# DESCRIPTIVE EPIDEMIOLOGY

# OF

# REPORTABLE DISEASES

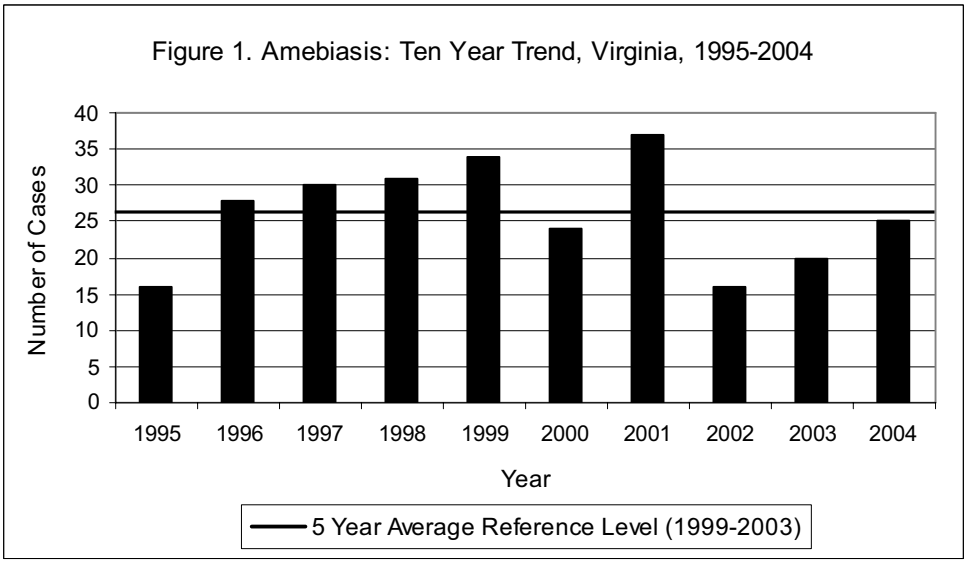
## Acquired Immunodeficiency Syndrome (AIDS)

See Human Immunodeficiency Virus (HIV)

## Amebiasis

Amebiasis is a parasitic infection transmitted by food or water contaminated by fecal matter containing *Entameoba histolytica*. Infection with amebic cysts can be asymptomatic. When infection causes disease, symptoms may include severe diarrhea, chills, or mild to moderate abdominal cramps, coupled with periods of remission. Occasionally, bloody diarrhea and fever may occur. Invasive amebiasis is most often found in young adults and is very rare in children under two years of age.

There were 25 cases of amebiasis reported in Virginia in 2004. Although this is a 5% decrease from the five year average of 26.2 cases per year, it marks the third year in a row of increasing numbers of cases (Figure 1).




Twenty-three cases (92%) were reported in persons 20 years or older. The 30-39 year age group had the highest incidence rate with 0.6 per 100,000. No cases occurred in infants. Forty percent of cases had no race reported. Among cases with a reported race, the black population had the highest infection rate (0.5 per 100,000). Most cases (16) occurred in the northern region, which had an incidence rate of 0.8 per 100,000. This was followed by the northwest region (5 cases, 0.4 per 100,000). The other regions reported few cases and had incidence rates of 0.1 to 0.2 per 100,000.

## Anthrax

Anthrax is caused by the spore-forming bacteria *Bacillus anthracis*. There are three main types of anthrax infection: cutaneous, from direct contact with spores; inhalation, from breathing in aerosolized spores; and gastrointestinal, from ingestion of undercooked meat of infected animals. Anthrax is rarely transmissible from person to person. The incubation period for anthrax is usually 1-7 days, although symptoms of inhalation anthrax can take up to two months to develop. In most industrialized countries cases are sporadic and occur in persons working with livestock or processing hides. However, anthrax may also be spread through intentional release of spores. It is included in Centers for Disease Control and Prevention's (CDC) list of category A bioterrorism agents (i.e., it can be easily disseminated or transmitted from person to person; has a high mortality rate and has the potential for major public health impact; might cause public panic and social disruption; and requires special action for public health preparedness).

No cases of anthrax have been reported in Virginia since 2001, when two Virginia residents were reported with inhalation anthrax due to an intentional release of *Bacillus anthracis* spores through the US postal service. Both individuals were exposed at their work place and both survived. These were the first reported cases of anthrax in Virginia since 1970.

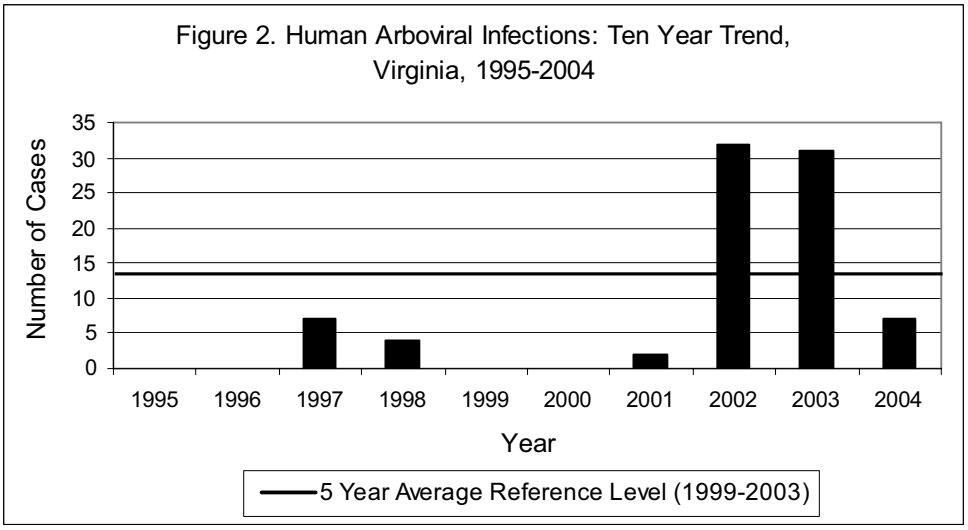
## Arboviral Infection

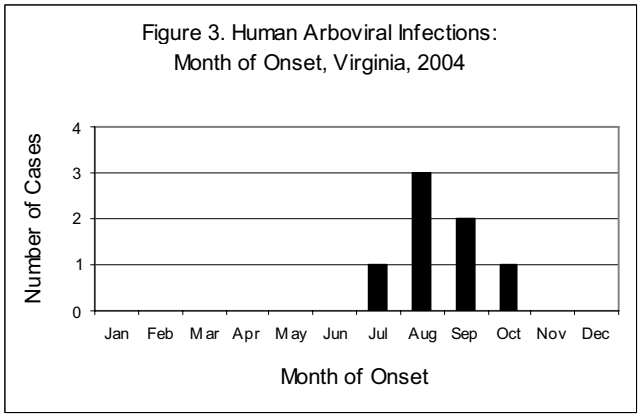
Arboviral (arbo = arthropod-borne) infections are caused by a number of different viruses that are transmitted by arthropods such as mosquitoes and ticks. The common arboviral infections that occur in Virginia are all transmitted by mosquitoes and therefore generally occur during warm weather months when mosquitoes are active. Mosquitoes usually become infected by feeding on infected animals (often wild birds) with high levels of virus in the blood. Humans and domestic animals can develop clinical illness from arboviral infections, but usually do not have high enough levels of virus in the blood to infect biting mosquitoes, making them incidental hosts that do not contribute to the transmission cycle. The severity and duration of arbovirus infection can range from no symptoms to death, depending on the particular virus and characteristics of the infected person. Infection with the arboviruses found in Virginia can cause nervous system disease, such as encephalitis (inflammation of the brain) or meningitis (inflammation of the lining of the brain and spinal cord). Eastern equine encephalitis (EEE) is more likely to affect children and older people and has a high death rate; West Nile virus (WNV) infections are more likely to cause severe disease in older persons, but the majority of infections result in no symptoms. LaCrosse encephalitis (LAC) is usually seen in children in the western part of the state. St. Louis encephalitis (SLE) is reported infrequently and usually from urban areas.

### Human

Seven cases of human arboviral infection were reported in 2004. This is a more than 77% decrease from the 31 cases reported in 2003 and the 32 cases reported in 2002 (Figure 2). The elevated levels in 2002 and 2003 were largely attributable to the emergence of WNV in Virginia. During 2004, five (71%) of the arboviral cases were due to West Nile Virus (WNV) infection

and two (29%) were due to LaCrosse encephalitis (LAC). This is a dramatic drop in WNV cases from the 29 reported in 2002 and 26 reported in 2003. The low numbers of WNV infections reported in Virginia during 2004 may be due to several factors: more summer rainfall (which can flood out mosquito breeding grounds); below average temperatures (which can decrease the mosquito's breeding rates); better mosquito control efforts; increased use of personal protection measures to ward off mosquito bites; and a decreased level of suspicion for WNV infections by physicians, leading to less testing, and therefore, less reporting of WNV cases.




The 1-9 and 50 year and older age groups had the same infection rate (0.2 per 100,000). The 40-49 year age group had a slightly lower rate of 0.1 per 100,000; no cases were reported in the other age groups. There was no difference in infection rate between the white and black populations (0.1 per 100,000). Likewise, females and males had the same infection rate (0.1 per 100,000, each). This is a change from previous years in which males had greater arboviral infection rates than females. At least one case occurred in each region and each region had rates between 0.1 and 0.2 per 100,000. Arboviral infections, especially WNV, increase during the summer months and into the fall when people are more commonly exposed to infected mosquitoes. This is a national trend which is reflected in Virginia (Figure 3).

**Animal**

Zoonotic surveillance for WNV is conducted each year on mosquitoes, sentinel chickens, birds, and horses. Surveillance for Eastern Equine Encephalitis (EEE) is also conducted on mosquitoes, sentinel chickens, and horses, but not on wild birds. During 2004, approximately

310,000 mosquitoes were tested and 430 mosquito pools (trappings of many mosquitoes) were positive for WNV, whereas 52 were positive for EEE. In 2004, 15 horses were found to have WNV infection and 5 were found to have EEE. There were a total of 31 sentinel chicken flocks tested by serology every other week from May to October. Approximately 90 sentinel chickens were tested through the season and 29 were positive for WNV and 16 were positive for EEE. For wild birds, reverse transcriptase polymerase chain reaction (RT-PCR) testing of bird tissues or swab samples indicated 26 WNV positive wild birds out of 190 tested.

## Botulism

### Foodborne

*Clostridium botulinum* is a spore-forming organism that, under the right conditions, can produce a potent neurotoxin. Foodborne botulism occurs when *Clostridium botulinum* is allowed to grow and produce toxin in food which is then eaten without sufficient heating to inactivate the toxin. Consumption of contaminated food typically results in severe illness. The neurotoxin produced by this organism can cause fatigue, weakness, vertigo, and sometimes diarrhea and vomiting. It also causes descending, flaccid paralysis, which can lead to cessation of breathing and death unless respiration is aided. Poisonings are often due to improperly home-canned fruits and vegetables. The toxin is rarely found in meats. Boiling food for 10 minutes will destroy the toxin, but much higher temperatures are required to kill the spores.

No cases of foodborne botulism were reported in Virginia during 2004. The last reported case occurred in 2002. It occurred in an infant but was determined to be foodborne botulism. *Clostridium botulinum* toxin type A was not found in a stool specimen, but was found in home-canned baby food.

### Infant

Infant botulism is also called intestinal botulism. It is a rare disease affecting children younger than one year of age who ingest *Clostridium botulinum* spores. In very young children, these spores may germinate in the colon to produce the bacteria, which secrete the disease-causing toxin. Spore ingestion does not usually cause disease in adults or children older than 12 months because natural defenses prevent germination and growth of the spores. Symptoms include weakness, loss of appetite, an altered cry and loss of head control. Honey has been associated with infant botulism, which is why parents are warned not to feed young children honey.

Three case of infant botulism were reported in Virginia during 2004. Two cases were reported in the white population and one case in the black population. Two cases were female and one was male. The cases occurred in the eastern (2 cases) and southwest (1 case) regions and had onset dates in the months of February, April, and August.

## Brucellosis

Brucellosis is a bacterial infection that can cause intermittent and irregular fever, headache, chills, sweating, muscle pain and depression. It can also cause long-term bone and joint problems. Though the case-fatality rate is only 2% in untreated brucellosis, long-term disability may result. Natural transmission of brucellosis occurs by contact with infected animal tissue, blood, or urine through breaks in the skin. It is also transmitted through ingestion of raw milk and cheese from infected cattle. There is no documented person to person transmission of brucellosis. Of note, brucellosis is included in the Centers for Disease Control and Prevention's (CDC) list of category B bioterrorism agents (i.e., organisms that may be relatively easy to disseminate, may cause moderate injury and/or death, and may need enhanced surveillance for detection).

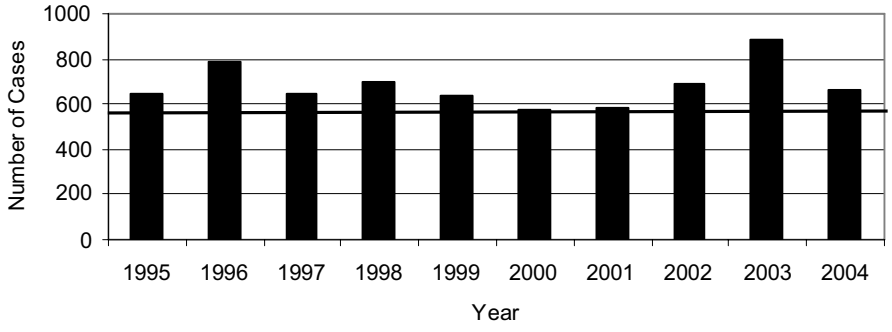
One case of brucellosis was reported in 2004. The case was a female in the 40-49 year age group from the northern region. The woman developed symptoms of the disease while traveling in central Asia.

## Campylobacteriosis

*Campylobacter* enteritis is a bacterial disease characterized by diarrhea (frequently bloody), malaise, abdominal pain, fever, nausea and/or vomiting. It is transmitted via contaminated food or water, including undercooked meat and raw milk. Contact with infected animals or infected people may also cause disease. Campylobacter affects all age groups and accounts for 5-14% of diarrheal cases worldwide. Most infections are self-limiting, but treatment with antibiotics has been shown to decrease the length of time infected individuals shed the bacteria.

There were 668 cases of campylobacteriosis reported in Virginia during 2004. This is similar to the five year average of 672.4 cases per year, but a 24.3% decrease from the 882 cases reported in 2003 (Figure 4).

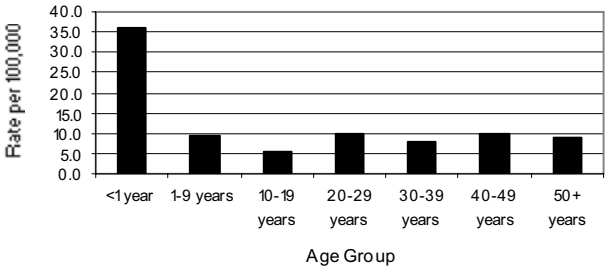
Figure 4. Campylobacteriosis: Ten Year Trend, Virginia, 1995-2004



The highest rate of infection occurred in infants (35.9 per 100,000). The lowest infection rate was reported in the 10-19 year age group (5.3 per 100,000). The other age groups had similar infection rates (between 8.2 and 9.7 per 100,000) (Figure 5). Race was missing in 28% of reported campylobacteriosis cases. Among cases for which race was reported, the white population had an infection rate more than three times that of the black population (7.5 versus 2.1 per 100,000). The other race category had a rate of 0.8 per 100,000.

Males had a higher rate (10.0 per 100,000) than females (7.6 per 100,000). By region, the southwest and northwest regions had similar rates of this disease (12.0 and 12.9 per 100,000, respectively). The other regions reported rates between 6.7 and 8.0 per 100,000. Cases occurred throughout the year, but most cases (33%) had reported onset dates during the summer months of July to September.

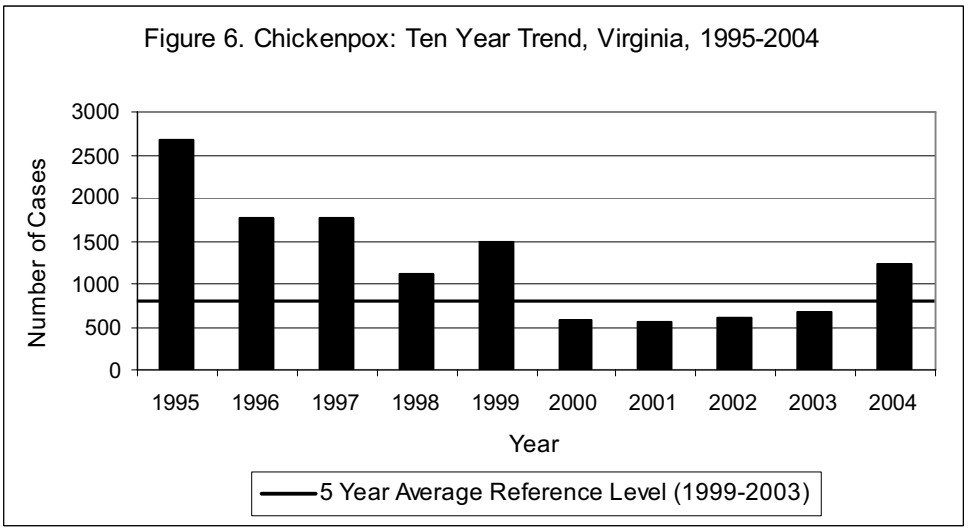
Figure 5. Campylobacteriosis: Rate by Age Group, Virginia, 2004




## Chickenpox (Varicella)

Chickenpox is a viral infection causing acute onset of mild fever and skin eruptions. The skin lesions can appear on the scalp, axilla, and mucous membrane of the mouth and respiratory tract. The disease is usually mild in children but can cause more serious illness in adults and infants, including pneumonia, secondary bacterial infections, or encephalitis. Infection usually confers long-time immunity and second attacks rarely occur. Transmission is person to person through droplet or airborne spread of respiratory secretions from an infected person. The disease is highly transmissible; susceptible household contacts have an 80%-90% risk of becoming infected.

There were 1,240 cases of chickenpox reported in Virginia during 2004. This is 82% increase from 2003 and a 58% increase in the five year average of 786.4 cases per year (Figure 6). The majority of cases were reported in children less than 20 years of age. The 1-9 year age group had the highest infection rate (92.9 per 100,000). This was followed by the less than 1 year age group (54.9 per 100,000) and the 10-19 year age group (26.4 per 100,000). The other age groups had between 0.1 cases per 100,000 (50 years and older age group) and 3.6 cases per 100,000 (20-29 year age group). The white population had a higher infection rate than the black population (15.2 versus 9.8 per 100,000, respectively).



