Mississippi State Department of Health

Mississippi Morbidity Report

Volume 24, Number 11 November 2008

Annual Summary
Selected Reportable Diseases
Mississippi—2007

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Preface, Annual Summary, 2007

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.

Of note this year are increases in tuberculosis and primary and secondary syphilis, diseases on which the Mississippi State Department of Health (MSDH) has placed renewed emphasis. Increases in state funding have allowed public health to hire more field staff to provide prevention and treatment services.

Statistics incorporated into tables, graphs and maps reflect data reported from health care providers in the state of Mississippi, or who care for Mississippi residents. Disease 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 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.

Mary Currier, MD, MPH
State Epidemiologist

PUBLIC HEALTH DISTRICTS

Northwest Public Health
District I
662-563-5603

Northeast Public Health
District II
662-841-9015

Delta/Hills Public Health
District III
662-453-4563

Tombigbee Public Health
District IV
662-323-7313

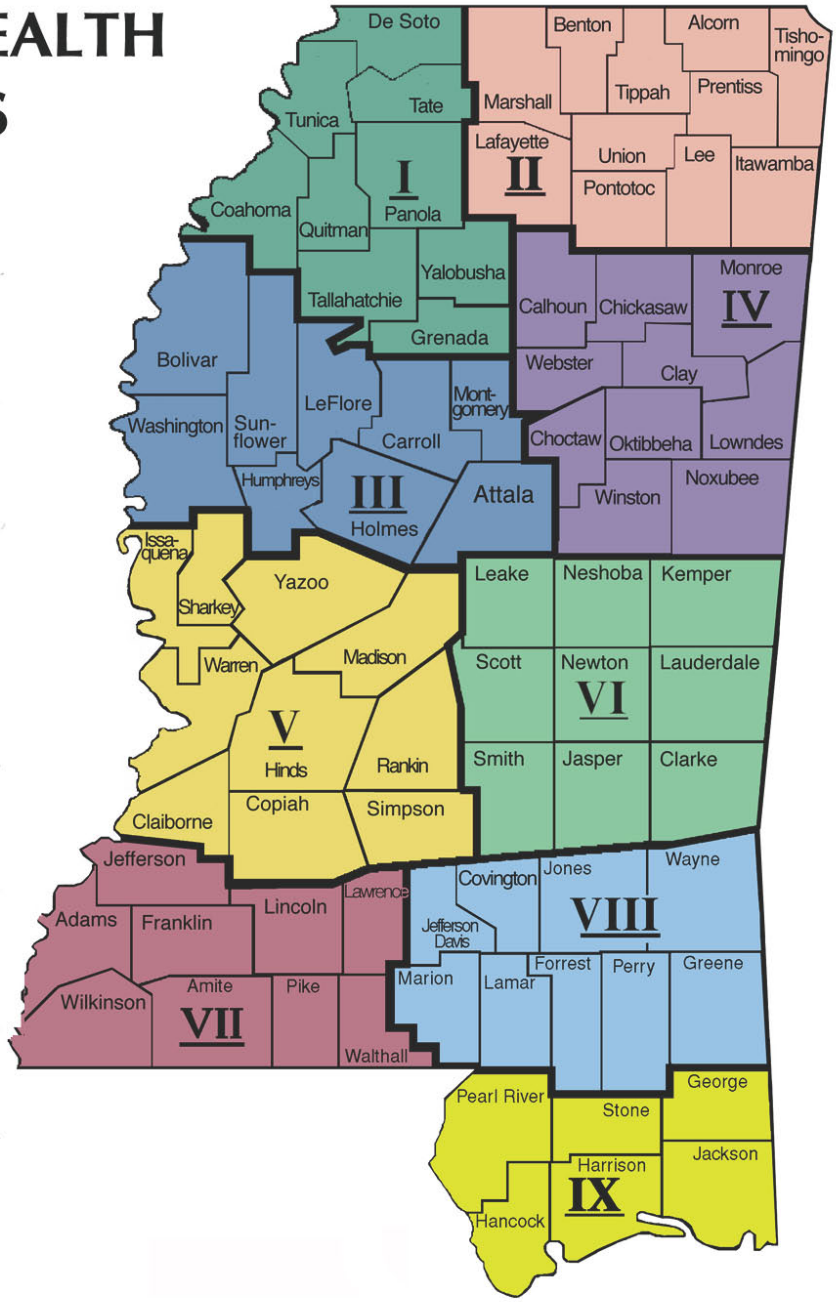
West Central Public Health
District V
601-978-7864

East Central Public Health
District VI
601-482-3171

Southwest Public Health
District VII
601-684-9411

Southeast Public Health
District VIII
601-544-6766

Coastal Plains Public Health
District IX
228-831-5151



Refer to the 2008 List of Reportable Diseases and Conditions for specific diseases in each reporting class

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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).

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.

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).

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.

For further information, please refer to the Mississippi State Department of Health's website at www.msdh.state.ms.us.

Effective: May 10, 2008

Haemophilus influenzae type b (Hib), invasive

Clinical Features: An invasive bacterial disease, particularly among infants, that can affect many organ systems. Meningitis is the most common manifestation, accounting for 50-60% of all cases in the prevaccine era. Epiglottitis, pneumonia, arthritis, and cellulitis are other forms of invasive disease. The common presentation of Hib meningitis is fever, decreased mental status and stiff neck. Neurologic sequelae can occur in 15-30% of survivors, with hearing impairment being the most common. Case fatality rate is 2-5% even with antimicrobial therapy. Peak incidence is usually in infants 6-12 months of age. 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 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. Immunization is not recommended for children over 5 years of age.

The Mississippi State Department of Health (MSDH) investigates all 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.

Reporting Classification: Class 1.

Epidemiology and Trends: In 2007, there were no cases of invasive *H. influenzae* type b reported to MSDH. From 2004-2006, the annual number has ranged from zero to four cases a year, with four cases reported in 2006. In the three previous years, incidence has been highest in adults (75%); however ages at onset of illness have ranged from 2 to 77 years of age.

MSDH investigates all reported *H. influenzae* to determine if the case is type b and if contacts should receive prophylaxis. MSDH requests that all isolates be sent to the Public Health Laboratory (PHL) for serotyping. During investigation, contacts are often treated before the isolate's type is known. In 2007, ten *H. influenzae* cases were reported; none were serotyped as *H. influenzae* type b. However, as a precaution, 24 contacts to these suspected cases received rifampin prophylaxis prior to results of serotyping.

Hepatitis B, acute

Clinical Features: An acute viral illness with insidious onset of anorexia, abdominal discomfort, nausea and vomiting. Clinical illness is often unrecognized because jaundice only occurs in only 30-50% of adults and less 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.

Infectious Agent: Hepatitis B virus, a hepadnavirus.

Reservoir: Humans.

Transmission: By 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 risk groups are heterosexuals with infected or multiple partners, injection-drug users, and men who have sex with men.

Incubation: Usually 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.

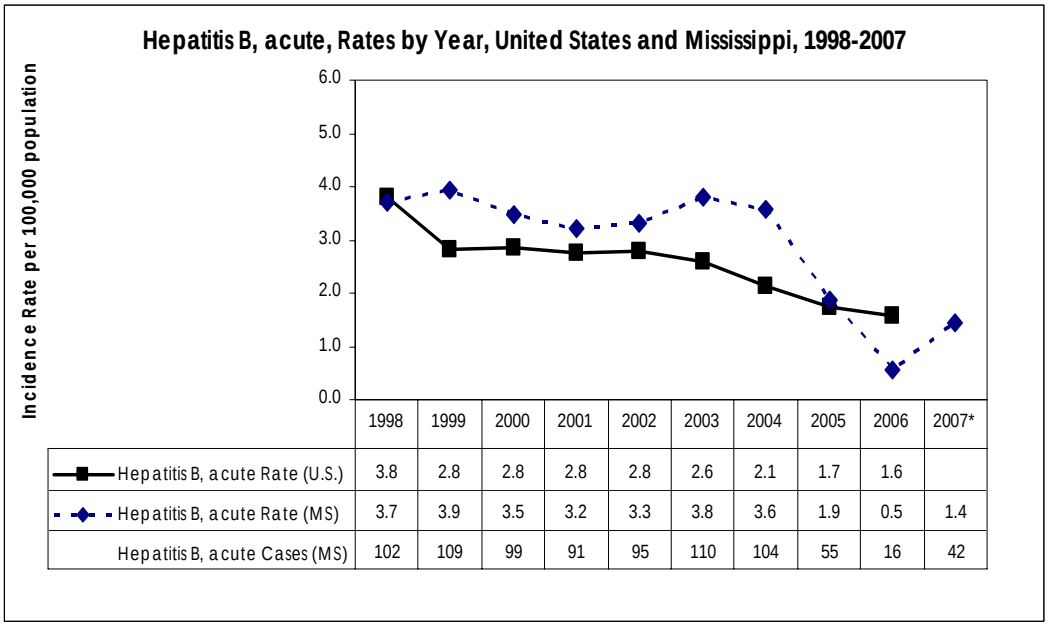
Methods of Control: Routine hepatitis B vaccination series is recommended for all children beginning at birth, with catch-up at 11-12 years of age if not previously vaccinated. The usual three dose schedule is 0, 1-2, and 6-18 months. Vaccination is also recommended for high risk groups, including those 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. Post-exposure prophylaxis is highly effective in preventing hepatitis B transmission from mother to infant, therefore, testing of all pregnant women for HBsAg is recommended with each pregnancy.

Reporting Classification: Class 2

Epidemiology and Trends: In 2007, 42 cases of acute hepatitis B were reported. This was almost three times the number of cases reported in 2006. The three year average for 2004-2006 was 58 cases (Figure 1).

Figure 1



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Hepatitis B, acute Rate (U.S.)	3.8	2.8	2.8	2.8	2.8	2.6	2.1	1.7	1.6	
Hepatitis B, acute Rate (MS)	3.7	3.9	3.5	3.2	3.3	3.8	3.6	1.9	0.5	1.4
Hepatitis B, acute Cases (MS)	102	109	99	91	95	110	104	55	16	42

*2007 U.S. data not available.

In Mississippi, 16 (43%) of the 42 reported cases occurred in individuals aged 20-29 years. Overall, the cases ranged in age from 19 to 65 years old. (Figure 2).

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. In 2007, 101 HBsAg positive pregnant women were reported to the Perinatal Hepatitis B Program. This is comparable to 108 in 2006 and the three year average of 106 (Figure 3).

Two infants born in 2007 were found to be HBsAg-positive. This is comparable to 2006 when there were three cases of perinatal transmission. From 1998-2005, however, only one infant was reported as HBsAg positive.

Figure 2

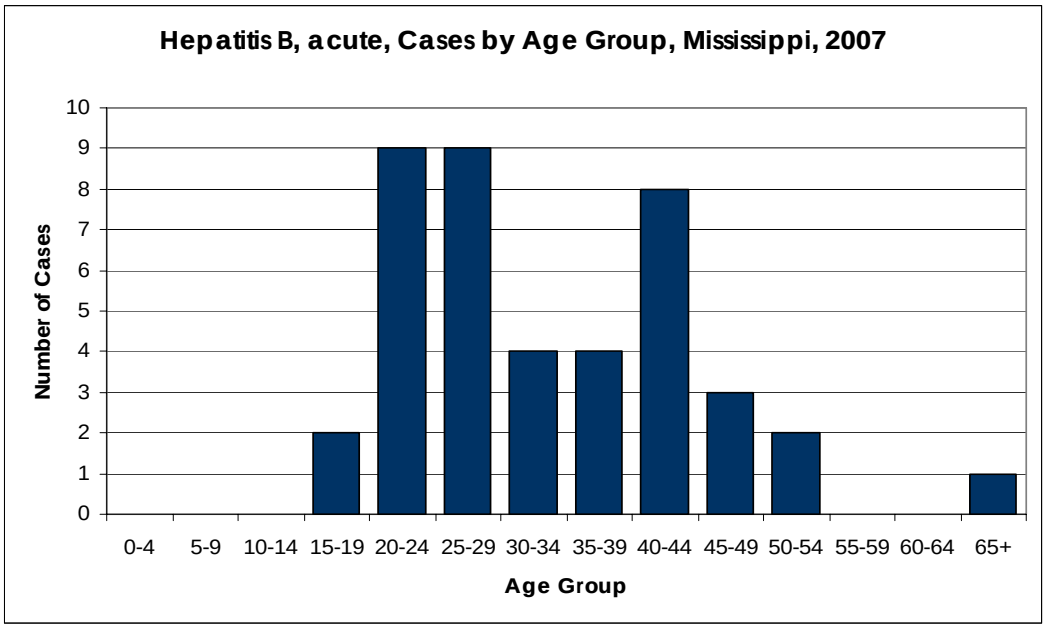
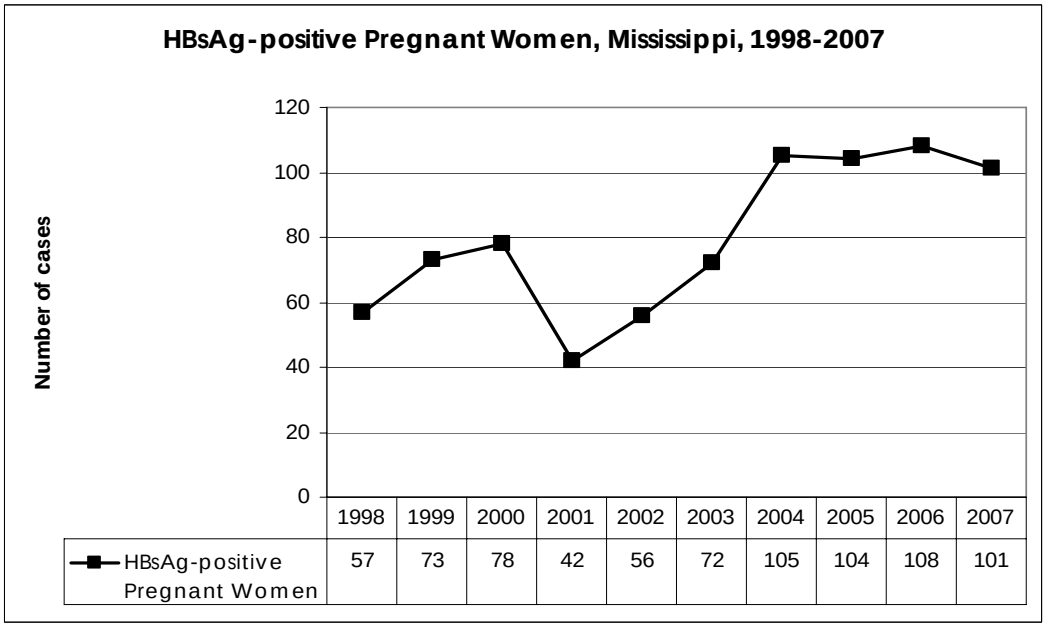


Figure 3



Influenza

Clinical Features: An acute viral infection of the respiratory tract characterized by sudden onset of fever, often with chills or rigors, headache, malaise, diffuse myalgia, and nonproductive cough. The highest risks for complications from influenza are in persons aged 65 years and older, young children, and persons at

any age with underlying chronic illnesses. Pneumonia due to secondary bacterial infection is the most common complication. There are, on average, 36,000 influenza associated deaths each year in the U.S.

Infectious Agent: Influenza is caused by an RNA virus. There is usually one predominant type of influenza virus causing infection each season, however both influenza A (H1N1 and H3N2) and influenza B viruses circulate during 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: 3-5 days from clinical onset in adults; up to7-10 days in young children.

Methods of Control: Education of basic personal hygiene, specifically transmission from unprotected coughs and sneezes and from hand to mucous membrane. Yearly vaccination is recommended with either the trivalent inactivated vaccine (TIV) or the live attenuated influenza vaccine (LAIV). Antivirals (oseltamivir and zanamivir) can also be used to prevent and treat influenza. Please consult the Center for Disease Control and Prevention(CDC) MMWR "Prevention and Control of Influenza, Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2008", published in August, for vaccine recommendations and guidelines, and use of antivirals for the 2008-2009 influenza season.

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

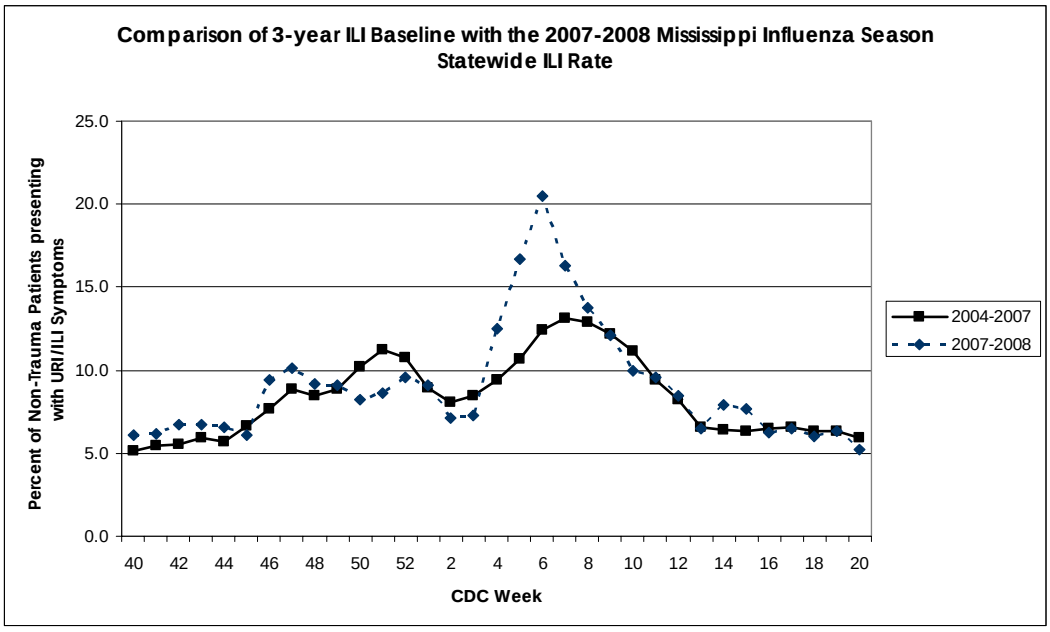
Epidemiology and Trends: Influenza activity usually occurs from December through March or April, but can occur earlier or later. Peak activity typically occurs in February or March. The risk of complications depends on many factors, including age and underlying chronic medical conditions. Vaccination 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 2007-2008 influenza season, 57 sentinel providers in 37 counties across the state 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 state's weekly influenza activity, ranging from no activity to widespread activity. This is an estimate of the geographic spread of influenza, rather than an indication of the severity of the season. ILI providers are also supplied with kits for PCR influenza testing at the Public Health Laboratory (PHL).

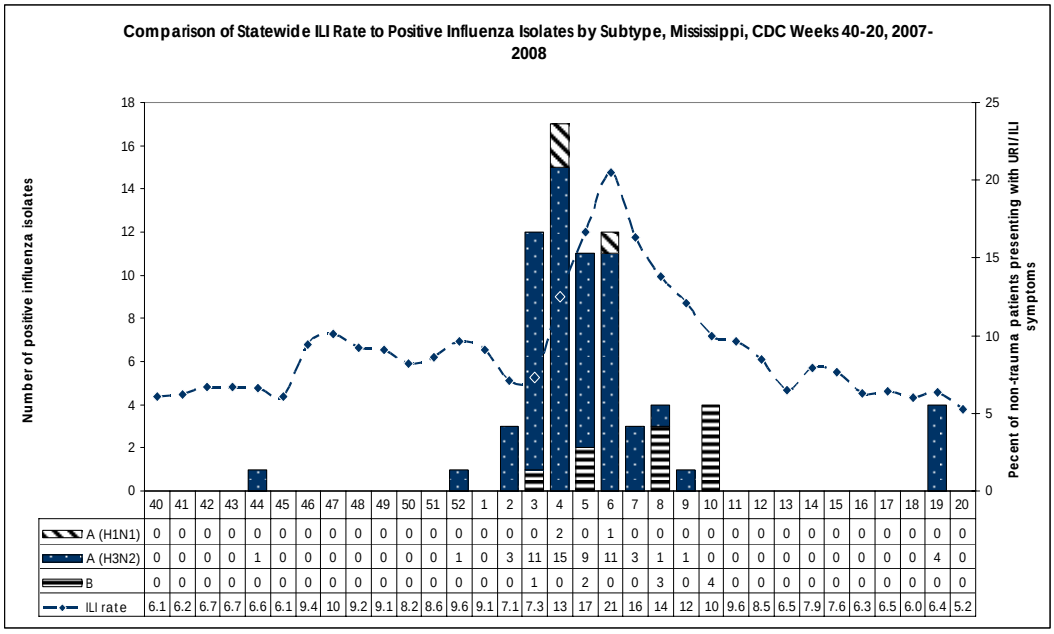
In the last several seasons, the influenza activity in Mississippi has been multiphasic, usually with a small peak occurring in December, followed by a larger peak in February to March. This pattern of activity was seen in the 2007-2008 influenza season (Figure 4). Influenza-like illnesses began to significantly increase in CDC week 4 (week ending 1/26/08), with widespread activity reported, and peaked in CDC week 6 (week ending 2/9/08) with 20.68% of nontrauma patients having symptoms consistent with an ILI. Widespread influenza activity was reported through CDC week 8 (week ending 2/23/08). The activity then steadily declined for the remainder of the season, with Mississippi's last official reported activity as sporadic at the end of CDC week 20 (May 17, 2008).

Figure 4



Positive PCR samples were reported in all nine Public Health Districts, and covered the age ranges from 17 months to 95 years. The PHL reported the first positive influenza PCR in CDC week 44 (week ending 10/30/07). Of the 129 samples submitted to the PHL for PCR influenza testing, 73 were positive (57%). During the peak weeks of activity in the state, 84.8% of all positive samples were influenza A (H3N2) (Figure 5). This same subtype was also the predominant virus for the entire season, representing 80.8% of all positives.

Figure 5



	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A (H1N1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A (H3N2)	0	0	0	0	1	0	0	0	0	0	0	0	1	0	3	11	15	9	11	3	1	1	0	0	0	0	0	0	0	0	0	4	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0
ILI rate	6.1	6.2	6.7	6.7	6.6	6.1	9.4	10	9.2	9.1	8.2	8.6	9.6	9.1	7.1	7.3	13	17	21	16	14	12	10	9.6	8.5	6.5	7.9	7.6	6.3	6.5	6.0	6.4	5.2

On the national level, the 2007-2008 season was considered more severe than the three previous seasons. This determination was made based on the percentage of deaths resulting from pneumonia and influenza (which exceeded the epidemic threshold for 19 consecutive weeks), pediatric hospitalization rates, and the percentage of ILI outpatient visits. Contributing to the severity of the season was a poor antigenic match between the circulating influenza strains causing infection and those contained in the vaccine. Also, of Influenza A (H1N1) viruses tested, 10.2% were resistant to oseltamivir in 2007-2008, compared to 0.7% in the 2006-2007 season. No resistance was noted in influenza A (H3N2) or B viruses.

Nationally, since the 2004-2005 season, there has been a five-fold increase in the number of pediatric influenza associated deaths in which there was also a pneumonia or bacteremia due to *Staphylococcus aureus*. In Mississippi, influenza associated pediatric deaths (<18 years of age) became a reportable disease on February 7, 2008 on a temporary basis, and was later permanently added to the list of Class 1 Reportable Diseases. They were four reported pediatric deaths in the 2007-2008 season, ranging in age from 5 months to 13 years. Two of these deaths were associated with methicillin sensitive *Staphylococcus aureus* co-infections.

Vaccination remains the mainstay of influenza prevention. In the 2004-2005 season, vaccination of healthy children age 6-23 months was first recommended by the ACIP. This recommendation was broadened in the 2006-2007 season to include all healthy children aged 24-59 months. For the 2007-2008 influenza season, the ACIP reemphasized these target groups, as well as persons 50 years of age and older, children, adolescents and adults at increased risk for

complications from influenza, women who were pregnant during the influenza season, residents of long term care facilities, and health care workers. Continued efforts are required to improve vaccine coverage among children aged 6 months through 4 years since this is an age group at high risk for influenza related complications and hospitalizations.

For a brief description of one late season influenza outbreak in a nursing home, please see the Special Reports section.

Additional References:

- CDC. Update: influenza activity---United States, September 30, 2007--April 5, 2008, and composition of the 2008--09 influenza vaccine. MMWR 2008;57:404--9.
- CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2007. MMWR 2007; 56 (No. RR-6).
- CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2008. MMWR 2008;57(No. RR-7).
- CDC. Interim within-season estimate of the effectiveness of trivalent inactivated influenza vaccine—Marshfield, Wisconsin, 2007-08 influenza season. MMWR 2008/57(15); 393-398.
- CDC. *Flu Activity & Surveillance*. Available online at: www.cdc.gov/flu/weekly/.
- CDC. Update: influenza activity---United States and Worldwide, 2007—08 season. MMWR 2008;57(25);692-697.

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.

