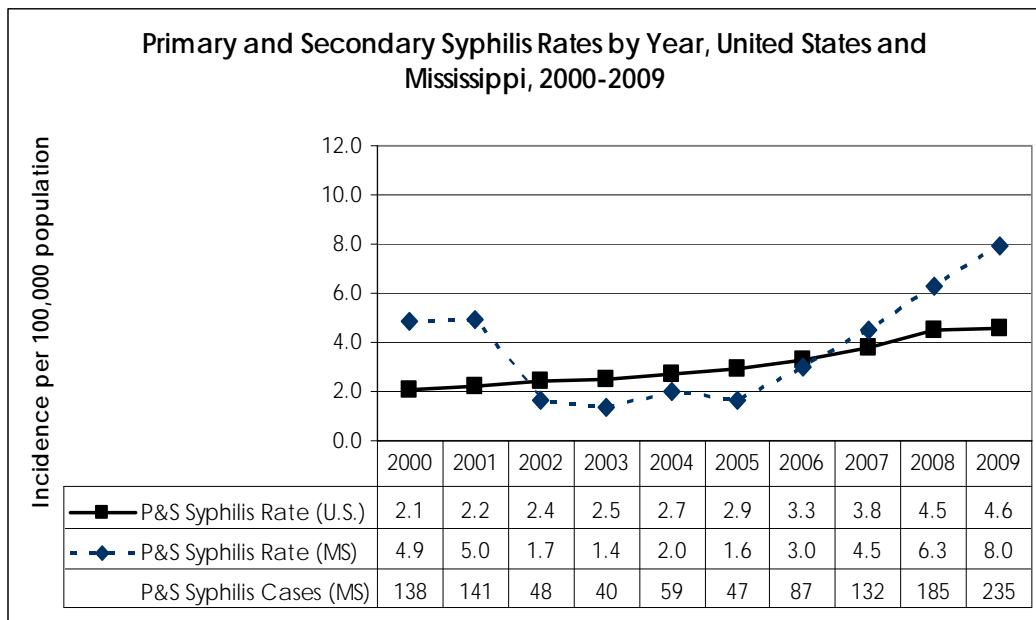
Reporting Classification

Class 1.

Epidemiology and Trends

Mississippi had a decline in primary and secondary (P&S) syphilis from 1997 through 2003, and since then, has had an increase in rates. Although P&S syphilis rates remained below the national average from 2002 through 2006, in 2009, MS ranked fifth nationally (Figure 26).

Figure 26



Districts VIII, V, and IX had the highest incidence of P&S syphilis (Figure 27). Seventy-seven percent of P&S syphilis cases occurred among 15-39 year olds (Figure 28) and 85% were among African Americans in which race was known (Figure 29).

Figure 27

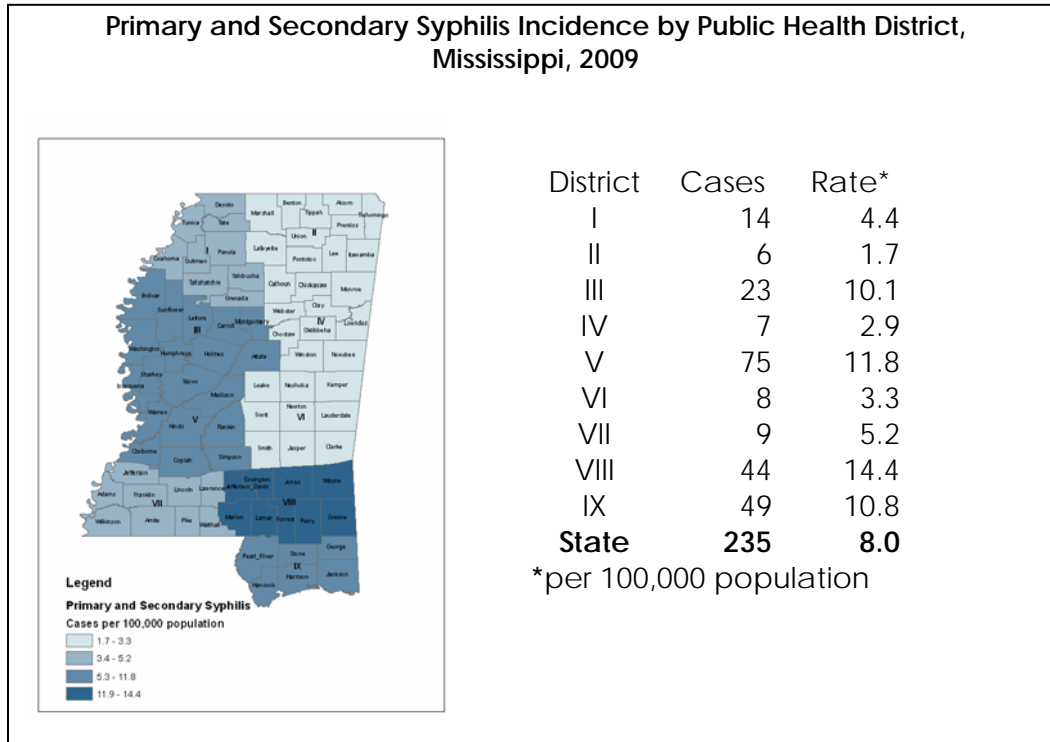


Figure 28

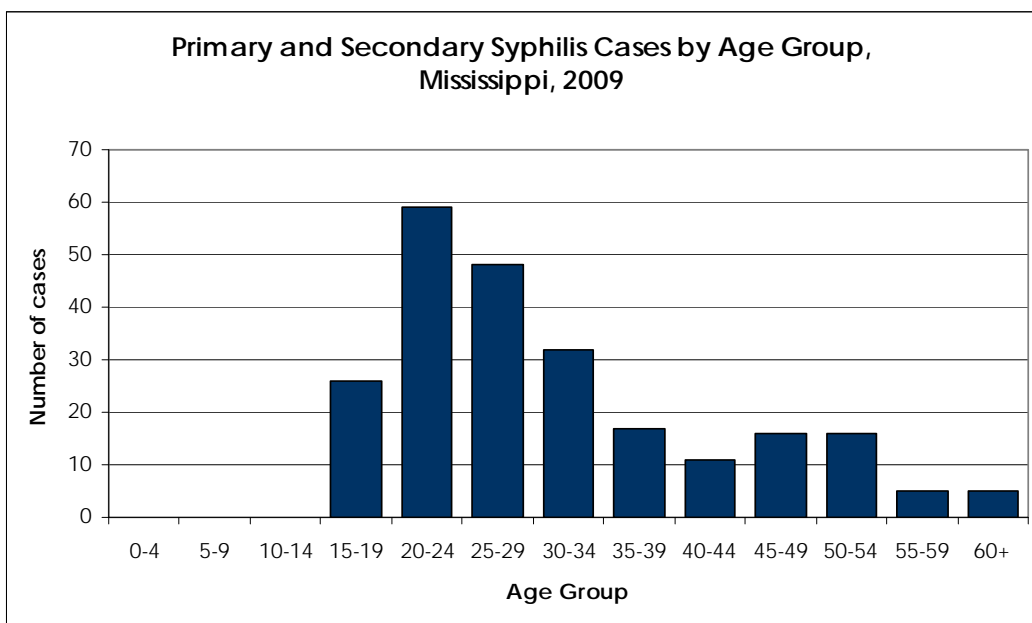
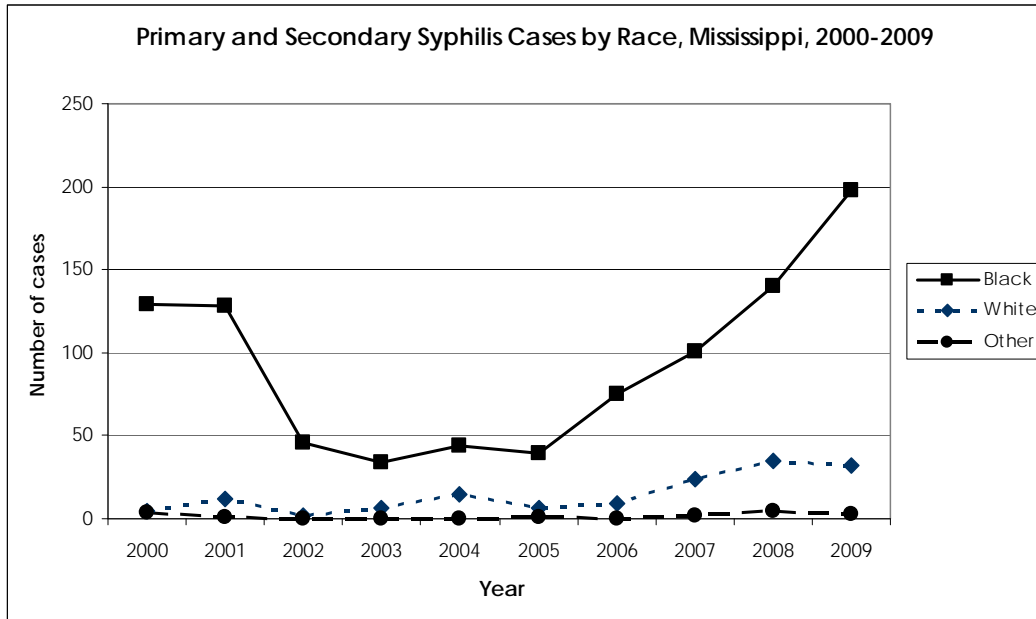
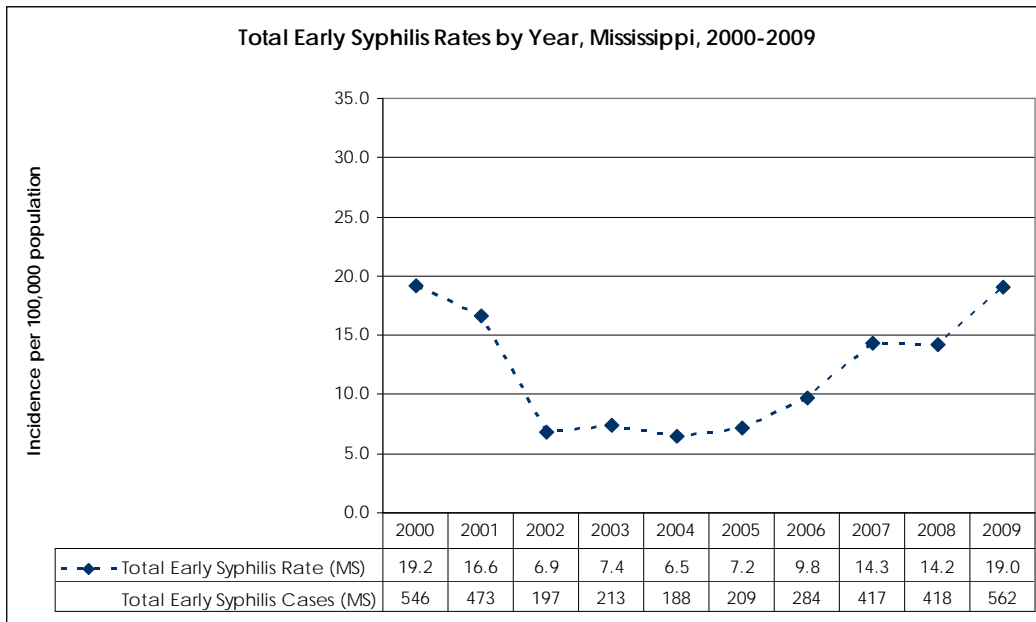


Figure 29



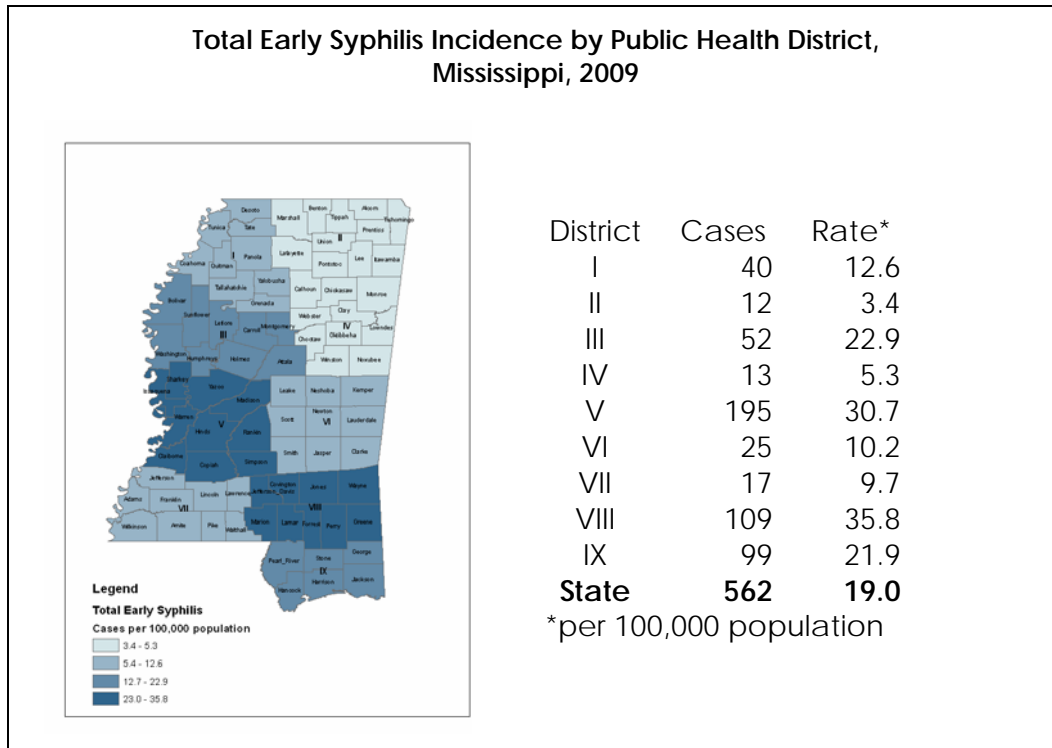
In 2009, Mississippi reported 562 cases of total early syphilis (first year of infection). There has been an increase in cases reported since 2004 (Figure 30).