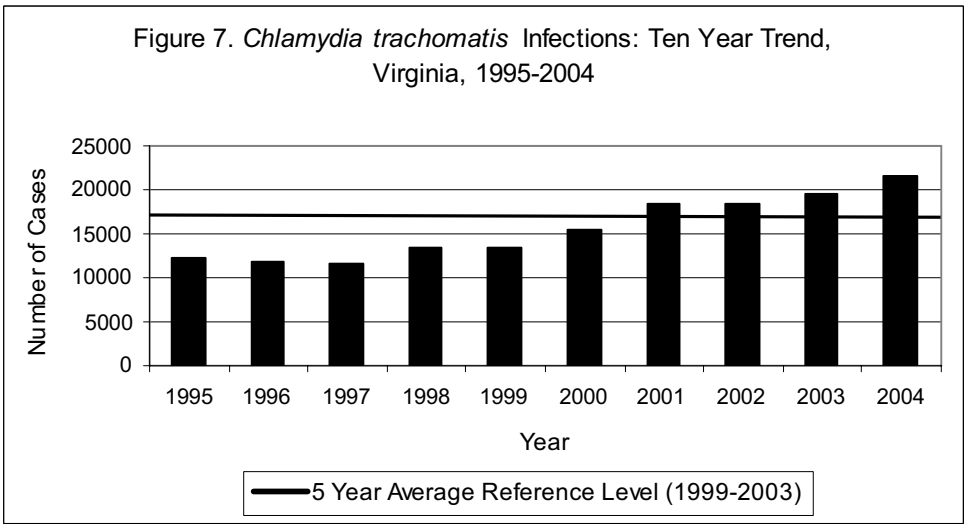

The female and male populations had similar infection rates. The eastern region reported the highest infection rate (20.0 per 100,000). This was followed closely by the southwest and central regions with 19.1 and 19.3 cases per 100,000, respectively. Cases occurred throughout the year with the most cases (34%) reported during the second quarter.

Vaccination information was collected for 307 cases which were reported during the first quarter of 2004. Of these, 144 (47%) were immunized; 89 (29%) were not; and for 74 (24%), the status was unknown. Of the 163 who were not immunized or whose status was not know, 8 (5%) reported a history of previous chickenpox disease. Three chickenpox outbreaks were reported in 2004 (Information on these outbreaks is presented in Table 11 on page 54).

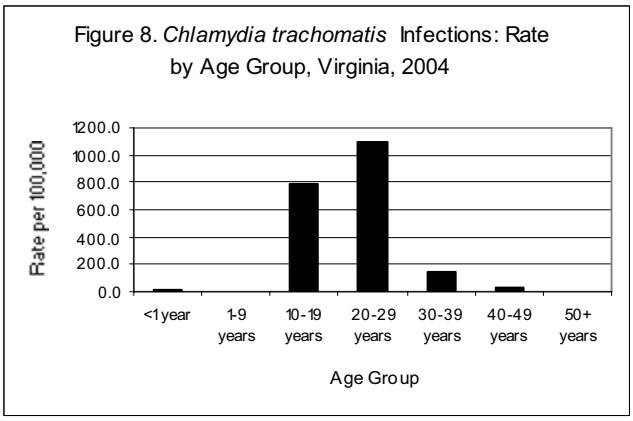
## ***Chlamydia trachomatis* Infection**

Chlamydiae bacteria are found in two different subtypes: *Chlamydia trachomatis,* which causes genital infections, trachoma (eye infection), chlamydial conjunctivitis, and infant pneumonia, and *C. pneumoniae*, which causes respiratory disease. Sexually transmitted *C. trachomatis* infection is the most common bacterial sexually transmitted disease (STD) reported in the United States. Symptoms in men include urethritis, with discharge, itching, and burning upon urination. Research suggests that 1%-25% of sexually active men have asymptomatic *C. trachomatis* infections. In women the disease manifests itself as cervical inflammation with discharge, edema, and easily induced vaginal bleeding. Long-term sequelae include infertility, ectopic pregnancy and chronic pelvic pain. Approximately 70% of infected women are asymptomatic. Infants who are born to infected mothers may develop chlamydial infections in their eyes and respiratory tracts.

During 2004, a total of 21,635 cases of *Chlamydia trachomatis* infections were reported in Virginia. Reported cases of this disease have been steadily increasing every year since 1997, and the number of cases reported in 2004 is a 27% increase over the five year mean of 17,014.4 cases per year (Figure 7).




Even these high numbers are most likely an underestimate. Reasons for this include 1) many cases are asymptomatic, 2) those with other infections (e.g. gonorrhea) who are presumptively treated for chlamydial infections are not counted and 3) screening has been limited to high-risk females and male partners of infected women. This testing pattern is also reflected in the difference in the infection rate for females and males. In Virginia the reported infection rate of *C. trachomatis* in females was 437.6 per 100,000 compared to 136.8 per 100,000 in males.




Differences in rates by age group are also apparent (Figure 8). Similar to previous years, the highest infection rate was reported in the 20-29 year age group (1,097.9 per 100,000), followed by the 10-19 year age group (788.4 per 100,000). Ten cases were reported in the less than 1 year age group (10.0 per 100,000). Eight of the 10 infants were confirmed to have *C. trachomatis* eye infections (see Ophthalmia Neonatorum section). The infection rate in the black population was more than nine times the rate in the white population (826.1 versus 89.8 per 100,000). The other race category had the second highest rate, with 93.6 per 100,000. The eastern and central regions reported the highest infection rates (460.6 and 418.8 per 100,000, respectively). The other regions had half as many cases with rates between 134.2 per 100,000 and 231.1 per 100,000. Cases occurred throughout the year.

## Creutzfeldt-Jakob Disease

Creutzfeldt-Jakob disease (CJD) is a rare brain disorder that may cause forgetfulness, behavior changes, and loss of coordination. Eventually, infected individuals lose their ability to walk, talk and take care of themselves; most die within a year of symptom onset. CJD is believed to be caused by a protein called a prion, which can destroy normal brain cells. About 85% of people get CJD for no known reason while about 5% to 15% of cases are due to heredity or exposure to materials contaminated with the prion. There is a form called variant CJD (vCJD), which is thought to be due to the consumption of beef from animals with bovine spongiform encephalopathy (BSE). The median age at death for vCJD is 28, while the median age at death for the other types is typically greater than 60 years of age. In Virginia, CJD is reportable when it occurs in persons under 55 years of age.

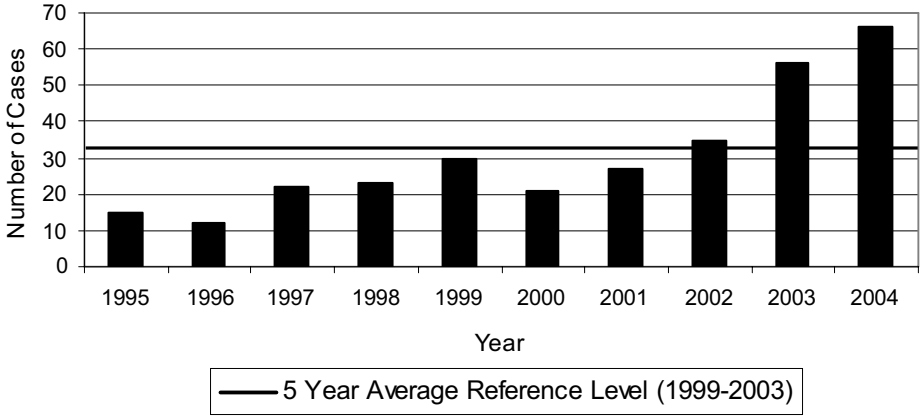
No cases of Creutzfeldt-Jakob disease in persons less than 55 years of age were reported in Virginia during 2004. The last reported case occurred in 2002.

## Cryptosporidiosis

Cryptosporidiosis is parasitic disease that causes profuse watery diarrhea with cramping and abdominal pain. The diarrhea may be preceded by anorexia and vomiting in children. Cryptosporidiosis can also be asymptomatic. Transmission occurs via the fecal-oral route and can include person to person, animal-to-person, foodborne and waterborne transmission. *Cryptosporidium* oocytes can remain infectious for 2-6 months after being excreted from infected individuals. The oocytes are very resistant to chemicals used to purify drinking water. People who have a decreased ability to fight off infection are at greater risk for more serious disease.

Sixty-six cases of cryptosporidiosis were reported in Virginia during 2004. This is a 18% increase in cases from 2003 and a 95% increase in cases from the five year average of 33.8 cases per year (Figure 9). Cases of cryptosporidiosis have been increasing since 2000. The highest

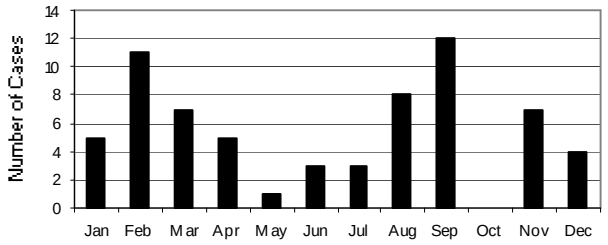
Figure 9. Cryptosporidiosis: Ten Year Trend, Virginia, 1995-2004



infection rate occurred among infants (2 cases, 2.0 per 100,000). The most cases (15) and the second highest infection rate (1.3 per 100,000) was reported in the 40-49 year age group, followed by the 1-9 year age group (1.1 per 100,000). The other age groups had rates between 0.7 and 1.0 per 100,000. Twenty-four percent of cases had no race reported, but among those with a reported race, the black and white populations had similar rates of infection (0.5 and 0.7 per 100,000, respectively), and the other race category had an infection rate of 0.1 per 100,000.

Females had a slightly higher rate of infection (1.0 per 100,000) than males (0.7 per 100,000). By region, the highest infection rate was reported from the southwest (1.8 per 100,000), followed by the northwest (1.3 per 100,000). The other regions had rates between 0.4 and 0.8 per 100,000. A bimodal seasonal trend was observed in onset of cases which occurred mostly during the first and third quarters of the year (34.8% of cases in each quarter) (Figure 10).

Figure 10. Cryptosporidiosis: Month of Onset, Virginia, 2004




## Cyclosporiasis

Cyclosporiasis is a diarrheal disease caused by the protozoa *Cyclospora cayetanensis*. Symptoms include watery diarrhea, nausea, abdominal cramps, anorexia, fatigue and weight loss; it rarely causes fever. Water- or food-borne transmission can occur, usually by drinking or swimming in contaminated water or eating fresh fruits and vegetables contaminated with the organism.

One case of cyclosporiasis was reported in the 50 year and older age group from the northern region. This is a decrease from the three cases reported in 2003.

## Diphtheria

Diphtheria is an acute bacterial infection caused by the organism *Corynebacterium diphtheriae.* The bacteria release a toxin that is responsible for tissue destruction and membrane formation at the site of infection. Symptoms include sore throat, anorexia and nasal discharge. More severe cases can include swelling of the neck and airway passages. The effects of the toxin can also cause congestive heart failure within one week of onset. The overall case-fatality rate for diphtheria is 5%-10%, with higher death rates in young children and those over 40 years of age. Diphtheria is vaccine preventable; however antibody levels wane over time making booster doses necessary every 10 years beginning at age 11-12.

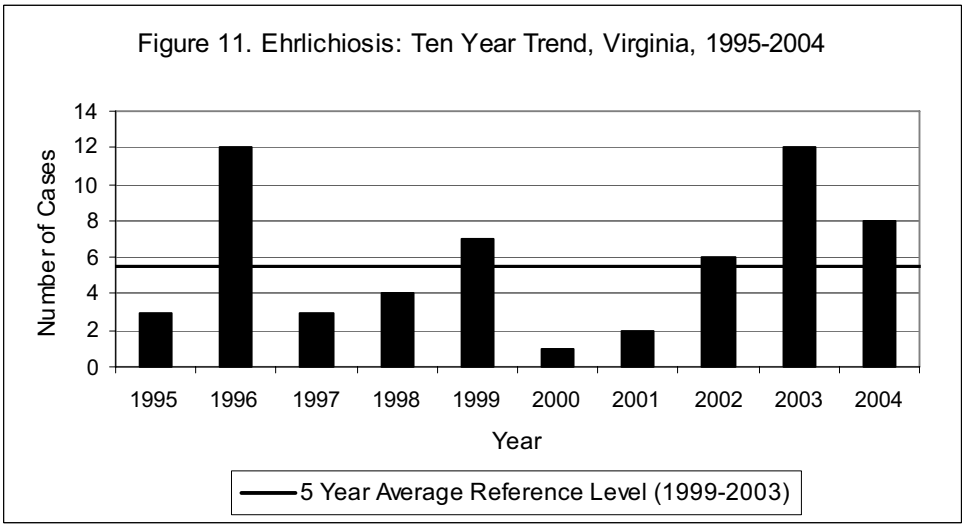
In Virginia, no cases of diphtheria were reported during 2004. The last reported case in Virginia occurred in 1989. Nationally, between 0-5 cases of diphtheria are reported each year.

## Ehrlichiosis

*Ehrlichia* infections are transmitted by ticks. Two different types of ehrlichiosis occur in Virginia, each caused by a different kind of bacteria. *Ehrlichia chaffeensis* causes human monocytotropic ehrlichiosis (HME) and *Anaplasma phagocytophilum* causes human granulocytotropic ehrlichiosis (HGE). HME is transmitted by lone star ticks whereas HGE is transmitted by deer ticks. Symptoms are usually non-specific but commonly include fever, headache, nausea, anorexia, vomiting, and muscle pain. Meningoencephalitis develops in 20% of patients with HME, but is very rare with HGE.

Eight cases of ehrlichiosis were reported in Virginia during 2004. This is a 33% decrease from the 12 cases reported in 2003, but a 43% increase from the five year average of 5.6 cases per year (Figure 11).

Figure 11. Ehrlichiosis: Ten Year Trend, Virginia, 1995-2004




The 40-49 year old age group had the highest infection rate (0.4 per 100,000). One case each was reported in the 1-9, 30-39, and 50 year and older age groups. No cases were reported from the other age groups. All cases occurred in the white population and males had a similar infection rate (0.2 per 100,000) to females (0.1 per 100,000). The northwest and eastern regions each had rates of 0.2 per 100.000. The other regions had rates between 0 and 0.1 per 100,000. Half of the cases occurred during the months of April-June. No cases occurred during the months of October-December.

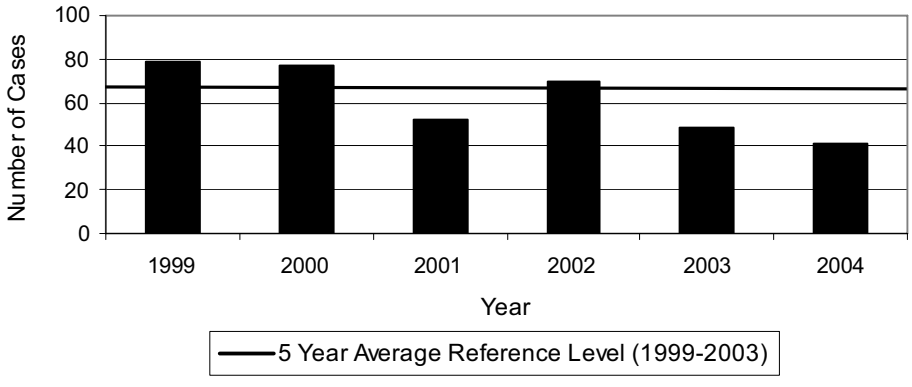
## *Escherichia coli* O157:H7 Infection

Six major strains of *Escherichia coli* cause diarrhea; however, only the enterohemorrhagic strains are reportable in Virginia. Enterohemorrhagic *E. coli* produce Shiga toxins (potent cell toxins) by which they can be identified. *E. coli* O157:H7 is the most common enterohemorrhagic strain in the United States. Symptoms include non-bloody to completely bloody diarrhea and abdominal cramps with little or no fever. Transmission occurs through eating contaminated ground beef, cheese, sprouts, lettuce, salami, and other contaminated food. Contact with cattle is

a risk factor, as well as swimming in contaminated lakes or pools, or drinking improperly chlorinated water, unpasteurized milk, or juices. *E. coli* O157:H7 infection can cause serious complications, including hemolytic uremic syndrome (HUS), especially in young children.

*E. coli* O157:H7 infection has been a reportable condition in Virginia since 1999. Forty-one cases of *E. coli* O157:H7 were reported in Virginia during 2004. This is 16% decrease from the five year average of 65.4 cases a year and follows a steady decrease since 2002 (Figure 12).

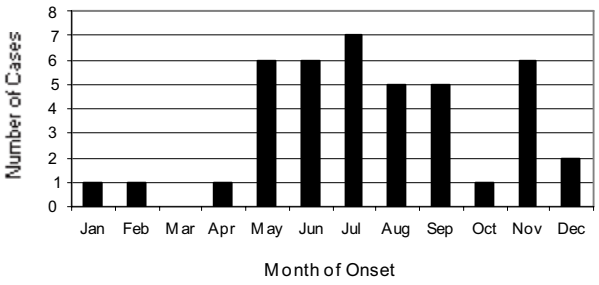
Figure 12. *Escherichia coli* O157:H7 Infections: Six Year Trend, Virginia, 1999-2004




The highest infection rates were in children less than 10 years old; 3.0 per 100,000 in infants and 2.2 per 100,000 in the 1-9 year age group. The other age groups had infection rates between 0.2 and 0.5 per 100,000. Thirty-four percent of cases did not have a reported race; however, among those with a race reported the majority of cases (25 cases, 0.5 per 100,000) were in the white population. The black population had an infection rate of 0.1 per 100,000. Females and males had similar rates of infection (0.6 and 0.5 per 100,000, respectively).

The southwest and northern regions reported the highest infection rates (1.0 and 0.7 per 100,000, respectively). The other regions reported rates of 0.2 to 0.5 per 100,000. Most cases (73%) occurred during summer months (Figure 13).

Figure 13. *Escherichia coli* O157:H7 Infections: Month of Onset, Virginia, 2004

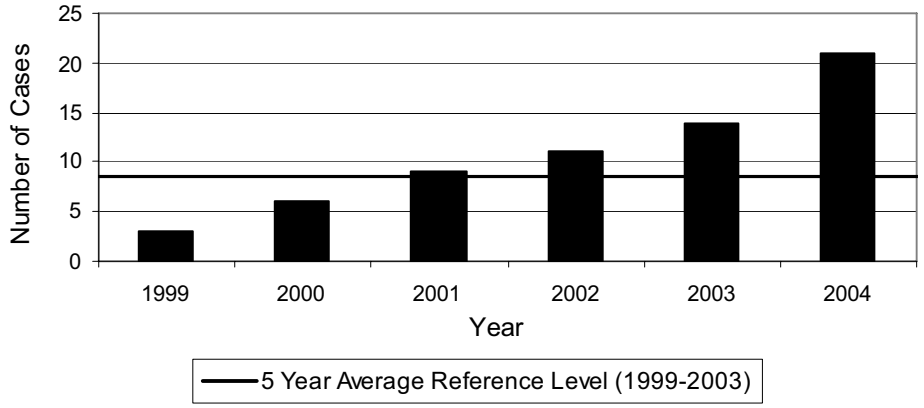


## Other Enterohemorrhagic *Escherichia coli* Infections

*E. coli* non-O157:H7 infections include enterohemorrhagic *E. coli* that are Shiga toxin positive and are not the O157:H7 serotype. The symptoms and mode of transmission for *E. coli* non-O157:H7 infections are the same as those for *E. coli* O157:H7.