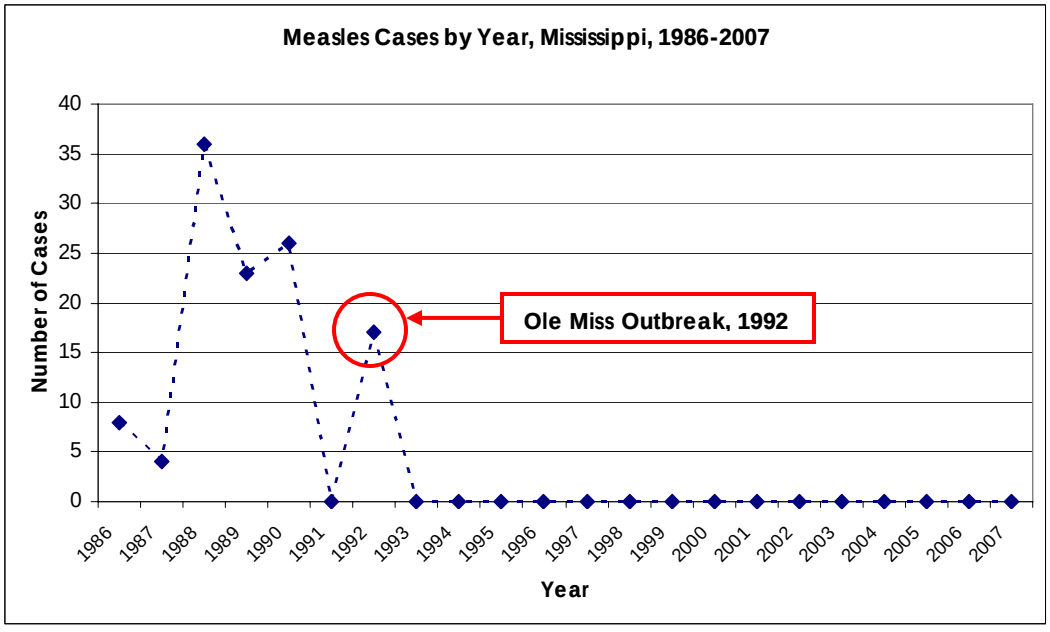
Methods of Control: Measles, mumps and rubella (MMR) vaccine is recommended for all children at 12 to15 months of age with a second dose at school entry (4 to 6 years of age). Appropriate two dose vaccination induces immunity in 99% of individuals.

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

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 (Figure 6). Following this outbreak, a history of 2 doses of MMR was required to attend public universities in Mississippi.

Figure 6



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 in several countries, particulary 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

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

Infectious Agent: *Neisseria 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 until 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.

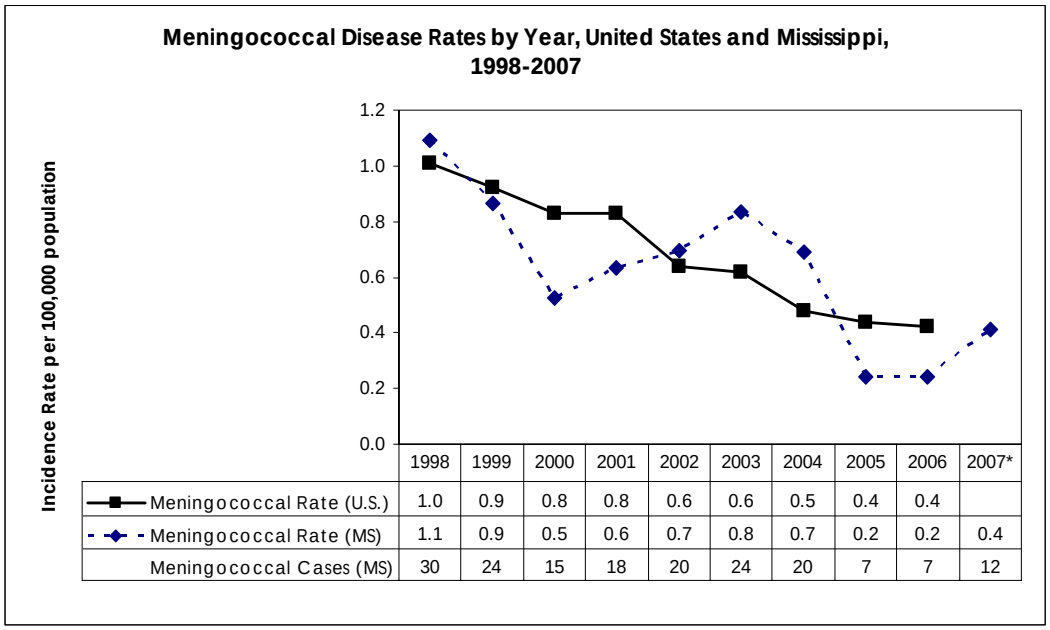
MSDH investigates each reported case and provides prophylactic antibiotics (rifampin) for household contacts and other appropriate close contacts. Health

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 2007 there were 12 reported cases of invasive meningococcal disease, compared to 7 cases in 2006. Typically, 7-30 cases are reported annually in Mississippi (Figure 7).

Figure 7



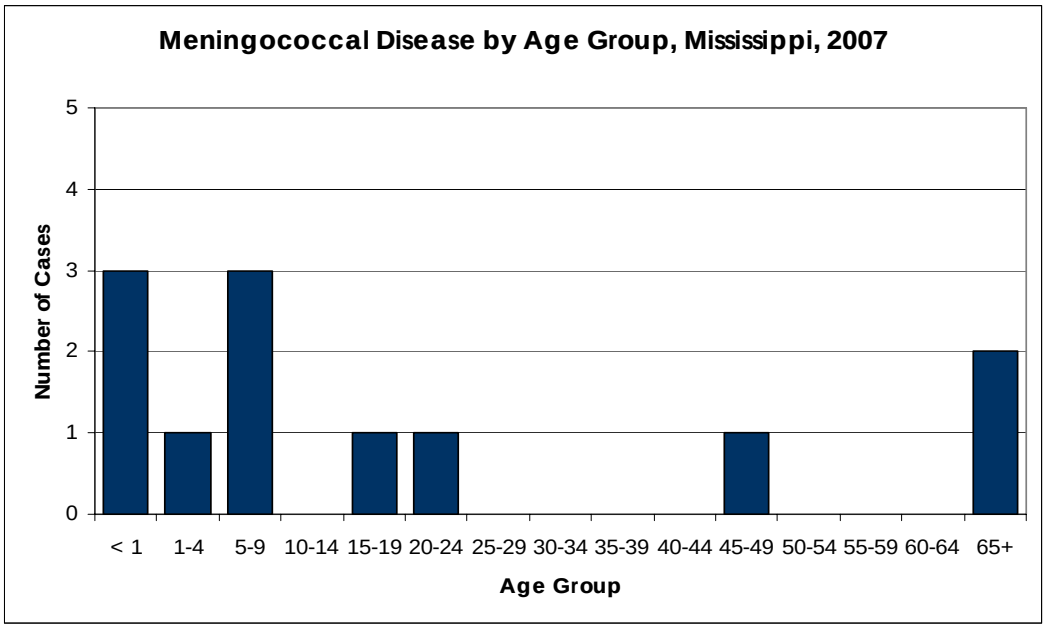
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Meningococcal Rate (U.S.)	1.0	0.9	0.8	0.8	0.6	0.6	0.5	0.4	0.4	
Meningococcal Rate (MS)	1.1	0.9	0.5	0.6	0.7	0.8	0.7	0.2	0.2	0.4
Meningococcal Cases (MS)	30	24	15	18	20	24	20	7	7	12

*2007 U.S. data not available.

The reported cases occurred statewide with no specific outbreaks. Meningococcal disease covered the spectrum of age groups, from one month to 92 years of age, with approximately 54% of invasive disease reported in children less than 10 years of age (Figure 8). MSDH requests that all isolates be submitted to the PHL for typing. Five of the confirmed cases in 2007 were typed into serogroups: two B; two C; and one Y.

One death occurred in a 6 month old child, and MSDH provided rifampin prophylaxis for 36 contacts around this case. In total, rifampin prophylaxis was provided for 184 contacts to meningococcal disease in 2007.

Figure 8



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).

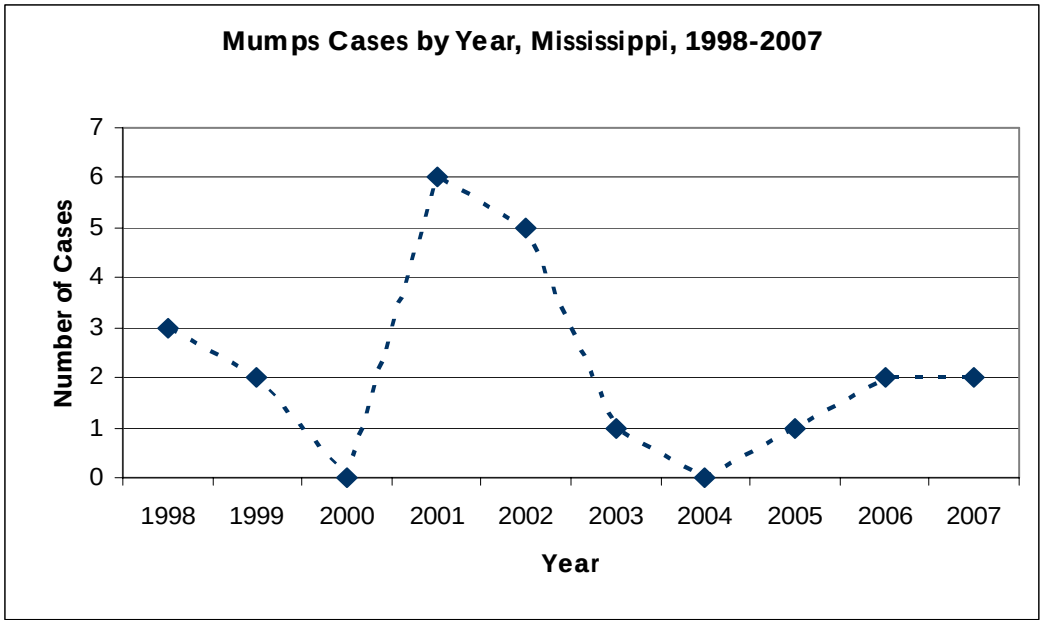
Period of communicability: Three days before to four days after onset of symptomatic disease. Virus has been isolated from saliva up to 7 days before and 9 days after onset of parotitis.

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

Reportable: Class 2.

Epidemiology and Trends: Incidence peaks in late winter to spring but cases have been reported year round. Typically 1-2 cases are reported annually (Figure 9). There were two cases of confirmed mumps in Mississippi in 2007, aged 5 years and 30 years.

Figure 9



Pertussis

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 serves as a source of infection for unvaccinated or incompletely vaccinated children.

Infectious Agent: *Bordatella pertussis,* an aerobic gram negative rod.

Reservoir: Humans. Adolescents and adults 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 in the home.

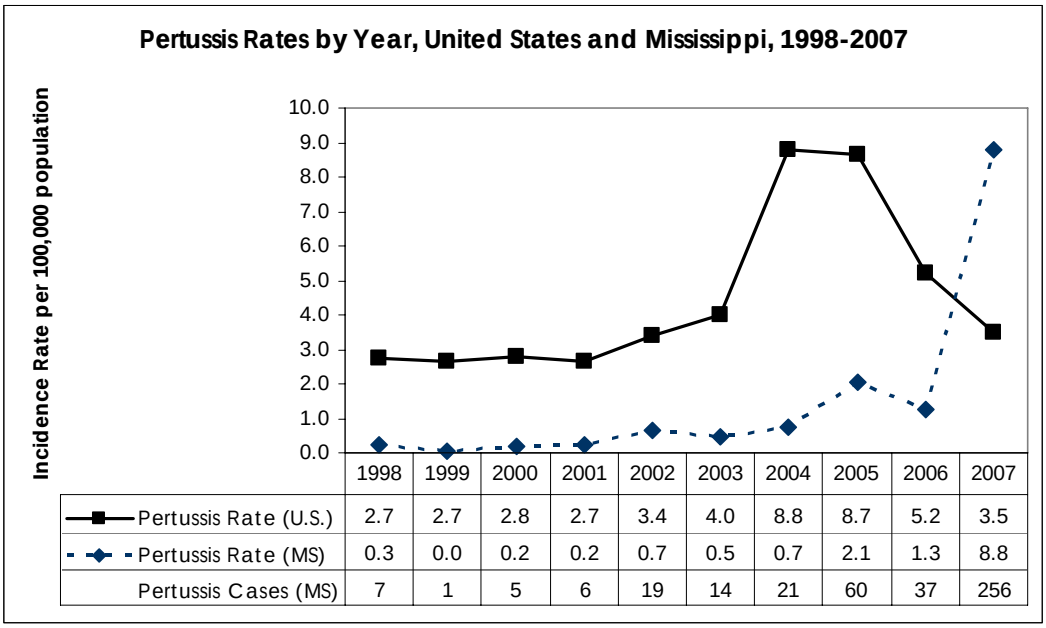
Reporting Classification: Class I

Epidemiology and Trends: Among the diseases for which universal childhood vaccination is recommended, pertussis is the only one that has seen annual increases for the last several years. Susceptibility of nonimmunized persons is universal.

In 2007, there were 256 reported cases of pertussis infection. This is a sharp increase from the three previous years, when reported cases ranged from 21 to 60 (Figure 10). The three year average for 2004-2006 was 39 cases.

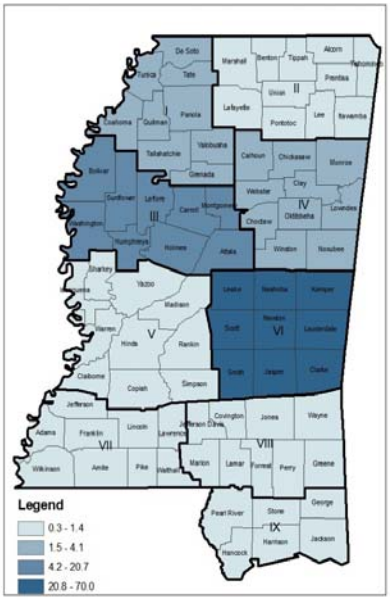
Public Health District VI (East Central Mississippi) had the most reported cases (170) (Figure 11). The majority of these cases were centered around an outbreak mainly in Leake and Neshoba counties. Statewide, 62% of the cases in 2007 were in children under 10 years of age. Children under 12 months age accounted for 25% of the total cases (Figure 12). One death occurred statewide in 2007, in a one month old infant associated with the District VI outbreak. For a detailed description of the District VI outbreak, please see the Special Reports section.

Figure 10



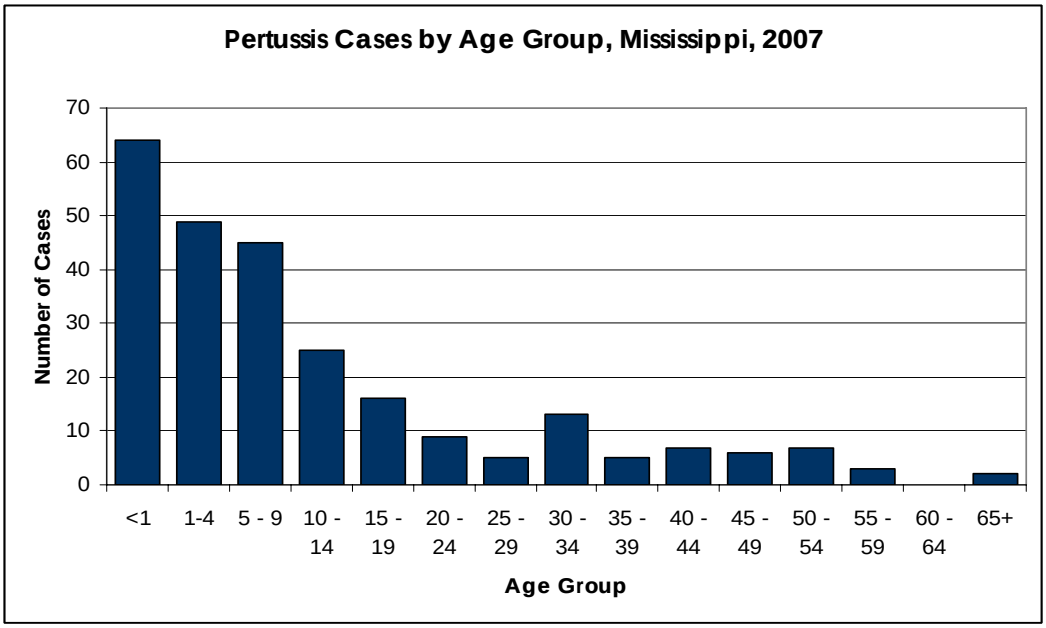
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Pertussis Rate (U.S.)	2.7	2.7	2.8	2.7	3.4	4.0	8.8	8.7	5.2	3.5
Pertussis Rate (MS)	0.3	0.0	0.2	0.2	0.7	0.5	0.7	2.1	1.3	8.8
Pertussis Cases (MS)	7	1	5	6	19	14	21	60	37	256

Figure 11



District	Cases	Rate*
I	9	3.0
II	4	1.2
III	49	20.7
IV	10	4.1
V	9	1.4
VI	170	70.0
VII	1	0.6
VIII	1	0.3
IX	3	0.3
State	**256**	**8.8**

Figure 12



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 2007 there were 13 reported cases of invasive disease caused by *S. pneumoniae* in children less than 5 years of age, compared to 22 cases in 2006. Of these13 cases, 12 were septicemias, with only one reported meningitis (Figure 13). Ages ranged from 7-24 months. In addition, 11 of the 13 invasive infections in this age group were infected with organisms that exhibited resistance to one or more antibiotics.

A total of 73 cases of antibiotic resistant invasive *S. pneumoniae* infections were reported in 2007, compared to 51 cases reported in 2006. This total includes those less than 5 years of age with drug resistant invasive disease. Of the 73 cases in 2007, 63 (86%) were septicemias, and 10 cases (14%) were meningitis. Reported cases of antibiotic resistant invasive disease ranged in age from 7 months to 92 years, with 52 cases (71%) occurring in individuals age 40 or older (Figure 14). Antibiotic resistance to penicillin was documented in 41% of drug resistant invasive infections. Both trimethoprim/sulfamethoxazole resistance (11% of isolates) and erythromycin resistance (8% of isolates) were also noted.

Figure 13

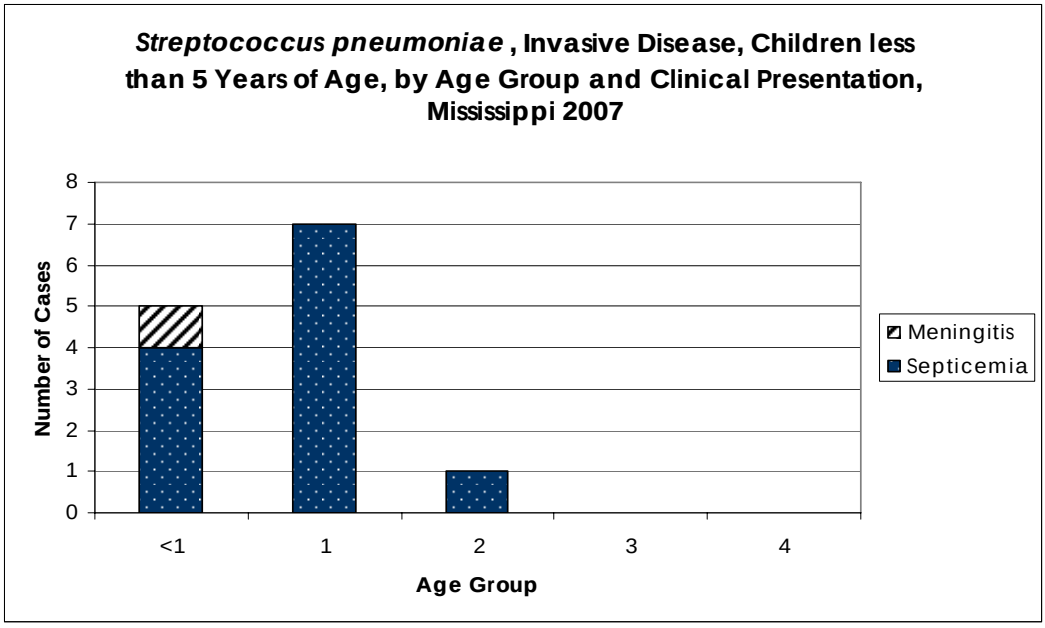
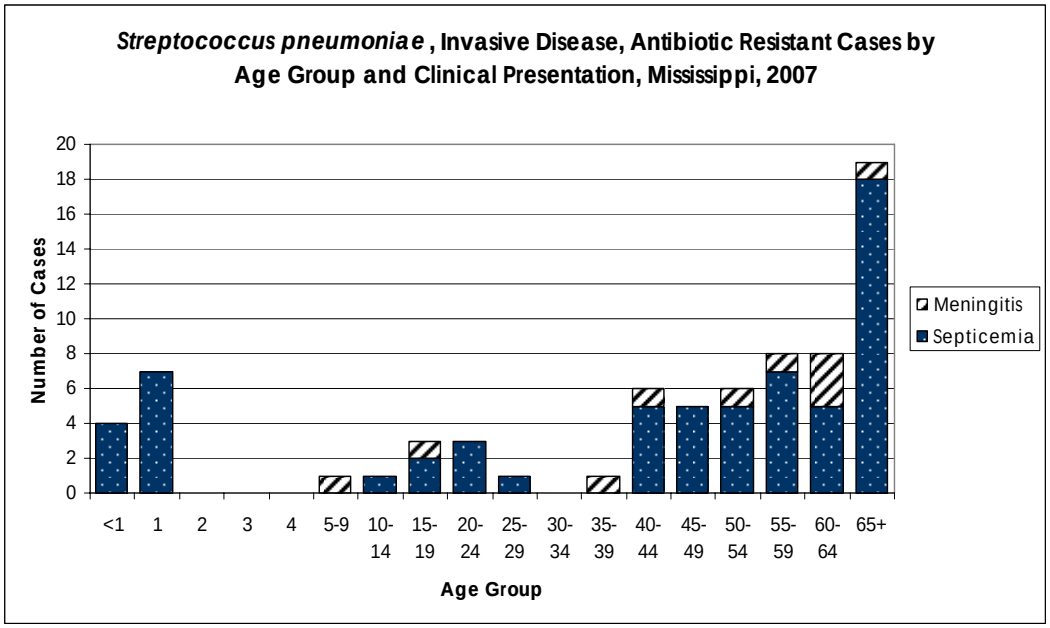


Figure 14



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, 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 congenital rubella syndrome.

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 2007. The last reported case in the state, in a 4 year old, was in 1986.

Varicella

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 herpes zoster develop chickenpox by direct contact with 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 immunity. 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: Between 2004-2006, 0-2 cases were reported annually, with two cases reported in 2006. In 2007 there were 3 cases reported ranging in age from 16-24 years. These were not epidemiologically linked.

There was one reported cluster of varicella centered around an elementary school in Public Health District IV. The index case was an 11 year old girl with onset of illness 8/20/07. A total of 11 contacts, between the ages of 5-12 years, developed clinical varicella, with dates of onset ranging from 8/28/07 to 9/18/07. The dates of onset were unknown for two of the contacts. Nine of the cases were direct contacts to the index case through school, and two were siblings of an ill contact. Only 4 of the ill individuals had been vaccinated, 6 were unvaccinated and the status for 2 was unknown.

Letters were sent to parents of more than 1300 students in the elementary, middle and high school, stressing the need for two varicella vaccinations in those with no previous history of illness, or in those with no history of vaccination or incomplete vaccination. Between 50-75 vaccinations were given to household and school contacts through the local Health Department.

Chlamydia

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: Virtually all *C. trachomatis* infections are sexually transmitted.

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

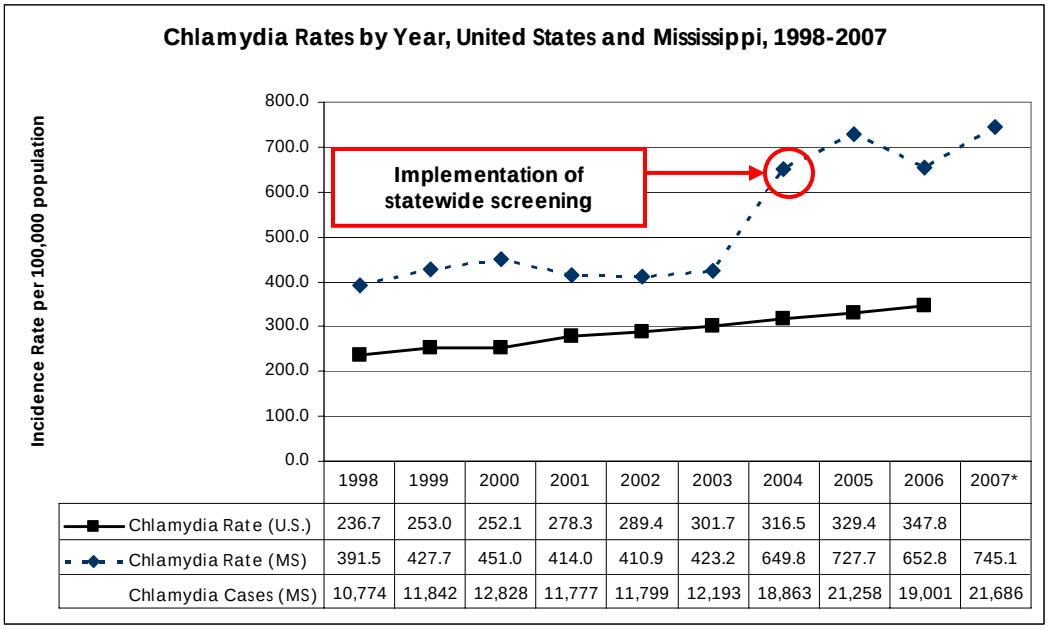
Period of communicability: Unknown.