Figure 30



Total early syphilis was reported in every district. District VIII had the highest case rate in the state (Figure 31).

Figure 31



Forty-one percent of reported cases were among 20-29 year olds (Figure 32). African Americans are disproportionately affected, accounting for 82% of cases for which race was known (Figure 33).

Figure 32

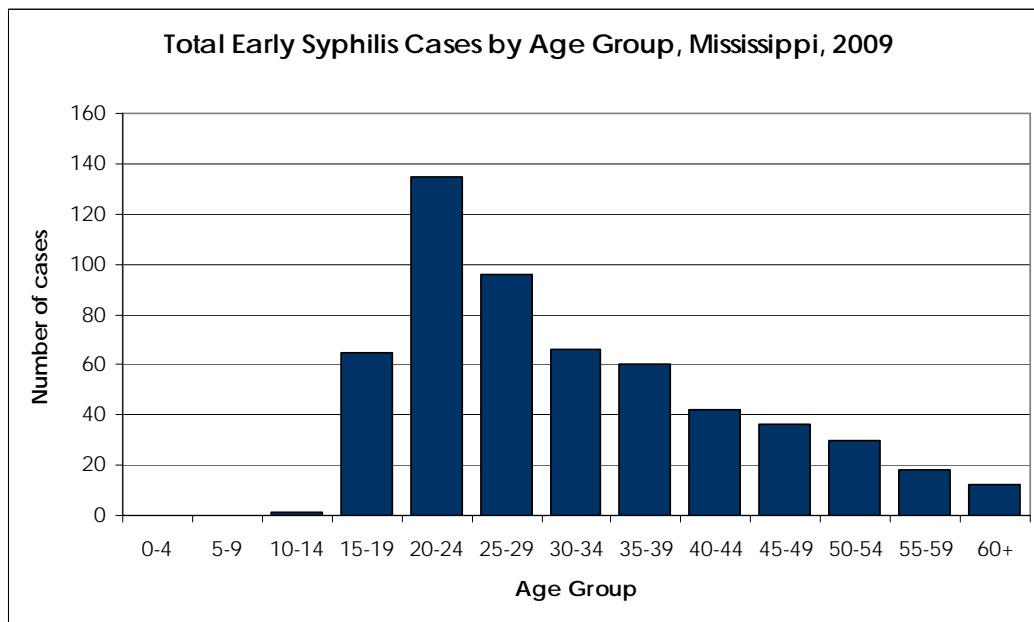
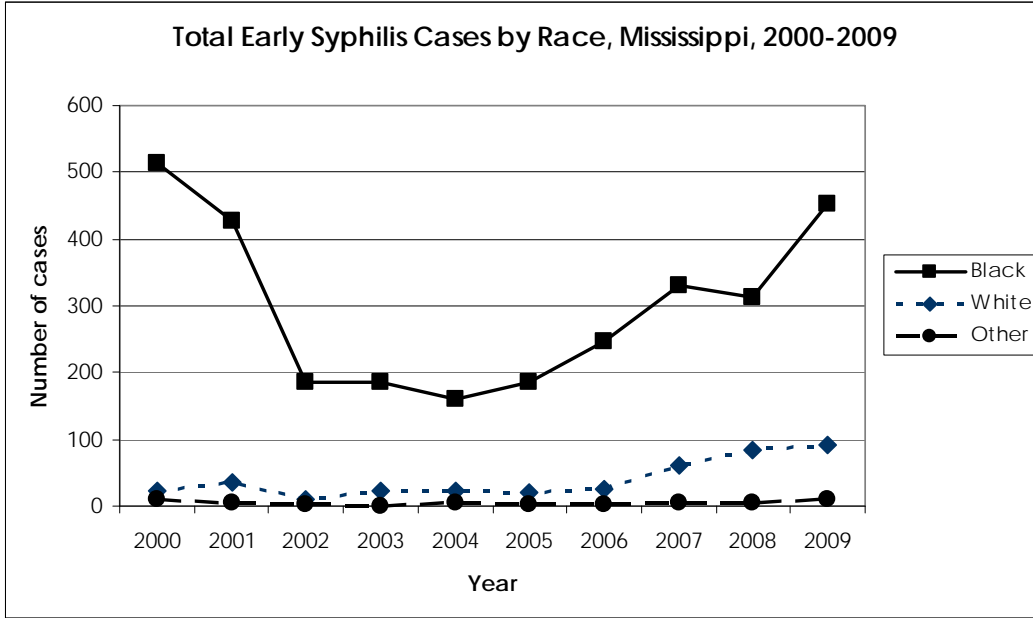


Figure 33



Tuberculosis

Tuberculosis

2009 Case Total	121	2009 rate/100,000	4.2
2008 Case Total	117	2008 rate/100,000	4.0

Clinical Features

Pulmonary tuberculosis (TB) is the most common form of active TB disease, but disease can be extrapulmonary, involving many organ systems. Symptoms are dependent on the site of infection, but 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. Latent tuberculosis infections (LTBI) occur and are asymptomatic.

Infectious Agent

Mycobacterium tuberculosis complex, an acid fast bacillus.

Reservoir

Primarily humans, rarely primates; in some areas, diseased cattle.

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

Tuberculin skin test conversion or positive BAMT, indicating LTBI, occurs 2-10 weeks after exposure to active TB disease. Ten percent of persons with LTBI will develop clinically 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. Children under 5 years of age have the highest risk of developing active 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. Children with primary tuberculosis are generally not infectious. LTBI is not infectious.

Methods of Control

Prompt identification, diagnosis and treatment of potentially infectious patients with TB disease. MSDH performs contact investigation, TB screenings in high risk areas, and provides treatment for all active and latent TB infections.

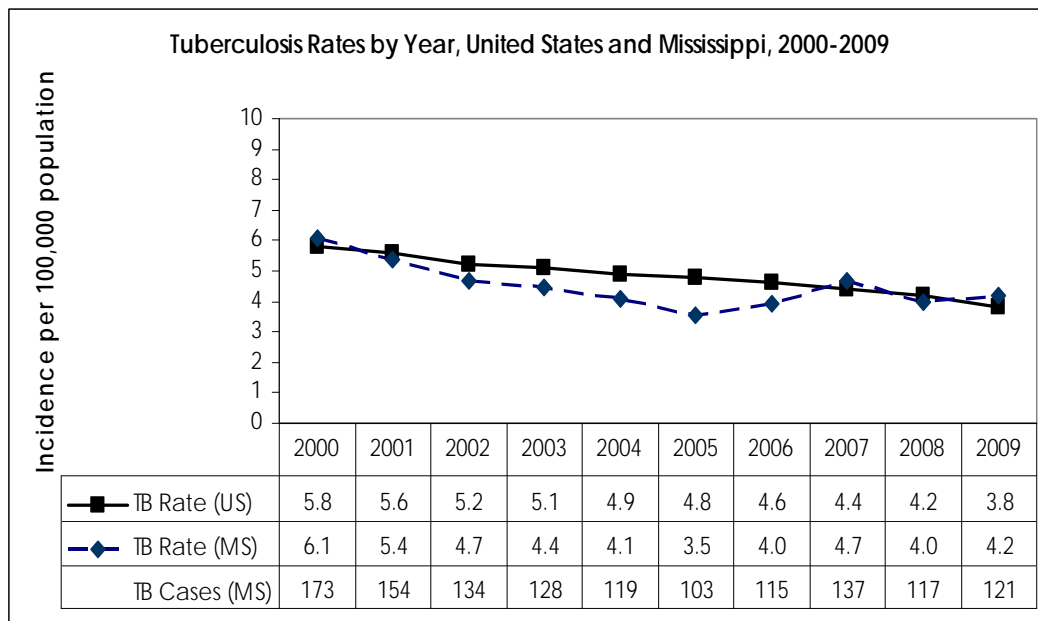
Reporting Classification

Class 1.

Epidemiology and Trends

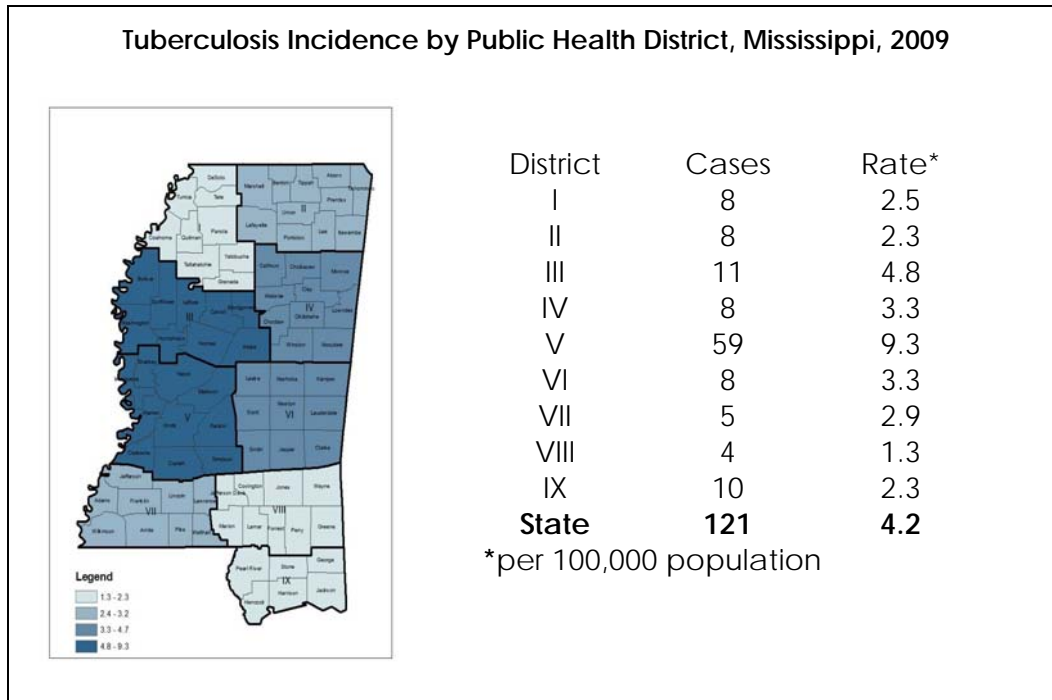
Mississippi had a consistent decline in TB morbidity from 1989 through 2005 and TB rates were below the national average in each of the 2001-2006 reporting periods. However, from a low of 103 cases in 2005, reported cases increased in 2006 (115), 2007 (137), 2008 (117) and 2009 (121). The case rate was above the national average in 2007 (4.7), and again in 2009 (4.2) (Figure 34).

Figure 34



Geographically, TB was reported in every public health district, with the highest incidence noted in Public Health Districts V and III (Figure 35).

Figure 35



Disease occurred in all age ranges, with the majority (75%) of cases reported in individuals 40 years of age and older (Figure 36). Disease in the African American population routinely accounts for approximately two-thirds of morbidity (Figure 37). There has also been a rise in TB cases among patients co-infected with HIV over the past few years (Figure 38).