There were 21 cases of other enterohemorrhagic *E. coli* infections reported in Virginia during 2004. This is one and a half times the number of cases reported in 2003 and continues the trend of increasing numbers of reports every year since *E. coli* non-O157:H7 cases became reportable in 1999 (Figure 14).

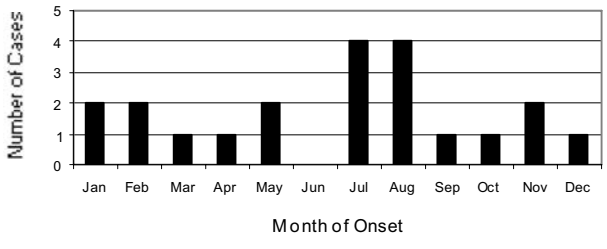
Figure 14. Other Enterohemorrhagic *Escherichia coli* Infections: Six Year Trend, Virgnia, 1999-2004




The highest infection rate was reported in infants (2 cases, 2.0 per 100,000), followed by the 20-29 year age group (0.6 per 100,000). The other age groups had rates between 0.1 and 0.3 per 100,000. Many cases (33%) did not have a reported race. Among those cases with a race reported, the black and white populations had similar infection rates (0.3 and 0.2 per 100,000, respectively).

No difference in infection rate was reported between females and males. The northwest and northern regions reported similar infection rates (0.4 and 0.5 per 100,000, respectively). The other regions had rates between 0.1 and 0.2 per 100,000. The highest proportion of cases (43%) had onset dates between July and September (Figure 15).

Figure 15. Other Enterohemorrhagic *Escherichia coli* Infections: Month of Onset, Virginia, 2004

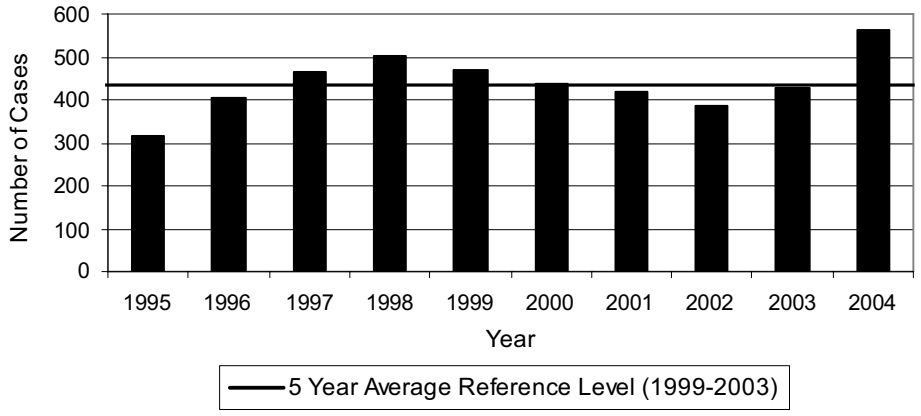


## Giardiasis

Giardiasis is a parasitic infection causing diarrhea, abdominal pain, bloating, vomiting, and nausea, although it can be asymptomatic. *Giardia* is found in the intestines of infected humans and animals, as well as in soil and water, and on surfaces contaminated with feces from infected humans or animals. While the principal mode of spread is probably hand to mouth transfer of *Giardia* cysts from feces of an infected individual, other modes of transmission include eating uncooked meat and drinking contaminated water. Persons most likely to get giardiasis include children in daycare; childcare workers; parents of children; international travelers; hikers and backpackers who drink untreated water; swimmers who swallow water from lakes, rivers, or streams; and those who drink from shallow wells.

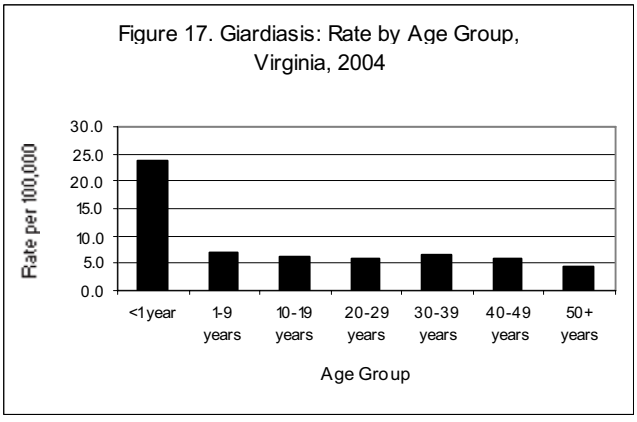
There were 563 cases of giardiasis reported in Virginia during 2004. This is a 32% increase from the 426 cases reported in 2003 and the five year average of 427.4 cases per year (Figure 16).

Figure 16. Giardiasis: Ten Year Trend, Virgnia, 1995-2004




The highest infection rate was in the less than one year age group (23.9 per 100,000), followed by the 1-9 year age group with a rate of 20.7 per 100,000 (Figure 17). The other age groups had rates between 5.5 and 6.8 per 100,000, except the 50 year and older age group which had a rate of 4.1 per 100,000. Almost one-third of cases had no reported race, but among those with a reported race, the black population had an infection rate more than three times that of the white population (11.3 versus 3.0 per 100,000). Cases were also reported among the other race category (52 cases, 1.1 per 100,000).

Figure 17. Giardiasis: Rate by Age Group, Virginia, 2004



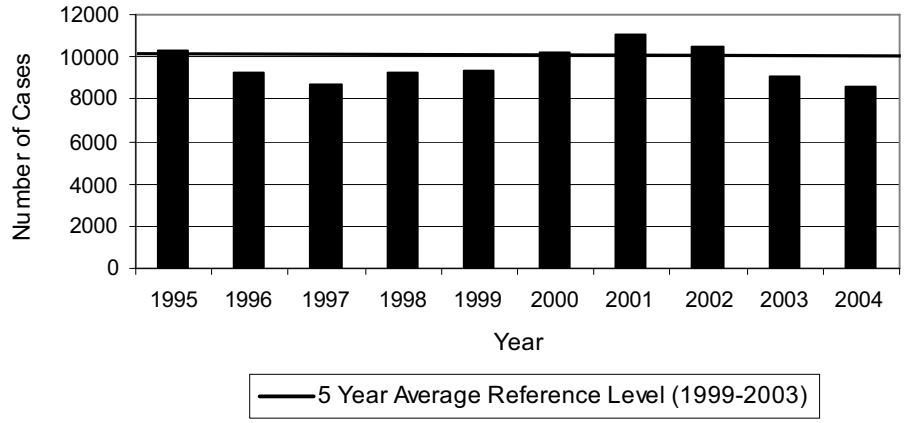
A higher rate was seen in the male population (8.0 per 100,000) than the female population (6.6 per 100,000). The southwest, northern, and northwest regions had similar infection rates of 8.3, 8.6, and 9.5 per 100,000, respectively. The central (7.3 per 100,000) and eastern (4.8 per 100,000) regions followed. Cases occurred throughout the year, but the largest proportion of cases (35%) had onset during the third quarter.

## Gonorrhea

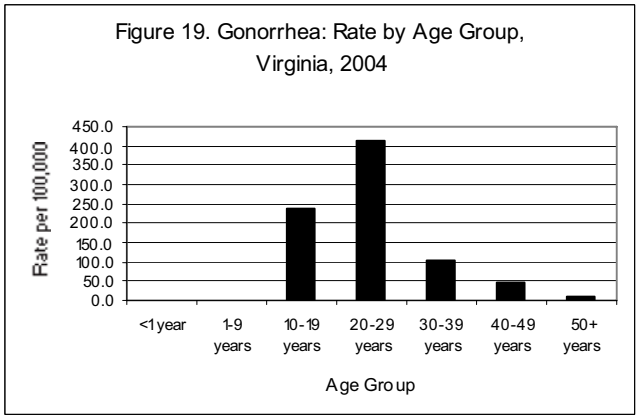
Gonorrhea is a sexually transmitted bacterial disease characterized in males by acute purulent discharge from the urethra. In females infection is usually asymptomatic, though it may cause vaginal discharge or bleeding after intercourse. In a small number of females the infection invades the uterus, increasing the risk of infertility or ectopic pregnancy. The mouth, throat, eyes, and anus may be colonized. Transmission occurs through direct contact with infected areas. The CDC estimates approximately 700,000 cases of gonorrhea occur each year in the United States, though only half of these are reported.

During 2004, 8,565 cases of gonorrhea were reported in Virginia, a greater than 5% decrease from the 9,062 cases reported in 2003 (Figure 18).

Figure 18. Gonorrhea: Ten Year Trend, Virginia, 1995-2004




The age group with the highest infection rate was the 20-29 year olds with 414.0 cases per 100,000 population, followed by the 10-19 year olds with 237.9 cases per 100,000 population (Figure 19). Seventy-four percent of cases were in the black population (infection rate of 427.8 per 100,000). This was followed by the other race group with 24 cases per 100,000 population and the white population with a rate of 19.7 per 100,000. According to the CDC, the large difference in gonorrhea cases by race can also be seen at the national level; in 2004 the black population had a rate 19 times greater than the rate in the white population. Though the discrepancy between races remains, the rate of infection in the black population has decreased between 2000 and 2004 (from 778.1 to 629.6 per 100,000 nationally and from 586.06 to 427.8 per 100,000 in Virginia).




The Virginia female population continued to have a slightly higher infection rate than the male population (122.8 versus 106.3 per 100,000, respectively). The eastern region had the highest rates of infection in 2004 (222.8 per 100,000), followed by the central region (179.8 per 100,000). The other regions had rates between 33.8 and 76.9 per 100,000. Cases occurred throughout the year.

## Granuloma Inguinale

Granuloma inguinale is a bacterial disease causing skin lesions that eventually form fibrous tissue. Warm, moist skin surfaces such as folds between thighs, the perianal area, the scrotum, or the vagina are most often infected. This is a chronic condition that can lead to destruction of genital organs and spread to other parts of the body through autoinoculation. Transmission occurs through direct contact with lesions, usually during sexual activity; however, sexually inactive individuals and young children have also been infected, suggesting that some cases are transmitted non-sexually.

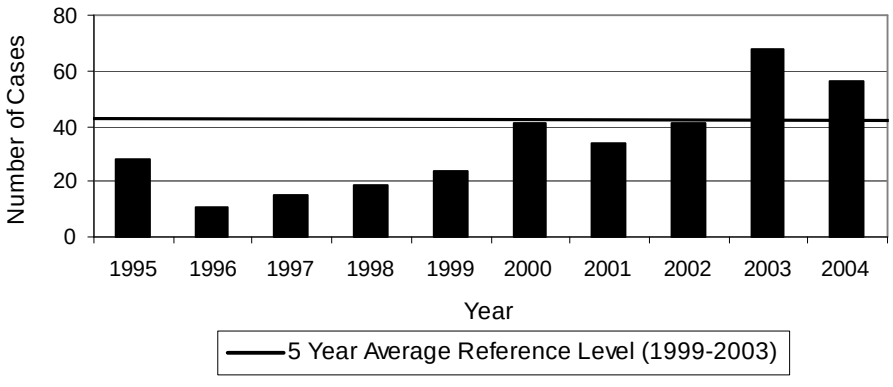
No cases of granuloma inguinale were reported in Virginia during 2004. The last reported case was in 2001.

## *Haemophilus influenzae* Infection, Invasive

Before the 1990s *Haemophilus influenzae* bacteria infection was the major cause of bacterial meningitis in the United States; however, since the introduction of the *H. influenzae* serotype b (Hib) conjugate vaccine for children in 1987, the incidence of invasive disease in children less than five years of age has decreased from 40-100 cases per 100,000 population to 1.3 cases per 100,000 population. Nationally, rates for adults have remained stable since the 1990s. Transmission of *H. influenzae* occurs through respiratory droplets and nose and throat discharge during the infectious period, which may be prolonged if the patient does not receive antibiotic therapy.

There were 56 cases of invasive *H. influenzae* infection reported in Virginia during 2004. This is a 18% decrease from the 68 cases reported in 2003, but a 35% increase from the five year average of 41.6 cases per year (Figure 20).

Figure 20. *Haemophilus influenzae* Infections, Invasive:
Ten Year Trend, Virginia, 1995-2004




Infants had the highest infection rate (4.0 per 100,000), followed by the 50 year and older age group (1.8 per 100,000). The other age groups had rates between 0.1 and 0.6 per 100,000. Twenty-three percent of reports had no race reported, but among those with a reported race, the black and white populations had similar rates of infection (0.7 and 0.6 per 100,000, respectively). Females had a slightly higher infection rate (0.9 per 100,000) than males (0.6 per 100,000). The northwest region had the greatest number of cases (17) and highest infection rate (1.5 per 100,000). The other regions had rates between 0.7 and 0.9 per 100,000, except the northern region which had a slightly lower rate of 0.3 per 100,000. Cases occurred throughout the year with the greatest percentage (32%) occurring between October and December.

## Hantavirus Pulmonary Syndrome

Hantavirus Pulmonary Syndrome (HPS) is a rare but extremely serious illness of the lungs caused by a family of viruses known as hantavirus. In 1993, the first United States cases were diagnosed in the southwestern part of the country. Isolated cases of HPS have since been diagnosed in other parts of the country, including one with exposure in Virginia. Several different types of hantaviruses have been identified and each is associated with a different rodent species. The rodents do not become ill but they transmit the virus when their urine and feces are aerosolized and inhaled. Signs and symptoms include fever, muscle pain, and gastrointestinal complaints followed by an abrupt onset of respiratory distress and decreased blood pressure. Respiratory failure and shock follow quickly. Although most common in the southwestern part of the country, hantavirus infections can occur anywhere.

Since May of 1993, when the syndrome was first recognized, there have been 379 cases of hantavirus pulmonary syndrome in the United States resulting in 136 (36%) deaths. No cases of this disease were reported in Virginia during 2004. The only hantavirus case reported in Virginia occurred in 1993. A resident of southwest Virginia died due to HPS in 2004 following an exposure that occurred in West Virginia. For surveillance purposes, that case is attributed to West Virginia.

## Hemolytic Uremic Syndrome (HUS)

Hemolytic uremic syndrome is a severe condition usually resulting from infection with *E. coli* O157:H7, though it may also result from infection with other enteric agents. Roughly 8% of people infected with *E. coli* O157:H7 progress to HUS. The syndrome produces kidney failure (often requiring dialysis) as well as neurological impairment (e.g., stroke or seizures). Children under the age of five years and older adults are more likely to develop the syndrome, which has a case fatality of 3% to 5%.

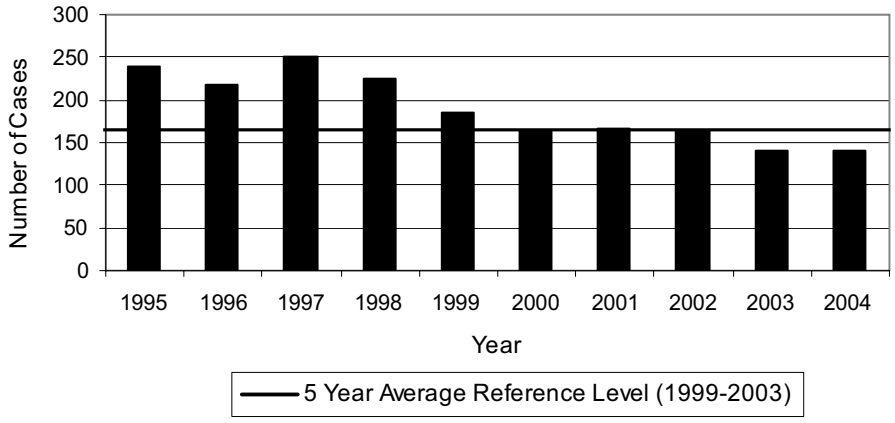
One case of HUS was reported in 2004 in a female in the 1-9 year old age group from the southwest region. One case was reported in 2003 as well. This is a large decrease from the eight cases reported in 2002.

## Hepatitis A

Hepatitis A is a liver disease caused by a virus. Transmission is person to person via the fecal-oral route, including contamination of food with the virus. Signs and symptoms include an acute onset of fever, malaise, anorexia, nausea, abdominal discomfort, and jaundice; children may experience mild or asymptomatic illness. Although chronic hepatitis A infection does not occur, some people may develop prolonged or relapsing symptoms for up to nine months after infection. A vaccine is available for persons 12 months of age and older.

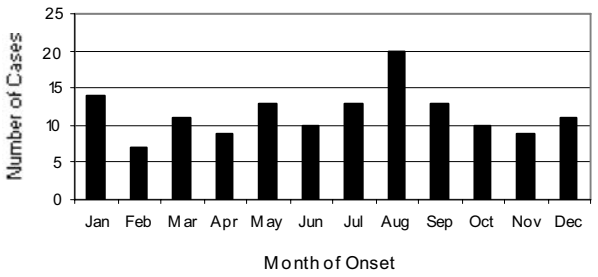
There were 140 cases of Hepatitis A reported in Virginia in 2004, similar to the 141 cases reported in 2003. The 2004 figure is a 15% decrease from the five year average of 164 per year (Figure 21).

Figure 21. Hepatitis A: Ten Year Trend, Virginia, 1995-2004



The highest infection rate occurred in the 50 year and older population (3.1 per 100,000), followed by the 1-9 year olds (2.3 per 100,000). The <1 year and 10-19 year old age groups had the same infection rate (2.0 per 100,000 each). The other age groups had rates between 0.6 and 1.6 per 100,000. Twenty-eight percent of reports had missing race data. Among complete reports, the black population had a slightly higher infection rate than the white population (1.8 versus 1.0 per 100,000, respectively). Males had a slightly higher rate than females (2.0 versus 1.7 per 100,000, respectively). By region, the northern and eastern regions had similar infection rates (2.1 and 2.4 per 100,000, respectively). The other regions had rates between 1.2 and 1.8 per 100,000. Cases occurred throughout the year, with onset of a third of cases during the third quarter (Figure 22).