Methods of control: Prevention and control of chlamydia are based on education, 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 2007, 21,686 cases of chlamydia were reported in Mississippi, an increase of 14% from 2006 (19,001). Mississippi has reported case rates higher than the United States average (Figure 15) for several years, and when compared to other states, Mississippi has one of the country's highest rates. The 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 15



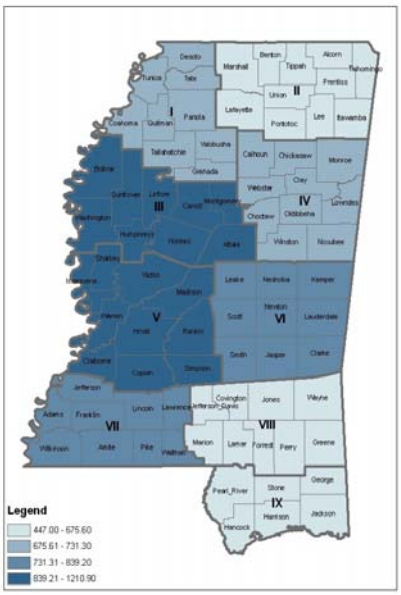
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Chlamydia Rate (U.S.)	236.7	253.0	252.1	278.3	289.4	301.7	316.5	329.4	347.8	
Chlamydia Rate (MS)	391.5	427.7	451.0	414.0	410.9	423.2	649.8	727.7	652.8	745.1
Chlamydia Cases (MS)	10,774	11,842	12,828	11,777	11,799	12,193	18,863	21,258	19,001	21,686

*2007 U.S. data not available.

Chlamydia was reported in every public health district, with the highest incidence noted in Public Health District III (Figure 16).

Figure 16

Chlamydia Incidence Rates by Public Health District, Mississippi, 2007



District	Cases	Rate*
I	2170	711.4
II	1747	506.2
III	2869	1210.9
IV	1792	731.3
V	5818	929.6
VI	1853	763.4
VII	1489	839.2
VIII	1993	675.6
IX	1955	447.0
State	**21686**	**745.1**

***per 100,000 population**

Chlamydia infections covered a range of age groups, but were predominant in the 15-24 year olds, accounting for 75% of the reported cases (Figure 17). African Americans accounted for a disproportionate number of the reported cases in which race was known (Figure 18). In 2007, the rate of chlamydia infections for African Americans was ten times the rate for whites.

Figure 17

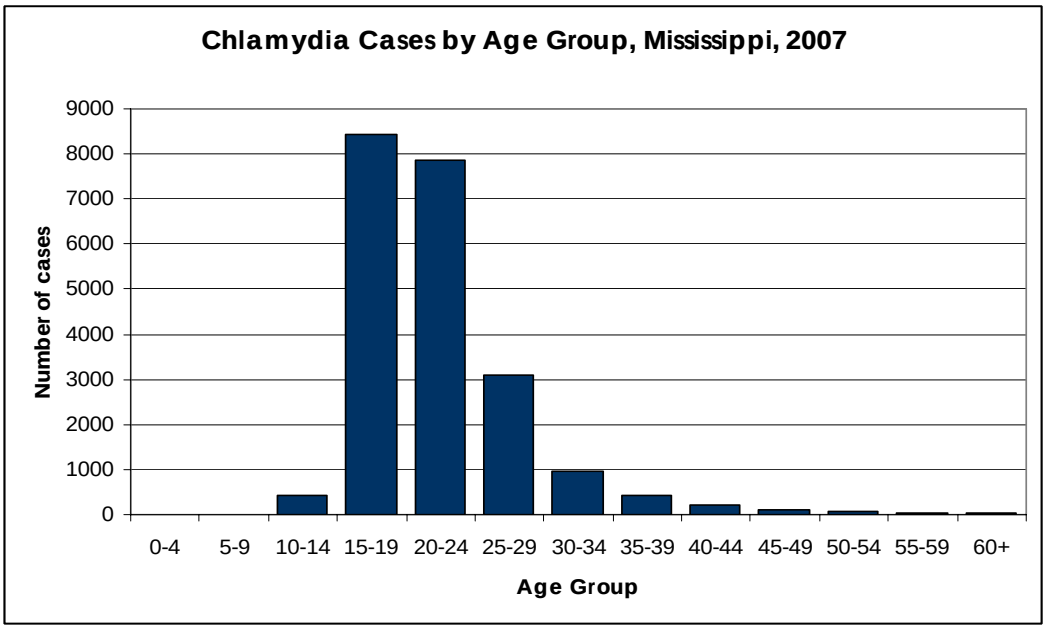
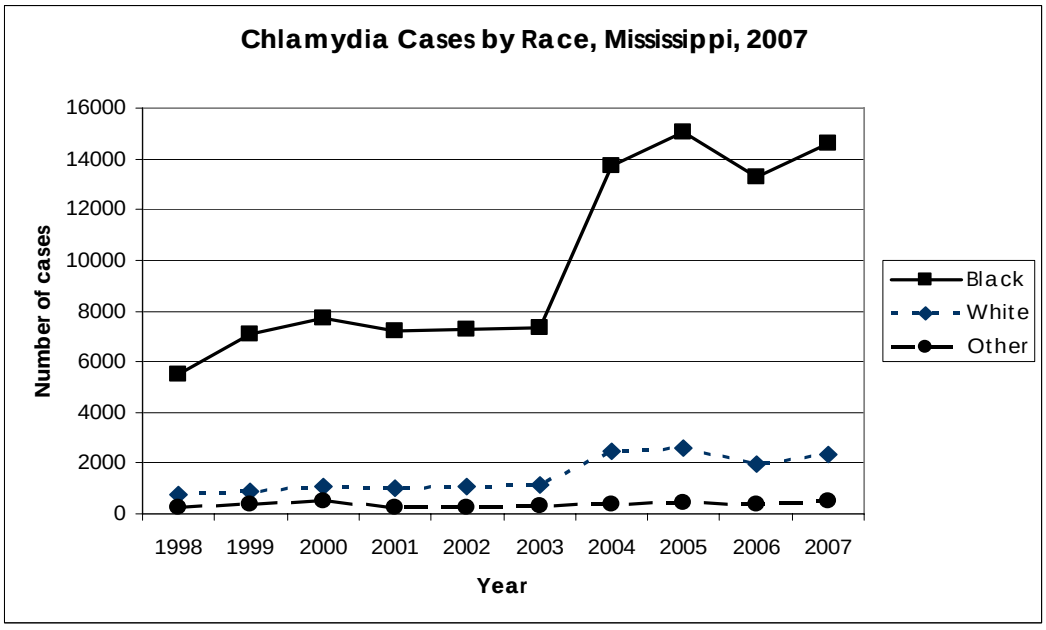


Figure 18



Gonorrhea

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 can pass 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

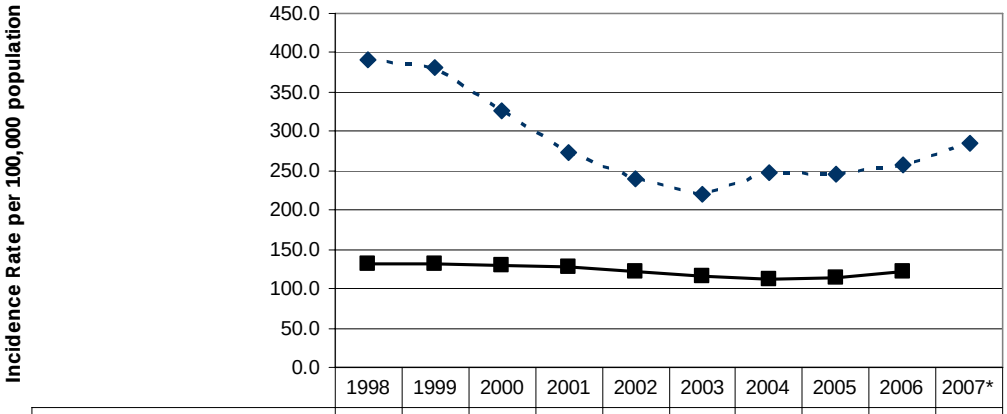
Epidemiology and Trends: Gonorrhea is the second most commonly reported notifiable disease in the United States. In 2006, the most recent year for which national rates are available, Mississippi had the highest case rate of gonorrhea in the United States. The number of gonorrhea cases has increased over the past 5 years (Figure 19). From 2003-2007, the number of gonorrhea cases increased 31.4%, from 6,328 to 8,315 cases.

Gonorrhea was reported in every public health district, with the highest incidence noted in Public Health District III (Figure 20).

Although the burden of disease impacted individuals of all age groups, 66% of reported cases were among 15-24 year olds (Figure 21). African Americans accounted for a majority of the reported cases in which race was known (Figure 22). In 2007, the rate of gonorrhea infections for African Americans was nearly sixteen times the rate of whites.

Figure 19

Gonorrhea Rates by Year, United States and Mississippi, 1998-2007



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Gonorrhea Rate (U.S.)	131.9	132.3	129.0	128.5	122.0	115.2	112.4	114.6	120.9	
Gonorrhea Rate (MS)	390.4	381.5	326.5	272.7	239.4	219.6	246.7	245.5	258.0	285.7
Gonorrhea Cases (MS)	10,744	10,561	9,287	7,756	6,875	6,328	7,163	7,170	7,510	8,315

*2007 U.S. data not available.

Figure 20

Gonorrhea Incidence Rates by Public Health District, Mississippi, 2007

District	Cases	Rate*
I	615	201.6
II	567	164.3
III	1073	452.9
IV	653	266.5
V	2273	363.2
VI	775	319.3
VII	544	306.6
VIII	878	297.6
IX	937	214.2
State	**8315**	**285.7**

***per 100,000 population**

Figure 21

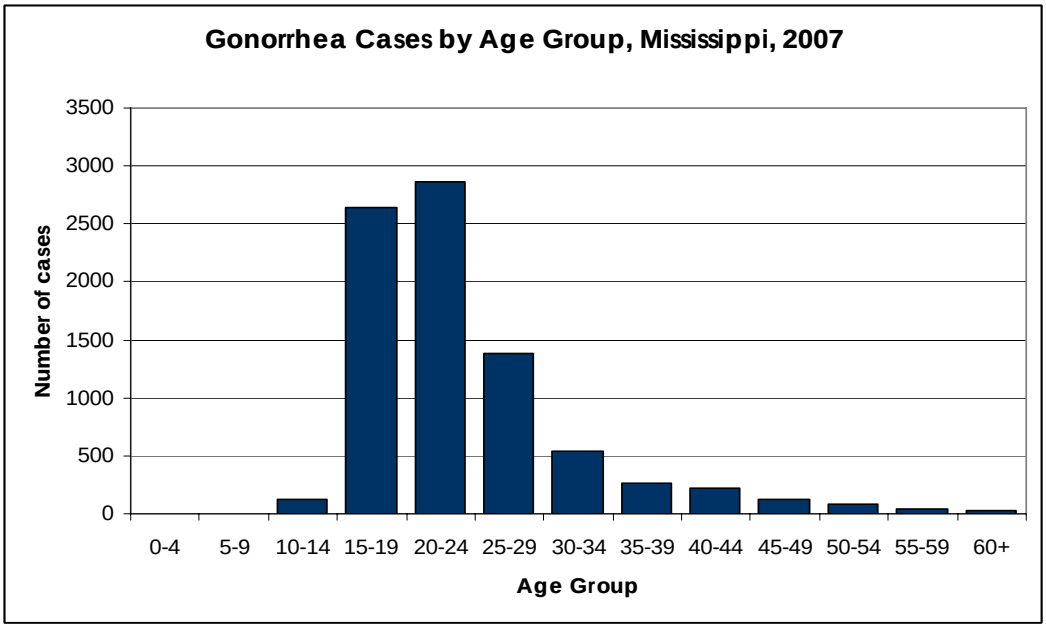
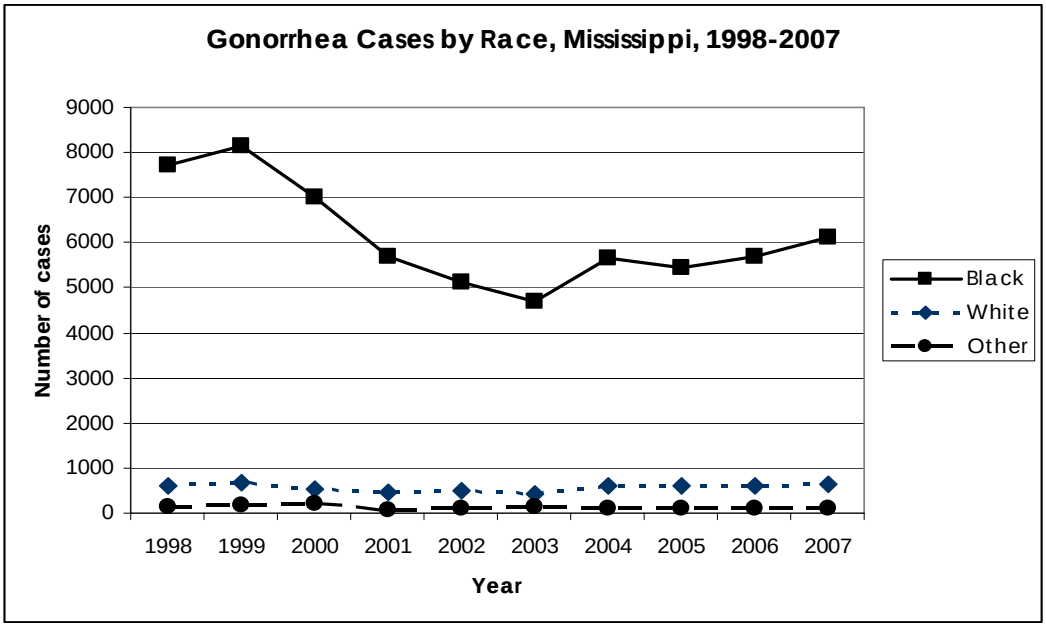


Figure 22



HIV Disease

Clinical Features: The clinical spectrum of human immunodeficiency virus (HIV) infection varies from an asymptomatic infection 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: Humans become infectious shortly after infection and remain infectious throughout the course of their lives.

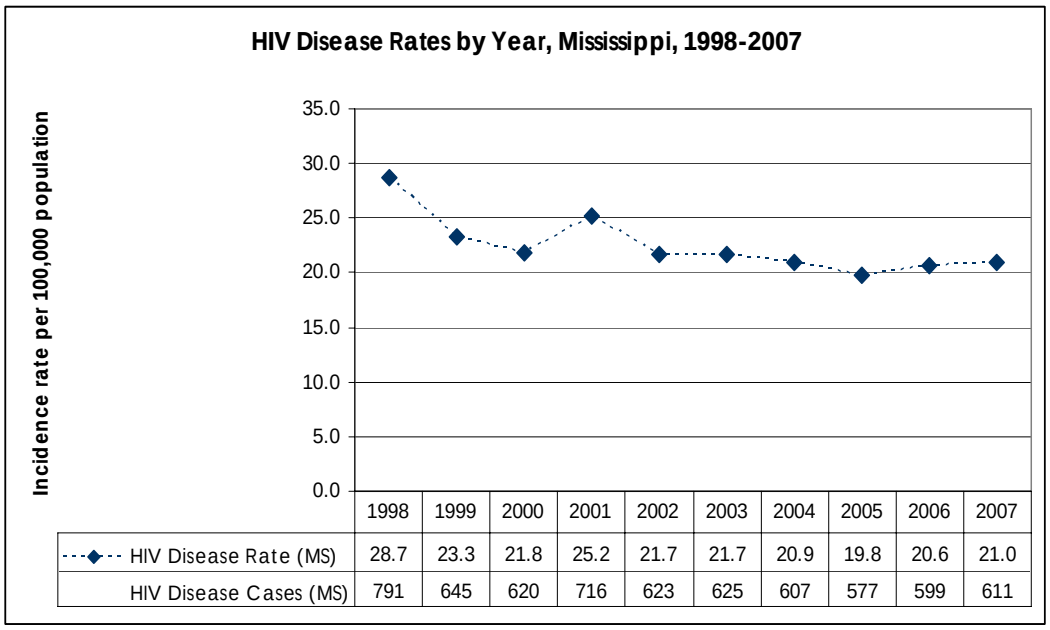
Methods of Control: Abstinence is the only sure way to avoid sexual HIV transmission; otherwise mutual monogamy with partners known to be uninfected and the use of latex condoms are known to reduce the risk of infection. Confidential HIV testing and counseling and testing of contacts, prenatal prevention 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 for each reported case of HIV infection.

Reporting Classification: Class I

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 611 cases of HIV disease reported in 2007, a 2% increase from 2006 (599)(Figure 23).

Figure 23



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
HIV Disease Rate (MS)	28.7	23.3	21.8	25.2	21.7	21.7	20.9	19.8	20.6	21.0
HIV Disease Cases (MS)	791	645	620	716	623	625	607	577	599	611

Individuals from every Public Health District were impacted by this disease. Public Health District V reported the highest case rate, statewide, followed by District VII (Figure 24).

Figure 24

HIV Incidence Rates by Public Health District, Mississippi, 2007

District	Cases	Rate*
I	56	18.4
II	43	12.5
III	49	20.7
IV	24	9.8
V	219	35.0
VI	34	14.0
VII	50	28.2
VIII	65	22.0
IX	71	16.2
State	**611**	**21.0**

***per 100,000 population**

HIV disease was reported in all age groups, with the majority of cases reported among young and middle aged adults (Figure 25). African Americans were disproportionately impacted by HIV disease. In 2007, 76% of new cases were among African Americans (Figure 26).

Figure 25

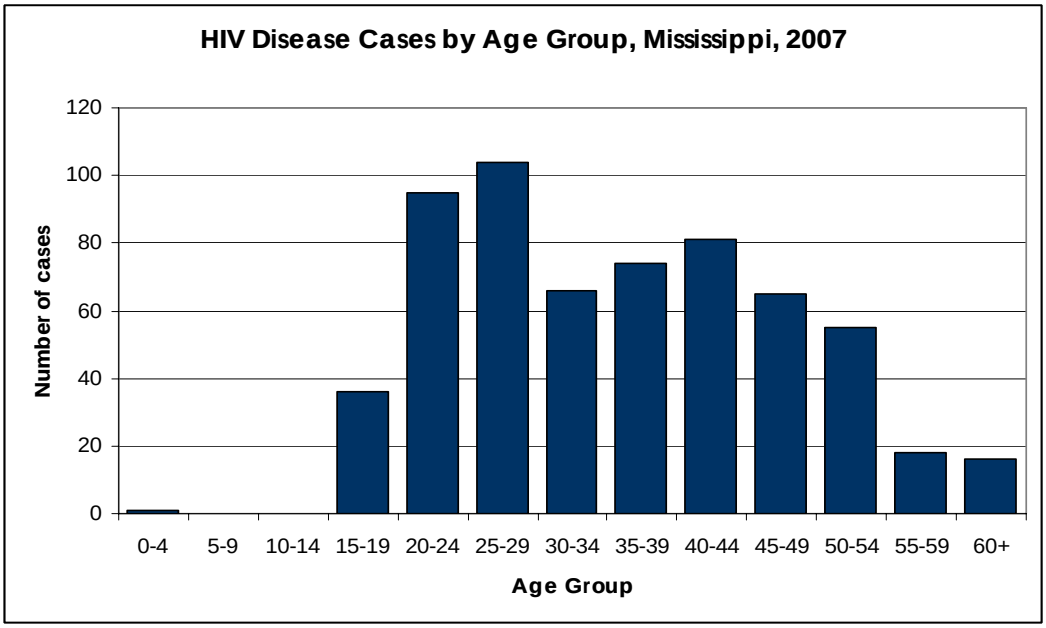
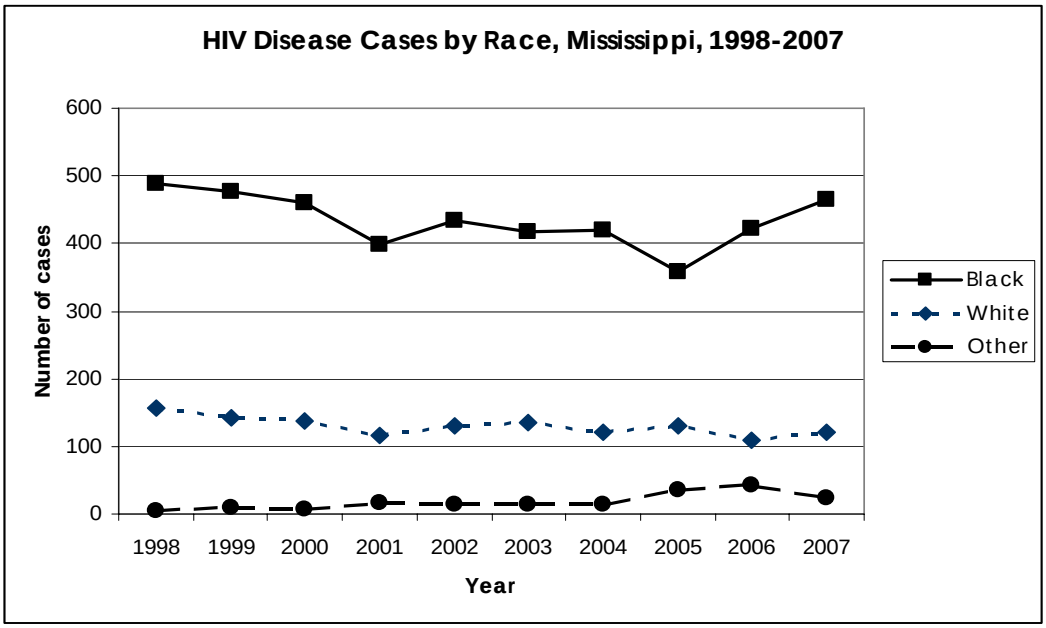


Figure 26



Of particular interest in 2007, an increase in diagnosed HIV infections was noted among young African American males in the Jackson area. MSDH requested assistance from CDC to evaluate demographic, clinical and behavioral characteristics among these HIV infected individuals to help define and identify risk factors for HIV transmission. A summary of this investigation will be available by December, 2008 at www.msdh.state.ms.us

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.

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Syphilis

Clinical Features: Syphilis is a bacterial infection that has three stages: primary, secondary, and tertiary. The primary lesion (chancre) is a painless indurated ulcer that develops at the sight of initial infection, usually on the external genitalia. Even without treatment, 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 arthalgia. Clinical manifestations of secondary syphilis usually resolve without treatment in weeks to months. Tertiary syphilis will develop years later in 15-40% if untreated, primarily as cardiovascular or neurosyphilis, or as skin, bone, visceral or mucosal surface gummas. Latent syphilis, a period of seroreactivity without clinical disease, is classified as early (infection acquired within the preceding year) or late (infection of more than a year's duration).

Syphilis can be transmitted to the fetus through the placenta in untreated women with early syphilis, resulting in congenital syphilis. Congenital syphilis can cause 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.

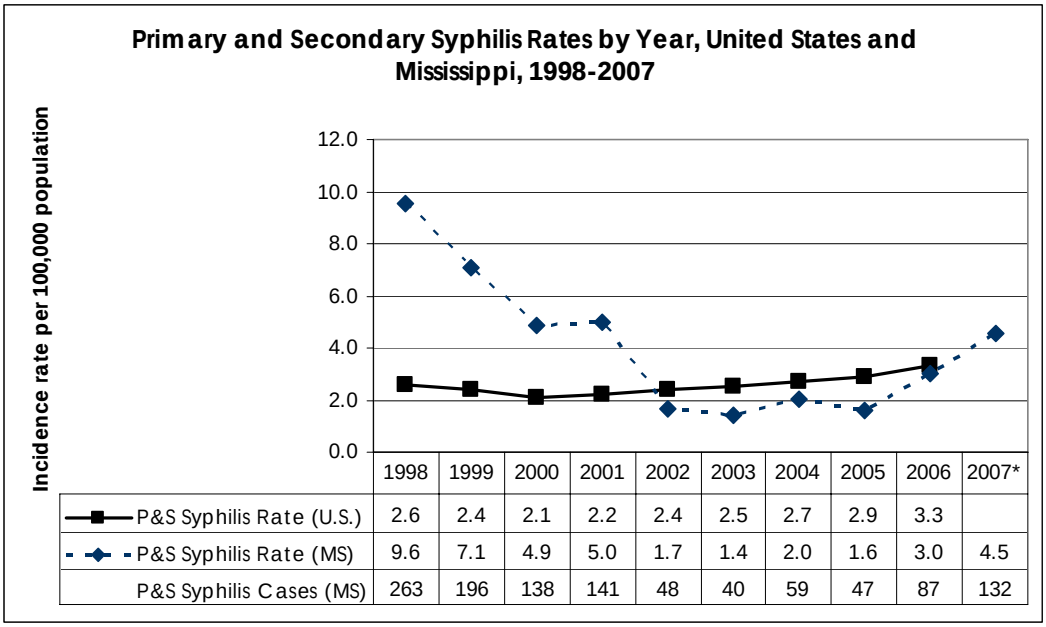
Period of Communicability: In untreated individuals, communicability can last for up to two years. Syphilis is most communicable during the primary and secondary stages. Maternal-fetal transmission is more likely in early syphilis, but may occur at any stage.