Figure 36

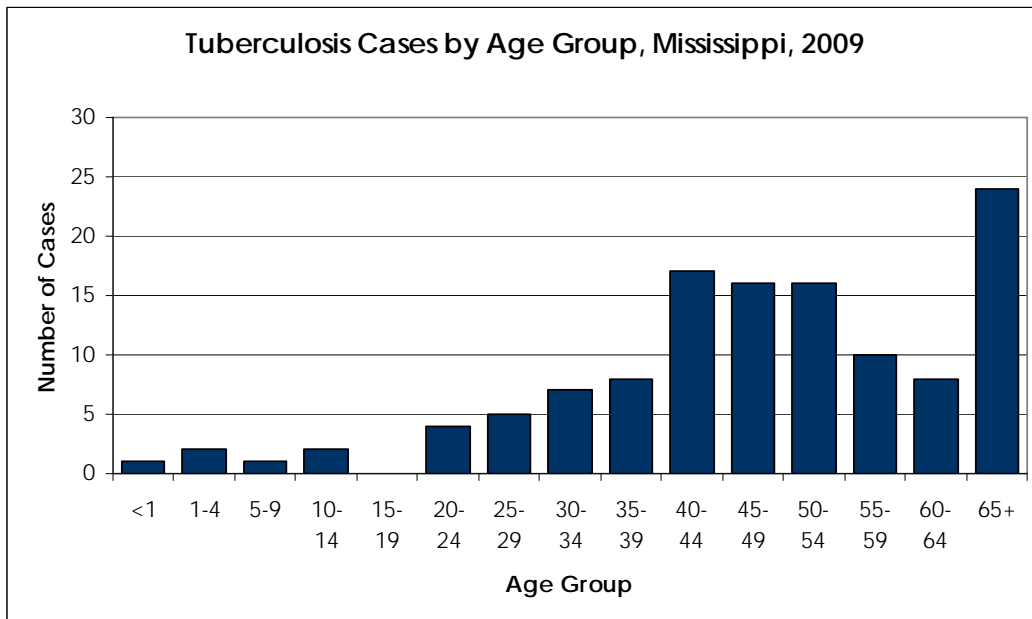


Figure 37

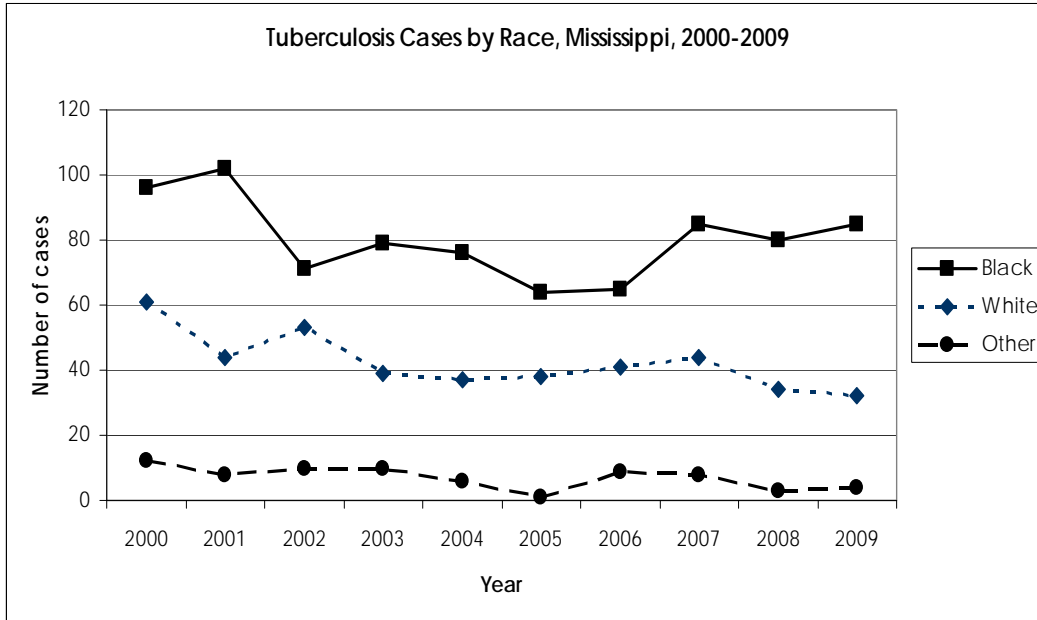
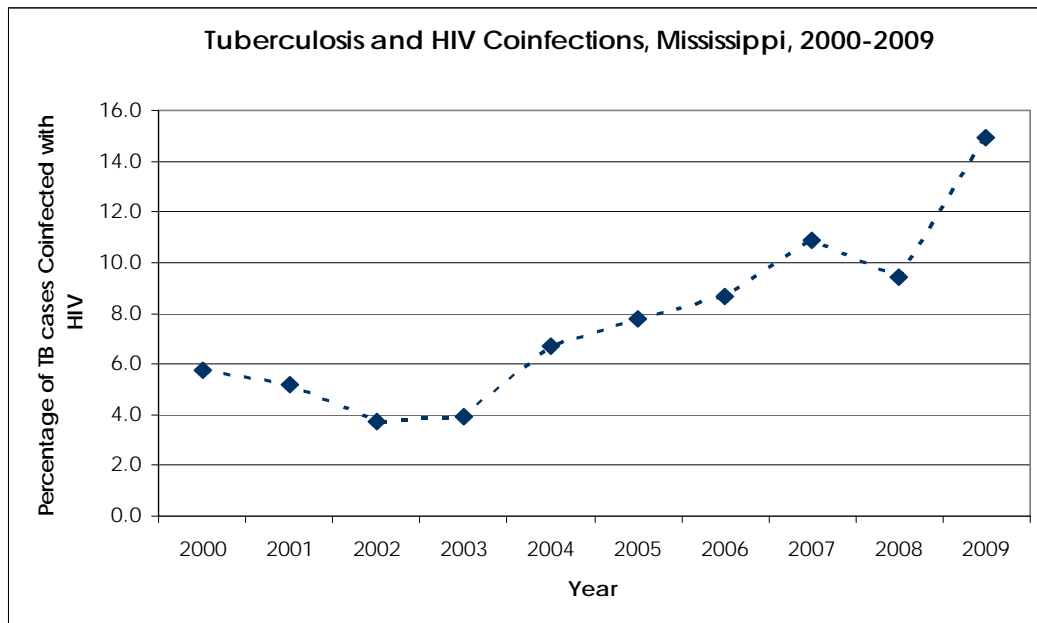


Figure 38



Campylobacteriosis

2009 Case Total	110	2009 rate/100,000	3.7
2008 Case Total	115	2008 rate/100,000	3.9

Clinical Features

Campylobacteriosis is a zoonotic bacterial disease of variable severity ranging from asymptomatic infections to clinical illness presenting with diarrhea, abdominal pain, fever, 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-Barre 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 or 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.

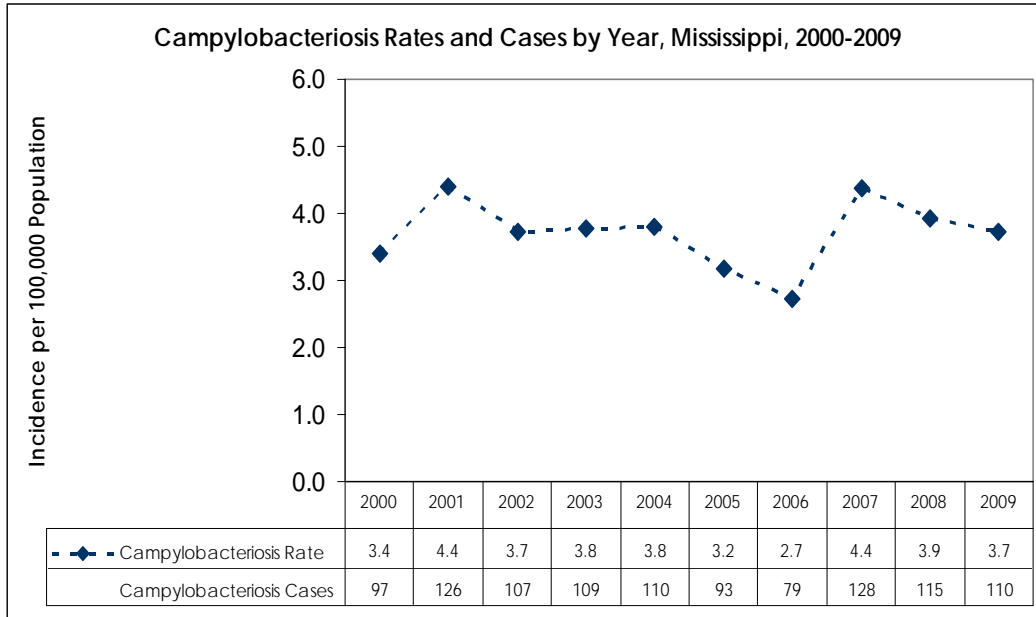
Reporting Classification

Class 3.

Epidemiology and Trends

In 2009, there were 110 reported cases of campylobacteriosis in Mississippi, comparable to the 115 cases reported in 2008 and the three-year (2006-2008) average of 107 cases (Figure 39).

Figure 39



Campylobacter infections are typically more common in the warmer months, as are many enteric illnesses, with 42% of the total 2009 cases occurring in June, July, and August, however cases are reported to MSDH year round (Figure 40). The highest rates of infection are in children less than five years of age. In 2009, 25% of all reported cases were in children younger than five years of age (Figure 41).

Figure 40

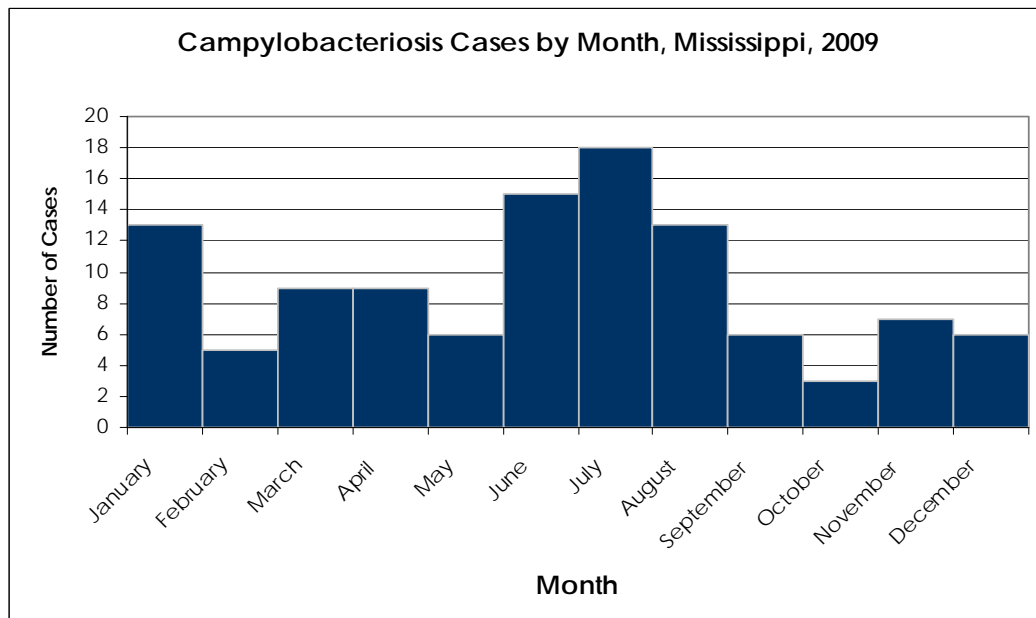
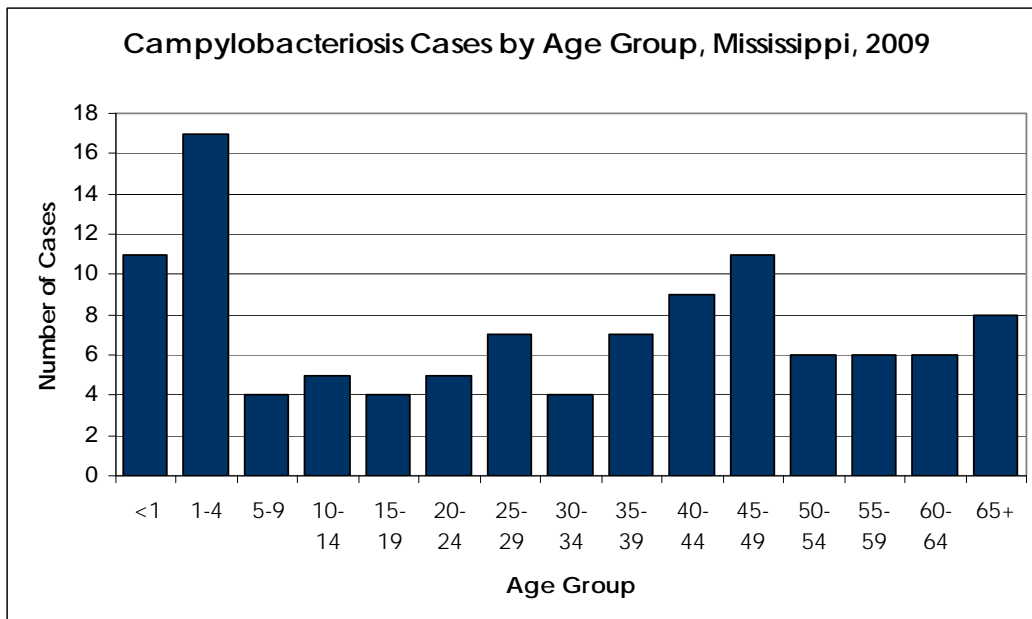


Figure 41



Cryptosporidiosis

2009 Case Total	19	2009 rate/100,000	0.6
2008 Case Total	17	2008 rate/100,000	0.6

Clinical Features

A parasitic infection characterized by profuse, watery diarrhea associated with abdominal pain. Symptoms include anorexia, weight loss, fever, and nausea and vomiting less frequently. Symptoms often wax and wane and but generally disappear in 30 days or less in healthy people. Asymptomatic infections do occur. 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

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 (eg, 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.