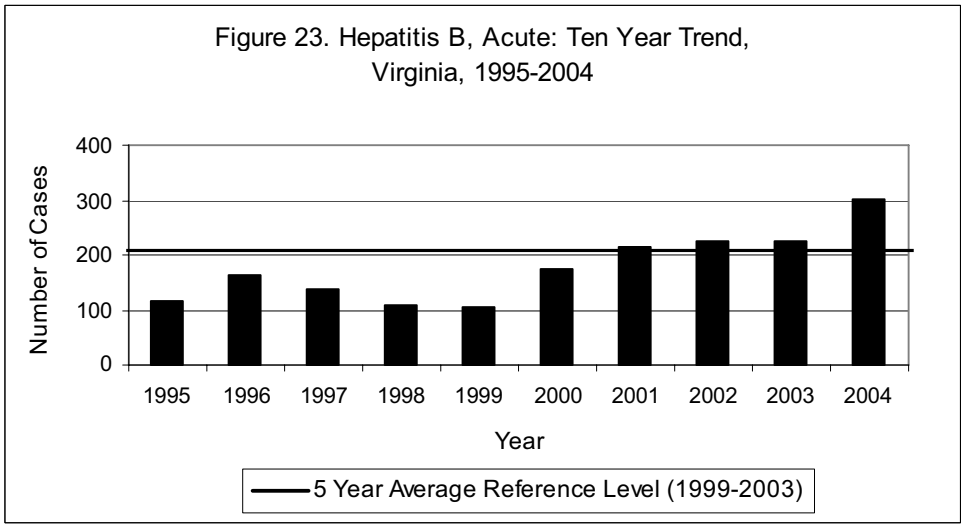
Figure 22. Hepatitis A: Month of Onset, Virginia, 2004

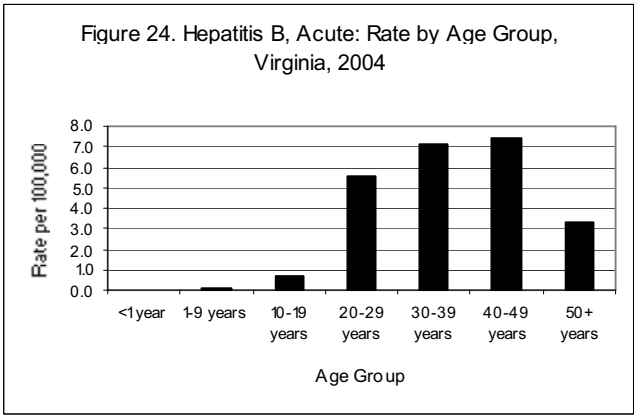



## Hepatitis B, Acute

Hepatitis B is a serious viral disease affecting the liver. Transmission occurs through exposure to the blood or body fluids of an infected individual. High risk groups include people with multiple sex partners, men who have sex with men, sex partners of infected persons, household contacts of infected persons, children born to infected mothers, children of immigrants from areas of high hepatitis B virus (HBV) prevalence, healthcare workers, and individuals on hemodialysis. Signs and symptoms of acute HBV infection may include jaundice, fatigue, nausea, vomiting, loss of appetite, abdominal pain, and joint pain, although up to 30% of persons who are infected are asymptomatic. Infection with HBV may lead to chronic (long-term) infection, and death from liver disease occurs in 15%-25% of those with chronic infection. Routine vaccination occurs in 0-18 year olds; other high risk persons, such as healthcare workers, may benefit from vaccination.

There were 303 cases of acute hepatitis B reported in Virginia during 2004, a 34% increase in reports from 2003 and a 60% increase from the five year average of 188.8 cases per year (Figure 23).



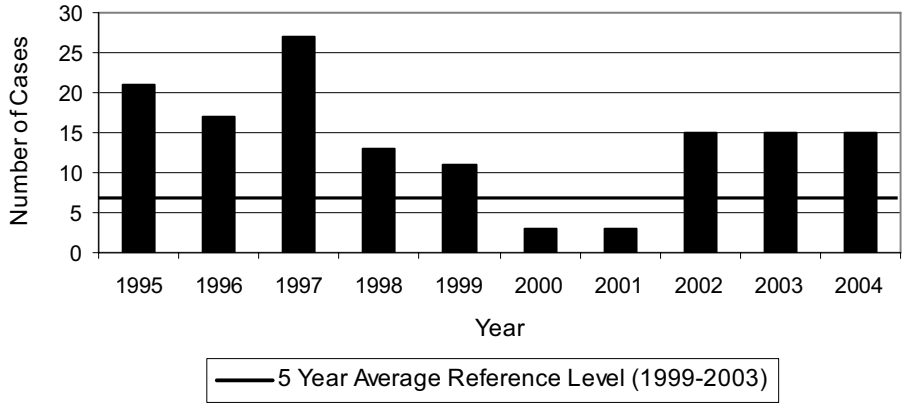

The 30-39 and 40-49 year old age groups had similar infection rates (7.1 and 7.4 per 100,000, respectively) (Figure 24). The 20-29 year old age group followed with 5.5 cases per 100,000 population. Fifty percent of reports had a missing race. Among those cases with a reported race, the black population had a higher infection rate (3.4 per 100,000) than the white population (1.8 per 100,000). A higher infection rate was reported in the male population (5.2 per 100,000) than in the female population (2.9 per 100,000). The central region had the highest rate of acute hepatitis B cases (6.1 per 100,000), followed by the southwest region with 5.9 per 100,000.

## Hepatitis C, Acute

Hepatitis C is a viral disease affecting the liver. Transmission of the hepatitis C virus (HCV) occurs through blood and other body fluids and the highest risk factor for contracting the disease is injection drug use. People who are recipients of clotting factors made before 1987 may also be at high risk for disease. People with multiple sex partners, people having sex with a steady infected partner, or healthcare workers are at mildly elevated risk for contracting the virus. Only about 10% of people newly (acutely) infected with HCV are symptomatic, with signs and symptoms that can include jaundice, fatigue, nausea, loss of appetite, abdominal pain, and dark urine. However, approximately 80% of those infected with HCV become chronic carriers who are able to spread the virus to others. About 20% of chronic carriers eventually develop liver cirrhosis (scarring), and are at a moderate risk for developing liver cancer. No vaccine exists for HCV.

Fifteen cases of acute hepatitis C were reported in Virginia during 2004. This is the same number of cases reported for the past two years (Figure 25).

Figure 25. Hepatitis C, Acute: Ten Year Trend, Virginia, 1995-2004

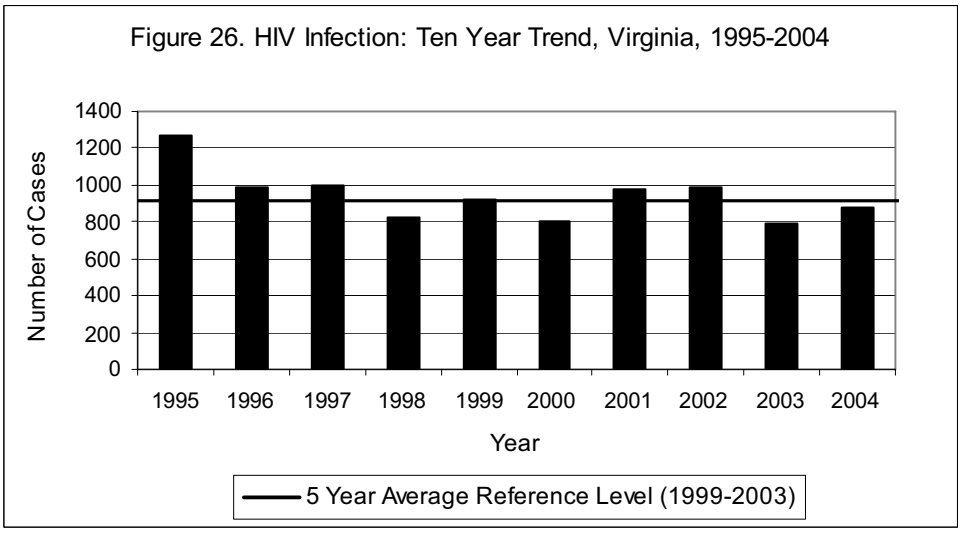



Similar rates of infection were reported for the 20-29 year old and the 30-39 year old population (0.6 per 100,000 and 0.5 per 100,000, respectively). The 40-49 year old age group had an infection rate of 0.3 per 100,000 and the 1-9 year olds had one case for an infection rate of 0.1 per 100,000. No cases were reported in the other age groups. Similar rates of infection were reported for the black and white populations (0.1 and 0.2 per 100,000, respectively) and males and females had the same rate. The largest proportion of cases occurred in the southwest region (7 cases, 0.5 per 100,000). The other regions reported rates between 0.1 and 0.2 per 100,000. Almost half of the cases (47%) had an onset during the first quarter of the year.

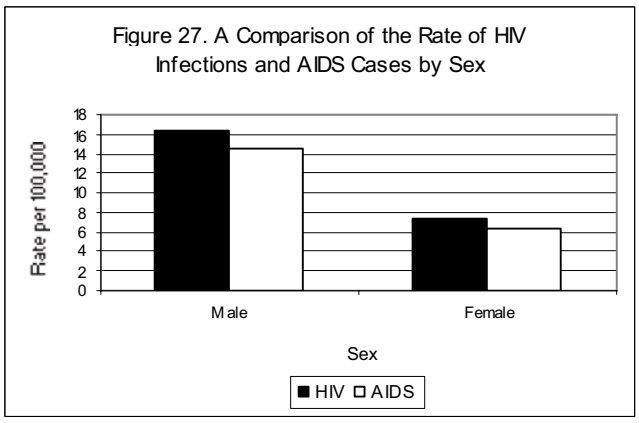
## Human Immunodeficiency Virus (HIV) Infection and Acquired Immunodeficiency Syndrome (AIDS)

HIV is a retrovirus that causes acquired immunodeficiency syndrome (AIDS). The virus is transmitted person to person via unprotected intercourse, contact of cut or abraded skin with body secretions carrying the virus (e.g. blood, cerebrospinal fluid, or semen), use of contaminated needles, blood transfusions and transplants with organs from infected donors. HIV can also be transmitted from mother to child before or during birth and through breastfeeding after birth. Weeks to months after initial infection with HIV an acute illness of fever, muscle pain, and sore throat appears. This lasts for about two weeks, after which the person may not experience other symptoms for several years. HIV affects the immune system, eventually causing AIDS. AIDS is defined in adults (≥13 yrs) as any patient with a diagnosis of advanced HIV disease who has a 1) CD4+ T-lymphocyte count of <200/ul or <14%/ul; or 2) is diagnosed with one of more than 26 CDC defined AIDS-related opportunistic infections or cancers. Opportunistic infections most common in persons diagnosed with AIDS include pneumocystis carinii pneumonia, Kaposi's sarcoma, cryptosporidiosis, histoplasmosis, other parasitic, viral, and fungal infections, and some types of cancers.

There were 875 cases of HIV infection reported in Virginia during 2004. This is a 10% increase from the number of cases reported in 2003, but a slight (3%) decrease from the five year average of 898.4 cases per year (Figure 26).




Similar rates of infection were reported in the 20-29 year old and 30-39 year old age groups (24.8 and 26.7 per 100,000, respectively). The 40-49 year old population followed with an infection rate of 15.9 per 100,000. The other age groups had reported rates between 0.2 per 100,000 (1-9 year old age group) and 4.3 per 100,000 (50 years and older group). The rate in the black population (36.6 per 100,000) was more than 8 times that in the white population (4.5 per 100,000). The incidence in the other race group was 1.8 per 100,000. There was also a difference by sex; the incidence of HIV in males was more than twice that in females (16.3 versus 7.3 per 100,000) (Figure 27). The central and eastern regions reported the highest incidence rates (16.2 and 17.0 per 100,000, respectively). This was followed by the northern region with a rate of 11.8 per 100,000.

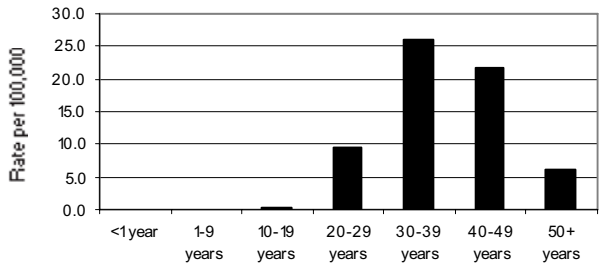



**AIDS**

Prior to 1996 it was estimated that about 50% of people infected with HIV would develop AIDS within 10 years; however, this interval increased with the introduction of anti-viral medications. The number of AIDS cases reported in Virginia decreased for the third year in a row, from 970 cases reported in 2001 to 772 reported in 2004. The highest incidence rate was reported in the 30-39 year old age group, with 26.0 cases per 100,000 population. This was followed by the 40-49 year age group with 21.7 cases per 100,000 population (Figure 28.) Reflecting the differences

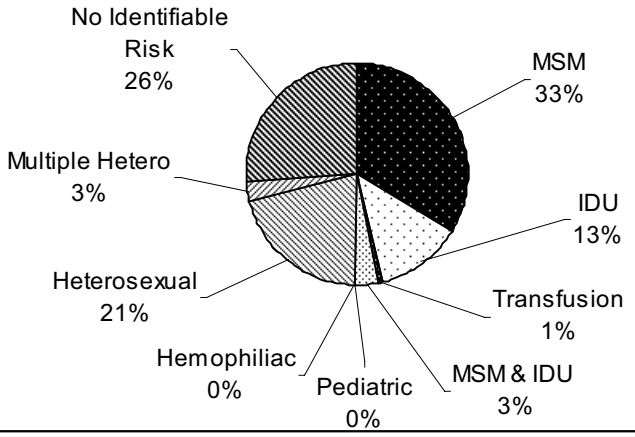
by race seen in HIV infection rates, the AIDS incidence rate in the black population was more than 8 times that in the white population (32.4 versus 4.0 per 100,000, respectively). Likewise, the male population had a much higher rate (14.5 per 100,000) than the female population (6.3 per 100,000) (see Figure 27). The highest incidence of AIDS by region, however, is slightly different than that of HIV for 2004. The northern and central regions reported similar rates of AIDS with 14.4 and 14.8 per 100,000, respectively. The eastern region followed with 10.0 cases per 100,000 population.

Figure 28. AIDS: Rate by Age Group, Virginia, 2004




The most common modes of transmission among those diagnosed with AIDS in 2004 were Men having Sex with Men (MSM) (33%), followed by no identifiable risk factors (26%), heterosexual contact (21%), and injection drug use (13%) (Figure 29).

Figure 29. AIDS: Mode of Transmission, Virginia, 2004



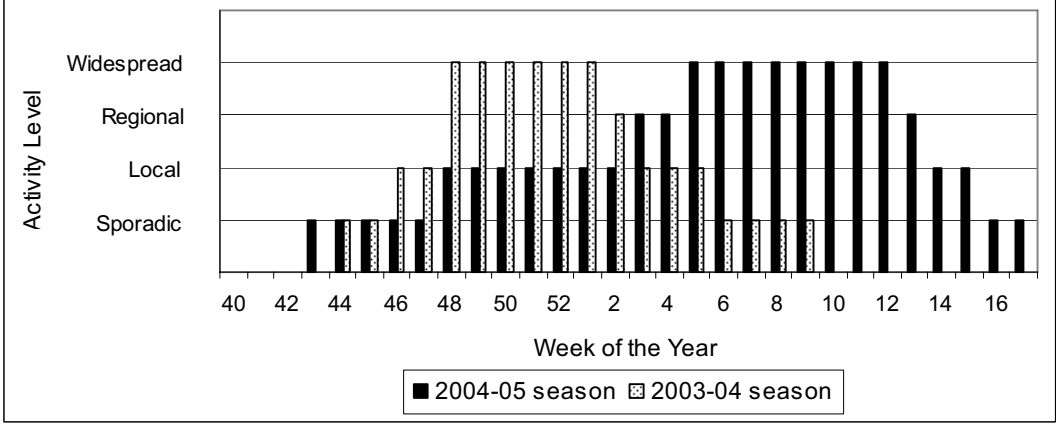
## Influenza

Influenza is an acute viral infection of the respiratory tract causing fever, headache, muscle pain, exhaustion, weakness, sore throat, and cough. It is usually a self-limiting disease with most patients recovering in 2-7 days. The two virus types that can cause epidemic human disease are influenza type A and B. Type A includes 15 subtypes, two of which are associated with epidemics (H1 and H3). Type B is less frequently associated with widespread outbreaks. The virus changes slightly from year to year (antigenic drift), making it necessary to prepare a new influenza vaccine each year. Periodically, the virus will change to form a completely new sub-type. This is called antigenic shift and can lead to pandemics.

In Virginia, influenza generally begins to increase in November and starts to decrease in March or April. During that time the Virginia Department of Health conducts active surveillance. Active surveillance depends on sentinel physicians around the state who report the weekly number of cases of influenza-like illness (ILI) seen at their office. An ILI case is defined as any person with a fever greater than or equal to 100° F and a cough and/or sore throat in the absence of a known cause. Six weeks of baseline data are collected and a threshold level is determined. The influenza activity level for the state is assigned based on the number of regions above threshold level. Levels, in order of severity, include: sporadic, local, regional, and widespread.

Virginia began collecting baseline data for the 2003-2004 influenza season in October, and active data collection continued through March. Peak activity occurred in mid-December (Figure 30). During the 2003-2004 season, 376 specimens were tested by DCLS. One hundred fifty eight were influenza A; no influenza B was detected. Subtyping showed 88 of the positive influenza A were type A H3. Further subtyping by CDC found that seven of these specimens were A/Korean/770/2002-like (H3N2). H3N2 is a drifted strain, also called Fujian, which predominated throughout the United States during 2003-2004.

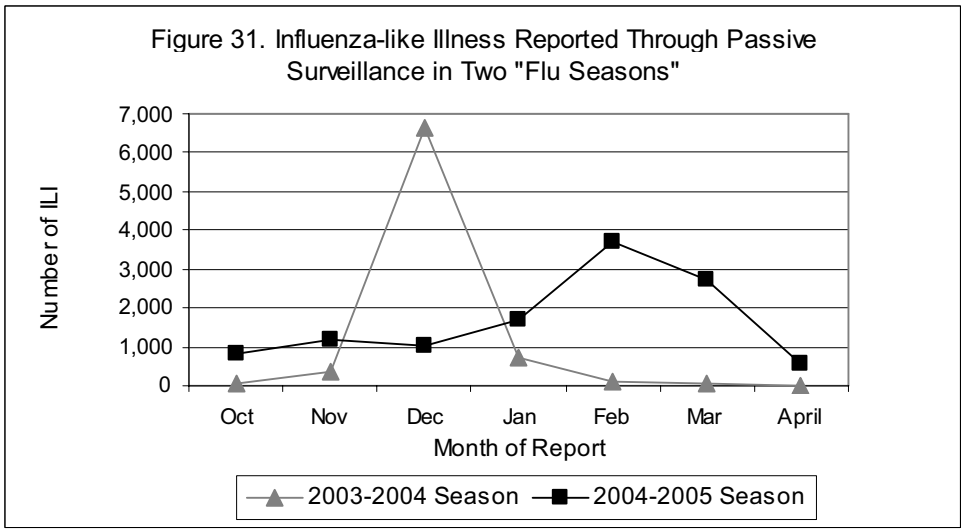
Figure 30. Comparison of ILI Activity Level Reported Through Active Surveillance for Two Flu Seasons in Virginia




For the 2004-2005 season, baseline ILI numbers were collected beginning in October and peak activity occurred in mid February. There were 148 positive influenza specimens confirmed at

DCLS by DFA, culture, or both. One hundred thirty-one (88%) were influenza A and 17 (11%) were influenza B.