Methods of Control: Education, 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 I

Epidemiology and Trends: Mississippi had a decline in primary and secondary (P&S) syphilis from 1997 through 2003, and an increase in rates in 2006 and 2007 (Figure 27). Although P&S syphilis rates remained below the national average from 2002 through 2006, it is likely the MS rate will once again be above the national average for 2007 (Figure 27). There were 132 cases of P&S syphilis in 2007.

Figure 27



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
P&S Syphilis Rate (U.S.)	2.6	2.4	2.1	2.2	2.4	2.5	2.7	2.9	3.3	
P&S Syphilis Rate (MS)	9.6	7.1	4.9	5.0	1.7	1.4	2.0	1.6	3.0	4.5
P&S Syphilis Cases (MS)	263	196	138	141	48	40	59	47	87	132

*2007 U.S. data not available.

Districts VII and IX had the highest incidence of P&S syphilis (Figure 28). Eighty percent of P&S syphilis cases occurred among 15-39 year olds (Figure 29) and 77% were among African Americans (Figure 30).

Figure 28

Primary and Secondary Syphilis Incidence Rates by Public Health District, Mississippi, 2007

District	Cases	Rate*
I	14	4.6
II	1	0.3
III	14	5.9
IV	1	0.4
V	41	6.6
VI	3	1.2
VII	12	6.8
VIII	14	4.7
IX	32	7.3
State	**132**	**4.5**

***per 100,000 population**

Figure 29

Primary and Secondary Syphilis Cases by Age Group, Mississippi, 2007

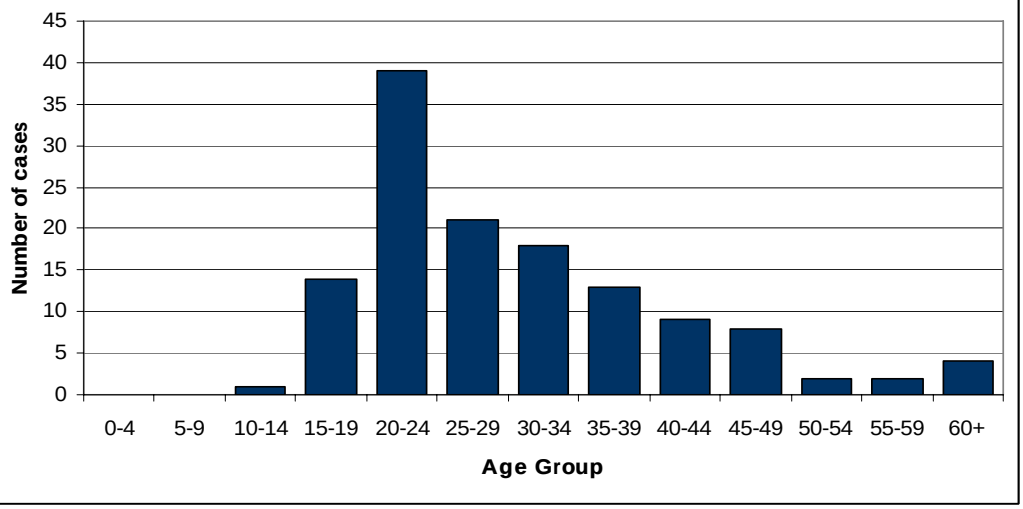
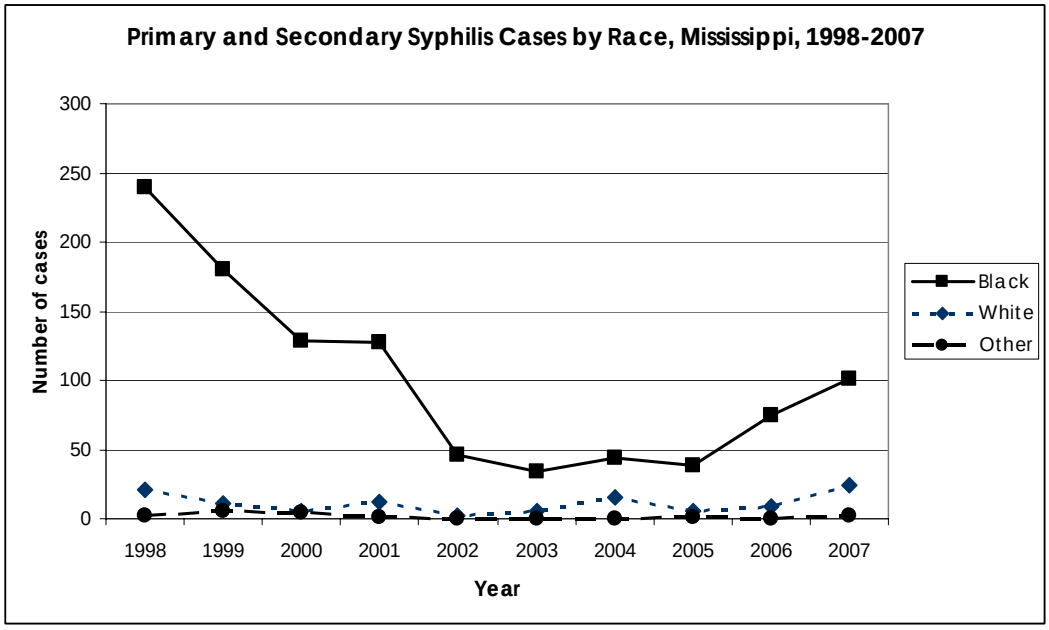
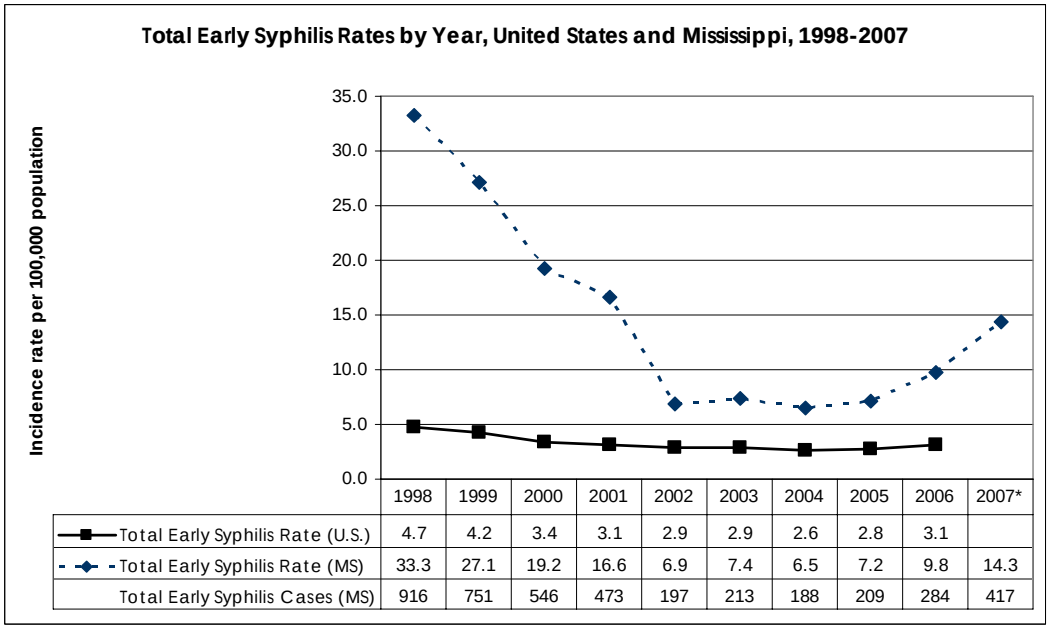


Figure 30



In 2007, Mississippi reported 417 cases of total early syphilis (first year of infection), a 47% increase from 2006 (284). Mississippi has maintained case rates higher than the U.S. average and has shown an increase in reported cases since 2005 (Figure 31).

Figure 31



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Total Early Syphilis Rate (U.S.)	4.7	4.2	3.4	3.1	2.9	2.9	2.6	2.8	3.1	
Total Early Syphilis Rate (MS)	33.3	27.1	19.2	16.6	6.9	7.4	6.5	7.2	9.8	14.3
Total Early Syphilis Cases (MS)	916	751	546	473	197	213	188	209	284	417

*2007 U.S. data not available.

Total early syphilis was reported in every district. District V had the highest case rate in the state (Figure 32).

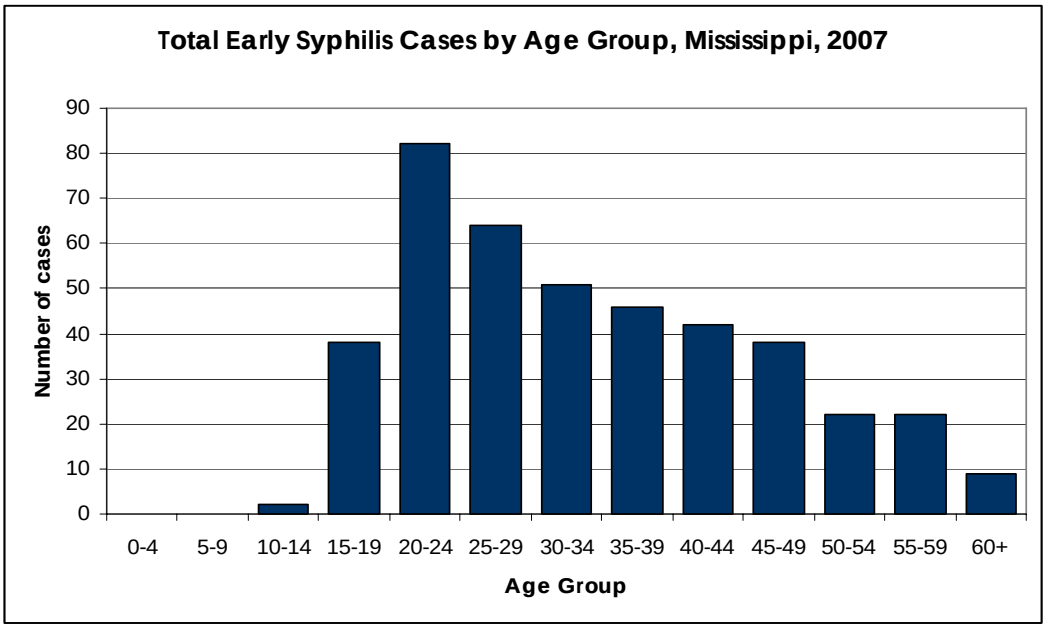
Figure 32

Total Early Syphilis Incidence Rates by Public Health District, Mississippi, 2007

District	Cases	Rate*
I	30	9.8
II	10	2.9
III	39	16.5
IV	7	2.9
V	175	28.0
VI	7	2.9
VII	28	15.8
VIII	42	14.2
IX	79	18.1
State	**417**	**14.3**

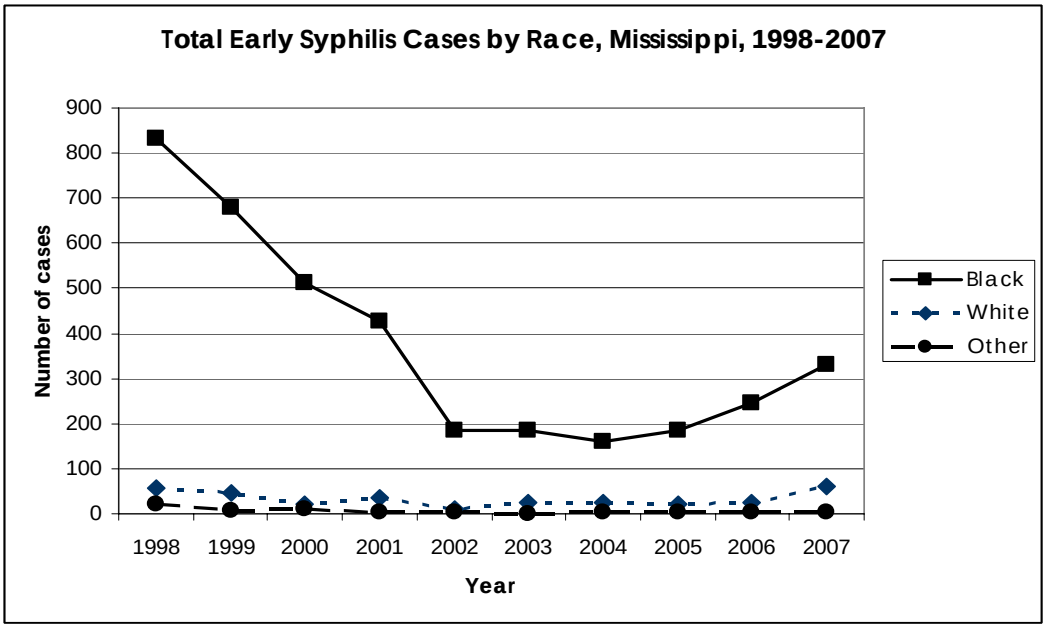
*per 100,000 population

Figure 33



Twenty percent of reported cases were among 20-24 year olds, followed by 15% among 25-29 year olds (Figure 33). African Americans are disproportionately affected, accounting for 79% of cases (Figure 34).

Figure 34



Tuberculosis

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, badgers, swine and other mammals are infected.

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

Incubation: Tuberculin skin test conversion, 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. In children, those under 5 years of age have the highest risk of developing disease.

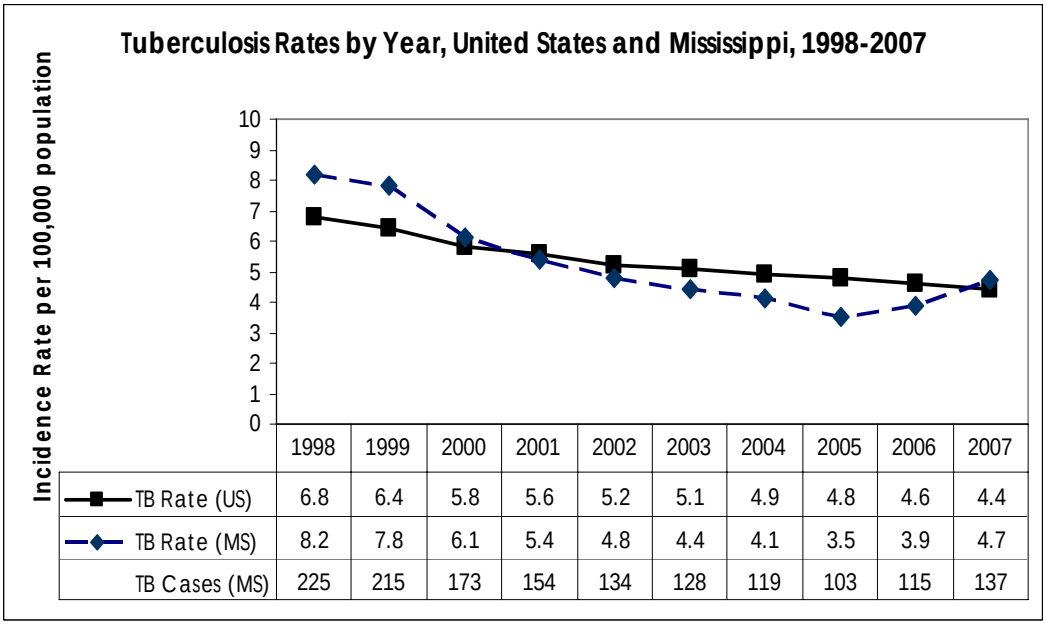
Period of Communicability: The degree of communicability depends on the number of bacilli discharged, virulence of the bacilli, adequacy of ventilation, exposure of bacilli to sun or UV light, and opportunities for aerosolization. Antimicrobial chemotherapy usually eliminates communicability within 2-4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

Methods of Control: Prompt identification, diagnoses 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 I

Epidemiology and Trends: Mississippi had a consistent decline in TB morbidity from 1989 through 2005. 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 both 2006 (115) and 2007 (137). In 2007, the case rate was above the national average for the first time since 2000 (Figure 35).

Figure 35

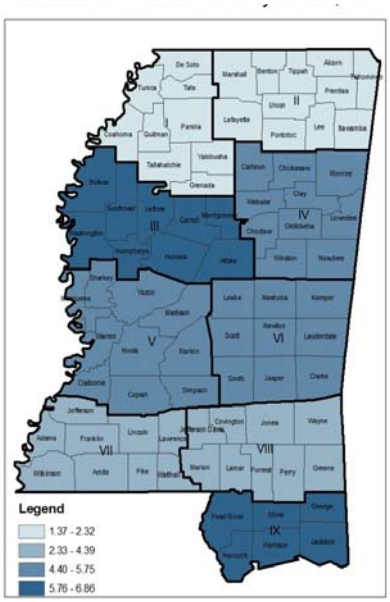


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
TB Rate (US)	6.8	6.4	5.8	5.6	5.2	5.1	4.9	4.8	4.6	4.4
TB Rate (MS)	8.2	7.8	6.1	5.4	4.8	4.4	4.1	3.5	3.9	4.7
TB Cases (MS)	225	215	173	154	134	128	119	103	115	137

Geographically, TB was reported in every public health district, with the highest incidence noted in Public Health Districts III and IX. (Figure 36).

Figure 36

Tuberculosis Incidence Rates by Public Health District, Mississippi, 2007



District	Cases	Rate*
I	6	2.0
II	8	2.3
III	16	6.8
IV	11	4.5
V	36	5.8
VI	13	5.4
VII	6	3.4
VIII	11	3.7
IX	30	6.9
State	**137**	**4.7**

***per 100,000 population**

Disease occurred across all age groups, with the majority in individuals 25 years old and above (Figure 37). Disease in the African-American population routinely

accounts for approximately two-thirds of morbidity (Figure 38). There has also been a rise in TB cases among patients co-infected with HIV over the past few years (Figure 39).

Figure 37

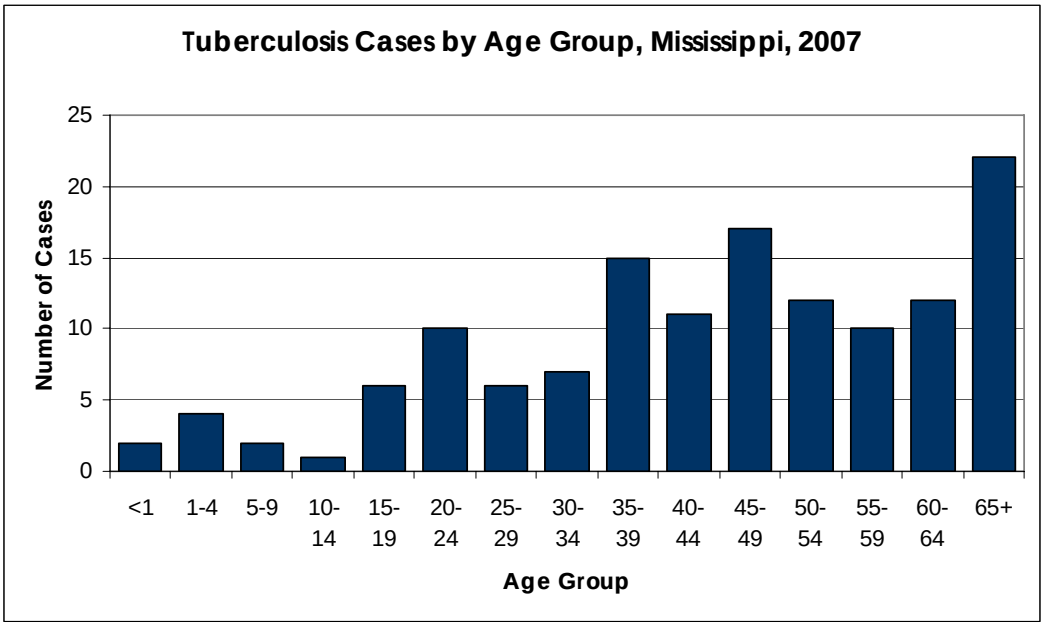


Figure 38

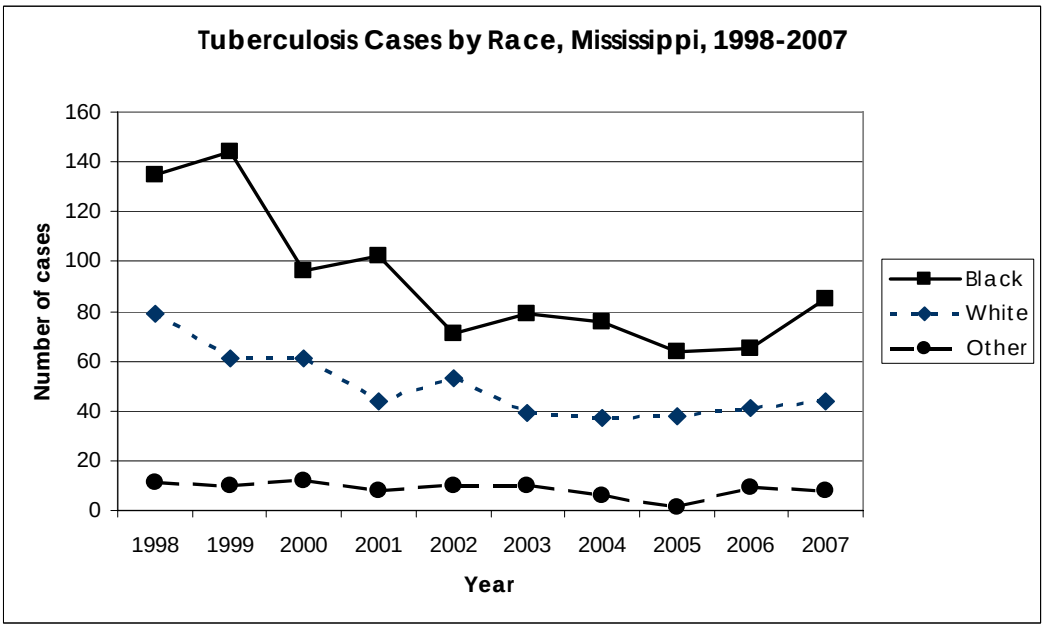
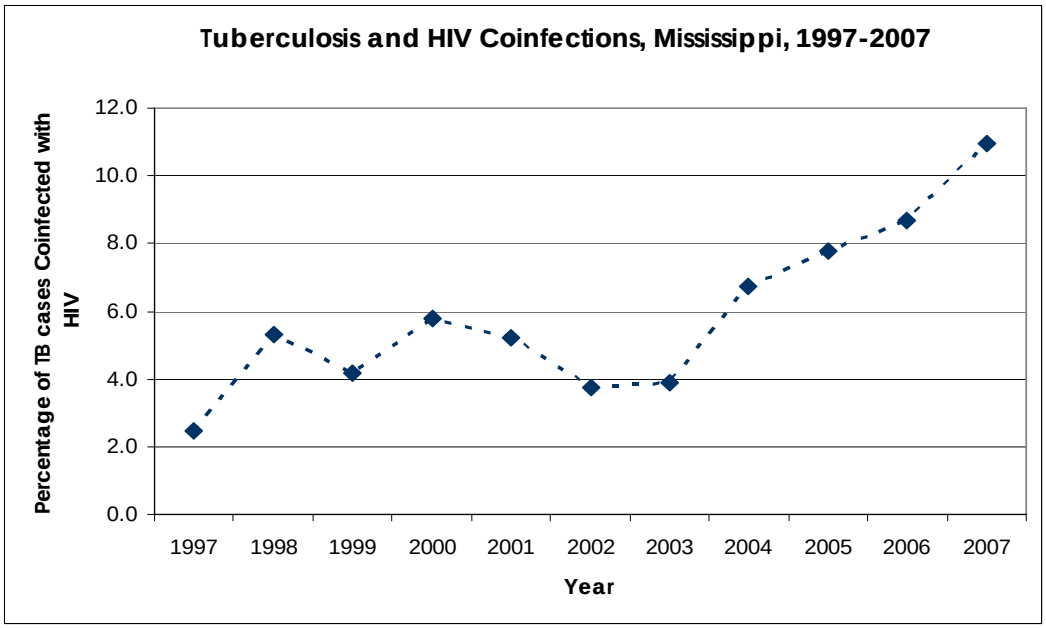


Figure 39


Tuberculosis and HIV Coinfections, Mississippi, 1997-2007
Percentage of TB cases Coinfected with HIV
12.0
10.0
8.0
6.0
4.0
2.0
0.0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year

Campylobacteriosis

Clinical Features: An enteric bacterial disease that ranges from asymptomatic infections to clinical illness manifested as 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*) is the most common organism causing infection.

Reservoir: *C. jejuni* is a commonly present in cattle and poultry.

Transmission: Transmission mainly occurs through ingestion of undercooked meat, or 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.