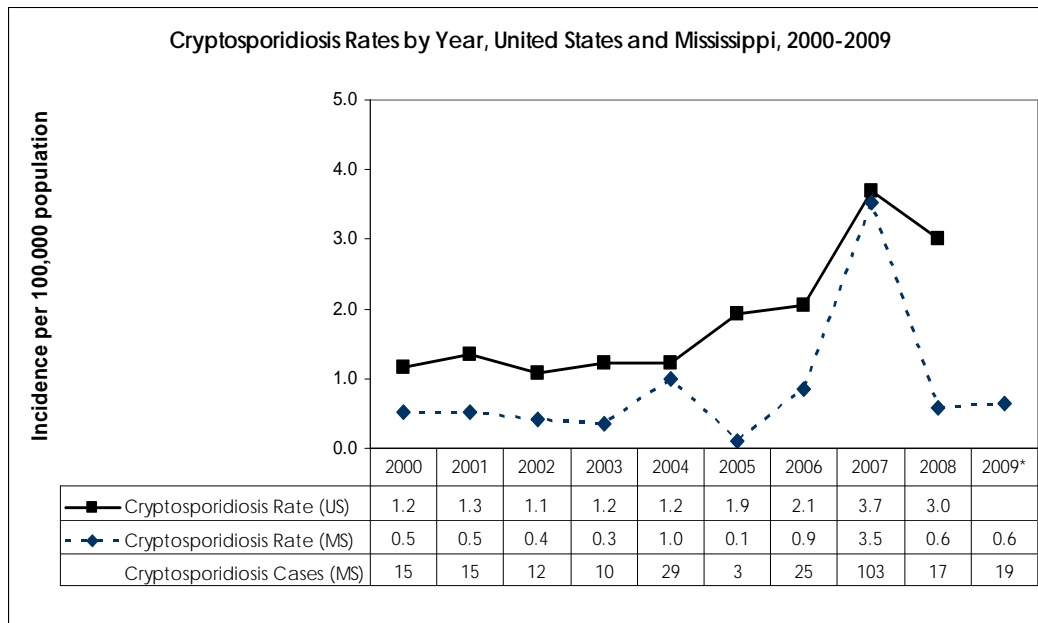
Reporting Classification

Class 3.

Epidemiology and Trends

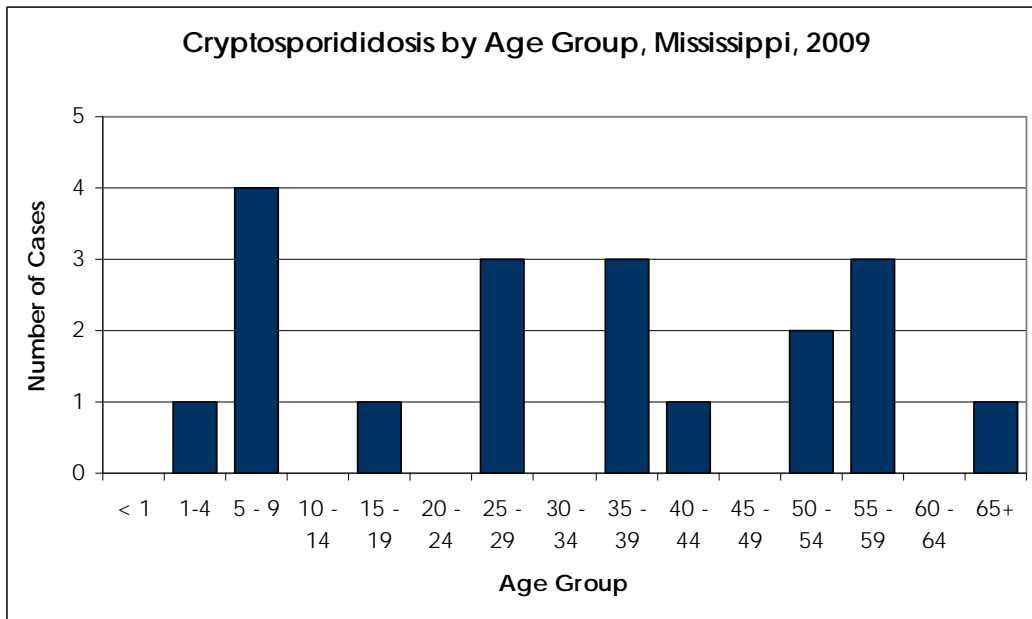
There were 19 reported cases of cryptosporidiosis in 2009, which is comparable to 2008 with 17 reported cases. In a typical year, usually between 3-29 cases are reported (Figure 42). The reported cases ranged in age from 3 to 66 years (Figure 43).

Figure 42



*2009 U.S. data not available.

Figure 43



***E. coli* O157:H7/ HUS**

2009 Case Total	6	2009 rate/100,000	0.2
2008 Case Total	5	2008 rate/100,000	0.2

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 postdiarrheal 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.

Infectious Agent

E. coli are gram negative bacilli. *E. coli* O157:H7 is thought to cause more than 90% of all diarrhea-associated HUS.

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.

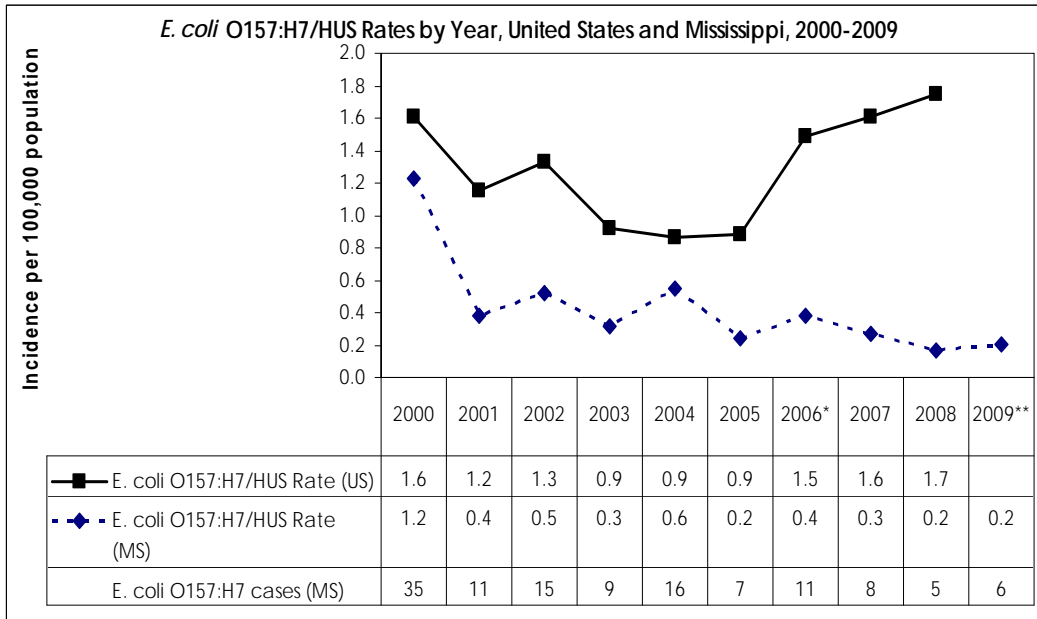
Reporting Classification

Class1.

Epidemiology and Trends

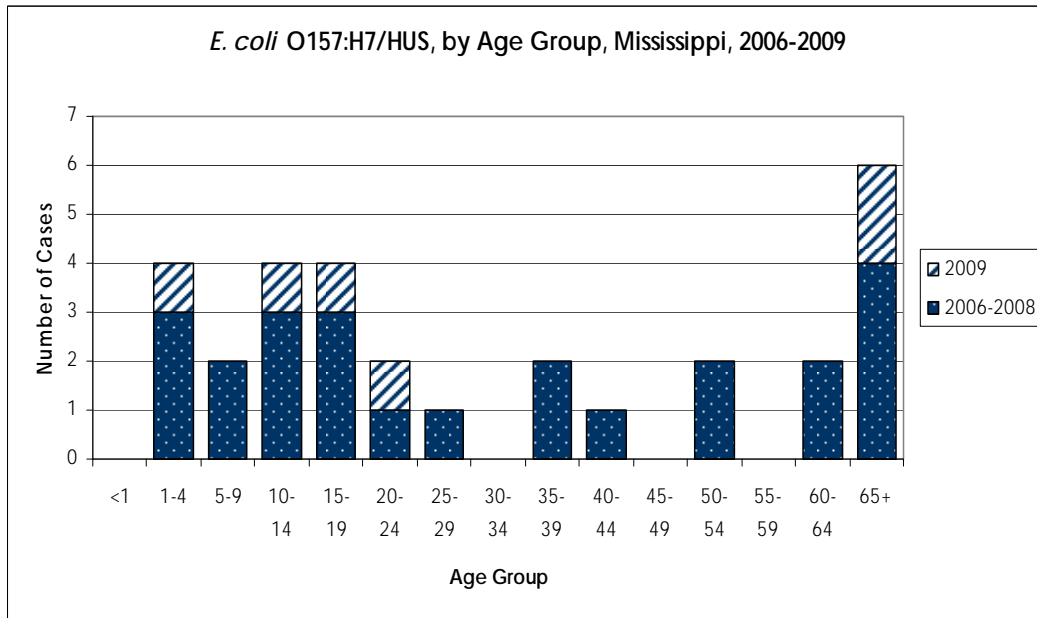
In 2009, six *E. coli* O157:H7 infections were reported to MSDH; two of which resulted in HUS. On average, eight infections have been reported annually over the past three years (2006-2008) (Figure 44). The six cases in 2009 were not related to any outbreaks and were not epidemiologically linked. There were no deaths reported in Mississippi in 2009. Of the 30 cases of *E. coli* O157:H7/HUS that were reported to MSDH between 2006 and 2009, 20% occurred in children less than 10 years of age (Figure 45).

Figure 44



* 2006 U.S. rate includes *E. coli* O157:H7: shiga toxin positive, serogroup non-O157; and shiga toxin positive, not serogrouped.
 **2009 U.S. data not available.

Figure 45



Hepatitis A

2009 Case Total	9	2009 rate/100,000	0.3
2008 Case Total	7	2008 rate/100,000	0.2

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 of, or 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 unless epidemiological investigation indicates ongoing hepatitis A transmission in the facility.