Influenza is also reported through a passive surveillance system throughout the calendar year. Overall, many more cases of influenza and influenza-like illness were reported in the 2003-2004 season than the 2004-2005 season (Figure 31).




In 2004, 3,404 cases were reported via this system compared to 18,765 influenza cases in 2003 and 486 in 2002. Of these 3,404 cases, 3,021 were reported in the 2003-2004 season (January and February, 2004); the remaining 383 cases were reported for the 2004-2005 influenza season (November and December, 2004). Two confirmed outbreaks due to influenza were reported in a hospital and assisted living facility during October and November 2004 (see Table 11 on page 54).

## Kawasaki Syndrome

Kawasaki syndrome is an acute febrile illness of childhood. Clinical symptoms include high fever, rash, swelling of the hands and feet, unresponsiveness to antibiotics, irritability, and mood changes. The disease-causing agent is unknown, but it is presumed to be an infectious organism or toxin because 1) seasonal variation in incidence occurs (most cases occur in the winter and spring), and 2) children less than five years of age make up approximately 80% of cases worldwide. The mode of illness acquisition is unknown.

Sixteen cases of Kawasaki syndrome were reported in Virginia during 2004. This is an increase of 46% from the 11 cases reported in 2003, but a 29% decrease from the five year average of 22.4 cases per year. All but one case was reported in children less than 10 years of age, and infants had the highest incidence rate (4.0 per 100,000). The black population had a slightly higher rate (0.5 per 100,000) than the white population (0.2 per 100,000). A higher incidence rate was also reported in the male population (0.3 per 100,000) than in the female population (0.1 per 100,000). The eastern region reported the highest incidence rate with 0.4 cases per 100,000

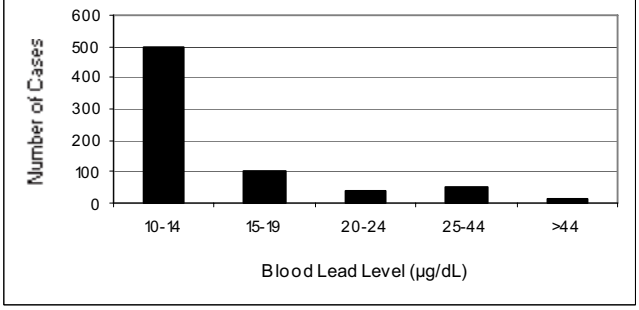
population. The other regions had rates between 0.0 and 0.3 per 100,000. The largest proportion of cases (56%) occurred during the first and fourth quarters of the year.

## Lead - Elevated Blood Levels in Children

Activities such as burning fossil fuels, mining, and manufacturing have spread lead into the environment, including workplaces and homes. Although lead can affect almost every organ and system in the body, children are much more vulnerable to lead poisoning than adults. The primary sources of lead for children are exposure to deteriorated paint in housing built before1978; chewing objects painted with lead paint; ingesting contaminated dust, soil or water; or using glassware, healthcare products or folk remedies containing lead. At low levels, lead in children can cause nervous system damage, learning disabilities, behavior problems, muscle weakness, decreased growth, hearing damage, or anemia. In adults, high lead levels can cause fertility problems, digestive and nerve disorders, memory and concentration problems, muscle weakness, and joint pain.

Virginia law requires reporting of elevated (≥ 10 µg/dL) venous blood lead levels. There were 703 cases of elevated blood levels reported in children less than 15 years old during 2004. This is a slight increase (5%) from the five-year average of 672.4 cases per year. Blood lead levels (BLL) in the 10-14 µg/dL range are above normal but require no treatment. BLL in the 15-19 µg/dL range require nutritional education and more frequent screening, while a finding in the range of 20-24 µg/dL requires medical and environmental evaluation and environmental remediation. Levels of 25-44 µg/dL and >44 µg/dL require medical and environmental interventions. Among children with elevated blood lead levels, 498 cases (71%) fell in the 10-14 µg/dL range, 104 cases (15%) fell in the 15-19 µg/dL range, 41 cases (6%) fell in the 20-24 µg/dL range, and 50 cases (7%) fell in the 25-44 µg/dL range. One percent (10 children) had lead levels greater than 44-µg/dL (Figure 32).

Figure 32. Elevated Blood Lead Levels: Children Age 0-14 Years, Virginia, 2004




The majority of elevated blood lead levels were reported in 1-9 year olds (638 cases, 72.6 per 100,000). This was followed by infants (54.9 cases per 100,000 population) and 10-15 year olds (1.9 cases per 100,000 population). Twenty-six percent of reports were missing race data. Among reports with a race, the black population had an incidence rate more than four times that of the white population (75.5 versus 18.5 per 100,000, respectively). The other race category had an incidence rate of 5.5 per 100,000. A higher incidence was reported in the male population (55.0 per 100,000) than in the female population (38.5 per 100,000). The central region had the highest incidence rate of elevated lead blood levels in children with 96.9 cases per 100,000 population. This was followed by the southwest region, which reported 60.9 cases per 100,000 population. The other regions had rates between 20.6 and 45.5 per 100,000.

## Legionellosis

Legionellosis is a serious and sometimes fatal form of pneumonia caused by the bacterium *Legionella pneumophila* and, less frequently, other *Legionella* species. The bacteria live in aquatic environments, but may colonize artificial water systems such as air conditioning cooling towers, humidifiers, and whirlpool spas. Legionellosis occurs by inhalation of water sprays or mists contaminated with the organism; direct human-to-human transmission does not occur. Exposure can cause one of two distinct clinical manifestations: Pontiac fever and Legionnaire disease. In both, initial symptoms include fever (up to 105°F), chills, muscle aches, headaches, and malaise. Patients with Pontiac fever generally recover spontaneously 2-5 days after symptom onset and it is thought that the condition may be due to inhaling the antigen, rather than actual infection with the organism. In contrast, patients with Legionnaire disease may develop illness that can range from a mild cough to a rapidly fatal pneumonia. Case-fatality rates of Legionnaire disease can be as high as 39% for hospitalized patients.

There were 56 cases of legionellosis reported in Virginia during 2004. This is almost a 50% decrease from 110 cases reported in 2003, but an increase from the 35 cases reported in 2002 and 39 cases reported in 2001. Incidence rates among adults increase with age, as shown in Figure 33. The most cases (39) and highest incidence rate (1.8 per 100,000) was reported in persons 50 years of age or older. This was followed by the 40-49 year age group (1.0 case per 100,000 population). Among cases with a reported race, the black and white populations had similar infection rates (0.6 and 0.7 per 100,000, respectively). Males had a slightly higher infection rate than females (1.0 versus 0.6 per 100,000). The southwest region had the highest infection rate (1.2 per 100,000), followed by the northwest region (1.0 per 100,000). The other regions had rates between 0.3 and 0.8 per 100,000. The majority of cases (71%) occurred during the second and third quarters of the year (Figure 34).

Figure 33. Legionellosis: Rate by Age Group, Virginia, 2004

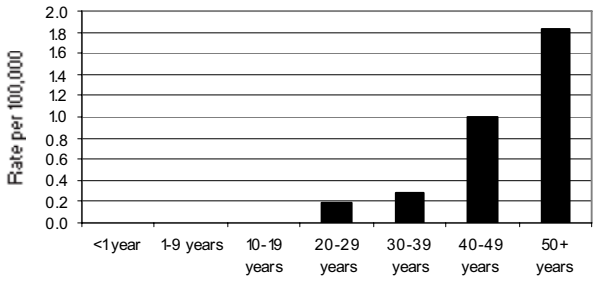
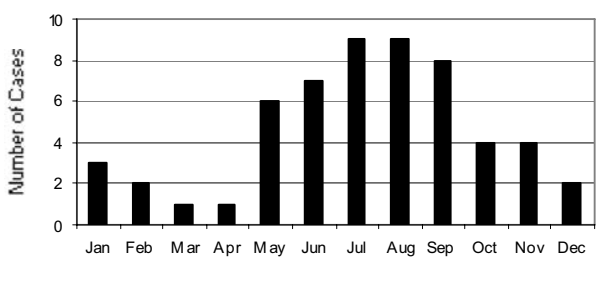



Figure 34. Legionellosis: Month of Onset, Virginia, 2004



## Leprosy (Hansen's Disease)

Leprosy is a bacterial infection of the skin, peripheral nerves, and upper respiratory tract caused by *Mycobacterium leprae*. The main reservoir for leprosy is humans, and it is thought that transmission occurs through contact of the nasal mucosa of an infected person with the skin or respiratory tract of a disease-free person. This requires close contact, but evidence suggests that communicability is lost soon after treatment with antibiotics. The incubation period for leprosy ranges from nine months to 20 years. In the United States, cases are mainly identified in California, Texas, Hawaii, Louisiana, and Puerto Rico.

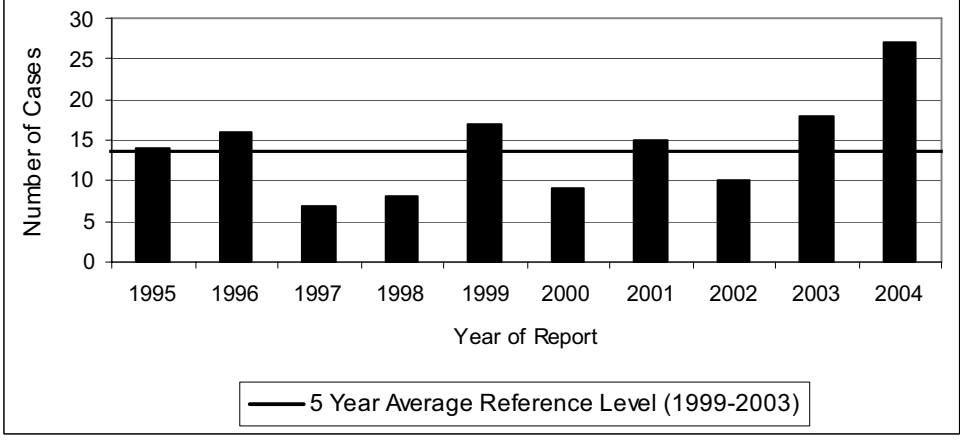
No cases of leprosy were reported in Virginia during 2004. The last reported case occurred in 2001.

## Listeriosis

Listeriosis is a bacterial disease caused by *Listeria monocytogenes*. Signs and symptoms of infection may include fever, headache, nausea, and vomiting. Infection may result in meningoencephalitis and/or septicemia in newborns and adults, and fever and miscarriage in pregnant women. The bacterium is transmitted by eating food or beverages contaminated with the organism. High risk items include milk, soft cheeses, vegetables, and ready-to-eat meats. *L. monocytogenes* is also able to multiply in refrigerated foods that are contaminated. In newborns, listeriosis has a case-fatality of 30% (up to 50% if disease onset occurs within the first four days after birth); the fatality rate in adults depends on age and ranges from 11% for those under 40 years old to 63% for those older than 60 years old.

There were 27 cases of listeriosis reported in Virginia during 2004. This is almost double the five year average of 13.8 cases per year (Figure 35).

Figure 35. Listeriosis: Ten Year Trend, Virginia, 1995-2004



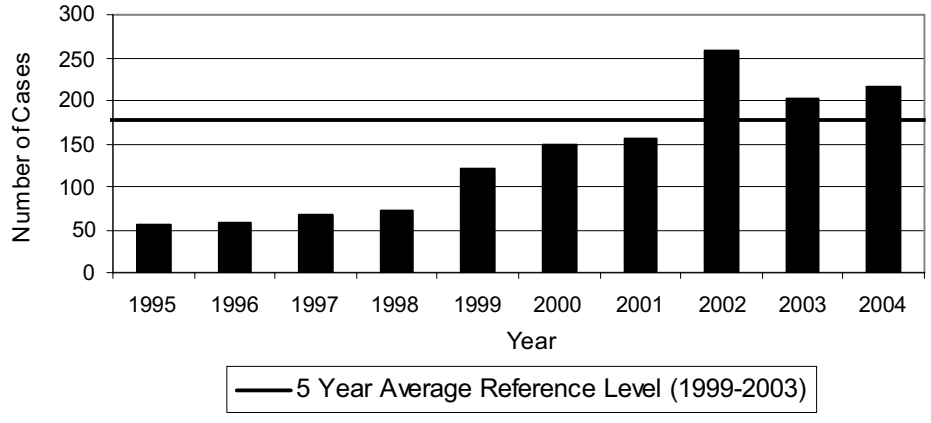
One case occurred in the less than 1 year population (1.0 per 100,000). Twenty cases were reported in the 50 year and older population, for an incidence rate of 0.9 per 100,000. The other age groups had infection rates between 0 and 0.3 per 100,000. The white population had a slightly higher infection rate (0.3 per 100,000) than the black population (0.1 per 100,000). The infection rate in females (0.5 per 100,000) was more than twice that of males (0.2 per 100,000). The highest rate by region was reported from the central region (0.7 per 100,000). The other regions reported rates between 0.2 and 0.4 per 100,000. Cases occurred throughout the year, though only 7% had onset dates during the first quarter.

## Lyme Disease

Lyme disease is caused by *Borrelia burgdorferi*, a spirochete bacterium. The bacteria are transmitted to humans from the bite of infected deer ticks. Deer ticks acquire the bacteria from feeding on small rodents. An infected tick must be attached and feed on a human for one to two days to transfer the bacteria. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks. Laboratory testing is more helpful in the later stages of disease than soon after infection. Minimizing exposure to tick-infested areas and protecting against bites are the best means of preventing disease.

During 2004, 216 cases of Lyme disease were reported in Virginia. This is a 7% increase from the 202 cases reported in 2003, and a 22% increase from the five year average of 177.6 cases per year (Figure 36). There has been an increasing trend of reported case of Lyme disease in Virginia since 1995. The decrease from 2002 levels in 2003 and 2004 may be due to a change in reporting patterns.

Figure 36. Lyme Disease: Ten Year Trend, Virginia, 1995-2004




The highest infection rate was reported in the 40-49 year old age group (3.8 per 100,000), followed closely by the 1-9 year age group (3.6 per 100,000) (Figure 37). Race data was missing for 31% of reports, but those reports with information on race suggest that the rate among the

white population (2.5 per 100,000) was more than four times the rate among the black population (0.6 per 100,000). The other race category had three cases (0.1 per 100,000). Males had a higher rate than females (3.1 versus 2.7 per 100,000, respectively). The northern region reported the highest infection rate (5.4 per 100,000), followed by the eastern region with 3.5 per 100,000 (Figure 38). The other regions reported rates between 0.4 and 2.5 per 100,000. Most cases (70%) occurred between the months of April and September.

Figure 37. Lyme Disease: Rate by Age Group, Virginia, 2004

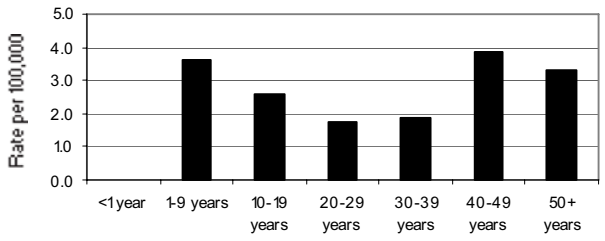
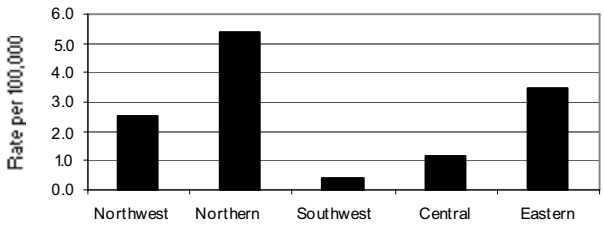



Figure 38. Lyme Disease: Rate by Region, Virginia, 2004




## Lymphogranuloma Venereum

Lymphogranuloma venereum (LGV) is a sexually transmitted disease caused by specific immunotypes of the bacteria *Chlamydia trachomatis.* Infection causes small, painless lesions on the penis or vulva, which usually go unnoticed. Fever, chills, headache, anorexia, and joint pain may also be present. The disease often persisits for a long period of time and may cause significant complications, although it is rarely fatal. It is transmitted by contact with the lesions of an infected person. LGV rarely occurs in most developing countries, but as of September 2004, the Netherlands reported as many as 92 cases of the disease among men who have sex with men (MSM). Cases have also been reported elsewhere throughout Europe. For this reason, the CDC has requested increased surveillance of LGV in the United States.

One case of lymphogranuloma venereum was reported in 2004. Prior to 2004, the last reported case of this disease in Virginia occurred in 2000.

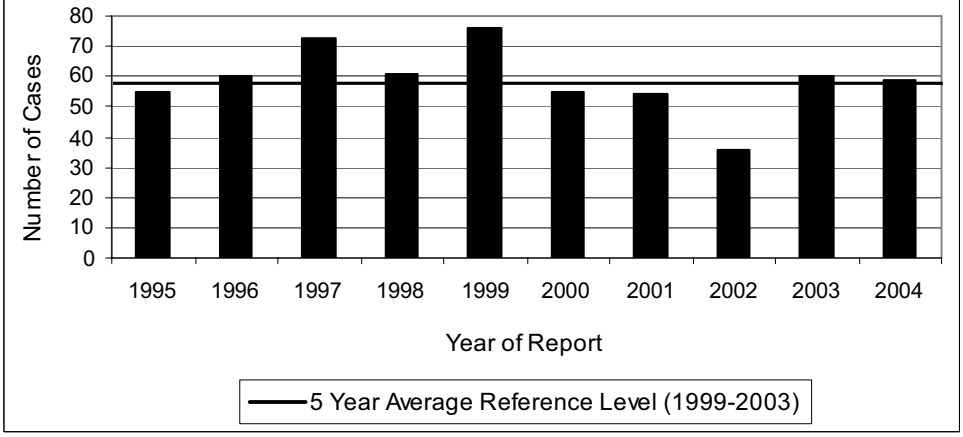
## Malaria

Malaria is a serious and sometimes fatal disease caused by a parasite that is transmitted by *Anopheles* mosquitoes. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum, P. vivax, P. ovale, and P. malariae.* Patients with malaria typically are very sick with high fevers, shaking chills, and flu-like illness. Infection with any of the malaria species can make a person feel very ill; infection with *P. falciparum*, if not promptly treated, may be fatal. Although malaria can be a fatal disease, illness and death from malaria are largely preventable. Most U.S. cases of malaria occur among persons who were infected in other countries. However, sometimes immigrants with inapparent malaria infection may infect local mosquitoes causing domestically acquired

infections. This has happened at least twice in Virginia (northern neck and northern Virginia) in areas in which persons from malaria-endemic countries were in residence.