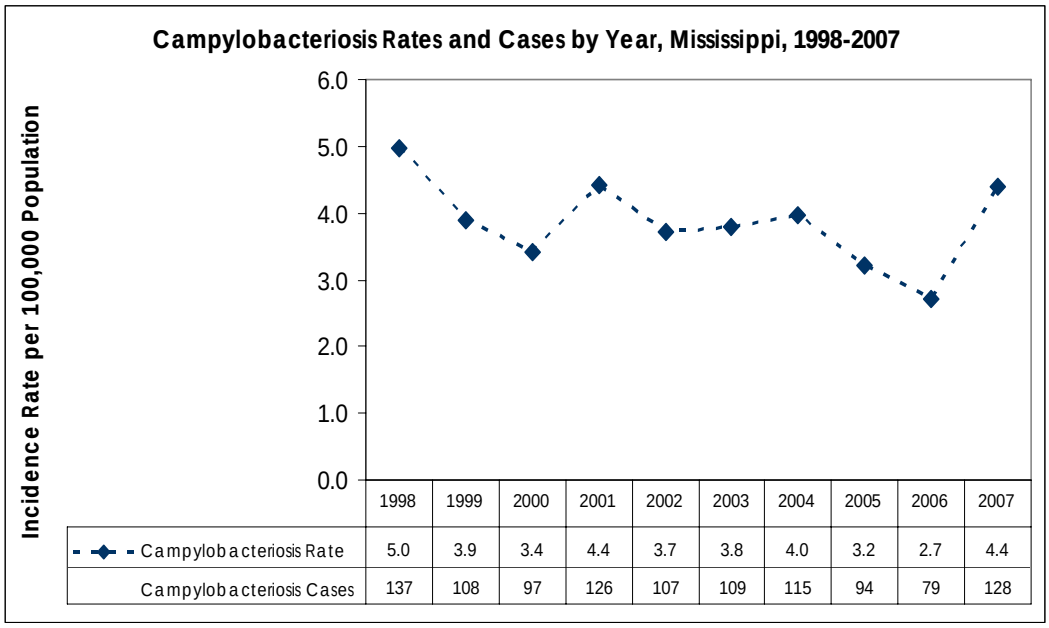
Methods of Control: Disease prevention includes promotion of proper food handling, good hand washing, particularly after handling raw meats, and after contact with feces of dogs and cats. Pasteurizing milk and chlorinating water are also important. Symptomatic individuals should be excluded from food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

Reporting Classification: Class 3

Epidemiology and Trends: In 2007, 128 cases of campylobacteriosis were reported to MSDH. This was an increase over 2006 when 79 were reported, and over the three-year (2004-2006) average of 96 cases (Figure 40).

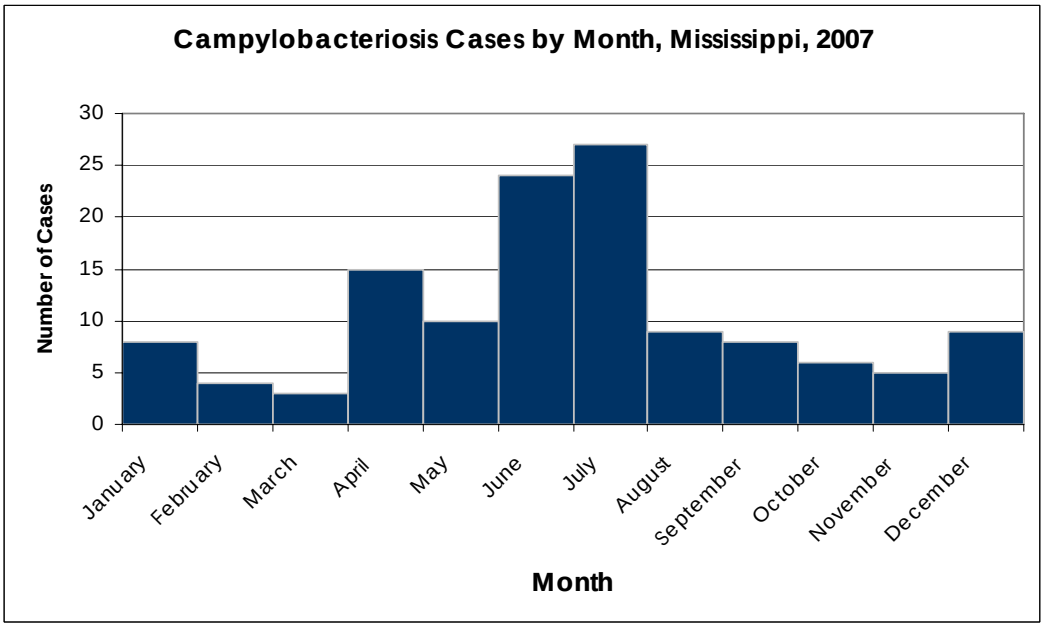
Campylobacter infections can occur any time of the year, but are typically more common in the warmer months in temperate areas. During 2007, the number of cases started to increase in April and spiked in June and July, with these two months accounting for approximately 40% of the total number of cases. Reported cases declined dramatically in August and continued to decrease into the cooler months (Figure 41).

Figure 40



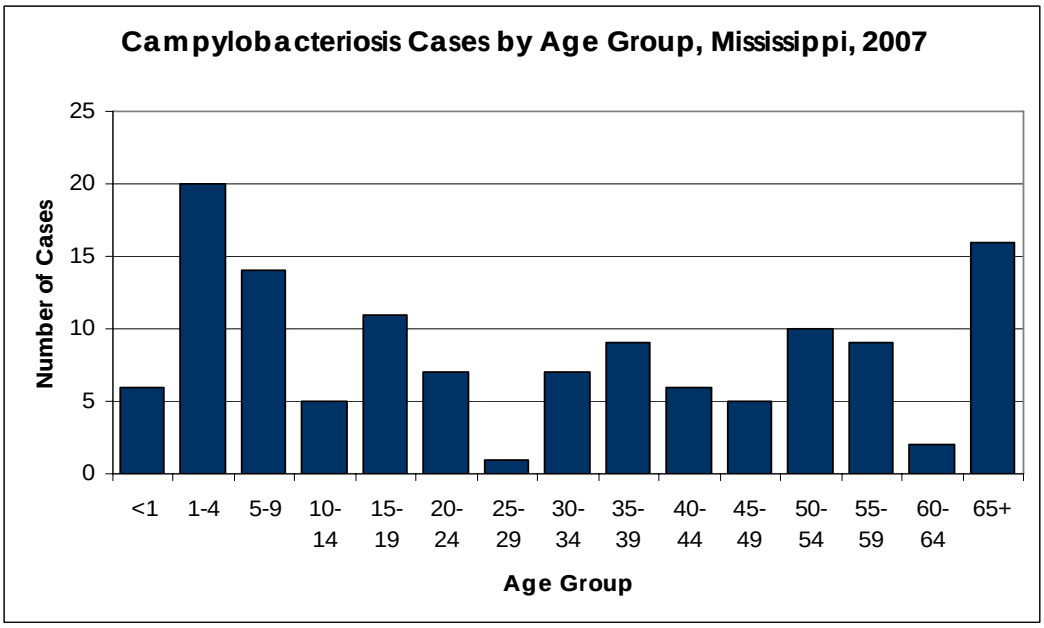
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Campylobacteriosis Rate	5.0	3.9	3.4	4.4	3.7	3.8	4.0	3.2	2.7	4.4
Campylobacteriosis Cases	137	108	97	126	107	109	115	94	79	128

Figure 41



Campylobacteriosis is an important cause of diarrheal illness in all age groups, with the highest incidence of disease in children under 5 years of age. In 2007, 20% of MS cases were among this age group (Figure 42).

Figure 42



Cryptosporidiosis

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.

Infectious Agent: *Cryptosporidium parvum*, a coccidian protozoan, is the species 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, waterparks). 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,

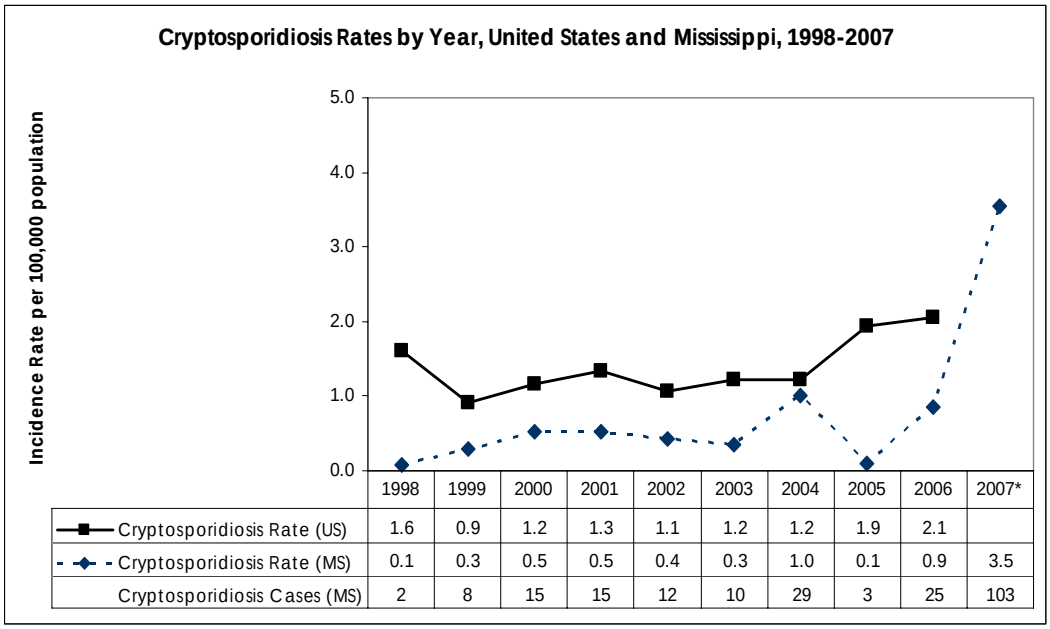
lakes, ponds) while they have diarrhea and for at least 2 weeks after symptoms resolve. It is recommended that infected individuals be restricted from handling food, and symptomatic children be restricted from attending daycare until free of diarrhea. Prompt investigation of common food or waterborne outbreaks is important for disease control and prevention.

Reporting Classification: Class 3

Epidemiology and Trends: Children under 2, animal handlers, travelers, men who have sex with men and close personal contacts of infected individuals are more prone to infection. Immunocompetent people may have asymptomatic or self-limited symptomatic infections. Immunodeficient individuals generally clear their infections when factors of immunosuppression are removed.

There were 103 reported cases of cryptosporidiosis in 2007, a sharp increase over the previous ten years, when case totals ranged from 2-29 annually (Figure 43). The majority of the 2007 cases were around the metropolitan Jackson area in Public Health District V (45), and on the Gulf Coastal area in Public Health District IX (28).

Figure 43

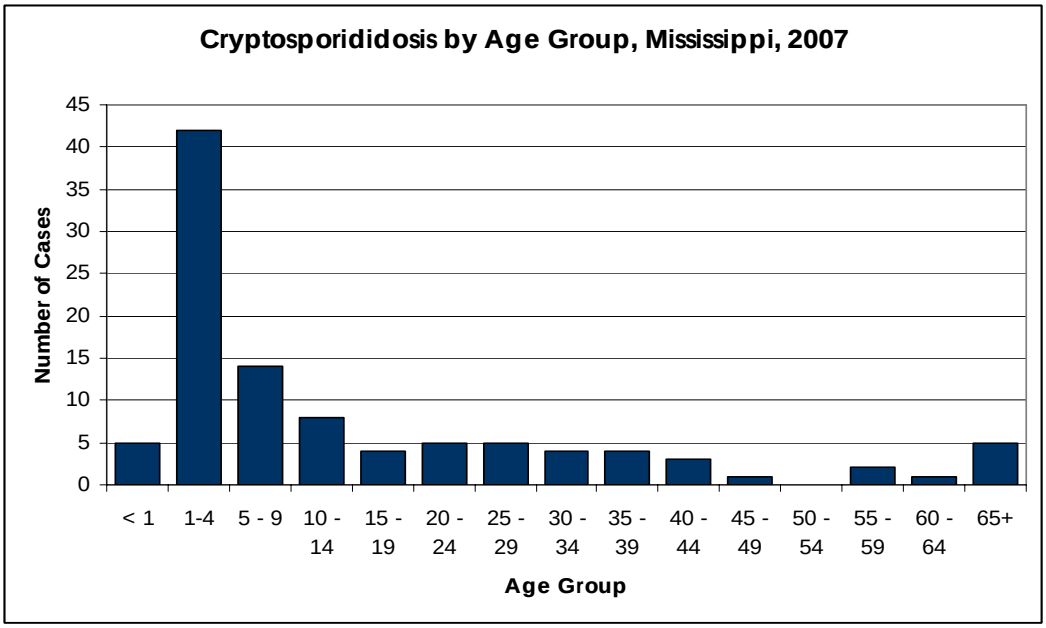


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Cryptosporidiosis Rate (US)	1.6	0.9	1.2	1.3	1.1	1.2	1.2	1.9	2.1	
Cryptosporidiosis Rate (MS)	0.1	0.3	0.5	0.5	0.4	0.3	1.0	0.1	0.9	3.5
Cryptosporidiosis Cases (MS)	2	8	15	15	12	10	29	3	25	103

*2007 U.S. data not available.

The highest number of cases occurred in children aged 0-4 years old at 47 cases (45.6%) (Figure 44). No specific food or isolated school or daycare was identified as the source of the increased numbers for 2007; however there was a small cluster of 10 cases linked to a local neighborhood swimming pool in Rankin County.

Figure 44



Due to the unusually elevated number of cases in daycare age group, MSDH staff visited local daycares and provided informational material regarding cryptosporidiosis and prevention of person to person transmission, including proper diaper changing and wastes disposal, hand washing and hygiene instructions, and suggested ill children or food handlers be restricted from attending the daycare until free of symptoms.

E. coli O157:H7/ HUS

Clinical Features: *Escherichia coli* O157:H7 is the most virulent serotype of the shiga toxin-producing *E. coli*, which 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.

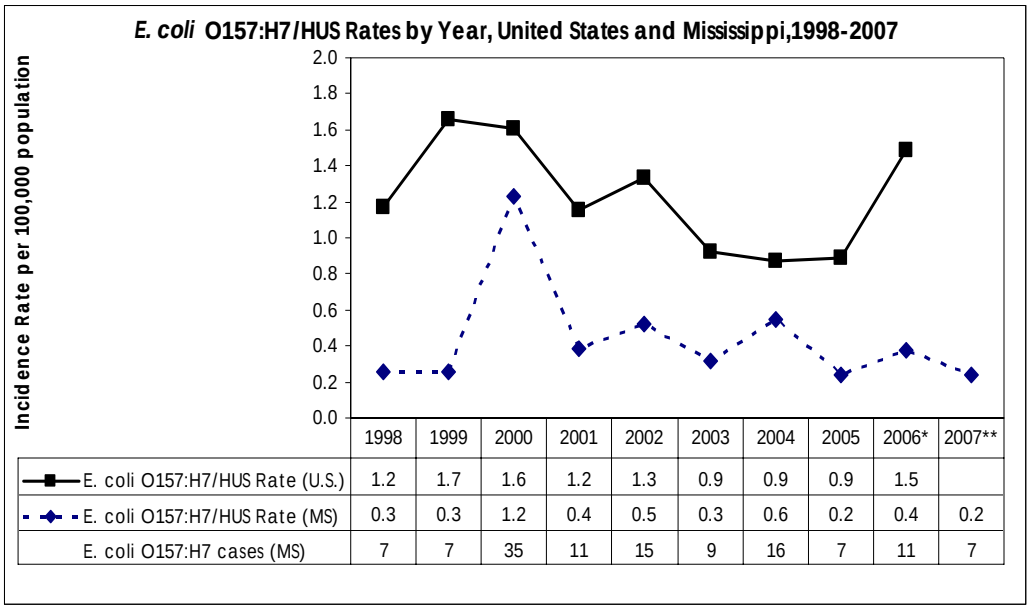
Methods of Control: Education regarding proper food preparation and handling, and good hand hygiene is essential in prevention and control. Pasteurization of milk and juice is important.

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 2007, seven *E. coli* O157:H7 infections were reported to MSDH; none with HUS. On average over the past three years, 11 infections have been reported annually (Figure 45). The seven cases in 2007 were not related to any outbreaks and were not epidemiology linked. There were no deaths reported in Mississippi in 2007. Of the 41 cases of *E. coli* O157:H7/HUS that were reported to MSDH between 2004 and 2007, approximately 32% occurred in children less than 5 years of age (Figure 46).

Figure 45

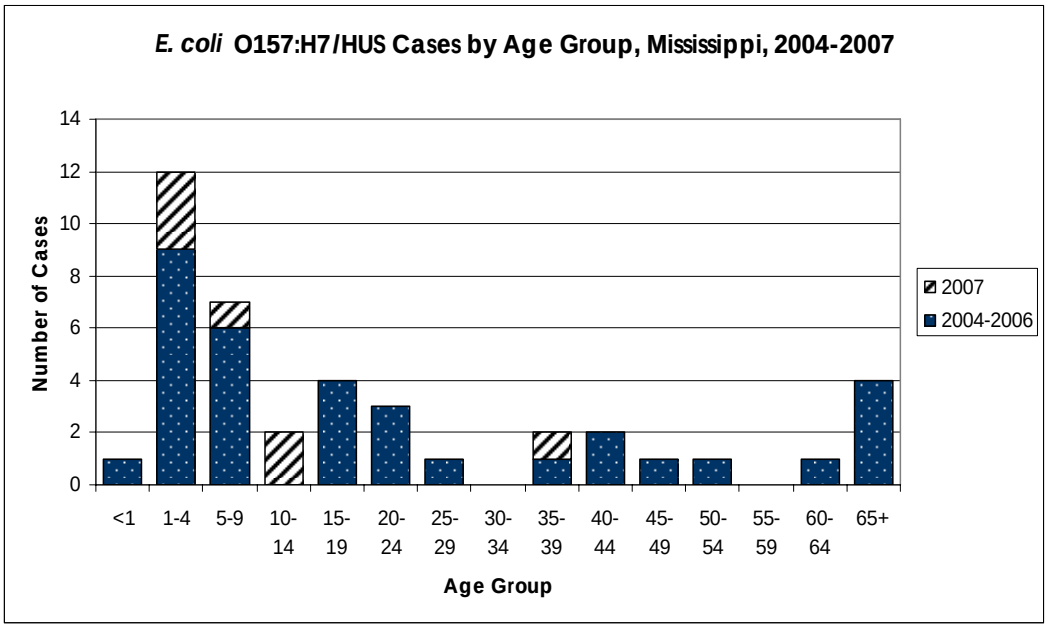


	1998	1999	2000	2001	2002	2003	2004	2005	2006*	2007**
E. coli O157:H7/HUS Rate (U.S.)	1.2	1.7	1.6	1.2	1.3	0.9	0.9	0.9	1.5	
E. coli O157:H7/HUS Rate (MS)	0.3	0.3	1.2	0.4	0.5	0.3	0.6	0.2	0.4	0.2
E. coli O157:H7 cases (MS)	7	7	35	11	15	9	16	7	11	7

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

**2007 U.S. data not available.

Figure 46



Hepatitis A

Clinical Features: Viral illness with 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)

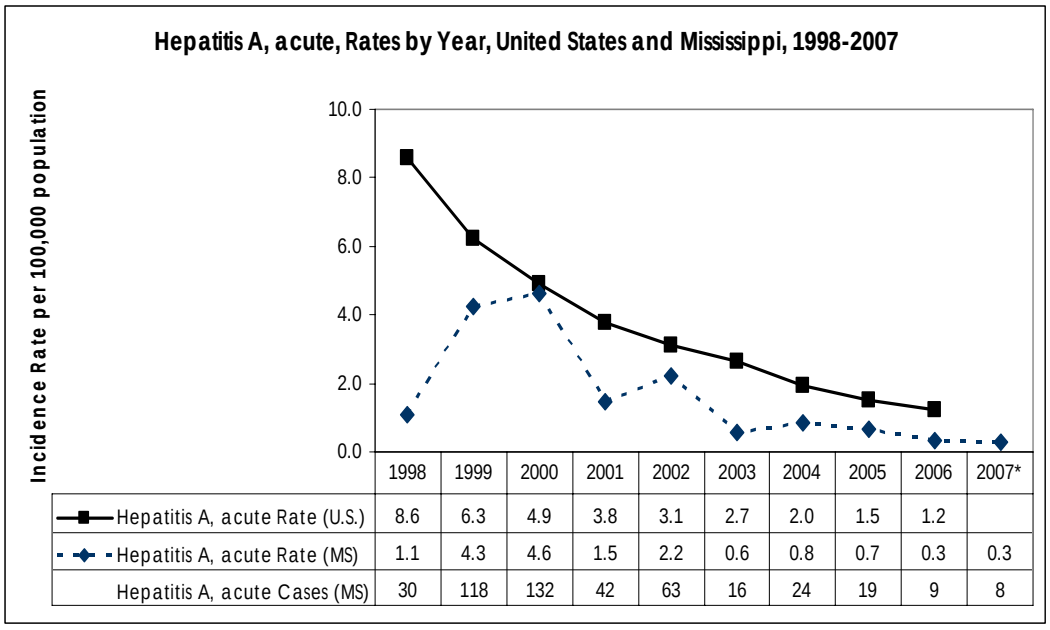
recommended routine vaccination for all children in 2005. Children aged 12-23 months of age should receive one dose of hepatitis A vaccine followed by a booster 6-18 months later, with catch up vaccination for children not vaccinated by 2 years of age.

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. The recommendations for use of immune globulin versus hepatitis A vaccine for post-exposure prophylaxis were updated in a CDC MMWR released October 2007. Under the new guidelines, hepatitis A vaccine (with completion of the series) is now preferred over immune globulin for 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 eight hepatitis A cases reported in Mississippi in 2007. This is comparable to the nine total cases reported in 2006, but lower than the 2004-2006 average of 17 annual cases (Figure 47).

Figure 47



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Hepatitis A, acute Rate (U.S.)	8.6	6.3	4.9	3.8	3.1	2.7	2.0	1.5	1.2	
Hepatitis A, acute Rate (MS)	1.1	4.3	4.6	1.5	2.2	0.6	0.8	0.7	0.3	0.3
Hepatitis A, acute Cases (MS)	30	118	132	42	63	16	24	19	9	8

*2007 U.S. data not available.

The 2007 cases ranged in age from 2 years to 79 years; none were related to a common source outbreak. In six of the 2007 cases, 60 susceptible contacts

received post-exposure prophylaxis with vaccine, immunoglobulin, or a combination of both. In the other two cases, the window of opportunity for prophylaxis had elapsed before MSDH was notified of these infections.

Additional References:

- CDC. Update: prevention of hepatitis A after exposure to hepatitis A virus and in international travelers. Updated recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2007; 57(41); 1080-1084.

Listeriosis

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

Infectious Agent: *Listeria monocytogenes*, a gram-positive, rod-shaped bacterium.

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

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

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

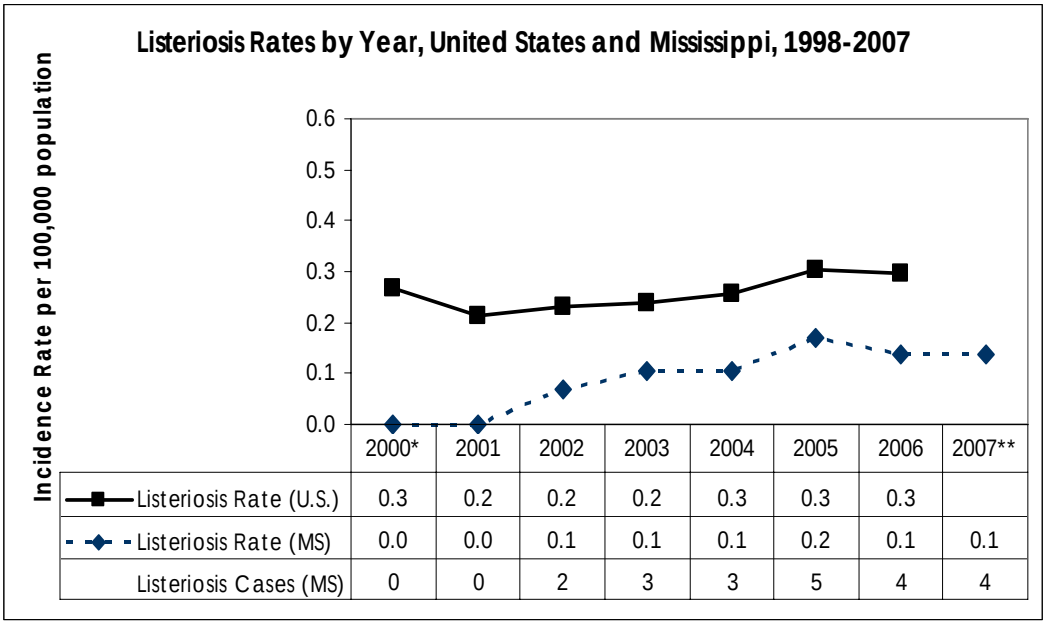
Period of Communicability: Mothers of infected newborns can shed the bacterium in vaginal discharges and urine for 7-10 days post delivery. Infected individuals can shed the bacteria in their stools for several months.