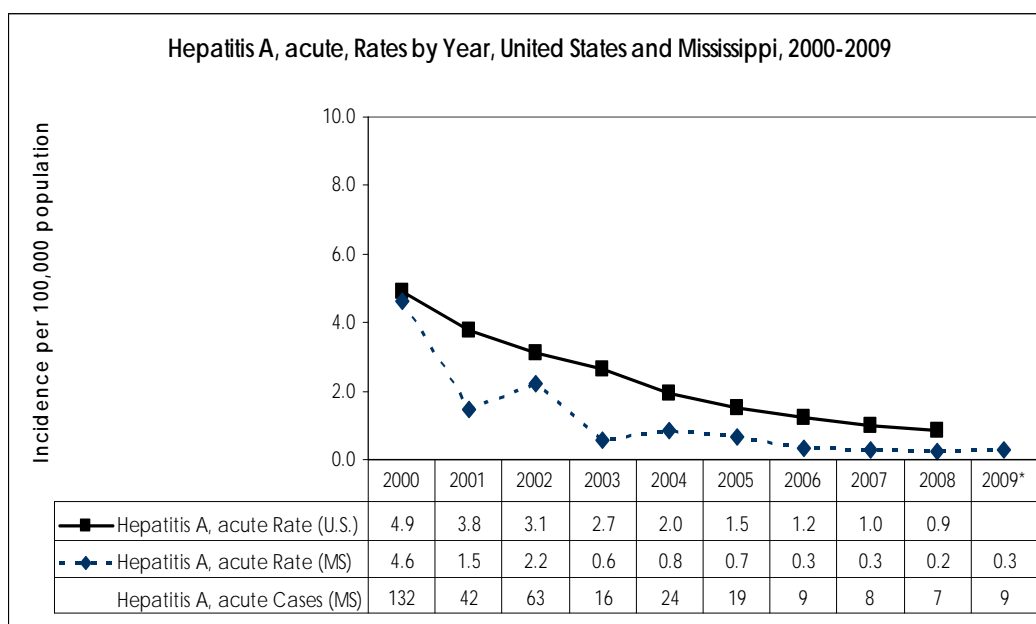
Reporting Classification

Class 1.

Epidemiology and Trends

There were nine hepatitis A cases reported in Mississippi in 2009. This was comparable to the seven cases reported in 2008 and to the three year (2006-2008) average of eight annual cases (Figure 46). The 2009 cases ranged in age from 49 years to 91 years; none were related to a common source outbreak.

Figure 46



*2009 U.S. data not available.

Listeriosis

2009 Case Total	5	2009 rate/100,000	0.2
2008 Case Total	6	2008 rate/100,000	0.2

Clinical Features

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 meningococcal meningitis 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.

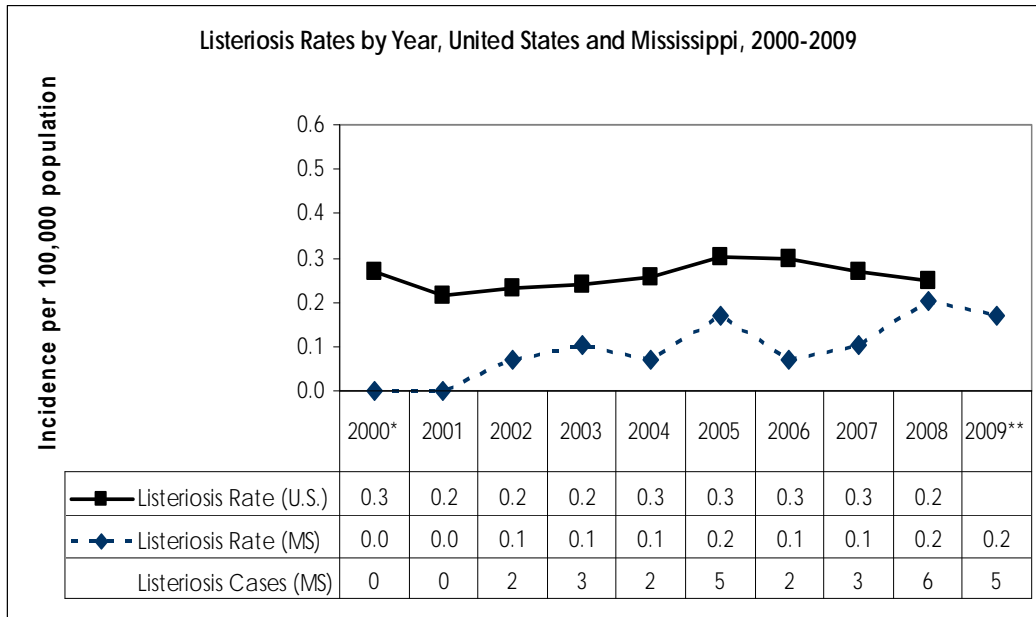
Reporting Classification

Class 2.

Epidemiology and Trends

There were five reported cases of listeriosis in Mississippi in 2009, which was comparable to 2008 and with the average number of cases reported for the past three years. The incidence rate in Mississippi has remained below national rates since *Listeria* was added to the National Notifiable Disease List in 2000 (Figure 47).

Figure 47



*Added to National Notifiable Disease List in 2000.

**2009 U.S. data not available.

Two neonatal infections (0-19 days) were reported in 2009. Three additional cases were reported in individuals ranging in age from 41 to 69 years old. One death was reported in a 57 year old. None of the infections were epidemiologically linked or associated with common source outbreaks.

Salmonellosis

2009 Case Total	901	2009 rate/100,000	30.5
2008 Case Total	1079	2008 rate/100,000	36.7

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 *Javianna*, *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.

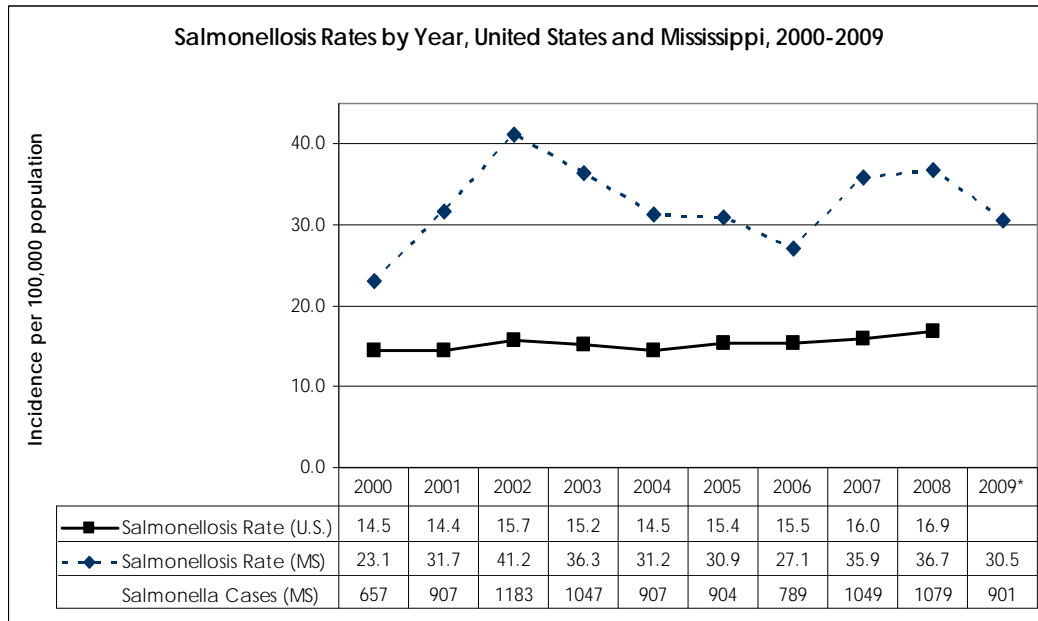
Reporting Classification

Class 2.

Epidemiology and Trend

In Mississippi, 901 cases of salmonellosis were reported to MSDH in 2009. This marked a decrease in the rate and number of reported cases in Mississippi (Figure 48). In 2009, the *Salmonella* serotypes *Typhimurium*, *Newport*, *Mississippi* and *Javiana* accounted for over 51% of the isolates seen in Mississippi.

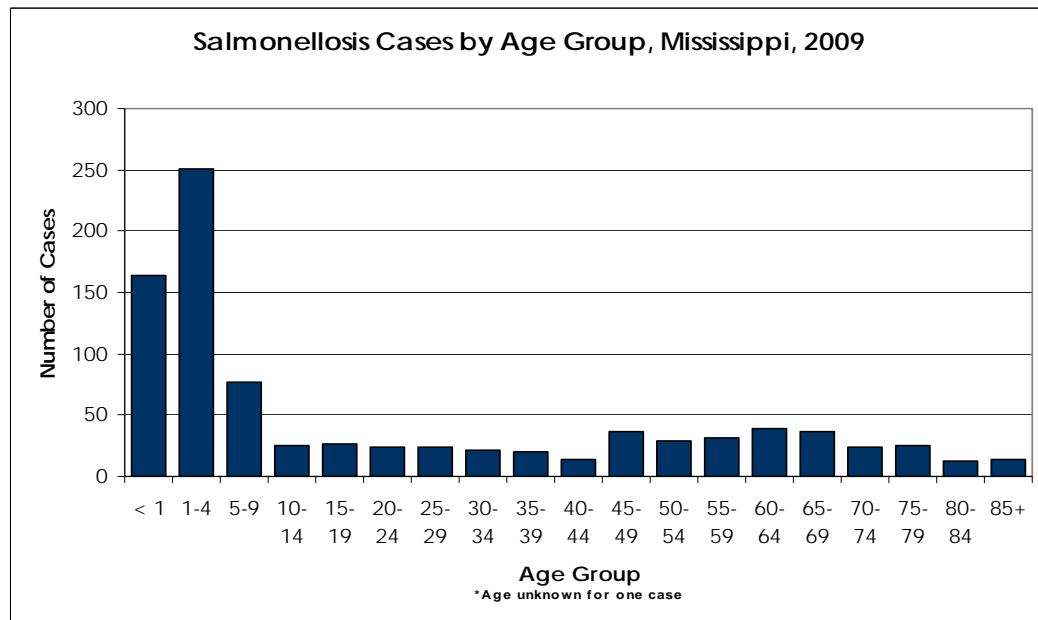
Figure 48



*2009 U.S. data not available.

Infections occur in people of all ages, but there is higher incidence in infants and small children. In 2009, 415 (46%) of the cases were in children less than 5 years of age (Figure 49).

Figure 49



In 2009 MSDH investigated a large outbreak of *Salmonella* that occurred in an adult detention center located in Public Health District IX (Gulf Coast region). On February 12, 2009, MSDH was first notified that an inmate at the facility had a stool specimen

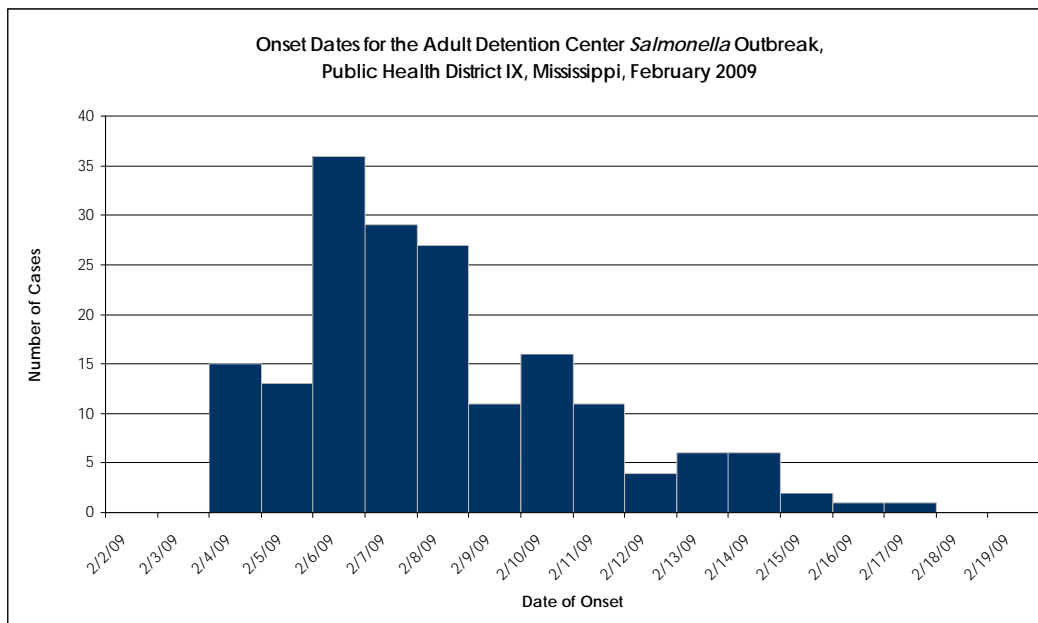
positive for *Salmonella*, Group D, and that 40 or 50 inmates had exhibited symptoms of gastroenteritis on February 8 and 9, 2009.

An initial environmental evaluation revealed that the facility was built for a capacity of approximately 200 inmates, but was currently housing more than 380 individuals. In addition to overcrowded conditions, there was also limited access to bathrooms, showers and sinks. All meals for the inmates were prepared in a central kitchen, operated by a private company that provided four supervisory staff overseeing 22-24 inmates who prepared the actual meals. The kitchen was designed to prepare meals for 80-100 inmates, but was serving upwards of 400 individuals. The kitchen staff was also interviewed, and food samples were collected from the stock food that was used to prepare meals between February 4 through February 7.