In 2004, 59 cases of malaria were reported in Virginia. This is similar to the 60 cases reported in 2003, and a 5% increase over the five year average of 56.2 cases per year (Figure 39).

Figure 39. Malaria: Ten Year Trend, Virginia, 1995-2004




The 20-29 year old age group had the highest infection rate (1.4 per 100,000), followed by the 10-19 and 30-39 year age group, both with rates of 1.2 per 100,000. No cases were reported in infants. The black population had an infection rate of 2.0 per 100,000. The white population and the other race category both had rates of 0.2 per 100,000. Males had a higher rate than females (1.0 versus 0.6 per 100,000, respectively). The northern region reported the greatest number of cases (35 cases, 1.8 per 100,000). The other regions reported rates between 0.2 and 0.7 per 100,000. All cases reported a history of travel outside of the United States within the four years prior to disease onset. Information on malaria prophylaxis usage was obtained for 50 (85%) cases. Of these, 12 (24%) reported receiving prophylaxis for malaria, although 7 of these cases reported missing at least one dose.

## Measles

Measles is an acute, highly contagious viral disease causing fever, conjunctivitis, nose secretions, cough, and a typical rash on the third to seventh day. The rash begins on the face and then spreads to the rest of body, usually lasting four to seven days. Complications may also arise from measles infection, including pneumonia, diarrhea, otitis media, and encephalitis. Measles is spread through airborne respiratory droplets or direct contact with nasal or throat secretions of infected people. The measles vaccine is given as part of the measles, mumps, and rubella series beginning at 12-15 months of age followed by a second dose at age 4-6years.

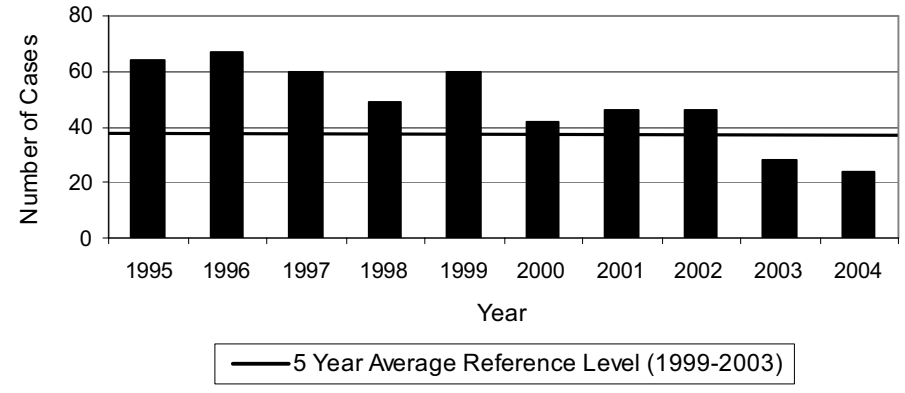
No cases of measles were reported in Virginia during 2004. The last reported case occurred in 2001.

## Meningococcal Infection

Meningococcal infection is caused by the bacteria *Neisseria meningitidis*. It is characterized by the sudden onset of fever, intense headache, stiff neck, vomiting, and photophobia (fear of light). A rash may also be present. With antibiotics the case-fatality rate of meningococcal infection ranges from 8%-15%. Of those who survive the disease, 10%-20% will experience long-term problems, such as mental retardation, hearing loss, or loss of limb use. Transmission occurs through direct contact with the respiratory droplets from the nose or throat of infected people. Five percent to 10% of people are asymptomatic carriers of *N. meningitidis.* Usually, those who develop invasive disease have been infected by an asymptomatic carrier.

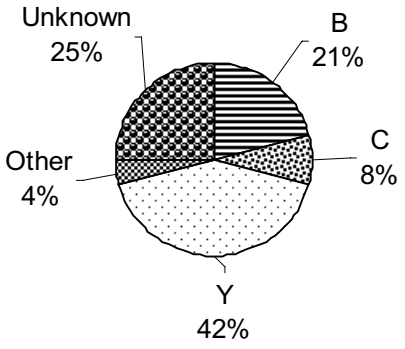
During 2004, 24 cases of meningococcal infection were reported in Virginia. This is a slight decrease from the 28 cases reported in 2003, and a 46% decrease from the five year average of 44.4 cases per year (Figure 40).

Figure 40. Meningococcal Infections: Ten Year Trend, Virginia, 1995-2004




The highest rate of infection occurred in the 10-19 year old population (0.6 per 100,000), followed by the 50 year and older age group (0.5 per 100,000). The black and white populations had the same infection rate (0.3 per 100,000 each) and similar rates were reported for females and males (0.3 and 0.4 per 100,000, respectively). Serogroups identified were as follows: ten (42%) were group Y, 5 (21%) were group B, and 2 (8%) were group C (Figure 41).

Figure 41. Meningococcal Serogroups, Virginia, 2004

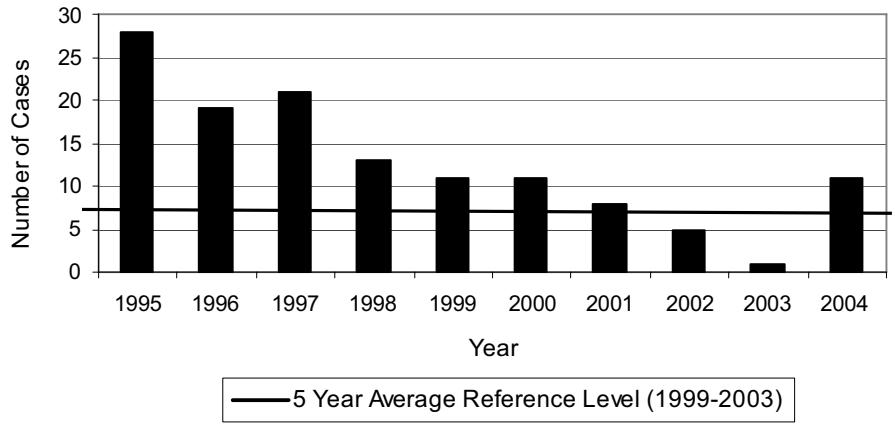



By region, the eastern region reported 0.6 cases per 100,000 population, followed by the northwest with 0.4 cases per 100,000 population. The other regions reported rates between 0.1 and 0.3 per 100,000. The highest proportion of cases (42%) had onset dates during the second quarter of the year.

## Mumps

Mumps is an acute viral disease producing fever, swelling and tenderness of one or more salivary glands. Testicular atrophy can occur in up to one third of infected males, although sterility does not usually result. In children under five, 40%-50% of cases are associated with respiratory symptoms. In both children and adults, mumps may cause hearing loss. Aseptic meningitis is also associated with up to 10% of mumps cases and may require hospitalization. Transmission is airborne or through respiratory droplets, as well as direct contact with saliva of an infected person. The mumps vaccine is available to children beginning at age 12 months.

Figure 42. Mumps: Ten Year Trend, Virginia, 1995-2004



Eleven cases of mumps were reported in Virginia during 2004, a large increase from the 1 case reported in 2003 and a 53% increase from the five year average of 7.2 cases per year (Figure 42).

Most of the cases were reported in the 1-9 year age category (4 cases, 0.5 per 100,000). The other age groups had rates between 0 and 0.2 per 100,000. No cases were reported in infants or the 40-49 year age group. The same infection rate (0.1 per 100,000) was reported for the black, white, and other race categories. Similar rates were reported for females and males (0.1 and 0.2 per 100,000, respectively). The southwest region reported the highest rate of 0.5 per 100,000.

## Ophthalmia Neonatorum

Ophthalmia neonatorum may be caused by the bacteria *Chlamydia trachomatis* or *Neisseria gonorrhoea*; however, *C. trachomatis* is the most common infectious agent. Infants are exposed to the organism in the birth canal during childbirth. Symptoms begin five to fourteen days after birth and include redness or swelling of one or both eyes. The inflammation can persist for up to a year if left untreated, with scarring of the cornea.

Eight infants were reported with ophthalmia neonatorum caused by *C. trachomatis*. Four of the cases were in the black population and two were in the white population. One case was in the Hispanic population (unknown race). Most of the cases were female (5). The northwest and eastern regions reported the same number of cases (3 each). One case each was reported from the southwest and central regions.

## Outbreak, Foodborne

Eighteen foodborne outbreaks were reported in Virginia during 2004 (see Table 9 on the following page). The number of ill persons per outbreak ranged from four (for two outbreaks) to 248. The etiologic agent was confirmed or suspected to be viral for 10 outbreaks (all norovirus) and bacterial for seven. Of the bacterial outbreaks, four were attributed to *Clostridium perfringens* and three to *Salmonella* (ser. Braenderup, Javiana, and Welteverden). One outbreak had an unknown etiologic agent. Factors contributing to the outbreaks included improper food handling (i.e., not keeping the food at the correct temperature or not cooking it for the correct amount of time) and infected food handlers. One outbreak of norovirus occurred after a pot luck dinner event at a school. The school was not implicated as contributing to the outbreak because all food was brought by the dinner attendees and no food was prepared by the school.

## Outbreak, Nosocomial

A nosocomial outbreak is defined as a group of illnesses with a common etiology among patients in a medical care facility (hospital or nursing home), where those patients acquired the illness while confined to that facility. There were 46 nosocomial outbreaks reported in Virginia during 2004 (see Table 10 on page 53). One of the outbreaks was reported from a hospital in Roanoke City that reported cases of methicillin-resistant *Staphylococcus aureus*. One influenza A outbreak was reported in a nursing home. The facility instituted the recommended administration

of antivirals for influenza treatment and prophylaxis. All other outbreaks were confirmed or suspected to be norovirus, except one outbreak in Hopewell City, which had 23 patients with an unknown respiratory illness. For norovirus or respiratory outbreaks in nursing homes, control measures include, but are not limited to, the following: hand washing education, cohorting of ill patients, keeping ill staff at home until three days after their symptoms subside, and cleaning contaminated surfaces with disinfectant.

## Outbreak, Other

Forty-nine other outbreaks were reported in Virginia during 2004 (see Table 11 on page 54). The etiologic agent in most outbreaks (41, 84%) was confirmed or suspected to be due to viruses, including norovirus, chickenpox, hepatitis, influenza, echovirus and enterovirus. Four methicillin-resistant *Staphylococcus aureus* (MRSA) outbreaks were reported from a federal training facility, a regional jail, and two schools (many of the students were on sports teams, though some non-team members were also infected). A mumps outbreak occurred at a summer choir camp for children from foreign countries. Five camp attendees were reported ill; no outbreak related infections were identified outside of the camp.

## Outbreak, Waterborne

Water was the most likely source of exposure for one outbreak reported in Virginia during 2004 (see Table8). Twenty-two people in the community became ill and four were hospitalized with *Campylobacter jejuni* infection. The town water supply was suspected as the source of exposure.

**Table 8. Waterborne Outbreaks Reported in Virginia, 2004**

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred |
|---|---|---|---|---|---|
| 08/15/04 | Lord Fairfax | 22 | *Campylobacter jejuni* | Town Water Supply Suspected | Community-wide |

## Table 9. Foodborne Outbreaks Reported in Virginia, 2004

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred | Factors Contributing to Outbreak |
|---|---|---|---|---|---|---|
| 02/15/04 | Henrico | 4 | Norovirus | Raw oysters suspected | Restaurant | Unknown |
| 02/16/04 | New River | 4 | *Clostridium perfringens* | Beef and gravy suspected | Restaurant | Unknown |
| 02/21/04 | Chesapeake | 21 | Norovirus suspected | Unknown | Catered event | Unknown |
| 02/24/04 | New River | >19 | Norovirus suspected | Unknown | Restaurant | Exposure to vomit |
| 03/04/04 | Richmond City | 248 | Norovirus | Sandwiches | Catered event | Ill food handler suspected |
| 03/22/04 | Fairfax | 17 | Norovirus suspected | Unknown | Restaurant | Unknown |
| 03/24/04 | Hampton | 33 | Norovirus | Unknown | School | Unknown |
| 04/18/04 | Chesterfield | 8 | Norovirus | Unknown | Private home | Unknown |
| 05/18/04 | Hampton | 13 | Unknown | Unknown | Church | Unknown |
| 06/18/04 | Multi-state | 137 (VA cases=11) | *Salmonella* ser. Braenderup | Roma tomatoes | Numerous restaurants | Unknown |
| 07/03/04 | Multi-state | 434 (VA cases=12) | *Salmonella* ser. Javiana | Roma tomatoes | National chain of gas stations | Contamination likely occurred pre-harvest or at packer. |
| 07/18/04 | Arlington | 10 | Norovirus | Lettuce suspected | Restaurant | Unknown |
| 08/08/04 | Crater | 20 | Norovirus | Unknown | Community center | Unknown |
| 10/23/04 | Rappahannock | 19 | *Clostridium perfringens* suspected | Crab cakes suspected | School | Time/temperature abuse, sanitation |
| 11/02/04 | Chesapeake | 31 | *Clostridium perfringens* | Pork barbeque | Residential training center | Time/temperature abuse (improper cooling followed by inadequate reheating) |
| 11/07/04 | Central Virginia | 13 | *Clostridium perfringens* | Unknown | Private home | Unknown |
| 12/09/04 | Crater | 45 | *Salmonella* ser. Welteverden | Canned tuna fish | Correctional facility | Time/temperature abuse |
| 12/10/04 | Fairfax | 32 | Norovirus suspected | Unknown | Country club restaurant | Unknown |

## Table 10. Nosocomial Outbreaks Reported in Virginia, 2004

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred |
|---|---|---|---|---|---|
| 01/10/04 | Henrico | 85 | Norovirus | Person to Person | Nursing Home |
| 01/15/04 | Henrico | 53 | Norovirus | Person to Person | Nursing Home |
| 01/15/04 | Chesterfield | 62 | Norovirus | Person to Person | Nursing Home and Assisted Living |
| 02/01/04 | Henrico | 11 | Norovirus suspected | Person to Person | Nursing Home |
| 02/06/04 | Pittsylvania-Danville | 45 | Norovirus | Person to Person | Nursing Home |
| 02/08/04 | Central Shenandoah | 7 | Norovirus | Person to Person | Nursing Home |
| 02/08/04 | Fairfax | 35 | Norovirus | Person to Person | Nursing Home |
| 02/09/04 | Roanoke City | Unk | Methicillin-resistant *Staphylococcus aureus* (MRSA) | Person to Person | Hospital |
| 02/09/04 | Fairfax | 73 | Norovirus | Person to Person | Nursing Home |
| 02/11/04 | Alexandria | Unk | Norovirus | Person to Person | Nursing Home and Assisted Living |
| 02/11/04 | Alleghany | 60 | Norovirus | Person to Person | Nursing Home |
| 02/11/04 | Southside | 78 | Norovirus | Person to Person | Nursing Home |
| 02/12/04 | Central Shenandoah | 26 | Norovirus | Person to Person | Nursing Home |
| 02/13/04 | Arlington | 60 | Norovirus | Person to Person | Nursing Home |
| 02/14/04 | Central Shenandoah | 14 | Norovirus | Person to Person | Nursing Home |
| 02/16/04 | Alexandria | Unk | Norovirus | Person to Person | Nursing Home and Assisted Living |
| 02/17/04 | Central Shenandoah | 85 | Norovirus | Person to Person | Nursing Home |
| 02/18/04 | Central Shenandoah | 17 | Norovirus | Person to Person | Nursing Home |
| 02/19/04 | Alexandria | Unk | Norovirus | Person to Person | Nursing Home and Assisted Living |
| 02/20/04 | Virginia Beach | 40 | Norovirus | Person to Person | Nursing Home |
| 02/20/04 | Central Shenandoah | 39 | Norovirus | Person to Person | Nursing Home |
| 02/23/04 | Thomas Jefferson | 5 | Norovirus | Person to Person | Nursing Home |
| 02/28/04 | Mount Rogers | 46 | Norovirus | Person to Person | Nursing Home |
| 03/01/04 | Piedmont | Unk | Norovirus | Person to Person | Nursing Home |
| 03/02/04 | Crater | 23 | Unknown respiratory pathogen | Person to Person | Nursing Home |
| 03/06/04 | Henrico | 9 | Norovirus suspected | Person to Person | Nursing Home |
| 03/10/04 | Henrico | 6 | Norovirus suspected | Person to Person | Nursing Home |
| 03/28/04 | Thomas Jefferson | 12 | Norovirus | Person to Person | Nursing Home |
| 04/01/04 | Central Virginia | 27 | Norovirus | Person to Person | Nursing Home |
| 04/04/04 | Chesterfield | 25 | Norovirus | Person to Person | Nursing Home |
| 04/15/04 | Alleghany | 32 | Norovirus suspected | Person to Person | Nursing Home |
| 04/17/04 | Central Virginia | 15 | Norovirus | Person to Person | Nursing Home |

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred |
|---|---|---|---|---|---|
| 05/24/04 | Central Virginia | 4 | Scabies | Person to Person | Nursing Home |
| 10/27/04 | Thomas Jefferson | 26 | Influenza A | Person to Person | Nursing Home |
| 11/29/04 | Three Rivers | 21 | Norovirus | Person to Person | Nursing Home |
| 12/06/04 | Thomas Jefferson | 25 | Norovirus | Person to Person | Nursing Home |
| 12/07/04 | Lord Fairfax | 24 | Norovirus | Person to Person | Nursing Home |
| 12/16/04 | Lord Fairfax | 24 | Norovirus suspected | Person to Person | Nursing Home |
| 12/17/04 | Lord Fairfax | 6 | Norovirus | Person to Person | Nursing Home |
| 12/24/04 | Norfolk | 30 | Norovirus | Person to Person | Nursing Home |
| 12/24/04 | Three Rivers | 30 | Norovirus | Person to Person | Nursing Home |
| 12/24/04 | Thomas Jefferson | 89 | Norovirus | Person to Person | Nursing Home |
| 12/28/04 | Henrico | 25 | Norovirus suspected | Person to Person | Nursing Home |
| 12/28/04 | Henrico | 34 | Norovirus | Person to Person | Nursing Home and Assisted Living |
| 12/29/04 | Loudoun | 9 | Norovirus suspected | Person to Person | Nursing Home |
| 12/30/04 | Henrico | 44 | Norovirus suspected | Person to Person | Nursing Home |