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

Reporting Classification: Class 2

Epidemiology and Trends: There were four reported cases of listeriosis in Mississippi in 2007, the same as 2006. This is consistent with the average number of cases reported for the past three years (Figure 48). No neonatal infections were reported; cases ranged in age from 63 to 85 years. None were epidemiologically linked or associated with common source outbreaks.

Figure 48



	2000*	2001	2002	2003	2004	2005	2006	2007**
Listeriosis Rate (U.S.)	0.3	0.2	0.2	0.2	0.3	0.3	0.3	
Listeriosis Rate (MS)	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1
Listeriosis Cases (MS)	0	0	2	3	3	5	4	4

*Added to National Notifiable Disease List in 2000.

**2007 U.S. data not available.

Salmonellosis

Clinical Features: A bacterial disease commonly manifested by 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. Currently, there are more than 2460 Salmonella serotypes. The predominant isolates in Mississippi are *S. javianna* (serogroup D), *S. mississippi* (serogroup G), *S. newport* (serogroup C2) and *S. typhimurium* (serogroup B).

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 both a food and waterborne infection. Infection occurs with 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. enteritidis* is not

commonly seen in Mississippi, this serotype can be passed trans-ovarially, from infected hens to their eggs. Transmission can then occur when eggs are not fully cooked.

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

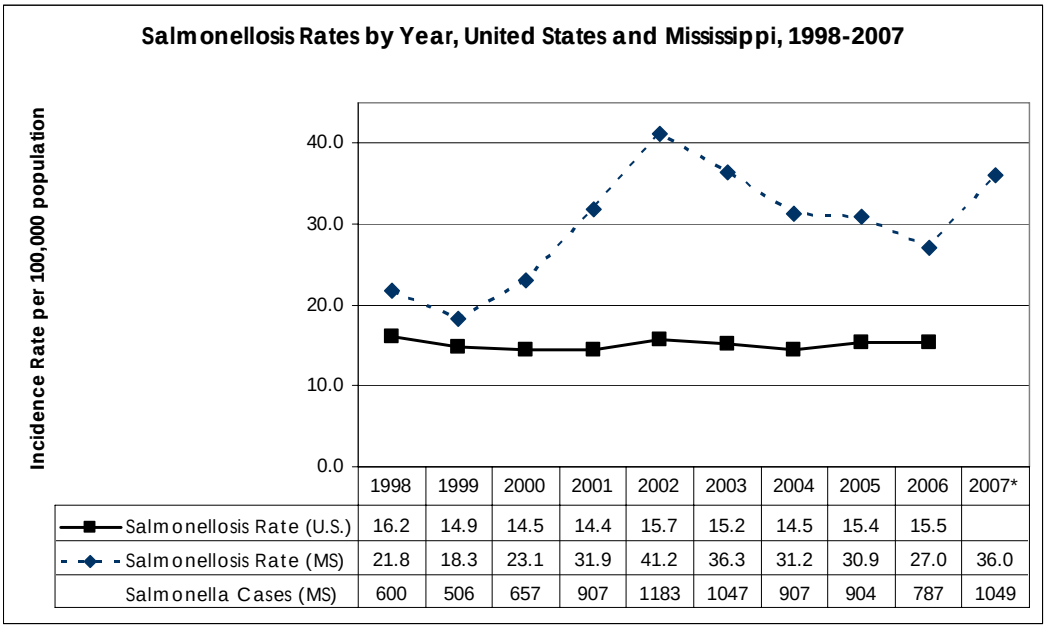
Period of Communicability: Throughout the course of infection; extremely variable, several days to several weeks. A temporary carrier state occasionally continues for months, especially in infants.

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 reported cases in children < 5 years old and 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, and assists in rapidly identifying the source of outbreaks.

Reporting Classification: Class 2

Epidemiology and Trends: In Mississippi, 1049 cases of salmonellosis were reported to MSDH in 2007. This was an increase from the previous year when there were 787 cases reported (Figure 50). In Mississippi, the most prevalent serotypes in 2007 were *S. newport* (serogroup C2), *S. mississippi* (serogroup G), *S. javianna* (serogroup D) and *S. typhimurium* (serogroup B) and accounted for over 36% of the isolates seen in Mississippi.

Figure 50

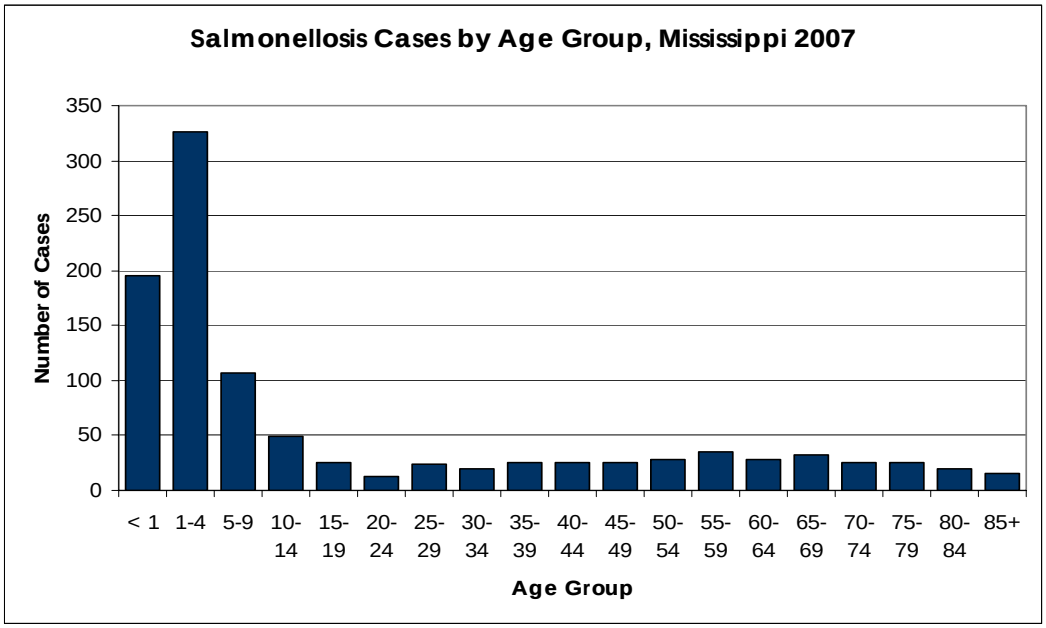


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Salmonellosis Rate (U.S.)	16.2	14.9	14.5	14.4	15.7	15.2	14.5	15.4	15.5	
Salmonellosis Rate (MS)	21.8	18.3	23.1	31.9	41.2	36.3	31.2	30.9	27.0	36.0
Salmonella Cases (MS)	600	506	657	907	1183	1047	907	904	787	1049

*2007 U.S. data not available.

Infections occur in people of all ages, but there is higher incidence in infants and small children. In 2007, 522 (almost 50%) of the cases were in children less than 5 years of age (Figure 51).

Figure 51



In November 2006, an outbreak of *Salmonella* Tennessee was detected by CDC and state health departments (through the PulseNet system). This is typically a rarely occurring serotype, representing only 0.1% of all *Salmonella* reported from 1995-2004 through the National *Salmonella* Surveillance System. This outbreak was associated with consumption of Peter Pan or Great Value peanut butter. Six hundred twenty-eight cases of *S.* Tennessee were reported to CDC with 47 states being affected. Mississippi had 8 cases associated with the outbreak, six in 2007 and two in 2006.

Additional Reference:

- CDC. Multistate outbreak of *Salmonella* Serotype Tennessee infections associated with peanut butter --- United States, 2006—2007, MMWR, June 1, 2007 / 56(21);521-524.

Shigellosis

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* 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.

Enteric Diseases, Annual Summary, 2007

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.

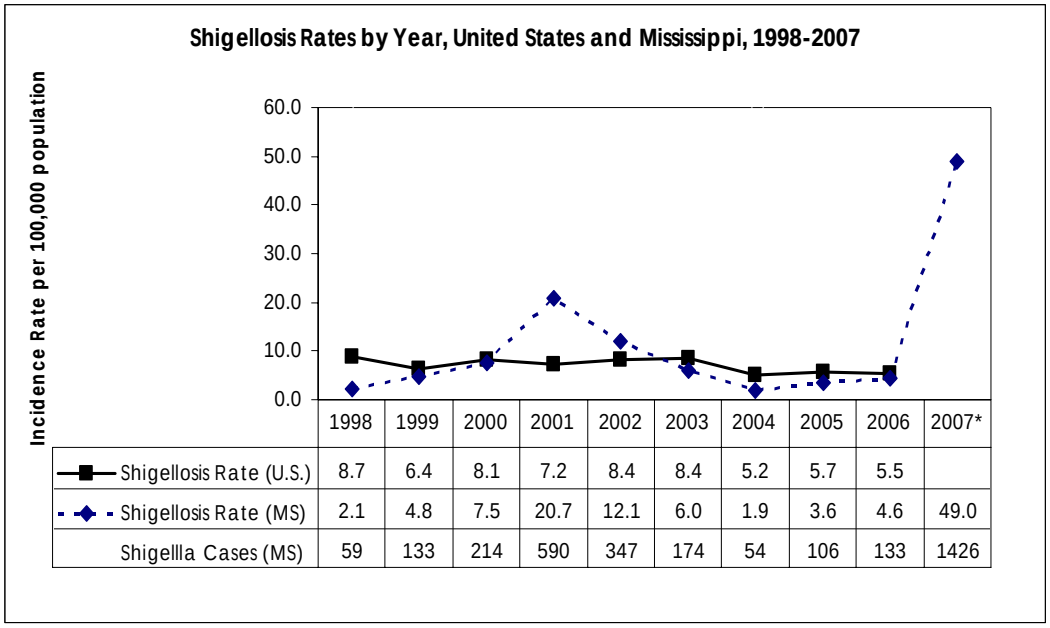
Incubation: Ranges from 12 hours to 7 days, with an average of 2-4 days.

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: In 2007, there were 1426 reported cases of Shigellosis, indicating a marked increase from previous years (Figure 52). There have been cyclic increases every 6-8 years since 1992, with the last peak of 590 cases in 2001. The three year average number of cases for 2004-2006 was 98 cases.

Figure 52

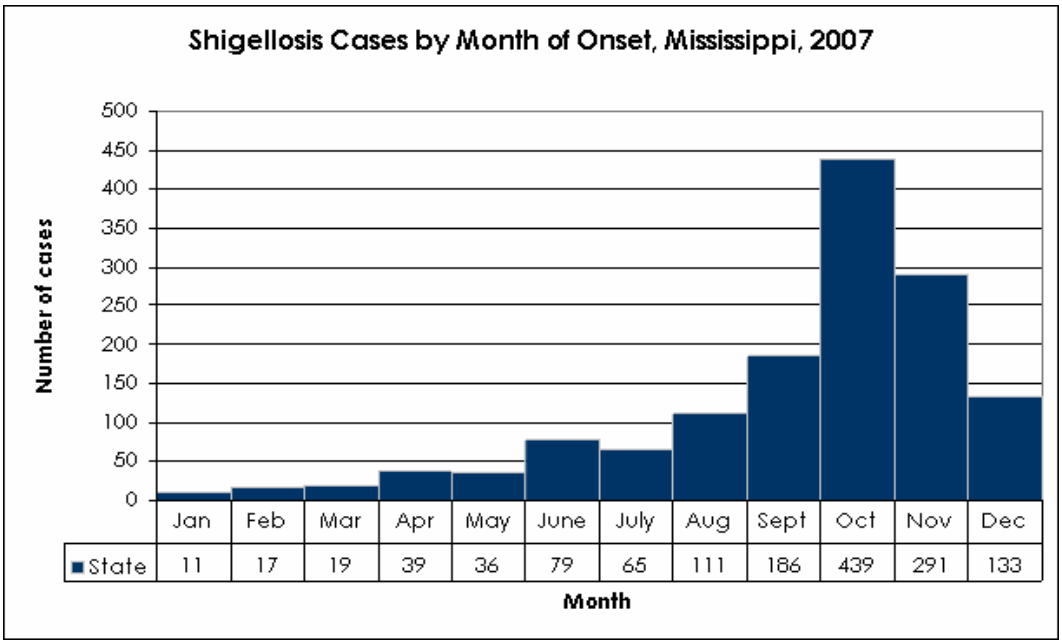


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
Shigellosis Rate (U.S.)	8.7	6.4	8.1	7.2	8.4	8.4	5.2	5.7	5.5	
Shigellosis Rate (MS)	2.1	4.8	7.5	20.7	12.1	6.0	1.9	3.6	4.6	49.0
Shigellla Cases (MS)	59	133	214	590	347	174	54	106	133	1426

*2007 U.S. data not available.

The increases in reported cases was first noted in the summer, peaked in October, and continued at higher than expected levels for the remainder of the year (Figure 53).

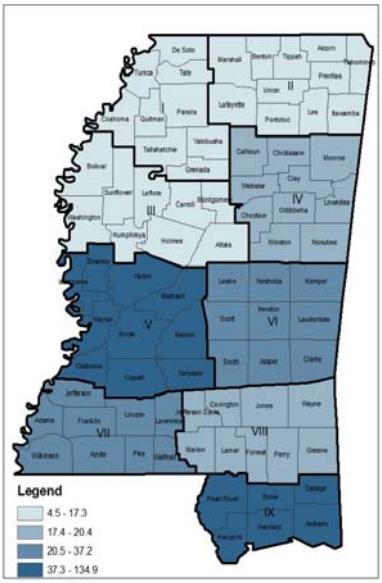
Figure 53



The majority of 2007 cases occurred in Public Health Districts V (844) and IX (239). These two Districts also had the highest incidence when adjusted for population (Figure 54). More than 75% of the cases occurred in the 0-4 and 5-9 year old age groups (Figure 55).

Figure 54

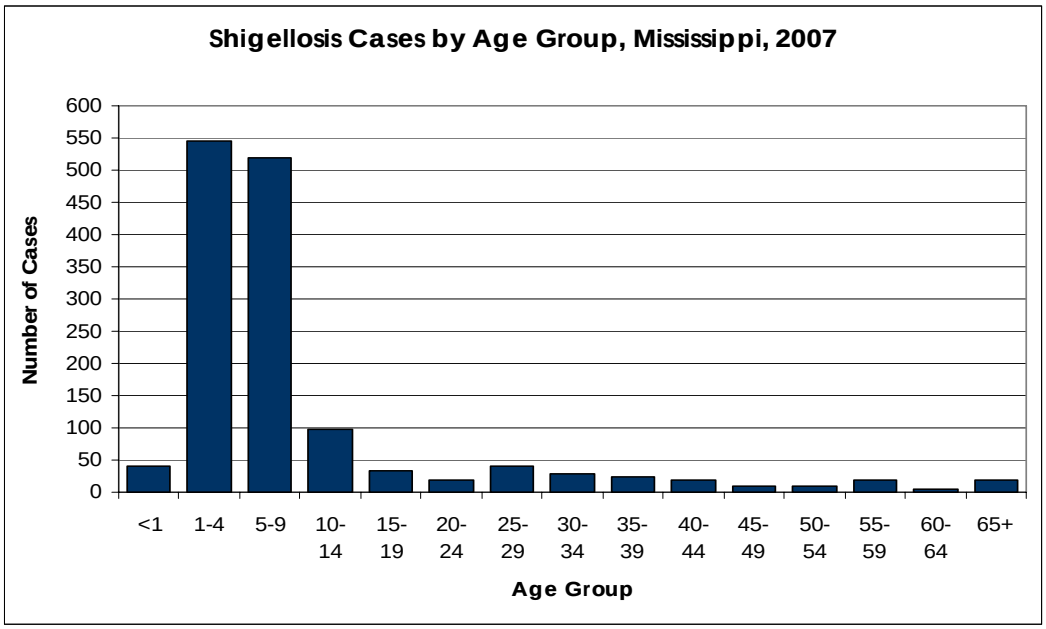
Shigellosis Incidence Rates by Public Health District, 2007



District	Cases	Rate*
I	12	4.5
II	39	11.3
III	41	17.3
IV	50	20.4
V	844	134.9
VI	75	30.9
VII	66	37.2
VIII	60	20.3
IX	239	54.6
State	**1426**	**49.6**

***per 100,000 population.**

Figure 55



Of the 1426 cases reported, 92.6% were in Group D (*S. sonnei*). Antibiotic susceptibility results from isolates sent to the PHL showed 47% were susceptible to ampicillin, 95% were susceptible to trimethoprim/sulfamethoxazole, and 100% were susceptible to ciprofloxacin.

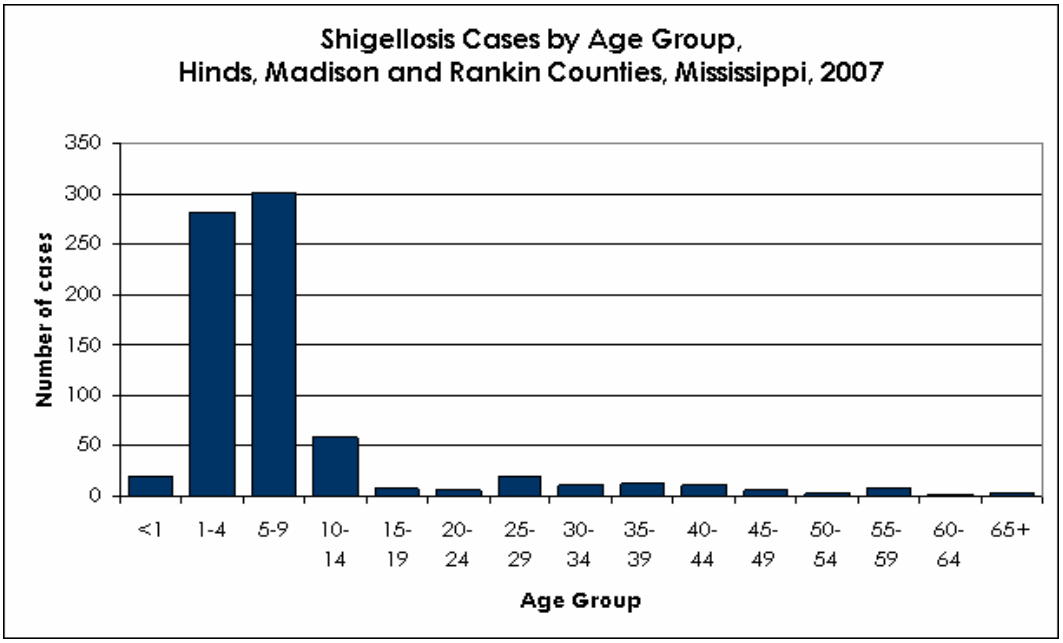
At the request of MSDH, CDC assisted with an investigation of the increased incidence of shigellosis in October, 2007. The investigation focused on District V, which includes the Metro-Jackson area. Of the 844 cases in District V, 753 were in three counties in this area (Hinds, Madison, and Rankin).

Specifically, efforts were focused on identifying risk factors for infection in District V. Because most of the cases in these counties were in children aged 1-9 years (similar to state data), there were initial concerns of a possible association between cases and childcare centers or schools (Figure 56).

The CDC investigators focused the majority of their efforts on childcare and elementary schools in Rankin county, where 414 of the District V cases were located. In looking at the relationship between elementary schools and afterschool programs at childcare facilities, investigators concluded that children who attended one particular elementary school, *and* attended one particular afterschool program, were 3 times more likely to have infection than their classmates who did not attend the afterschool program. Beyond that, no common source of infection such as food or water, or isolated school or childcare center was identified. Investigators also concluded that facility infrastructure was not a risk factor of transmission despite precedents reported among several other shigellosis outbreaks.

MSDH instituted a school and childcare center based hand washing campaign targeting the most affected counties. This included visits to elementary schools and childcare centers to address issues such as hand washing and diaper changing practices. An assessment of facility infrastructure–numbers of sinks and toilets and availability of soap--was also done.

Figure 56



Vibrio disease

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*. Nontoxigenic *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.

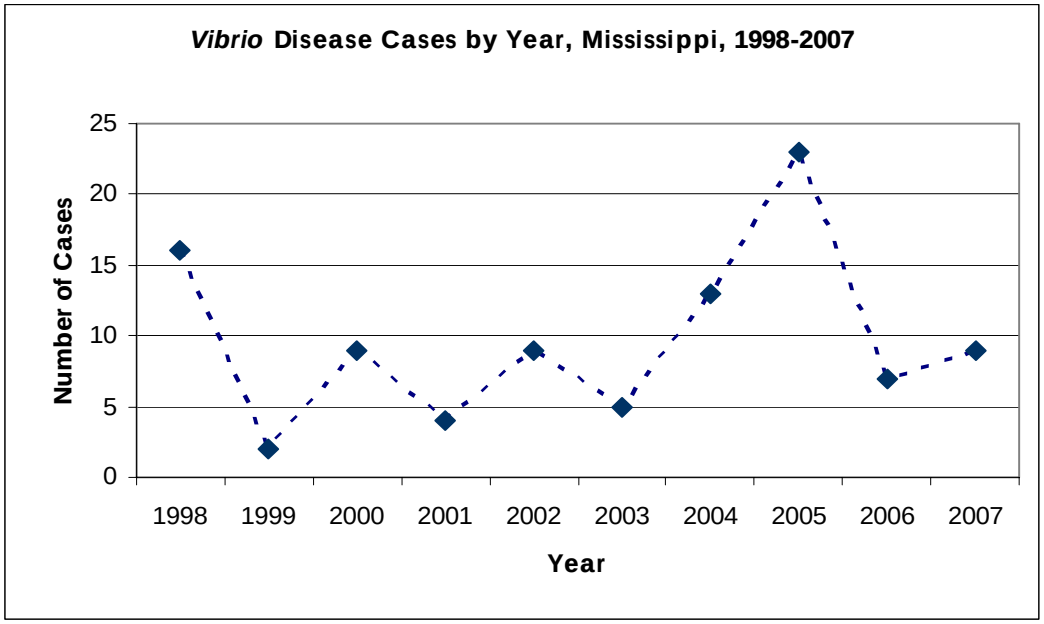
Period of Communicability: Not typically transmitted person to person.

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 2007, there were eight reported *Vibrio* infections. This is comparable to 2006 when there were seven reported cases. The three year mean for 2004-2006 is 14 cases (Figure 49).

Figure 49



Of the 8 reported cases, 3 were due to *V. vulnificus* (2 sepsis and one isolated from both wound and blood cultures), 2 were due to *V. parahaemolyticus* (one wound infection and one gastrointestinal infection), and one each of *V. hollisae*, *V. mimicus* and nontoxigenic *V. cholerae* isolated in stool cultures. There was one reported death in 2007 attributed to *V. vulnificus*.

In 2005, 23 *Vibrio* infections were reported in Mississippi, which was a substantial increase compared to years leading up to and following 2005. Twelve of the 23 cases were related to floodwater exposures during and after Hurricane Katrina, which made landfall August 29, 2005. Of these twelve hurricane-related *Vibrio* infections, nine cases were *V. vulnificus*, and two cases were *V. parahaemolyticus*. All presented with wound infections or sepsis, and four deaths occurred secondary to sepsis.

Additional References:

- CDC. *Vibrio* illnesses after Hurricane Katrina --- Multiple States, August--September 2005. MMWR 2005;54(37);928-931

Arboviral Infections (mosquito-borne)

Background: Arthropod-borne viral (arboviral) diseases in Mississippi are limited to a few 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.

These 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 to 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 repellant to exposed skin areas. Reduce mosquito breeding areas around the home and workplace by eliminating standing or stagnant water. Larvacides are effective when water cannot be easily drained.

Mosquito Surveillance: Mosquitoes are collected throughout the state for West Nile and other arboviral testing to provide information regarding the burden and geographic distribution of infected vectors. Mosquitoes are collected by local mosquito programs and MSDH personnel and submitted as pools of 5-50 mosquitoes for testing. In 2007, mosquito pools were submitted to the Veterinary Diagnostic Laboratory for WNV, SLE, and EEE testing, and to MSDH for WNV testing.

Arboviral Testing: Available at MSDH through the Public Health Laboratory (PHL) as 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 2007. 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. The Mississippi Board of Animal Health reports equine infections to MSDH, and in 2007, 67% of the thirty positive horses were located in the southeastern and coastal areas of the state. There were no reported EEE positive mosquito pools in 2007.

LaCrosse Encephalitis

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 12 reported cases since 1998; the last case was reported in 2005. There were no reported cases of LaCrosse encephalitis in 2007. Of these 12 total cases since 1998, 50% were in males. The ages ranged from 3 months to 78 years of age, with 92% 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 and one in 2006.

St. Louis Encephalitis

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 or 2006, but there were nine cases with one death reported in 2005.

Mississippi had two reported cases of SLE in 2007. The two SLE cases occurred in late-August to early September. Both were in individuals greater than 65 years of age and were from Hinds County, MS. There were no deaths due to SLE in 2007. No positive mosquito pools were reported in 2007.

West Nile Virus

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.

Enhanced Control Measures: In August, 2005 Hurricane Katrina caused extensive and severe damage resulting in Federal disaster declarations for 49 Mississippi counties. As a result, the CDC made one time funds available to MSDH, through its Epidemiology and Laboratory Capacity grant, for enhancement of community mosquito abatement programs in these affected counties. Mississippi received 2.8 million dollars. These funds were dispersed to communities and municipalities in the affected counties, through contractual agreements, with the purpose of developing new or additional mosquito control activities.