To find cases and define the scope of the outbreak, 319 inmates were interviewed with an in depth questionnaire to determine food history over the last 72 hours, symptom assessment and onset dates. In addition, stool samples were obtained to confirm the etiologic agent.

Cases were defined as anyone with diarrhea and two or more of the following symptoms: nausea, vomiting, bloody stools, cramps, fever, chills or headache. A total of 184 individuals were identified as cases. The predominant symptoms were diarrhea (100%), abdominal cramps (90%), nausea (81%) and headache (81%). Onset dates of illness ranged from February 4, 2009 to February 17, 2009 (Figure 50). The median duration of symptoms was seven days. An analysis of the food consumption questionnaires did not reveal any food item served that was associated with illness.

Figure 50



Seventeen stool samples were obtained from ill individuals. Thirteen of the samples were positive for *Salmonella*, Group D. Twelve of the isolates were sent to the PHL for serotyping and PFGE. All isolates were identified as *Salmonella enteritidis*, and PFGE analysis showed a 100% match for all the isolates. One of the positive samples was in an ill inmate kitchen worker, who had an unknown onset of illness.

Seven stock food samples used to prepare meals served from February 4-7 (collard greens, lettuce, dry milk, mayonnaise, pasteurized eggs and ground chicken) were tested for *Salmonella*. Only the ground chicken tested positive for *Salmonella*, but was Group B instead of the outbreak Group D.

Although a single point source was not identified in this outbreak, several risk factors were identified that likely contributed to rapid person to person transmission once the infectious agent was introduced, possibly from an infected kitchen worker. The facility was overcrowded with a lack of sanitary conditions for inmates, and the kitchen was not an adequate size to cook, serve and clean for the number of inmates in the detention center.

To prevent further outbreaks, it was recommended that overcrowding and sanitation issues be addressed. Follow up with the facility indicated that no further inmates or staff became ill after February 17, 2009.

Shigellosis

2009 Case Total	52	2009 rate/100,000	1.8
2008 Case Total	290	2008 rate/100,000	9.9

Clinical Features

An acute bacterial illness characterized by loose, often bloody stools (dysentery), fever, and nausea with vomiting, cramps and tenesmus. Asymptomatic infections occur. Illness is usually self-limited, lasting an average of 4-7 days; however infection with *Shigella dysenteriae* (*S. dysenteriae*) is often associated with 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*. Predominant isolates in Mississippi are Group D, *S. sonnei*.

Reservoir

Humans are the primary reservoir.

Transmission

Primarily person to person by direct and indirect fecal oral contact. Infection may also occur after ingestion of contaminated food or water. The infective dose can be as low as 100-200 organisms.

Incubation

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

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, and investigates all reported infections in children less than 5 years of age.

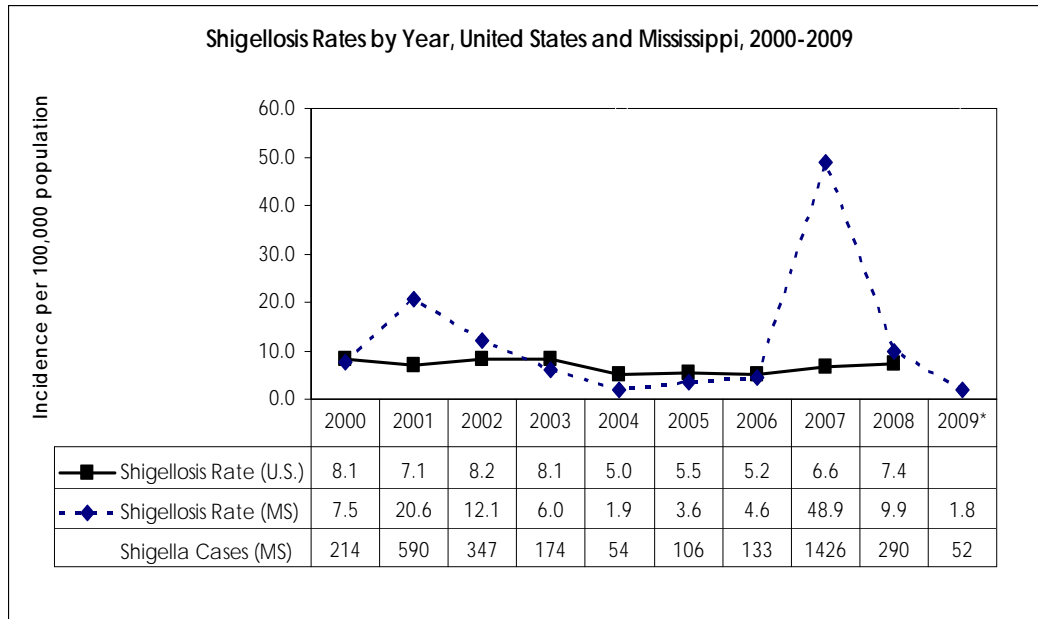
Reporting Classification

Class 2.

Epidemiology and Trends

There were 52 cases of Shigellosis reported to MSDH during 2009, a marked decrease from 2008 (Figure 51). There have been cyclic increases every 6-8 years since 1992, with a peak of 1426 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 with 46% of the cases reported between May and August, cases are reported to MSDH year round (Figure 52). The reported cases ranged in age from 3 months to 87 years, with 58% occurring in children less than 10 years of age (Figure 53).

Figure 51



*2009 U.S. data not available.

Figure 52

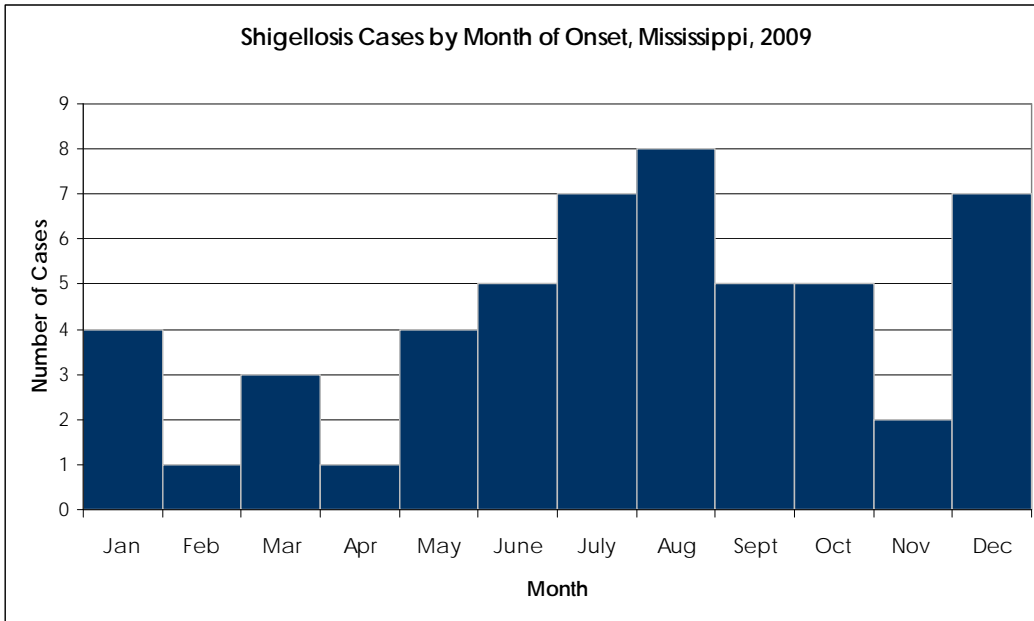
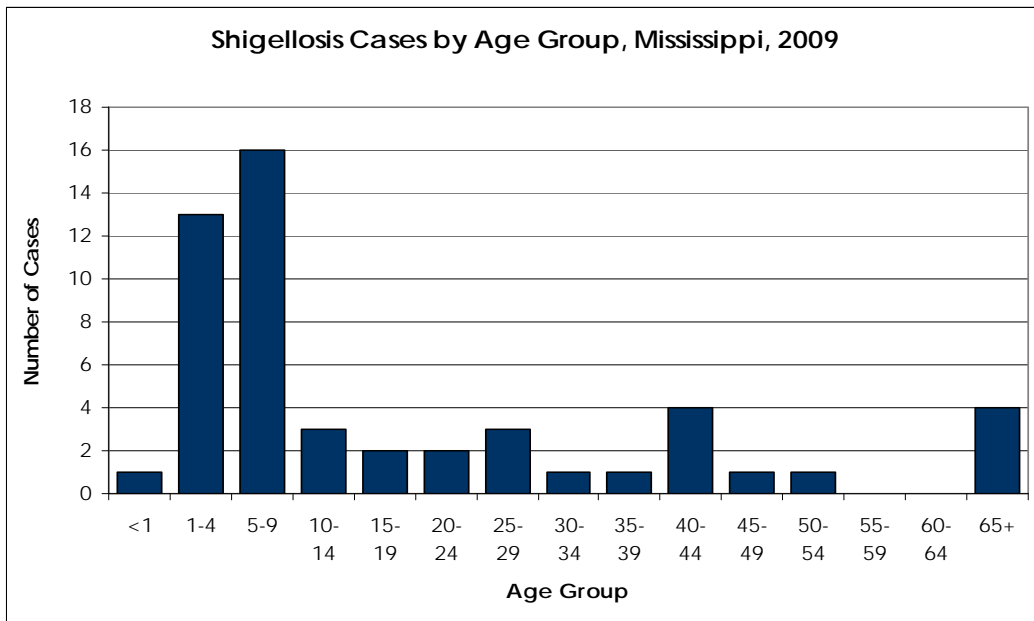


Figure 53



***Vibrio* disease**

2009 Case Total	11	2009 rate/100,000	0.4
2008 Case Total	7	2008 rate/100,000	0.2

Clinical Features

Several noncholera *Vibrio* species can cause illness in humans, usually wound infections, septicemia or gastroenteritis. *Vibrio vulnificus* and *Vibrio parahaemolyticus* are the two most frequently reported species in Mississippi.

V. vulnificus causes sepsis 12 hours to 3 days after ingestion of contaminated seafood, usually raw oysters, especially among people with chronic liver disease, alcoholism, or immunosuppression. These same groups are at risk for severe wound infections from contact with coastal waters. *V. vulnificus* sepsis is characterized by fever, chills, blistering skin lesions, shock and death. The case fatality rate is over 50% when septicemia occurs.

V. parahaemolyticus infection typically causes gastroenteritis with watery diarrhea with abdominal cramps, nausea, vomiting and fever; less commonly wound infections.

Infectious Agent

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

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. MSDH investigates all reported cases to determine the source of infection and possible risk factors of the case.

Reporting Classification

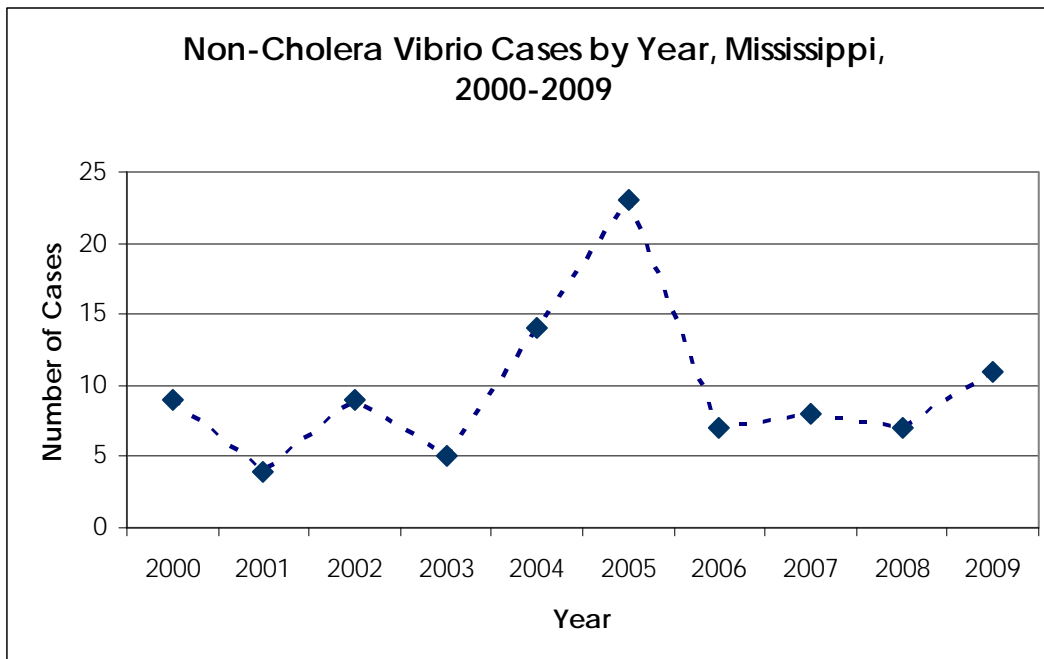
Class 2.