## Table 11. Other Outbreaks Reported in Virginia, 2004

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred |
|---|---|---|---|---|---|
| 01/29/04 | Fairfax | 31 | Norovirus | Person to Person | Child Care Setting |
| 01/31/04 | Hanover | 71 | Varicella (Chickenpox) | Person to Person | Elementary School |
| 02/01/04 | Western Tidewater | Unk | Norovirus | Person to Person | Assisted Living |
| 02/05/04 | Chesterfield | 14 | Norovirus | Person to Person | Private Home |
| 02/06/04 | Central Shenandoah | 28 | Norovirus | Person to Person | Assisted Living |
| 02/06/04 | Hampton | 62 | Norovirus suspected | Unknown | High School |
| 02/08/06 | Central Shenandoah | 7 | Norovirus suspected | Person to Person | Assisted Living |
| 02/09/04 | Fairfax | 40 | Norovirus | Person to Person | Adult, Child Day Cares and Independent Living |
| 02/13/04 | Chesterfield | 125 | Norovirus suspected | Person to Person | Elementary School |
| 02/14/04 | Arlington | 89 | Norovirus | Person to Person | Elementary School |
| 02/18/04 | Portsmouth | 22 | Norovirus | Person to Person | Assisted Living |
| 02/19/04 | Fairfax | 107 | Norovirus | Person to Person | Elementary School |
| 02/21/04 | Peninsula | 38 | Norovirus | Person to Person | Assisted Living |
| 02/23/04 | Chesterfield | 13 | Varicella (Chickenpox) | Person to Person | Elementary School |
| 02/25/04 | Fairfax | 35 | Norovirus | Person to Person | Assisted Living |
| 02/29/04 | Peninsula | 69 | Norovirus | Person to Person suspected | College |
| 03/01/04 | Henrico | 21 | Norovirus suspected | Person to Person | Assisted Living |

| Onset Date | Health District | Number of Cases | Etiologic Agent | Vehicle | Place Where Outbreak Occurred |
|---|---|---|---|---|---|
| 03/01/04 | Arlington | 25 | Norovirus | Person to Person | Assisted Living |
| 03/01/04 | Fairfax | >100 | Norovirus | Person to Person | Elementary School |
| 03/01/04 | Fairfax | >127 | Norovirus suspected | Person to Person | Elementary School |
| 03/03/04 | Norfolk | 31 | Norovirus | Person to Person | Elementary School |
| 03/24/04 | Fairfax | 19 | Norovirus | Person to Person | Assisted Living |
| 04/05/04 | Chesterfield | 6 | *Bordetella pertussis* | Person to Person | Elementary and Middle Schools |
| 04/05/04 | Hampton | 4 | *Bordetella pertussis* | Person to Person | Family |
| 04/23/04 | Central Virginia | 23 | Methicillin-resistant *Staphylococcus aureus* (MRSA) | Person to Person | Regional Jail |
| 05/09/04 | Hanover | 9 | Norovirus | Person to Person | Private Event |
| 05/30/04 | Central Shenandoah | 19 | Unknown | Unknown | Conference Center |
| 06/01/04 | Henrico | 4 | Enterovirus | Person to Person | Child Care Center |
| 06/03/04 | Fairfax | 16 | Norovirus | Person to Person | Elementary School |
| 06/17/04 | Loudoun | 28 | Norovirus | Person to Person | Camp |
| 07/29/04 | Portsmouth | 8 | Hepatitis A | Person to Person | Child Day Care |
| 08/09/04 | Piedmont | 5 | Echovirus 30 | Person to person | Community Wide |
| 08/10/04 | Central Virginia | 18 | Methicillin-resistant *Staphylococcus aureus* (MRSA) | Person to Person | University |
| 08/21/04 | Central Virginia | 5 | Mumps virus | Person to Person | Camp |
| 09/01/04 | Central Virginia | 6 | Methicillin-resistant *Staphylococcus aureus* (MRSA) | Person to Person | Private School |
| 09/02/04 | Rappahannock | 58 | Methicillin-resistant *Staphylococcus aureus* (MRSA) | Person to Person | Federal Training Facility |
| 09/06/04 | Mount Rogers | 14 | Enterovirus | Person to Person | Community Wide |
| 11/01/04 | Henrico | 9 | Varicella (Chickenpox) | Person to Person | Elementary School |
| 11/10/04 | Piedmont | 20 | *Bordetella pertussis* | Person to Person | Community Wide |
| 11/29/04 | Lord Fairfax | 68 | Norovirus | Person to Person | Military Academy |
| 11/30/04 | Thomas Jefferson | 7 | Influenza A | Person to Person | Assisted Living |
| 12/06/04 | Loudoun | 18 | Norovirus suspected | Person to Person | Assisted Living |
| 12/08/04 | Three Rivers | 16 | Norovirus | Person to Person | Retirement Community |
| 12/11/04 | Lord Fairfax | 25 | Norovirus | Person to Person | Assisted Living |
| 12/14/04 | Hampton | 14 | Norovirus | Person to Person | Assisted Living |
| 12/15/04 | Thomas Jefferson | Unk | Influenza suspected | Person to Person | Assisted Living |
| 12/23/04 | Fairfax | 41 | Norovirus | Person to Person | Assisted Living |
| 12/27/04 | Lord Fairfax | 6 | Norovirus | Person to Person | Assisted Living |
| 12/27/04 | Fairfax | 44 | Norovirus | Person to Person | Assisted Living |

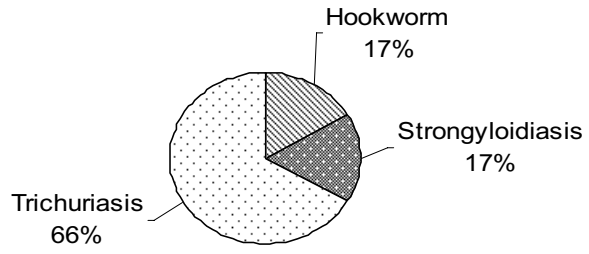
## Parasites, Intestinal

Intestinal parasitic infections of humans are caused by a wide range of organisms. Depending on the species of parasite and its mode of transmission and target organ(s), signs and symptoms vary. In addition to amebiasis, cryptosporidiosis, cyclosporiasis, and giardiasis, other selected parasitic infections are recorded when reported to public health. Examples of other intestinal parasitic infections reported in Virginia in 2004 include:

- Hookworm infections, caused by the larvae of hookworms (e.g., *Necator americanus*), which infect humans by entering the skin, causing an itchy rash. After traveling to the lungs, they travel up the respiratory tract to the mouth, are swallowed, and eventually reach the small intestine. In the host's intestines, they cause infection that may range from asymptomatic to diarrhea, abdominal pain, and weight loss. Recommendations for controlling this disease include not walking barefoot in soil and de-worming dogs and cats to prevent them from serving as reservoirs.
- Strongyloidiasis, caused by a roundworm, *Strongyloides* spp., which lives in soil contaminated by feces of infected animals. The larvae of *Strongyloides* spp. penetrate human skin to cause infection. Roundworms multiply in the intestines, and may cause abdominal pain and diarrhea; *Strongyloides* spp. may also affect the lungs, causing cough or inflammation of the lungs.
- Trichuriasis, caused by roundworms, also called the human whipworm. The eggs of the roundworm are passed in stools of infected animals. Ingesting soil infected with the eggs can cause disease in humans. After ingestion (via soil-contaminated hands or food), the eggs hatch in the small intestine and release larvae that mature and establish themselves as adults in the colon. Infections are usually asymptomatic, but heavy infection, especially in children, can cause abdominal pain, diarrhea, and possibly growth retardation. Worldwide, infections are more frequent in areas with tropical weather and poor sanitation practices, and among children.

In Virginia during 2004, laboratory confirmed cases of intestinal parasites included: five cases of hookworm, five cases of strongyloidiasis, and 20 cases of trichuriasis (Figure 43).

Figure 43: Other Intestinal Parasites, Virginia, 2004



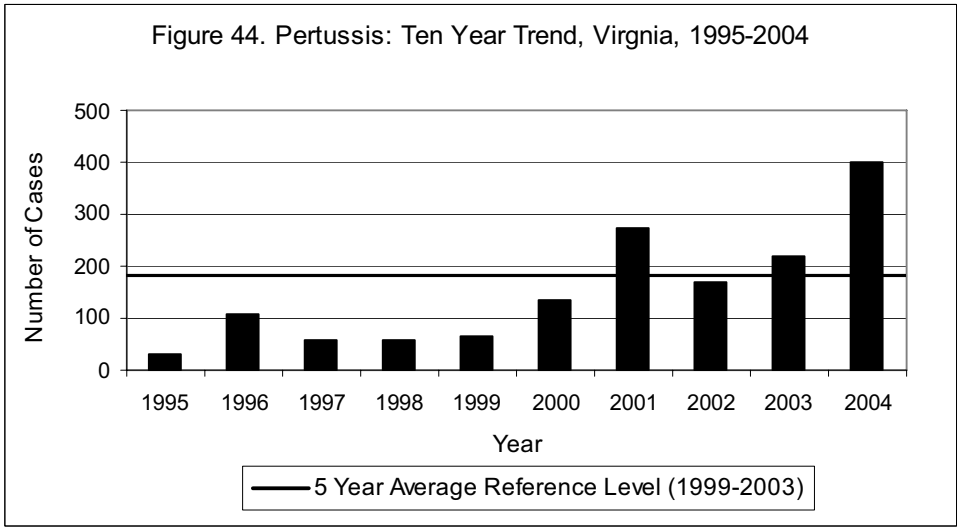
Cases were reported from all age groups except infants; rates for the age groups ranged from 0.1 per 100,000 in the 40-49 year age group to 1.5 per 100,000 in the 10-19 year age group. Twenty-six (87%) cases were reported among the black population (1.8 cases per 100,000 population) and one (3%) from the other race category (less than 1 case per 100,000 population). Three (10%) cases had an unknown race. There were 13 females (43%) and 16 males (53%). No sex was reported for one case. The southwest region reported the highest incidence rate (0.8 per 100,000). Rates in the other regions ranged from 0.1 to 0.4 per 100,000. Most cases had onset during the second and third quarters of the year (April-September).

## Pertussis

Pertussis is a bacterial disease caused by the organism *Bordetella pertussis*. Symptom onset includes an insidious cough that progresses to paroxysmal coughing with posttussive vomiting. Paroxysmal coughing is characterized by severe, sequential coughs without the ability to inhale. This action causes a whooping sound, hence the common name for pertussis, Whooping Cough. This typical whoop, however, is generally not present in adults, vaccinated children, or children younger than six months of age. In vaccinated populations the case-fatality rate is low, and deaths generally occur in children less than six months old who are too young to have received the vaccine. Transmission of pertussis occurs through direct contact with the mucous membrane discharge of infected patients. It is highly contagious; up to 90% of susceptible household contacts may develop clinical illness.

There were 400 cases of pertussis reported in Virginia during 2004. This is an 83% increase from the 219 cases reported in 2003 and an over 100% increase from the five year average of 171.6 per year (Figure 44). The general rise in pertussis cases since 2000 has been seen nationally.

Figure 44. Pertussis: Ten Year Trend, Virgnia, 1995-2004




In Virginia, pertussis cases were reported from every age group, but the less than one year age group had the highest infection rate with 61.9 per 100,000. This was followed by the 10-19 year old population with 19.6 cases per 100,000 population (Figure 45). The white population had

almost twice the incidence rate of the black population (6.0 versus 3.3 per 100,000, respectively). No difference in incidence rate was seen between males and females (5.4 per 100,000, each). By region, the northwest region reported the highest infection rate (12.2 per 100,000). This was followed by the central region with 5.9 per 100,000 and the eastern region with 4.1 per 100,000. The largest proportion of cases (46%) occurred during the fourth quarter of the year (Figure 46).

Figure 45. Pertussis: Rate by Age Group, Virginia, 2004

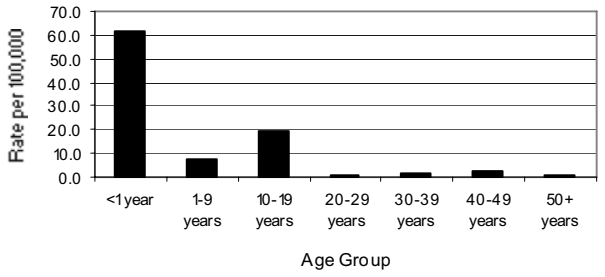
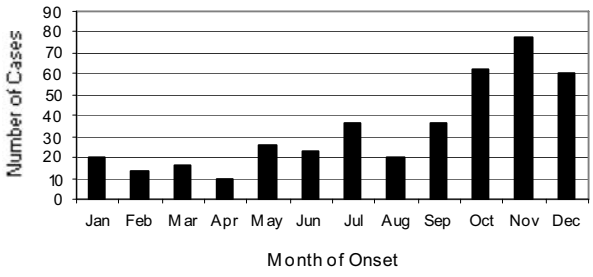



Figure 46. Pertussis: Month of Onset, Virignia, 2004




## Plague

Plague, which is caused by the bacterium *Yersinia pestis*, is included in CDC's list of category A bioterrorism agents (i.e., it can be easily disseminated or transmitted from person to person; has a high mortality rate and has the potential for major public health impact; might cause public panic and social disruption; and requires special action for public health preparedness).

Plague cases, though rare, occur naturally every year in the United States (<20 per year). The plague bacteria live in animals and rodents. When fleas feed on the infected animals, they can then pass on the disease to the humans they bite. Plague usually affects people working in or visiting places with infected animals, as well as people living in areas of poor cleanliness where infected fleas and rodents live. If the disease moves into the lungs, person to person transmission can occur by inhaling respiratory droplets from an infected person's cough. It is thought that the agent could possibly be spread by bioterrorists through an aerosol attack, causing an outbreak of pneumonic plague.

No cases of plague have been reported in Virginia since the nineteenth century.

## Poliomyelitis

Poliomyelitis is a viral disease that usually (in 90% of cases) causes inapparent or very mild illness. The disease is most recognized by the acute onset of flaccid paralysis; however, this occurs in only about 1% of cases. Ten percent of infections will develop into a non-specific syndrome with fever, malaise, headache, nausea, and vomiting. When paralysis does occur, it is usually asymmetric and is accompanied by a fever. Paralysis may be overcome, but if it persists up to 60 days after symptom onset, it will most likely be permanent. Transmission of polio

occurs person to person through the fecal-oral route. Polio eradication programs have led to the elimination of the disease in the western hemisphere. By the end of 2002, only seven countries still had endemic polio: Afghanistan, Egypt, India, Niger, Nigeria, Pakistan, and Somalia. Since polio has not yet been eliminated from the world, surveillance of this disease continues.

The last reported case of poliomyelitis in Virginia occurred in 1978.

## Psittacosis

Psittacosis, also known as Parrot fever or Ornithosis, is caused by the bacterium *Chlamydophila* (formerly known as *Chlamydia*) *psittaci* that is shed in the droppings and nasal secretions of infected birds. The birds may or may not show signs of illness when infected. Birds in the parrot family (e.g., cockatiels, parakeets, parrots, macaws) are most commonly responsible for human infection, but any bird species can be infected and, thus, be a source for human disease. Humans usually become infected by inhaling organisms that have been aerosolized from dried feces or respiratory tract secretions of infected birds. Typically, humans develop flu-like symptoms that can lead to severe pneumonia and non-respiratory health problems. With appropriate treatment, the disease is rarely fatal.

No cases of psittacosis were reported in Virginia during 2004. One case was reported in 2003 and previous to that one case was reported in 1998.

## Q Fever

Q fever is a zoonotic bacterial disease caused by *Coxiella burnetii.* Transmission to humans generally occurs from the inhalation of air contaminated with the bacteria from dried placental material, birth fluids, or excreta of infected animals (e.g., sheep, cattle, goats). Other modes of transmission, including from tick bites or from human-to-human, are very rare. Infection with *C. burnetii* causes clinical illness in approximately one-half of those infected. Signs and symptoms may include an acute onset of high fever (up to 105° F), severe headache, malaise, myalgia, confusion, sore throat, chills, sweats, non-productive cough, nausea, vomiting, diarrhea, abdominal pain, and/or chest pain. Pneumonia develops in 30%-50% of symptomatic infections, and extra-pulmonary involvement (e.g., hepatitis) occurs in a small percentage of cases. Chronic infection involving the heart valves, liver, or bone (osteomyelitis) may occur. Q fever is included in the CDC's list of category B bioterrorism agents (i.e., organisms that may be relatively easy to disseminate, cause moderate injury and/or death, and may need enhanced surveillance for detection).

No cases of Q fever were reported in 2004 in Virginia. The last reported case occurred in 1999.

## Rabies

Rabies is a viral infection that can cause fatal, acute inflammation of the brain and spinal cord. The disease may incubate from several days to years, but the usual time is one to three months.

Although symptoms can vary widely, initially they usually include a sense of apprehension, headache, fever, malaise, and sensory changes. The disease then typically progresses to paralysis, spasms of the swallowing muscles, which was originally described as hydrophobia (fear of water), delirium and convulsions. Once symptoms appear, the disease is almost always fatal. Rabies is most commonly transmitted through the bite of an infected animal, but other ways in which virus-infected saliva or central nervous system tissue can enter the body can also lead to disease. Many rabies virus variants have been identified; each one is usually associated with a particular animal species and geographic area. In Virginia, the predominant variants include raccoon, north central skunk, and multiple bat variants. A pre-exposure vaccine should be given to people at high risk of infection (e.g., veterinarians, animal handlers, or laboratorians working with rabies virus). Important prevention methods include vaccination of cats and dogs and the elimination of stray animals.

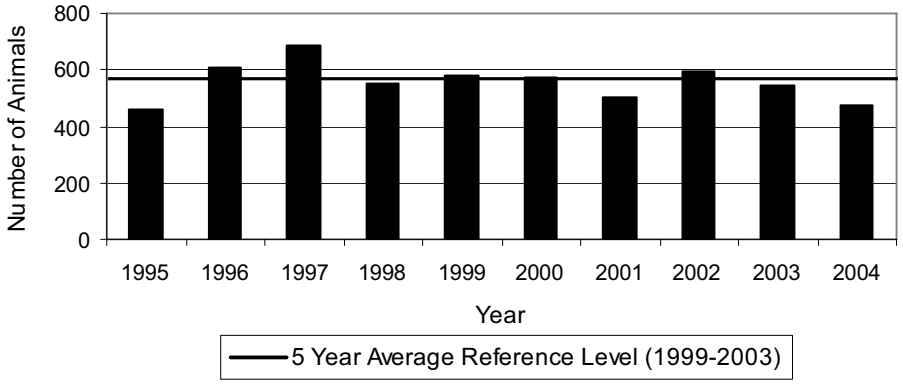
**Human**

No human cases of rabies were reported in Virginia during 2004. The last reported case was in 2003 in an adult male from the northern region who was infected with a raccoon rabies variant. Though no specific exposure could be determined, the case had lived and worked in an area with endemic raccoon rabies. This was the first instance of a raccoon variant human rabies infection reported in the United States.