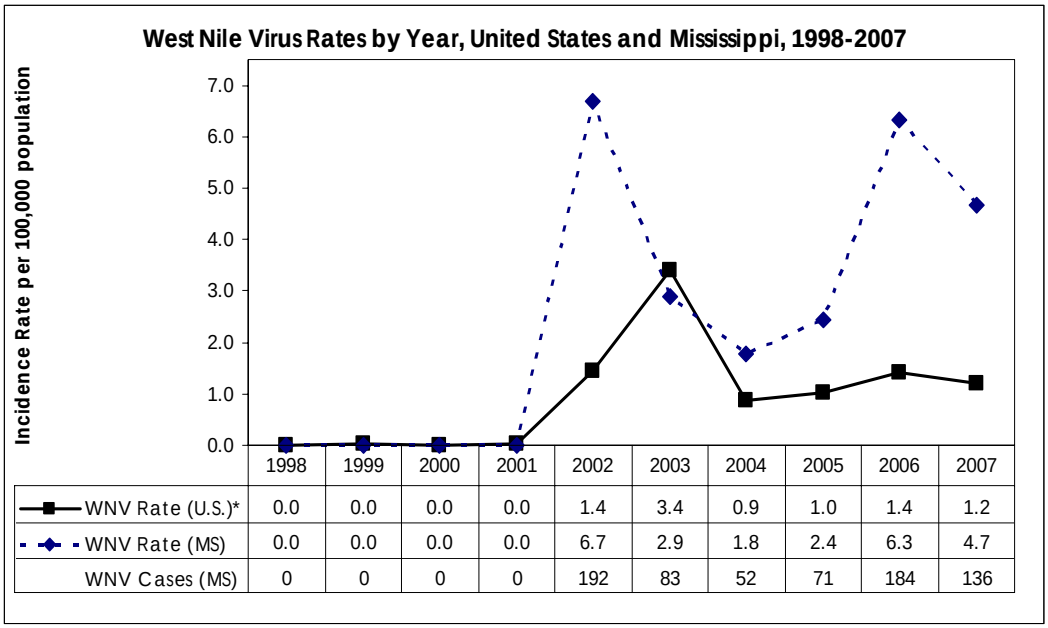
When a new case of WNV is reported, MSDH staff alert the counties and communities in the general area of the case to increase mosquito control measures and public awareness.

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 with 184 cases (Figure 57). In 2007, there were 136 reported cases with 4 deaths.

Figure 57

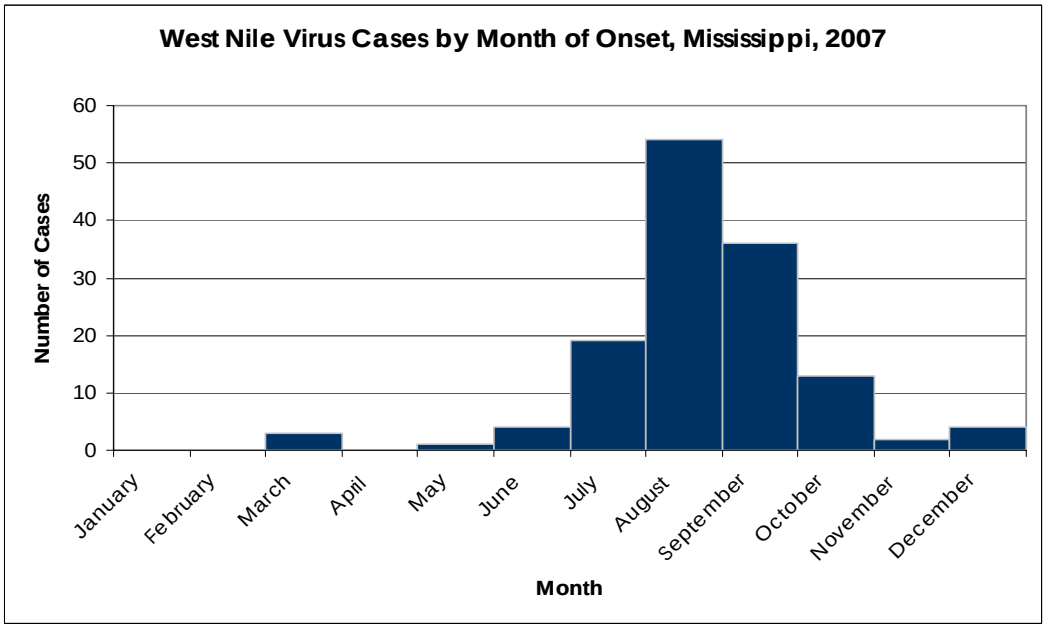


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
WNV Rate (U.S.)*	0.0	0.0	0.0	0.0	1.4	3.4	0.9	1.0	1.4	1.2
WNV Rate (MS)	0.0	0.0	0.0	0.0	6.7	2.9	1.8	2.4	6.3	4.7
WNV Cases (MS)	0	0	0	0	192	83	52	71	184	136

*U.S. data: 62 cases in 1999; 21 cases in 2000; 66 cases in 2001.

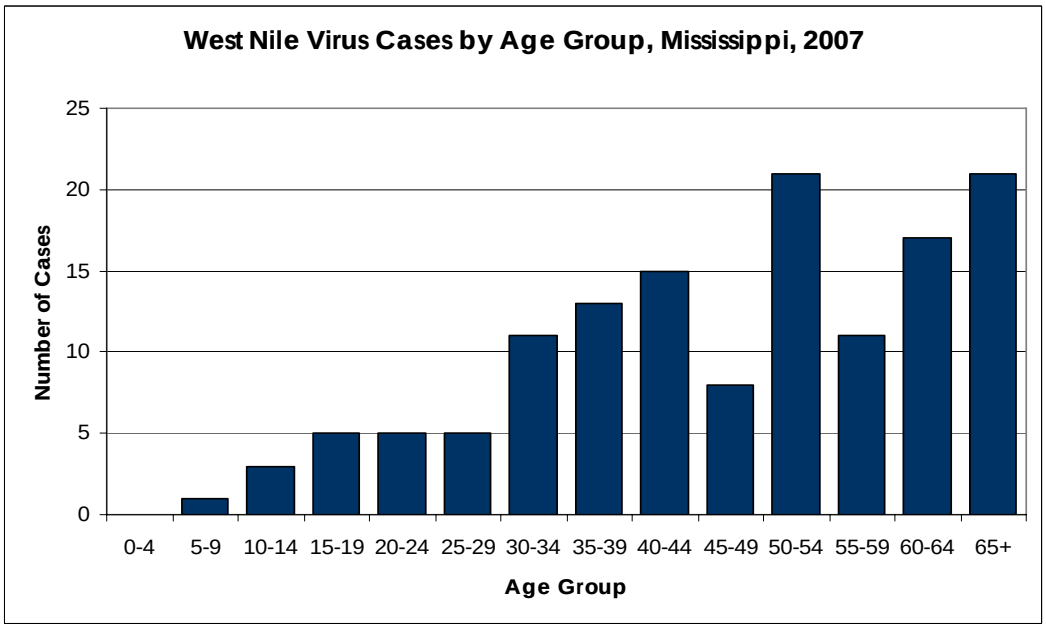
WNV is now thought to be endemic in Mississippi, and the mosquito vector is present the entire year. Human illness can occur year round, but is most prevalent from July to October. August and September are usually the peak months (Figure 58).

Figure 58



Of these 2007 cases, 64% were classified as WNV fever and 36% were encephalitis. The percentage of infections that are symptomatic increases with age, with a mean age of reported cases of approximately 50 years. The cases ranged in age from 9 to 93 years. Fifty-one percent were 50 years or older (Figure 59).

Figure 59

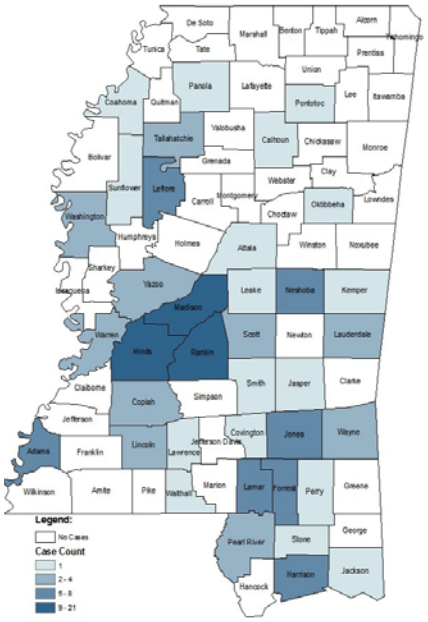


WNV infection can occur in any part of the state, and activity (human cases, positive mosquito pools, horses or birds) has been reported in every Mississippi county except Issaquena. Thirty-seven percent of the 2007 cases occurred in Hinds, Madison and Rankin counties (Figure 60).

Of the 627 mosquito pools tested, a total of eighteen 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 2007, 15 horses tested positive for WNV with no predominant geographical location.

Figure 60

West Nile Virus Cases by County, Mississippi, 2007



Lyme disease

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).

Zoonotic Diseases, Annual Summary, 2007

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

Reporting Classification: Class 2

Epidemiology and Trends: Most cases 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 two confirmed cases reported in 2007, and three in 2006.

For surveillance purposes, during the 2007 reporting year, a case was considered confirmed if:

- erythema migrans was diagnosed, or
- there was a diagnosis of at least one late manifestation (musculoskeletal, nervous, or cardiovascular system) with laboratory confirmation.

The two confirmed cases in 2007 were a 3 year old with Bell's Palsy and an IgM positive Western blot, and a 48 year old with erythema migrans, arthritis and AV block.

For the 2008 reporting season, the confirmed case definition has changed slightly. A confirmed case will be defined as:

- A case of erythema migrans with a known exposure to an endemic area (defined as a county where at least two confirmed cases of Lyme disease have occurred, or an area with an established population of the vector known to be infected with *B. burgdorferi*).
- A case of erythema migrans with laboratory evidence of infection, or

- A case with at least one late manifestation and laboratory evidence of infection.

With this change, obtaining a good travel history will be more important in determining if a patient fits the case definition criteria.

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 raccons 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(s): 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 3-11 bats test positive each year (Figure 61). There were 3 positive bats out of 65 tested in the PHL in 2007, one in Holmes County and two in Rankin County. Since 1998, there has been a wide geographic distribution of positive bats, with 45 reported positives in 21 counties (Figure 62). There has not been an indigenous terrestrial (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 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 61

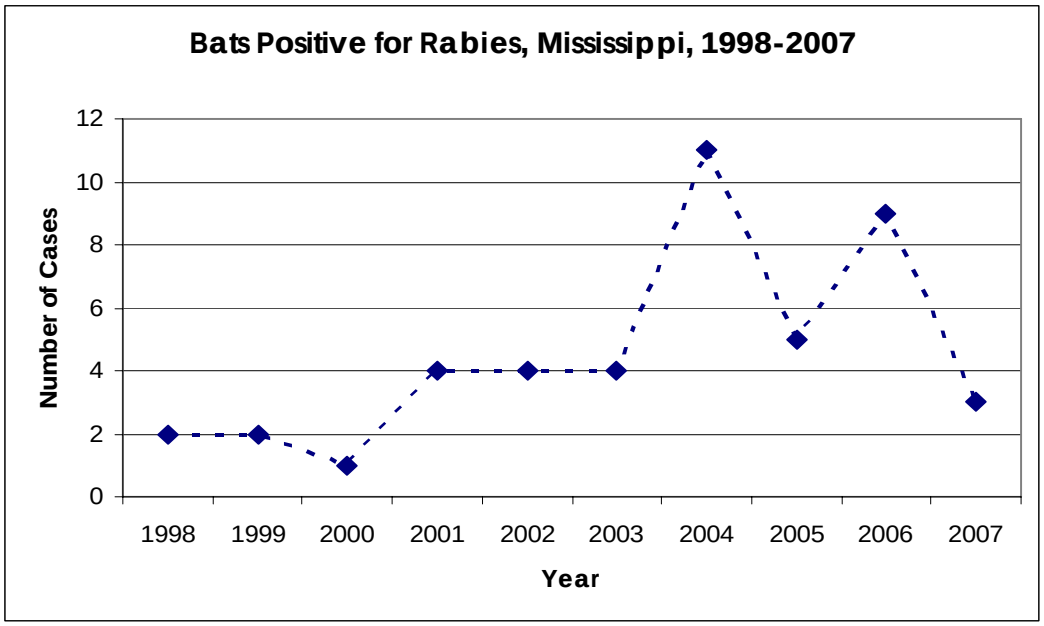
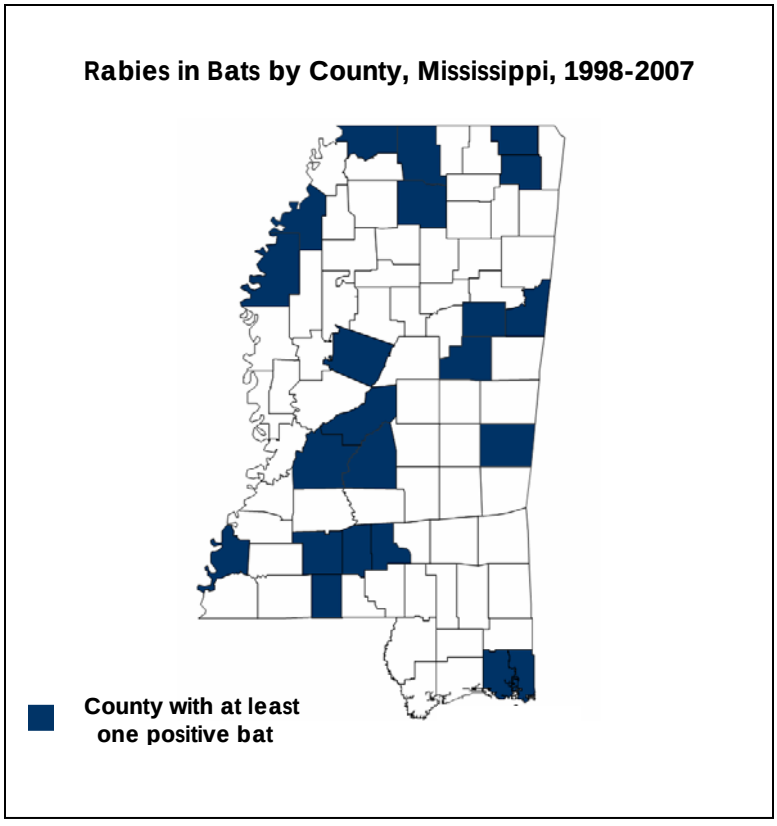


Figure 62



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- JAVMA, Vol 231, No. 4, August 12, 2007, Public Veterinary Medicine: Public Health: Rabies Surveillance in the United States during 2006, Jesse D. Blanton, MPH; Cathleen A. Hanlon, VMD, PhD; Charles E. Rupprecht, VMD, PhD

Rocky Mountain spotted fever

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 meningococcemia.

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).

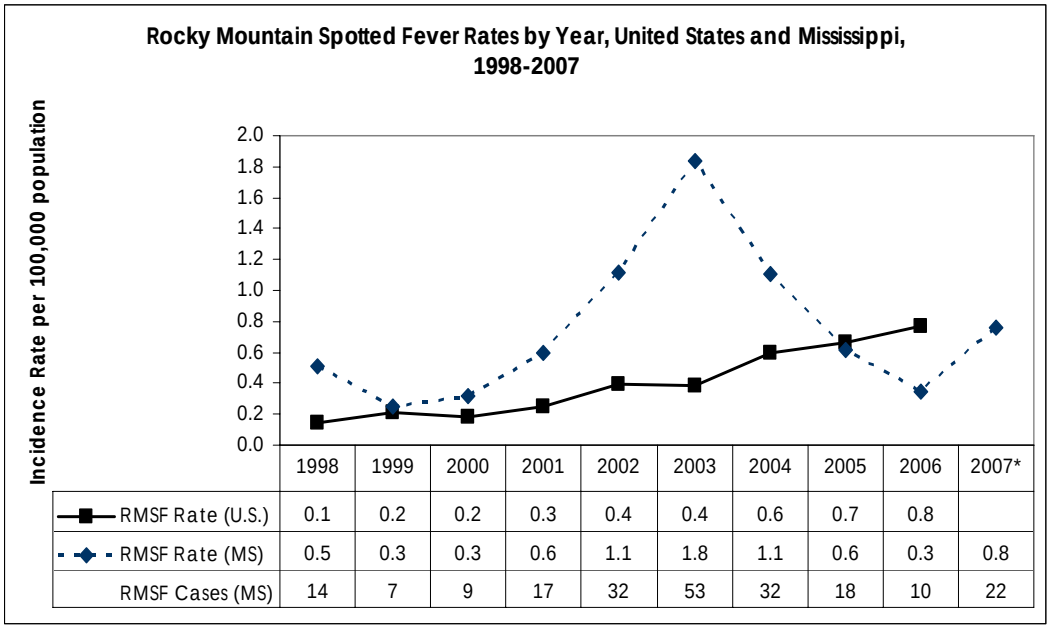
Period of Communicability: No evidence of person to person transmission.

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

Reporting Classification: Class 2.

Epidemiology and Trends: In 2007, there were 22 cases of Rocky Mountain spotted fever reported in Mississippi. This is comparable to the 2004-2006 average of 20 cases reported annually (Figure 63). The cases ranged in age from 12 to 84 years of age.

Figure 63



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007*
RMSF Rate (U.S.)	0.1	0.2	0.2	0.3	0.4	0.4	0.6	0.7	0.8	
RMSF Rate (MS)	0.5	0.3	0.3	0.6	1.1	1.8	1.1	0.6	0.3	0.8
RMSF Cases (MS)	14	7	9	17	32	53	32	18	10	22

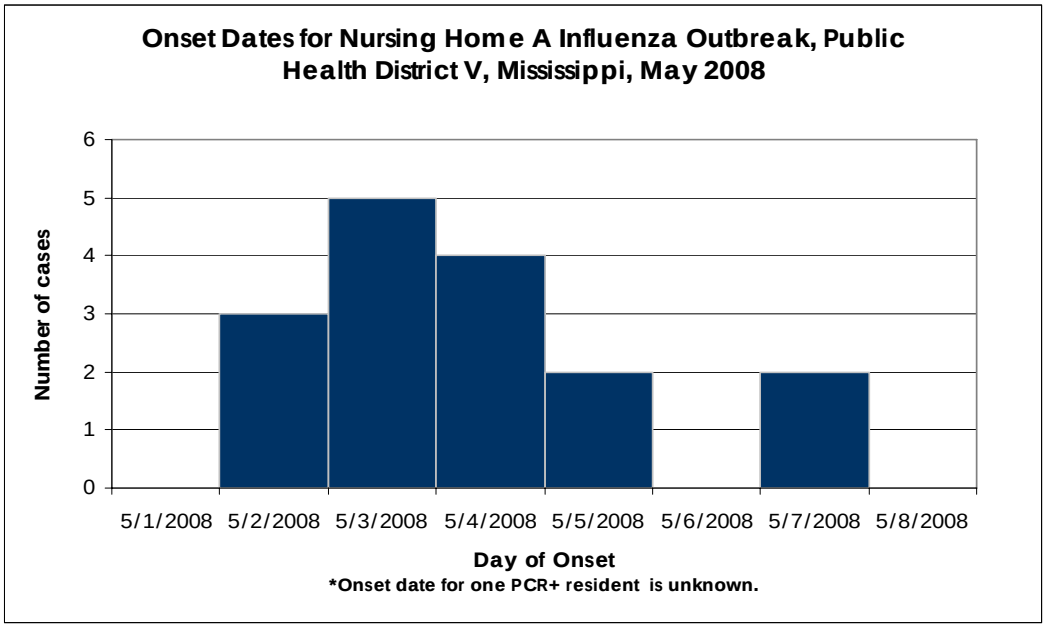
*2007 U.S. data not available.

Special Report—Influenza Outbreak, May 2008

While individual Influenza cases are not reportable, influenza associated outbreaks are reportable as a Class 1 condition, as is any suspected outbreak. In a typical influenza season, isolated outbreaks can occur in nursing or personal care homes. During the 2007-2008 season, there were six confirmed influenza outbreaks in nursing homes. Five of these were reported during Mississippi's peak influenza activity from CDC weeks 4-8 (1/20/08-2/23/08). However, one occurred after the usual season in May, 2008.

The late outbreak was in a nursing home within Public Health District V, the most populous district in the state. The cluster was restricted to one wing of the facility and involved a total of 17 individuals (13 residents and 4 employees). Onset of symptoms compatible with influenza began May 2, 2008 with the last cases becoming ill May, 7, 2008 (Figure 64). Two residents required hospitalization, but all residents and employees recovered, and no deaths were reported. Thirteen of the cases had positive rapid antigen tests for influenza, and four of six PCR samples submitted to the Public Health Laboratory were positive. All four samples sub-typed as influenza A (H3N2). Of specific interest, 88% of the ill residents and employees had received the trivalent influenza vaccine in October 2007.

Figure 64



To reduce spread of influenza to the unaffected wings of the facility, a notice was posted on the door of the wing limiting access to the area on May 3, 2008. The facility also cohorted ill residents to the outbreak area, suspended group activities and initiated serving meals in resident's rooms. Dedicated staff were assigned to the affected wing of the facility to provide resident care. Oseltamivir prophylaxis was given by the facility, on May 4, 2008, to well residents in a further effort to prevent spread of infection.

MSDH was first notified on May 6, 2008. MSDH Epidemiology and District staff visited the facility that same day, providing information on influenza outbreak control, and collecting PCR samples as appropriate. MSDH continued to monitor the facility for new influenza symptom onset. No further influenza-like illness was reported in employees or residents. As a result of this late season outbreak, Mississippi's reported influenza activity remained sporadic for the remaining two weeks of the reporting season.

This outbreak illustrates the importance of rapid identification and reporting of outbreaks in closed setting facilities to expedite actions to control the spread of infection, and the need for monitoring for potential outbreaks of influenza-like illnesses even late in the season.

Special Report—Chagas Disease, Mississippi, 2007

Introduction: In March 2007, blood banks began screening donors for antibodies to the causative agent of Chagas disease, leading to identification of the disease in four Mississippi residents.

Background: Chagas disease (American Trypanosomiasis) is a zoonotic infection caused by the parasite *Trypanosoma cruzi (T. cruzi).* Chagas is endemic in Mexico, Central and South America, where an estimated 11-13 million people are infected, and 50,000 deaths occur annually. After years to decades of subclinical chronic infection, 20-30% of infected persons develop irreversible cardiomyopathy or intestinal megasyndromes, which account for the majority of the morbidity and mortality.

Transmission is primarily through the bite of an infected insect vector, the triatomine or reduviid bug, commonly known as the "kissing bug". This bug thrives in conditions of poor housing where it can easily live in the walls. Transmission through blood transfusion, organ transplant, and congenital routes also occurs. Individuals with chronic subclinical infection can remain parasitemic and infectious for life.

Although the insect vector for transmission is present in the U.S., and *T. cruzi* has been identified in many mammalian reservoirs in this country (mainly opossums, armadillos and rural dogs), autochthonous or indigenously acquired infection is rarely considered in the non-immigrant populations. However, as the number of immigrants from endemic regions has increased, there has been concern for the safety of the blood supply. To date, seven cases of transfusion transmitted *T. cruzi* and five cases of infection from organ transplantation have been documented in the U.S. and Canada.

There is no gold standard test for diagnosis, but immunofluorescence assays (IFA), indirect hemagglutinin (IHA), enzyme linked immunosorbent assays (ELISA) and radioimmune precipitation assays (RIPA) are available for serological diagnosis. Diagnosis is made by at least two different serologic tests, and by considering clinical findings and exposure risks.

In 2006, the FDA granted a license for a new ELISA screening test for the detection of antibodies to *T. cruzi.* Blood banks in Mississippi began using this assay in March 2007. Specimens testing positive are retested with the screening ELISA, and repeat positives are confirmed with RIPA.

Mississippi Cases: There were four confirmed positive blood donors reported to MSDH in 2007. Two were natives of endemic countries, and felt to be imported cases. The other two donors were residents of Mississippi and possibly represented indigenously acquired infections. A joint investigation between MSDH and the CDC was initiated to help determine the potential risk factors and sources of infection in these two cases, and to investigate possible blood transfusion-related transmission that may have occurred as a result of blood previously collected from these two donors.

Methods: In depth interviews were performed, focusing on potential exposure to both the vector and mammalian reservoirs. The property of both donors was inspected for vectors and reservoirs, and serological testing at the CDC was repeated on both donors. *T. cruzi* testing was also performed on the donor's family members and their dogs, and any insect vectors discovered were tested with PCR for the presence of *T. cruzi*. A look back at previously donated blood and recipients was performed to rule out transfusion related transmission.

Results: Donor A grew up in rural Mississippi, while donor B spent his childhood in rural Louisiana. Both were avid hunters and outdoorsman, and reported exposures to raccoons, opossums and armadillos. Neither had extensive travel to endemic areas, nor mother's with risk factors for infection. Structures on both donors' property were suitable to support bug infestation, and donor B recognized the insect vector. Donor A had received a blood transfusion previously, but the original donor was negative by ELISA. Repeat serological testing of the donors at CDC by IFA and a different ELISA were positive for donor A, but inconclusive for donor B.