Epidemiology and Trends

In 2009, there were 11 reported *Vibrio* infections. This was close to twice the number of reported cases in 2008 (7) and higher than the three year average of 7 cases for 2006-2008 (Figure 54).

Of the 11 reported cases, five were due to *V. vulnificus* (3 isolated from blood cultures and 2 from wound cultures), two were due to *V. parahaemolyticus* (1 isolated from a stool culture and the other from an unknown site), four were due to Non-O1 *V. cholerae* (two isolated from stool cultures, 1 isolated from a wound culture, and one from an unknown site). There was one reported death attributed to *V. vulnificus* in 2009 in a 59 year old man with an underlying history of alcoholic cirrhosis.

Figure 54



Zoonotic Diseases

Arboviral Infections (mosquito-borne)

Background

Arthropod-borne viral (arboviral) diseases in Mississippi are limited to a few types transmitted by mosquitoes. In this state, there are four main types of arboviral infections that have been reported: 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 symptoms of 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. Infections 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; wear light-colored long pants and long-sleeved shirts; and apply mosquito repellent to exposed skin areas. Reduce mosquito breeding areas around the home and workplace by eliminating standing or stagnant water. Larvicides 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 5-50 mosquitoes for testing. In 2009, 439 mosquito pools were submitted to MSDH PHL for WNV, SLE, and EEE testing.

Arboviral Testing

The Public Health Laboratory (PHL) performs an arboviral panel consisting of IgM testing for WNV and SLE, and, for patients under 25 years of age, LAC IgM. Clinicians are encouraged to call MSDH Epidemiology or the PHL for specifics and indications for arboviral testing.

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

Eastern Equine Encephalitis (EEE)

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 1.

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 2009. 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 reports equine infections to MSDH, and in 2009, 40 horses tested positive for EEE. The EEE-positive horses were located throughout the state

with 65% of the horses reported from District IX and District VIII (14 and 12 cases, respectively). District VI reported eight EEE-positive horses, while Districts II, III, and IV each reported two cases. There were no reported EEE positive mosquito pools in 2009.

LaCrosse Encephalitis

2009 Case Total	0	2009 rate/100,000	0.0
2008 Case Total	3	2008 rate/100,000	0.1

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.

Reporting Classification

Class 1.

Epidemiology and Trends

Reported LaCrosse encephalitis remains relatively rare in Mississippi, with 15 reported cases since 1999. There were no reported cases of LaCrosse encephalitis in 2009.

Of the 15 total cases since 1999, 53% were in females. The ages ranged from 3 months to 78 years of age, with 93% of the cases being under the age of 15.

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 were no reported cases of Jamestown Canyon encephalitis virus in 2009.

St. Louis Encephalitis

2009 Case Total	2	2009 rate/100,000	0.1
2008 Case Total	0	2008 rate/100,000	0.0

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 1.

Epidemiology and Trends

The number of reported SLE cases fluctuates annually. There were no cases reported in 2004, 2006, or 2008, but there were nine cases with one death reported in 2005 and two reported cases in 2007. There were no deaths due to SLE in 2007.

Mississippi had two reported cases of SLE in 2009. Both cases presented as neuroinvasive, were in individuals greater than 65 years of age, and were from District VIII. There were no deaths due to SLE in 2009. No positive SLE mosquito pools were reported in 2009.

West Nile Virus

2009 Case Total	53	2009 rate/100,000	1.8
2008 Case Total	65	2008 rate/100,000	2.2

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 symptoms compatible with 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, 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.

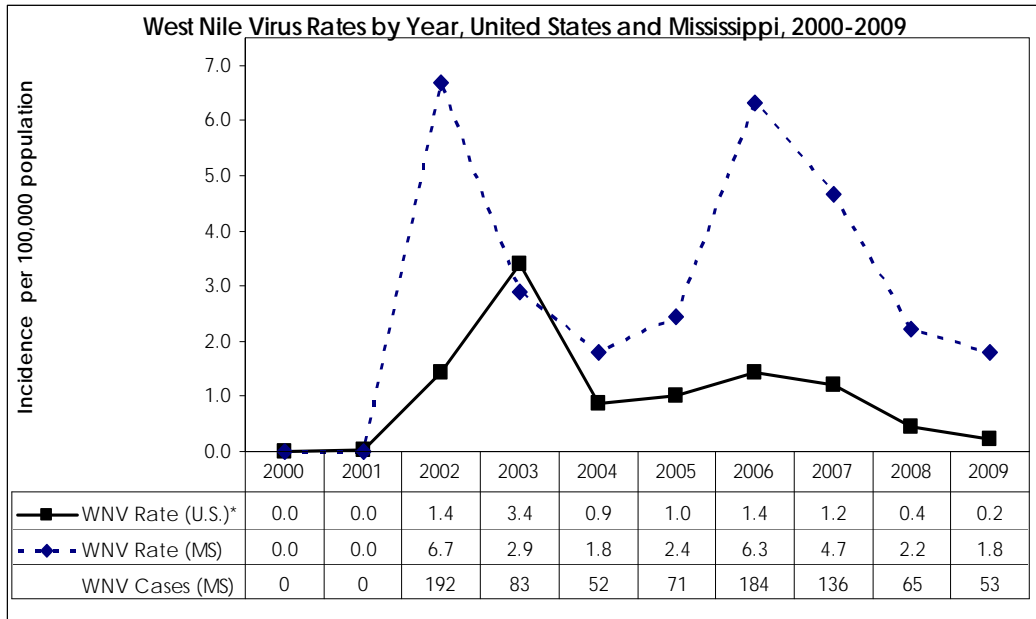
Reporting Classification

Class 1.

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. The years following saw a decrease in the number of reported infections; however in 2006, there was a resurgence of 184 cases (Figure 55). In 2009, there were 53 reported cases with 5 deaths.

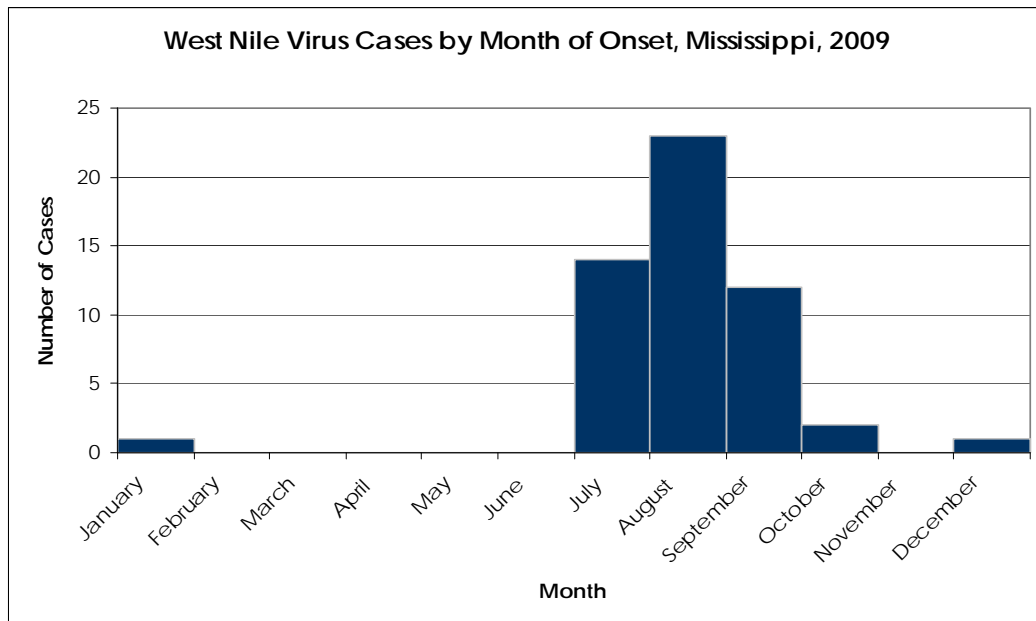
Figure 55



*U.S. data: 21 cases in 2000; 66 cases in 2001.

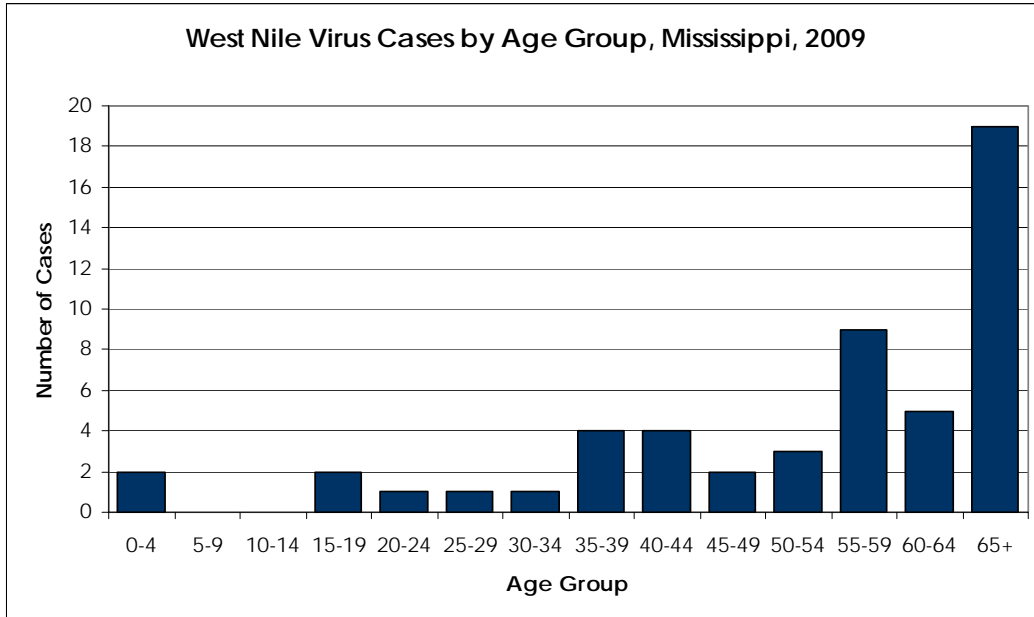
WNV is now thought to be endemic in Mississippi, and the mosquito vector is present the entire year. Human illness can occur year round, but is most prevalent from July to October. August and September are usually the peak months (Figure 56).

Figure 56



Of these 53 cases, 42% were classified as WNV fever and 58% were encephalitis. The cases ranged in age from 10 months to 89 years. Nearly 68% were 50 years or older (Figure 57).

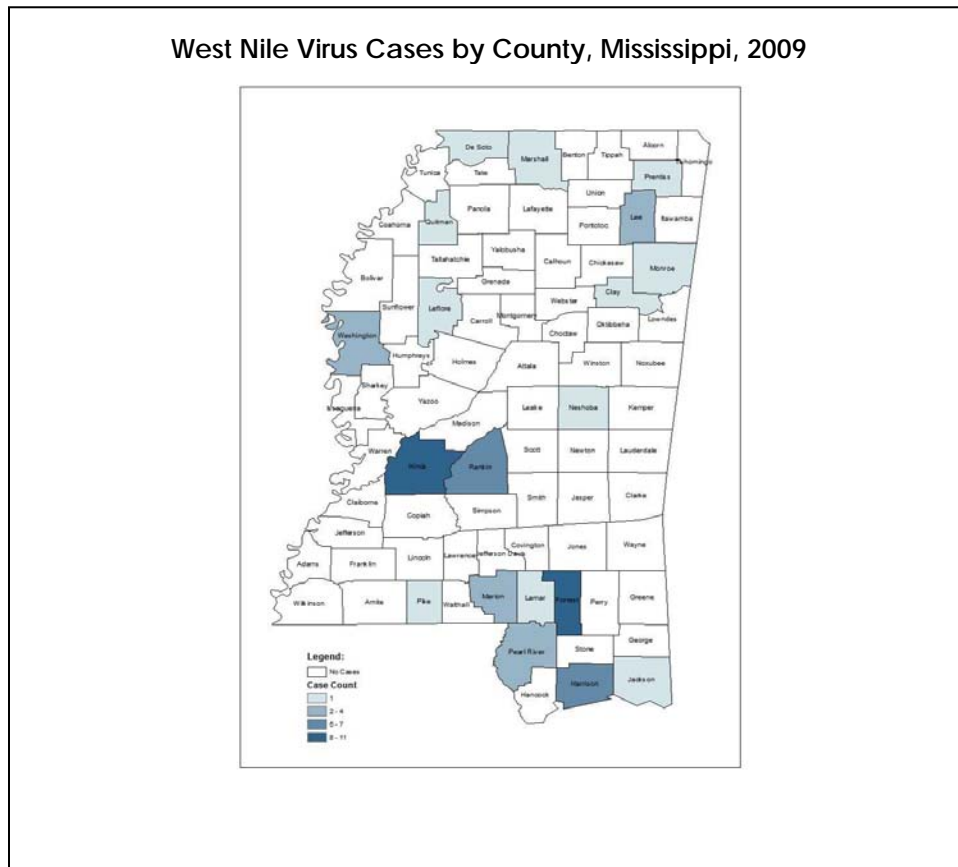
Figure 57



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. Approximately 62% of the cases in 2009 occurred in Forrest, Hinds, Rankin, and Harrison counties (Figure 58).

A total of five mosquito pools tested positive for WNV. 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 2009, eleven horses tested positive for WNV with about half of the cases being in District IX.

Figure 58



Lyme Disease

2009 Case Total	0	2009 rate/100,000	0.0
2008 Case Total	0	2008 rate/100,000	0.0

Clinical Features

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 inapparent 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 repellent 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 occur in late spring and summer. Lyme disease is not considered endemic in Mississippi, although the vector is present in the state. Since 2004 the number of annual reported cases has ranged from 0-3. There were no confirmed cases reported in 2009, but there were two cases in 2007.

Rabies

Clinical Features

Rabies is an acute fatal 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 raccoons 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 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. Currently, only bats maintain the cycle in Mississippi.

Transmission

The most common mode of rabies virus transmission is through the bite of an infected host. All mammals are susceptible to varying degrees. 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 preventing and controlling rabies in animals can be found in the Compendium of Animal Rabies Prevention and Control, at <http://www.nasphv.org/Documents/RabiesCompendium.pdf>.

Recommendations for prevention of rabies in humans can be found in the document by the Advisory Committee on Immunization Practices entitled Human Rabies Prevention—United States, 2008 <http://www.cdc.gov/mmwr/pdf/rr/rr57e507.pdf>.

Reporting Classification

Class 1 (human or animal).

Epidemiology and Trends

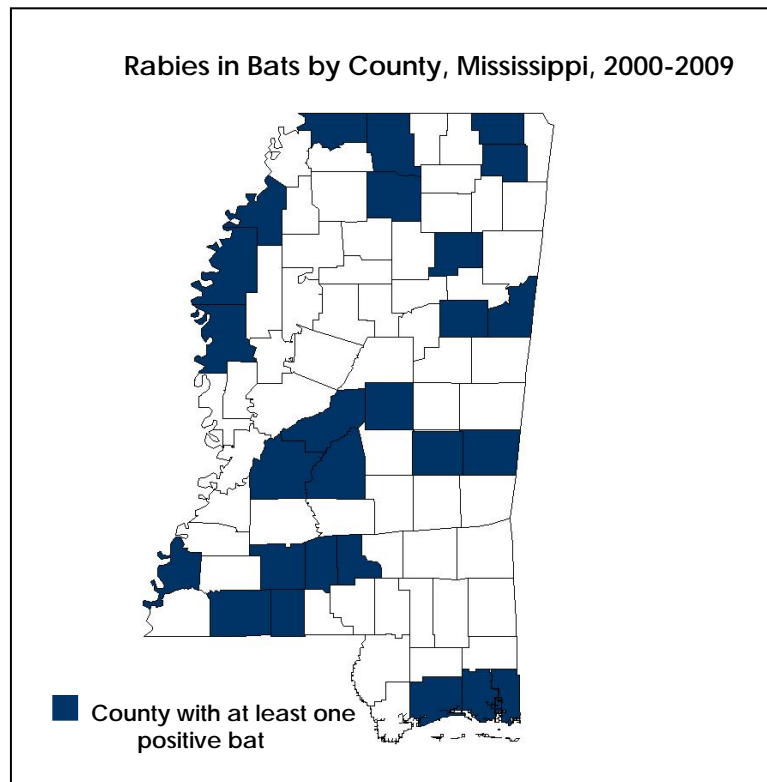
In the U.S. in the 1940s and 1950s, canines were the predominant reservoir and cause of human rabies. By 2006, however, approximately 92% of animal rabies cases were in wildlife, and only 8% were in domestic animals. This change is attributed to concerted, targeted rabies vaccination campaigns and stray animal control that have reduced the number of canine rabies cases from 6,947 in 1947 to 79 in 2006. 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.

The MSDH PHL is the only laboratory in Mississippi that tests for rabies in animals. Since 1962, bats are the only animals that have tested positive for rabies in Mississippi. Usually between 2-11 bats test positive each year. There were 4 positive bats out of 75 tested in the PHL in 2009. Since 1999, there has been a wide geographic distribution of positive bats, with 52 reported positives in 25 counties (Figure 59). There has not been an indigenous terrestrial animal (land) rabies case reported in Mississippi since 1961, however, rabies occurs in terrestrial animals annually in states that border Mississippi (Arkansas, Alabama, Louisiana, and Tennessee).

Mississippi reported a human case of rabies due to a bat strain in a 10 year old boy in 2005. Prior to this 2005 human case, the last reported human rabies case in Mississippi was in 1953 and this was transmitted by a terrestrial animal.

Figure 59



Rocky Mountain spotted fever

2009 Case Total	9	2009 rate/100,000	0.3
2008 Case Total	12	2008 rate/100,000	0.4

Clinical Features

A rickettsial illness with 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. In untreated cases and those with delayed recognition, fatality occurs in 13-25% of the cases. Early stages of Rocky Mountain spotted fever (RMSF) are often confused with ehrlichiosis and meningococemia.

Infectious Agent

Rickettsia rickettsii, a gram-negative coccobacillus.

Reservoir

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

Transmission

Through 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 repellent 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.

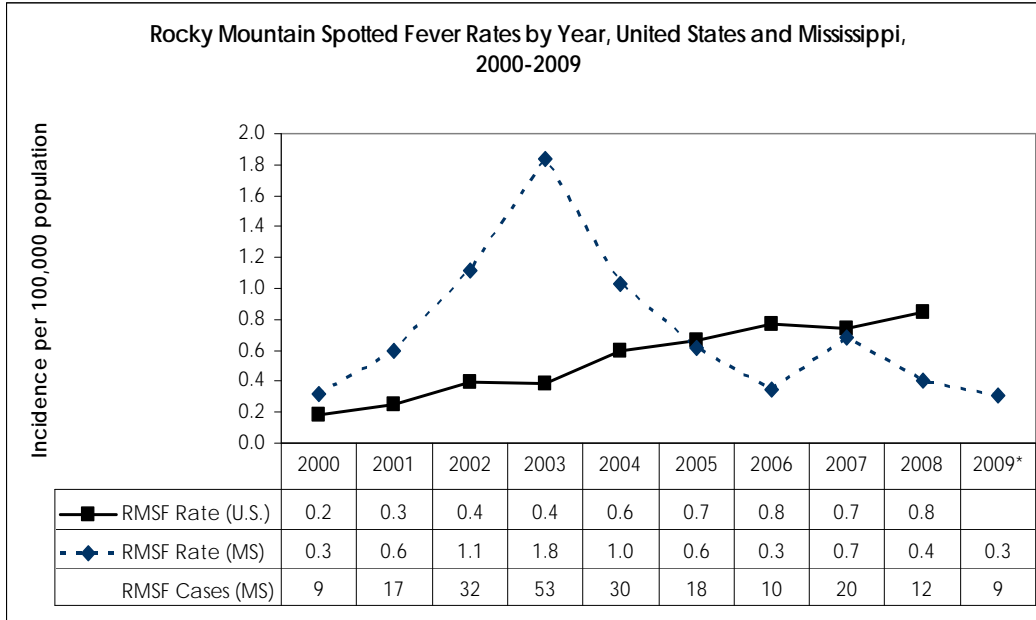
Reporting Classification

Class 2.

Epidemiology and Trends

In 2009, there were nine cases of Rocky Mountain spotted fever reported in Mississippi. This is lower than the three year (2006-2008) average of 14 cases (Figure 60). The cases ranged in age from 28 to 67 years of age. There were no reported deaths.

Figure 60



*2009 U.S. data not available.

Reportable Disease Statistics



Mississippi Reportable Disease Statistics 2009

		Public Health District									State Total
		I	II	III	IV	V	VI	VII	VIII	IX	
Sexually Transmitted Diseases	Primary & Secondary Syphilis	14	6	23	7	75	8	9	44	49	235
	Total Early Syphilis	40	12	52	13	195	25	17	109	99	562
	Gonorrhea	652	470	1,012	496	2,115	737	413	739	607	7,241
	Chlamydia	2,615	1,849	3,236	1,757	6,217	2,042	1,554	2,221	2,101	23,592
	HIV Disease	62	27	67	33	218	36	28	63	76	210
Mycobacterial Diseases	Pulmonary Tuberculosis (TB)	6	5	11	7	50	5	4	3	10	101
	Extrapulmonary TB	1	2	1	1	9	2	2	2	0	20
	Mycobacteria Other Than TB	30	20	10	17	94	27	21	36	42	297
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	0
	Pertussis	10	4	12	3	10	5	15	8	13	80
	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	1	0	0	0	0	1
	Hepatitis B (acute)	2	6	3	2	6	5	0	2	6	32
	Invasive <i>H. influenzae</i> b disease	0	0	0	0	0	0	0	0	0	0
	Invasive Meningococcal disease	0	0	1	1	1	1	0	0	1	5
Enteric Diseases	Hepatitis A (acute)	0	0	1	0	2	1	1	4	0	9
	Salmonellosis	61	141	31	71	221	84	68	103	107	901
	Shigellosis	14	19	0	6	5	3	1	1	1	52
	Campylobacteriosis	7	16	18	7	18	13	6	12	12	110
	<i>E. coli</i> O157:H7/HUS	1	0	0	1	3	0	0	0	1	6
Zoonotic Diseases	Animal Rabies (bats)	0	0	0	1	2	0	0	0	1	4
	Lyme disease	0	0	0	0	0	0	0	0	0	0
	Rocky Mountain spotted fever	0	2	1	1	1	1	0	0	3	9
	West Nile virus	2	5	3	2	15	1	1	14	10	53



**Mississippi
Provisional Reportable Disease Statistics
November 2010**

Figures for the current month are provisional

		Public Health District									State Totals*			
		I	II	III	IV	V	VI	VII	VIII	IX	Nov 2010	Nov 2009	YTD 2010	YTD 2009
Sexually Transmitted Diseases	Primary & Secondary Syphilis	1	0	0	1	4	2	2	1	5	16	12	199	195
	Total Early Syphilis	2	3	3	3	18	7	3	4	7	50	31	549	496
	Gonorrhea	57	31	81	54	173	47	21	49	50	563	553	5,615	6,771
	Chlamydia	217	145	230	147	500	163	127	132	139	1,800	1,863	19,613	21,813
	HIV Disease	4	4	5	2	16	5	2	6	4	48	55	491	507
Mycobacterial Diseases	Pulmonary Tuberculosis (TB)	4	1	0	0	4	1	1	0	1	12	7	90	91
	Extrapulmonary TB	0	1	0	1	0	0	0	0	0	2	1	10	19
	Mycobacteria Other Than TB	5	1	2	0	5	4	1	2	4	24	25	362	264
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pertussis	0	1	0	1	0	3	0	0	2	7	10	76	73
	Tetanus	0	0	0	0	0	0	0	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0	0
	Measles	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mumps	0	0	0	0	0	0	0	0	0	0	0	0	1
	Hepatitis B (acute)	0	0	0	0	0	0	1	0	0	1	3	35	31
	Invasive <i>H. influenzae</i> b disease	0	0	0	0	0	0	0	0	0	0	0	0	0
	Invasive Meningococcal disease	0	0	0	0	0	0	0	0	0	0	0	5	4
Enteric Diseases	Hepatitis A (acute)	0	0	0	0	0	0	0	0	0	0	0	2	8
	Salmonellosis	8	16	1	4	21	2	3	5	8	70**	59	1160	869
	Shigellosis	1	0	1	0	2	1	2	0	0	7	2	51	45
	Campylobacteriosis	1	3	0	0	1	0	3	1	4	13	7	125	104
	<i>E. coli</i> O157:H7/HUS	0	0	0	13	0	0	0	0	0	13	0	24	6
Zoonotic Diseases	Animal Rabies (bats)	0	0	0	0	0	0	0	0	0	0	0	0	4
	Lyme disease	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rocky Mountain spotted fever	0	0	0	0	0	0	0	0	1	1	0	16	9
	West Nile virus	0	0	0	0	0	0	0	0	0	0	0	9	52

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

** Address unknown for two cases.

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