Serological tests of the donor's family members and dogs were negative. A dead triatomine bug was found at the boyhood home of donor A (100 yards from current dwelling) and tested positive for *T. cruzi* by PCR. A live bug was found in the barn of donor B, and was negative by PCR. A look back at the previously donated blood products and all recipients of those products did not reveal evidence of Chagas disease transmission.

Discussion: Although prior to 2007 only six autochthonous infections had been identified in the U.S., indigenous transmission is the most likely source of infection in these two donors. Cases of Chagas disease will likely be increasingly identified as a result of screening donors for *T. cruzi* infection. However, most cases of Chagas disease in the U.S. will still represent chronic infections acquired in endemic countries. It is estimated that up to 100,000 legal immigrants currently living in the U.S. and Canada are unknowingly infected with *T. cruzi.* CDC is preparing guidance for the clinical evaluation, staging and management of patients identified with Chagas disease.

References:

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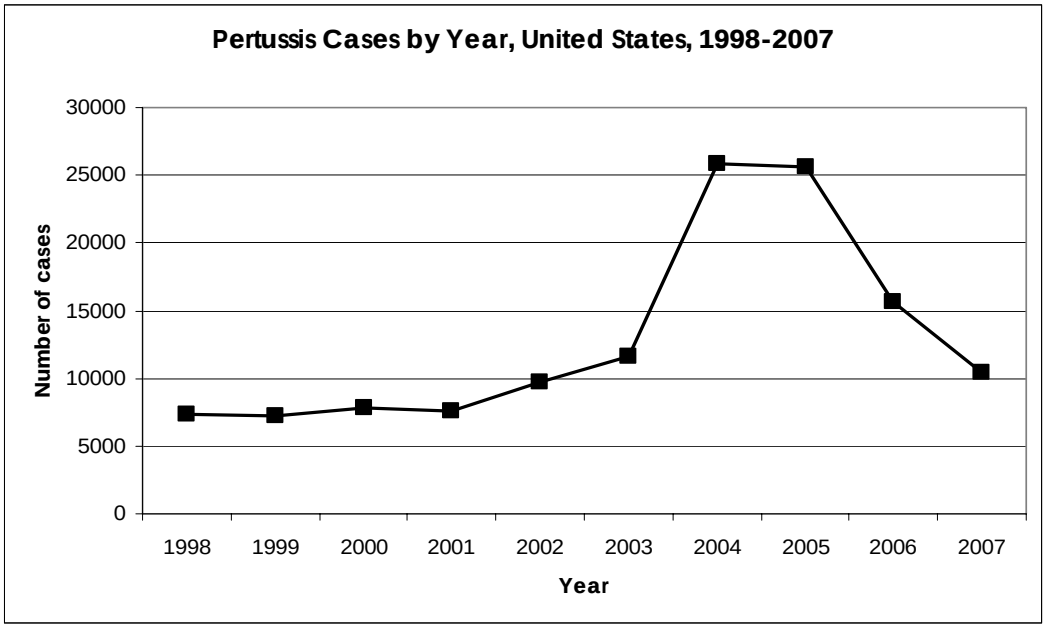
- CDC. Chagas disease. Available online at: www.cdc.gov/chagas/
- Dorn PL, Perniciaro L, Yabsley MJ, Roellig DM, Balsamo G, Diaz J, et al. Autochthonous transmission of *Trypanosoma cruzi*, Louisiana. Emerg Infect Dis [serial on the Internet]. 2007 Apr [*date cited*]. Available from http://www.cdc.gov/EID/content/13/4/605.htm

Special Report—Pertussis Outbreak, District VI, 2007

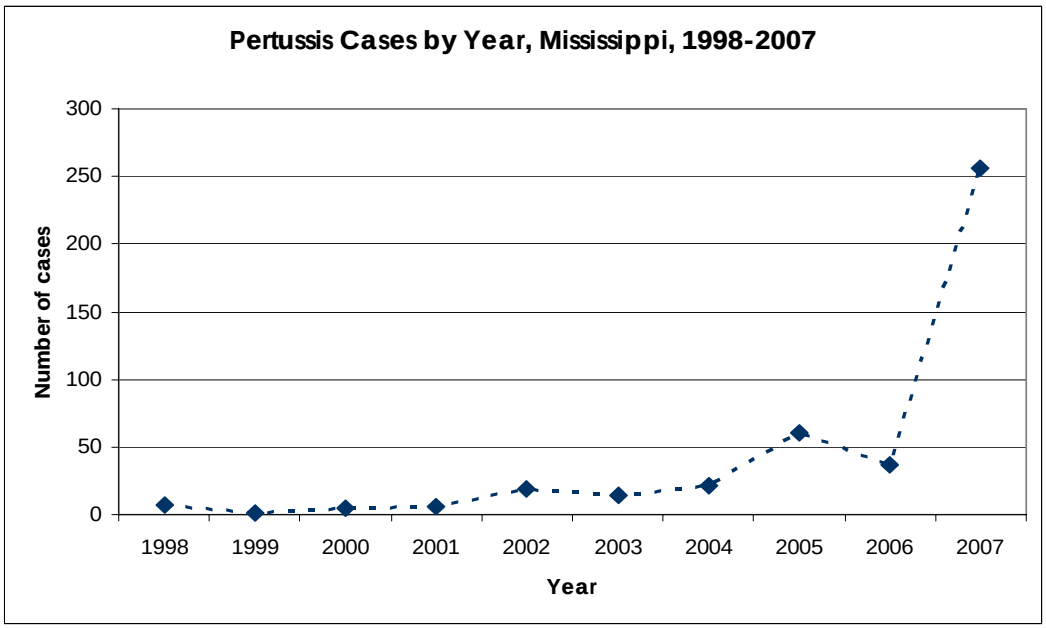
Following the introduction of pertussis immunization in the mid-1940s, the incidence in the United States declined by more than 99 percent, to an all-time low of 1,010 cases in 1976. Since then, a nationwide increase in incidence has been documented, with a peak of more than 25,000 cases reported in 2004 (Figure 65). Several factors are felt to be responsible for this resurgence of disease, including decreased vaccination rates in infants and waning immunity in adolescents and adults. Adolescents and adults with asymptomatic or mild illness can be reservoirs for *Bordatella pertussis* and are often the source of infection in infants. The majority of fatalities and complications occur in infants less than 6 months of age.

Figure 65



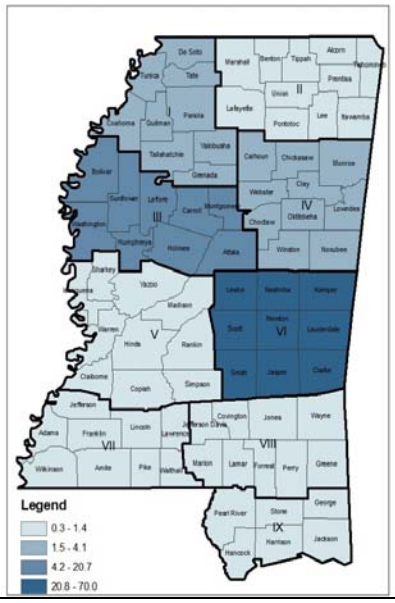
The number of pertussis cases reported to MSDH mirrored U.S. trends through 2006. Increases in reported cases were first noted in Mississippi in 2002. This trend continued in the following years, hitting a peak in 2005 with 60 reported pertussis cases. In 2006, the number of reported pertussis cases decreased in Mississippi as did it nationally. In 2007, however, Mississippi had 256 reported cases, indicating a significant increase over previous years. (Figure 66).

Figure 66



All public health districts had reported cases of pertussis, but the majority of the cases (170) were reported in Public Health District VI (East Central Mississippi) (Figure 67).

Figure 67



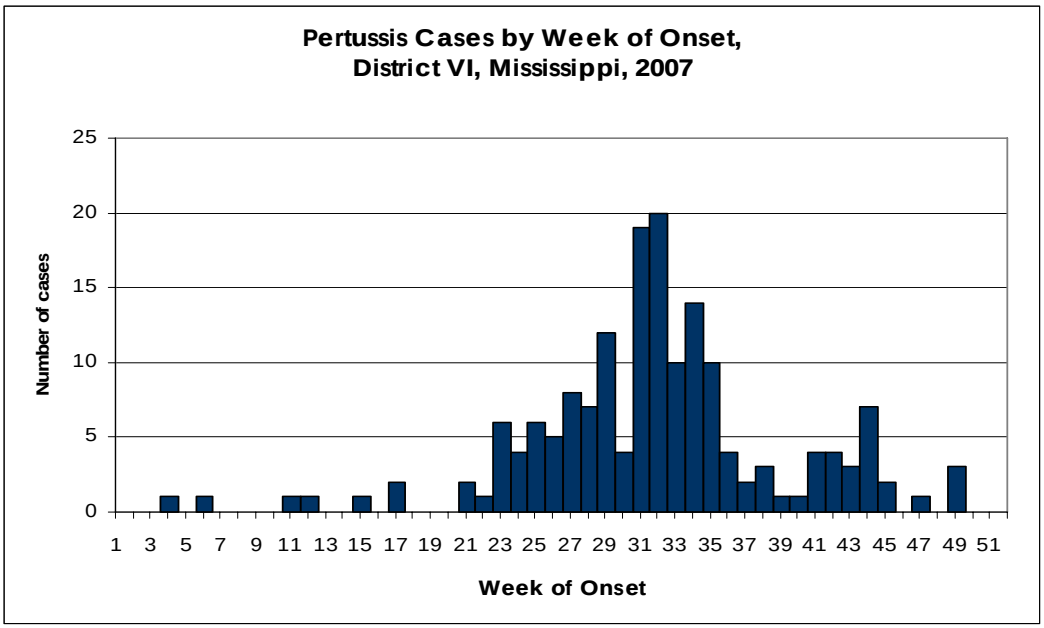
Pertussis Incidence Rates by Public Health District, 2007

District	Cases	Rate*
I	9	3.0
II	4	1.2
III	49	20.7
IV	10	4.1
V	9	1.4
VI	170	70.0
VII	1	0.6
VIII	1	0.3
IX	3	0.3
State	**256**	**8.8**

***per 100,000 population**

The dates of onset of the 170 cases in District VI ranged from January 25, 2007 to December 8, 2007, and not all were epidemiologically linked. However, the first indications of a potential outbreak were noted in early June (week 23) with a rise in the number of reported cases that eventually peaked in August (weeks 31 through 35) with 67 cases, and continued through the end of October (week 44). Eighty-eight percent of all the District VI pertussis cases occurred in this time frame. In the weeks following, the reported number of pertussis cases decreased, with only 11 additional cases reported in November and December (Figure 68). At the request of MSDH, CDC assisted in the investigation of the outbreak.

Figure 68



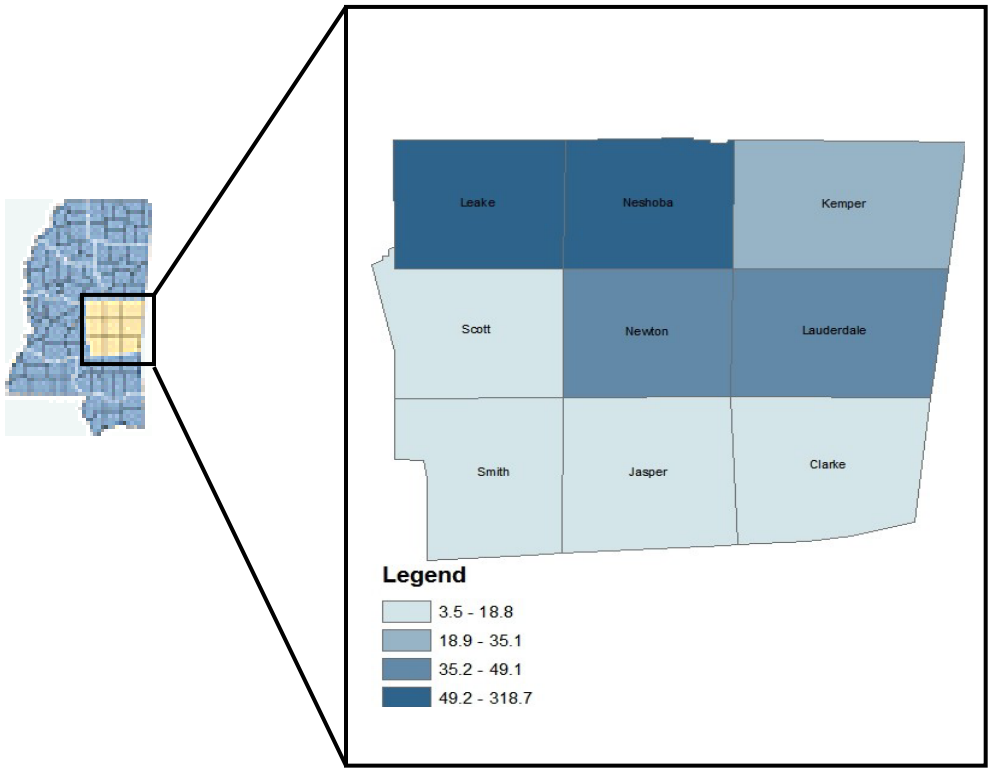
The outbreak centered primarily in Leake and Neshoba counties with 25 and 96 cases, respectively. These two counties alone accounted for 71% of the total District VI cases and 47% of the total number of reported pertussis cases in Mississippi in 2007 (Figure 69).

Racial and gender differences were noted in the District VI cases. Fifty-six percent of the cases were in Native Americans, 31% were white, 9% were black and 4% had an unknown race (Figure 70). Hispanic ethnicity was reported in one percent of the cases. Sixty-two percent were female.

Ages of the reported cases ranged from 3 days to 52 years. Similar to statewide incidence by age group, 64% percent of the District VI cases occurred in the age groups less than 10 years of age, with 23% reported in infants less than 12 months of age (Figure 71). Twelve cases were hospitalized with one death reported in a less than one month old infant. Ten of the twelve hospitalized patients were less than one month of age.

Figure 69

District VI Pertussis Cases and Rates by County, Mississippi, 2007



COUNTY	CASE COUNT	RATE*
Clarke	2	11.3
Jasper	3	16.5
Kemper	2	19.8
Lauderdale	27	35.2
Leake	25	109.8
Neshoba	96	318.7
Newton	11	49.1
Scott	1	3.5
Smith	3	18.8
TOTAL	**170**	**70.0**

*Rate per 100,000 population.

Figure 70

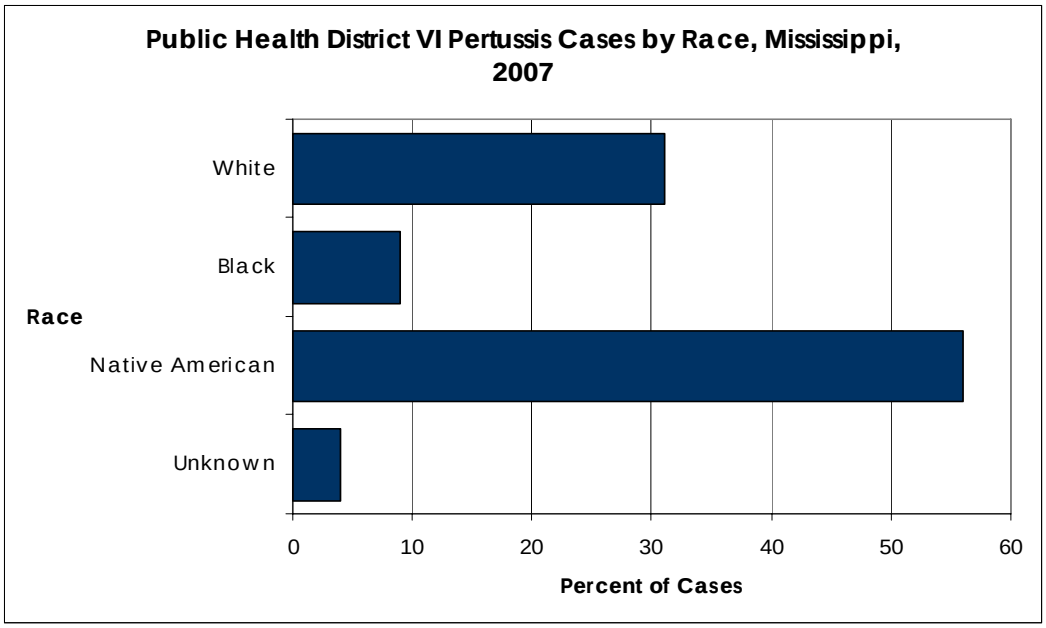
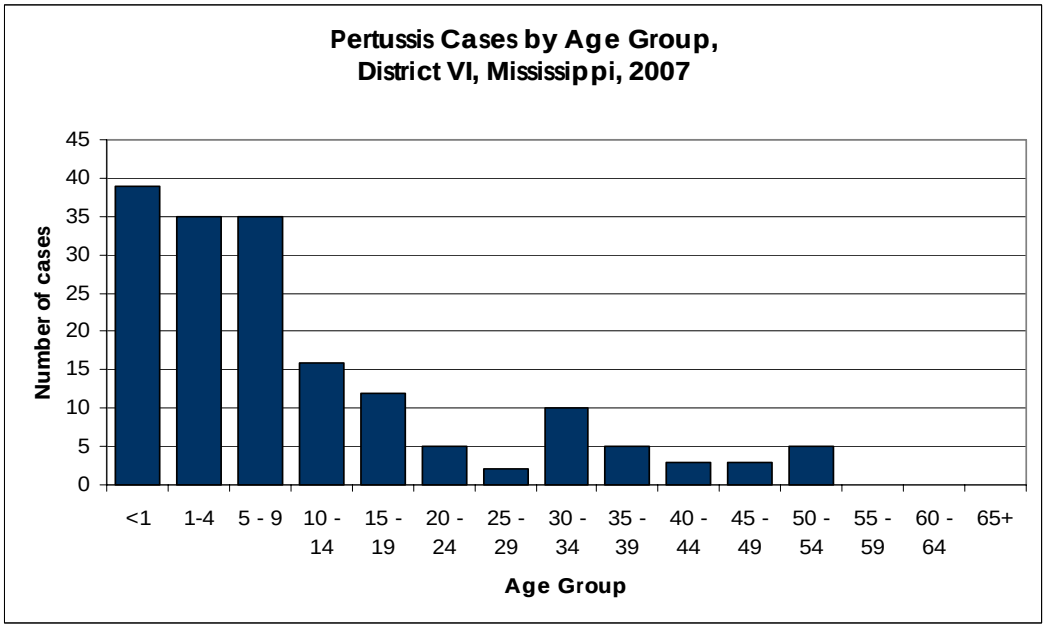


Figure 71



As part of the MSDH response, the medical community in the affected area was made aware of the increasing number of pertussis cases, and information was provided regarding how to best access the PHL for confirmatory pertussis PCR testing, as well as, the most current guidelines for post-exposure prophylaxis and use of vaccines.

MSDH nurses performed detailed investigations surrounding each reported case to identify at risk contacts and need for prophylactic antibiotics (erythromycin or azithromycin) and catch up vaccinations when required. Additional weekend

and after hour clinics were held in order to provide easier access to the community for vaccinations and prophylactic antibiotics in the identified contacts. At least 1,329 contacts were offered post-exposure prophylaxis during 2007 in district VI.

To increase the level of immunity in adolescents, Tdap, a recently approved pertussis containing vaccine for adolescents and adults, was offered on specified days to all middle and high school students in Leake and Neshoba counties.

Vaccination remains the most important component of pertussis prevention. Completion of the primary series with DTaP in a timely manner is paramount for the protection of children under 12 months of age who bear the burden of pertussis morbidity. To combat waning immunity in adolescents and adults, Tdap should be given to replace a single dose of Td.

This outbreak emphasizes the need for continued heightened awareness of pertussis in the primary care setting, the need for continued surveillance and rapid management of outbreaks, and the importance of both the primary and booster vaccinations as a means of reducing overall pertussis morbidity.

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Mississippi Reportable Disease Statistics
2007

		Public Health District									
		I	II	III	IV	V	VI	VII	VIII	IX	State Total
Sexually Transmitted Diseases	Primary & Secondary Syphilis	14	1	14	1	41	3	12	14	32	**132**
	Total Early Syphilis	30	10	39	7	175	7	28	42	79	**417**
	Gonorrhea	615	567	1073	653	2273	775	544	878	937	**8315**
	Chlamydia	2170	1747	2869	1792	5818	1853	1489	1993	1955	**21686**
	HIV Disease	56	43	49	24	219	34	50	65	71	**611**
Myco-bacterial Diseases	Pulmonary Tuberculosis (TB)	5	8	12	8	34	9	5	7	27	**115**
	Extrapulmonary TB	1	0	4	3	3	4	1	3	3	**22**
	Mycobacteria Other Than TB	29	24	14	12	54	43	7	22	41	**246**
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	**0**
	Pertussis	9	4	49	10	9	170	1	1	3	**256**
	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	1	**2**
	Rubella	0	0	0	0	0	0	0	0	0	**0**
	Pneumococcal Disease, invasive	10	12	2	4	25	5	3	4	10	**75**
	Varicella	0	0	1	0	0	0	0	0	2	**3**
Viral Hep-atitis	Hepatitis A (acute)	1	0	0	0	1	1	0	4	1	**8**
	Hepatitis B (acute)	1	3	7	3	5	7	4	1	11	**42**
Enteric Diseases	Salmonellosis	83	153	29	82	331	99	75	107	90	**1049**
	Shigellosis	12	39	41	50	844	75	66	60	239	**1426**
	Campylobacter Disease	16	14	5	4	29	13	10	19	18	**128**
	E. coli O157:H7/HUS	0	1	0	1	3	2	0	0	0	**7**
	Cryptosporidiosis	8	5	7	3	45	3	1	3	28	**103**
	Listeriosis	0	0	0	0	0	0	1	1	2	**4**
	Vibrio Disease	1	0	0	0	0	0	0	0	7	**8**
Other Conditions of Public Health Significance	Invasive Meningococcal Disease	2	0	1	1	1	0	1	2	4	**12**
	Invasive *H. influenzae* b, Disease	0	0	0	0	0	0	0	0	0	**0**
	RMSF	3	0	1	3	3	5	3	4	0	**22**
	West Nile Virus	4	1	12	2	57	18	10	22	10	**136**
	Lyme Disease	0	0	0	1	1	0	0	0	0	**2**
	Animal Rabies (bats)	0	0	1	0	2	0	0	0	0	**3**
	Eastern equine encephalitis Virus	0	0	0	0	0	0	0	0	0	**0**
	LaCrosse Virus	0	0	0	0	0	0	0	0	0	**0**
	Saint Louis encephalitis Virus	0	0	0	0	2	0	0	0	0	**2**

Mississippi
Provisional Reportable Disease Statistics
October 2008

Figures for the current month are provisional

		Public Health District									State Totals*			
		I	II	III	IV	V	VI	VII	VIII	IX	Oct 2008	Oct 2007	YTD 2008	YTD 2007
Sexually Transmitted Diseases	**Primary & Secondary Syphilis**	2	1	0	1	8	1	1	8	5	27	12	149	100
	Total Early Syphilis	3	5	1	2	14	1	1	14	8	49	25	327	326
	Gonorrhea	60	58	131	52	212	88	51	89	59	800	706	6,210	7,054
	Chlamydia	261	235	324	155	623	194	147	207	213	2,359	1,805	17,305	18,487
	HIV Disease	2	1	7	4	29	6	1	6	13	69	48	511	501
Myco-bacterial Diseases	**Pulmonary Tuberculosis (TB)**	1	0	0	1	11	1	0	0	2	16	9	73	91
	Extrapulmonary TB	0	0	0	1	0	0	0	1	1	3	2	16	10
	Mycobacteria Other Than TB	3	1	2	3	5	1	1	2	8	26	15	249	202
Vaccine Preventable Diseases	**Diphtheria**	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pertussis	0	0	0	1	4	0	0	0	0	5	22	86	229
	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	1	0	2
Viral Hep-atitis	**Hepatitis A (acute)**	0	0	0	0	0	0	0	0	0	0	0	4	8
	Hepatitis B (acute)	0	1	0	0	2	0	0	0	1	4	5	40	38
Enteric Diseases	**Salmonellosis**	0	10	1	3	17	5	4	3	4	47	185	956	927
	Shigellosis	2	2	0	0	1	0	1	0	0	6	439	284	1001
	Campylobacter Disease	0	0	0	0	0	0	0	2	1	3	6	100	114
	***E. coli* O157:H7/HUS**	0	0	0	0	0	0	0	0	0	0	0	4	6
Other Conditions of Public Health Significance	**Invasive Meningococcal Disease**	0	0	0	0	0	0	0	0	2	2	0	11	10
	Invasive *H. influenzae* b Disease	0	0	0	0	0	0	0	0	0	0	0	2	0
	RMSF	0	0	0	0	0	0	0	0	0	0	1	7	17
	West Nile Virus	0	0	0	0	1	0	0	1	0	2	13	99	130
	Lyme Disease	0	0	0	0	0	0	0	0	0	0	0	1	2
	Animal Rabies (bats)	0	0	0	0	0	0	0	0	0	0	0	2	2

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

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