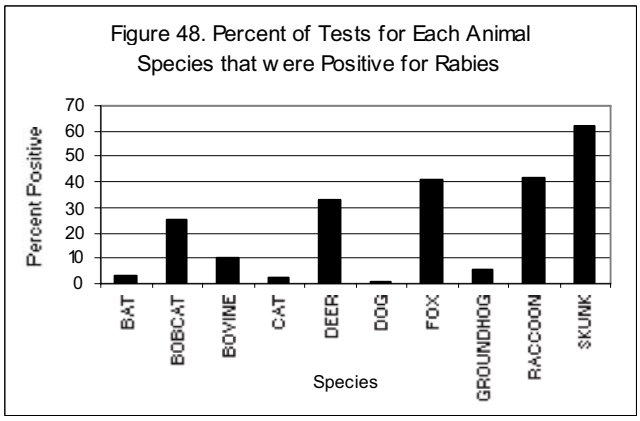
**Animal**

The number of animals testing positive for rabies decreased from 542 in 2003 to 474 in 2004 (Figure 47). Fairfax (including Fairfax County, Fairfax City, and Falls Church) reported the most positive animals (81, 17%), followed by Loudoun County (23, 4.8%). A total of 3,913 animals were tested for rabies.

Figure 47. Rabies in Animals: Ten Year Trend, Virginia, 1995-2004



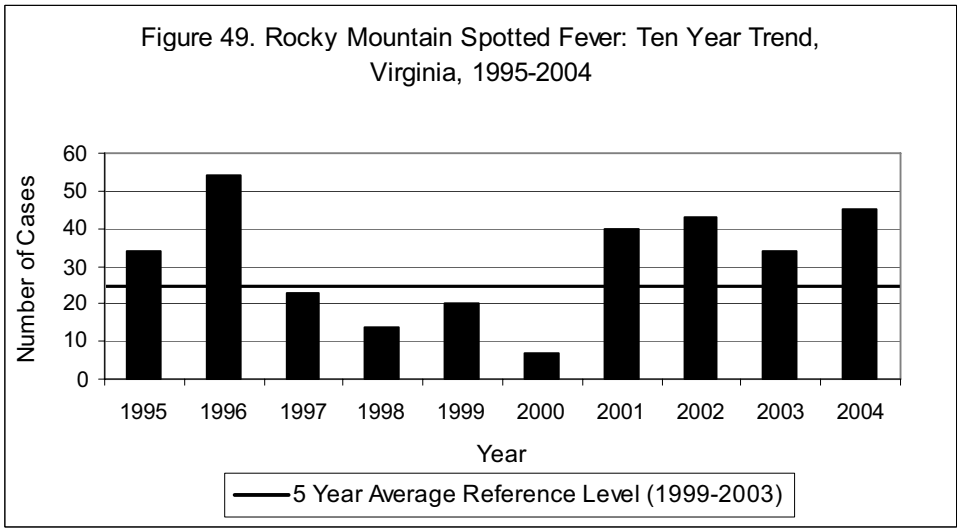
The most commonly tested animals included cats (1,118), raccoons (644), dogs (590), bats (514), opossums (208), skunks (143), and foxes (136). Of these tests, the number positive for rabies included 25 cats (2% of those tested), 267 raccoons (41%), 3 dogs (1%), 17 bats (3%), 89 skunks (62%), and 56 foxes (41%) (Figure 48). Human exposures were reported from 36 animal species and a total of 3,094 animals. The ratio of human exposures to rabid animals by species is: 13/17 rabid bats, 1/1 rabid bobcat, 12/10 rabid bovines, 58/25 rabid cats, 1/1 rabid deer, 2/3 rabid dogs, 33/56 rabid foxes, 1/5 rabid groundhog, 41/267 rabid raccoons, and 16/89 rabid skunks. A total of 473 people were reported to have received pre-exposure prophylaxis and 741 people were reported to have received post-exposure prophylaxis in Virginia in 2004.



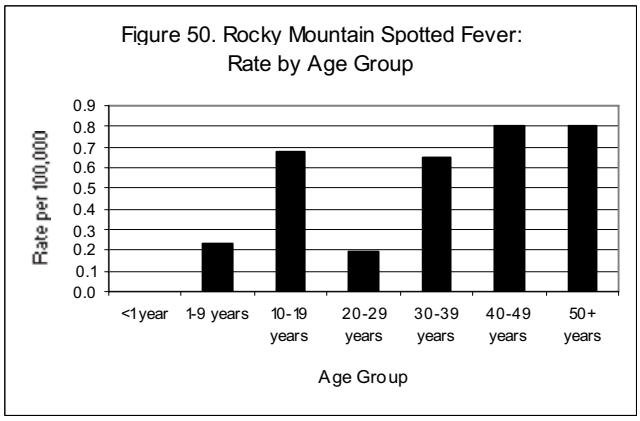

## Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is caused by *Rickettsia rickettsii*, a species of bacteria that is spread to humans by Ixodid (hard) ticks and is maintained in nature by the ticks. In Virginia, the common vector is the American dog tick, *Dermacentor variabilis*. Ticks need to be attached to humans for at least 4 to 6 hours to transmit infection. RMSF is the most severe tick borne illness reported in the United States. Initial signs and symptoms of the disease include sudden onset of fever, headache, and muscle pain, followed by development of rash. The disease can be difficult to diagnose in the early stages, and without prompt and appropriate treatment can be fatal.

There were 45 cases of RMSF reported in Virginia during 2004. This is a 32% increase over the 34 cases reported in 2003 (Figure 49). In order to be counted as a RMSF case, both serology and clinical data must be obtained on a patient. The large increase in cases in 2004 compared to previous years can be attributed to more thorough follow up on serology reports by health districts to acquire confirmatory clinical information.




Incidence rates were the highest for the 40-49 and 50 year and older age groups (0.8 per 100,000 each). This was followed by the 10-19 year age group with 0.7 cases per 100,000 population and the 30-39 year age group with 0.6 cases per 100,000 population (Figure 50). The white population had an incidence rate of 0.7 per 100,000, while the black and other race categories had rates of 0.1 per 100,000, each. The male population had an incidence rate twice that of the female population (0.8 versus 0.4 per 100,000, respectively). The northwest and central regions reported the highest incidence rate (0.8 per 100,000, each), followed by the eastern region with 0.7 per 100,000. Onset of cases occurred primarily (44%) during the third quarter of the year.




## Rubella

Rubella is a viral infection causing fever and rash. The rash is usually indistinguishable from several other infections, including measles, scarlet fever, and dengue fever. Children usually exhibit no other symptoms, but adults often experience a 1-5 day prodrome with low fever, headache, malaise, and conjunctivitis preceding the rash, followed by arthralgia and arthritis. Rubella is transmitted through contact with nose and throat secretions from infected people. It may also be transmitted from mother to child during pregnancy, causing congenital rubella syndrome (CRS) in the infant. Risk of CRS is 90% if the mother is infected during her first trimester; this decreases to 10%-20% with infections after the 16$^{th}$ week of pregnancy. CRS may cause congenital malformations or even fetal death. Infants with CRS shed large amounts of the virus from their throat and in their urine and can easily spread the disease to their contacts. Childhood vaccination against rubella is an important factor in controlling the spread of CRS.

No cases of rubella were reported in Virginia during 2004. The last case was reported in 1998.

**Congenital Rubella Syndrome**

No cases of congenital rubella syndrome (CRS) were reported in Virginia during 2004. One case was reported in 2001 in an infant whose mother was an immigrant from South America. That was the first reported case of CRS in Virginia since 1981.

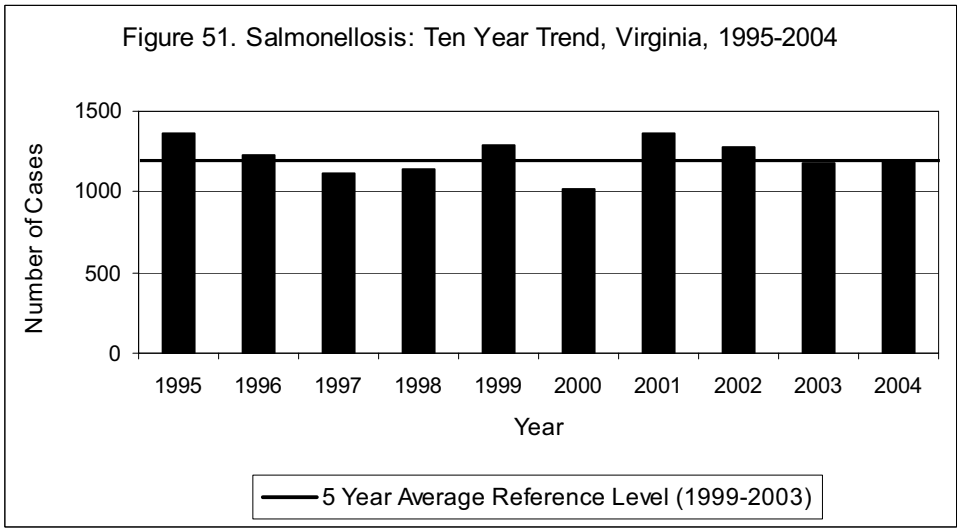
## Salmonellosis

Salmonellosis is an acute bacterial disease characterized by sudden onset of headache, fever, abdominal pain, diarrhea, and sometimes vomiting. Dehydration, especially in the elderly and young children, can be a severe complication. Although the mortality rate for this disease is very low, costs of morbidity can be high. Transmission occurs through ingestion of food from contaminated animals or food contaminated with infected animal or human feces (e.g., raw or undercooked eggs, unpasteurized milk, undercooked meat or poultry products), or direct person to person transmission. Infections may also occur from contact with pet turtles, iguanas, or chicks. Over 100 different *Salmonella* serotypes cause infections in animals and humans; *S.* ser. Typhimurium and *S.* ser. Enteritidis are the most common types reported nationally and in Virginia (Table 12).

**Table 12. Number and Percent of *Salmonella* Infections by Serotype, Virginia, 2004**

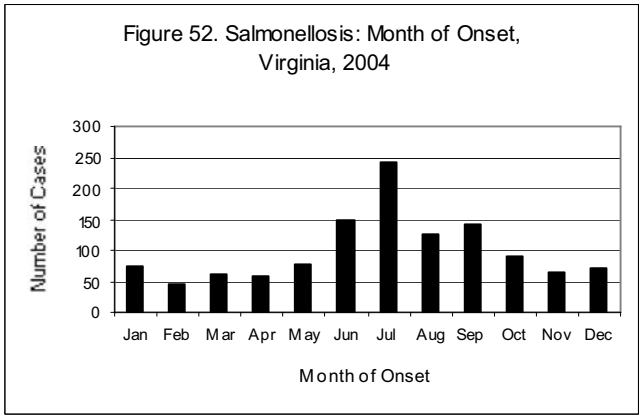
| Serotype Causing Infection | Number of Cases | Percent of Cases |
|---|---|---|
| *S.* ser. Typhimurium | 283 | 23.6 |
| *S.* ser. Enteritidis | 118 | 9.9 |
| *S.* ser. Newport | 107 | 8.9 |
| *S.* ser. Javiana | 79 | 6.6 |
| *S.* ser. Heidelberg | 41 | 3.4 |
| *S.* ser. Braenderup | 39 | 3.3 |
| *S.* ser. Saintpaul | 18 | 1.5 |
| *S.* ser. Muenchen | 14 | 1.2 |
| *S.* ser. Montevideo | 14 | 1.2 |
| *S.* ser. Bareilly | 14 | 1.2 |
| Unspecified | 245 | 20.5 |
| All Others | 210 | 17.6 |
| **TOTAL** | 1,196 | 100 |

There were 1,196 cases of salmonellosis reported in Virginia during 2004. This is similar to the 1,175 cases reported in 2003, and a slight decrease (2%) from the five year average of 1,225.2 cases per year (Figure 51). By far, the highest incidence rate was reported in infants (117.7 per 100,000). This was followed by the 1-9 year age group (29.9 per 100,000). The other age groups all reported similar rates of infection (between 11.4 and 12.9 per 100,000).




A slightly higher incidence rate was reported in the white population (10.8 per 100,000) than in the black population (9.2 per 100,000) and females had a slightly higher rate (16.3 per 100,000) than males (15.1 per 100,000).

The central, eastern and northwest regions reported the highest incidence rate (16.9, 16.5 and 16.4 per 100,000, respectively). This was followed by the northern region with 15.6 per 100,000 and the southwest region with 15.0 per 100,000. While cases occur throughout the year, there is a notable increase during the warmer months, with 43% of cases occurring during the third quarter of the year (Figure 52).




## Severe Acute Respiratory Syndrome (SARS)

Severe acute respiratory syndrome was first recognized in February 2003. The disease manifests as a severe respiratory infection and can include gastrointestinal symptoms. SARS is caused by a coronavirus (SARS-associated coronavirus or SARS-CoV) and may have originated in China. SARS may be transmitted via close contact, and primarily spreads when an infected person sneezes or coughs. The period of communicability is not yet known. From the limited number of persons who have been infected with SARS, the case-fatality rate seems to range from 1% to greater than 50%, and varies by age. Between February and July of 2003, six outbreaks were recognized in Canada, China (including Hong Kong), Singapore, and Vietnam. A total of 8,098 people worldwide were reported infected and 774 died, yielding an overall case-fatality rate of 10%. Although transmission was mainly isolated within hospitals and between family members,

cases were carried throughout the world via major airplane travel routes. In the United States, eight people had laboratory evidence of SARS-CoV infection.

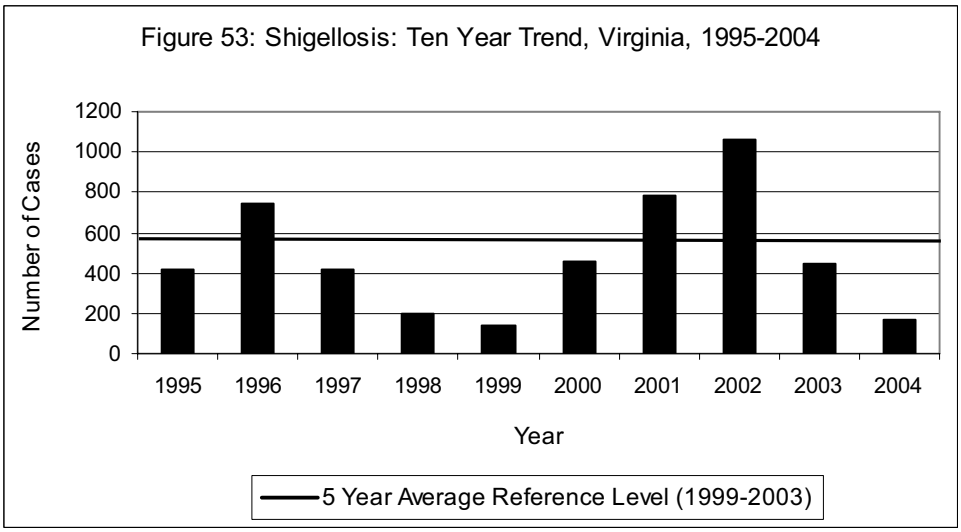
One case of SARS was confirmed in Virginia during the outbreaks in 2003. The case was a female in the 50 years and older age group who had traveled to Taiwan, Malaysia and Singapore in the four weeks before onset of symptoms. Her exposure most likely occurred in Singapore, where she had contact with persons ill with SARS. No cases of SARS were reported in Virginia during 2004.

## Shigellosis

Shigellosis is an acute bacterial disease characterized by diarrhea, fever, and sometimes vomiting and nausea. While four different species of this bacterium exist, one species, *Shigella sonnei,* predominates in the United States and Virginia and typically causes mild illness. The disease occurs through fecal-oral transmission from person to person transmission or ingestion of contaminated food or water. The major preventive measure for shigellosis is a thorough washing of hands and fingernails after defecation. Infections may be asymptomatic, and carriers are able to transmit disease. Most of the cases, and deaths, occur in children under 10 years of age. Severe infections with seizures have been associated with children less than two years of age. Secondary infection (e.g. from a child to a family member) can be as high as 40%. Outbreaks are most likely to occur in institutional settings with poor hygiene practices such as day care centers, prisons, or mental hospitals.

There were 167 cases of shigellosis reported in Virginia during 2004. This is a 63% decrease from the 451 cases reported in 2003, and a 71% decrease from the five year average of 578.4 cases per year (Figure 53).

Figure 53: Shigellosis: Ten Year Trend, Virginia, 1995-2004




The 1-9 year age group had the highest incidence rate (61 cases, 6.9 per 100,000). The other age groups had rates between 0.7 per 100,000 (50 year and older) and 4.0 per 100,000 (infants). Race data were missing for 27% of reports. Among reports with a reported race, the black population

had a higher rate (2.0 per 100,000) than the white population (1.1 per 100,000). Males had a higher rate than females (2.5 versus 1.9 per 100,000, respectively). By region, the highest incidence rate (4.0 per 100,000) was reported in central Virginia, followed by 3.6 per 100,000 from the northern region. Other regions reported rates between 0.8 and 1.4 per 100,000. A seasonal trend was observed; the largest proportion of cases (41%) occurred during the third quarter of the year.

## Smallpox

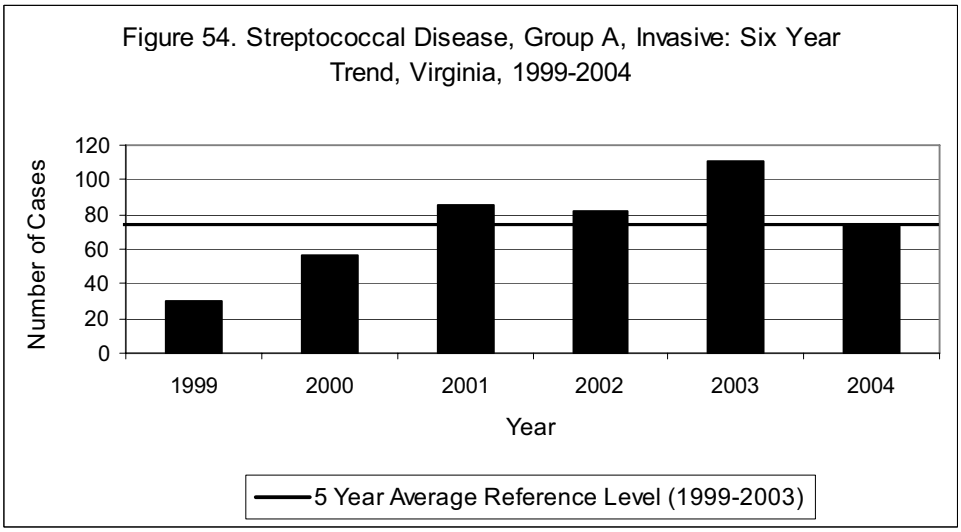
Smallpox is a viral disease characterized by a sudden onset of fever, discomfort, headache, weakness and exhaustion, severe backache, and the development of a rash consisting of lesions with infectious virus. The lesions progress through several stages until becoming scabs and falling off 3-4 weeks after the rash first appears. The smallpox rash first appears on the face and extremities, especially the palms and soles, and then the trunk. Transmission occurs through respiratory droplets or inoculation of the skin from direct contact with contaminated body fluids or objects (e.g., bedding). Two clinical types of smallpox exist, variola major and variola minor. Variola major is the most serious disease; unvaccinated populations experienced case-fatality rates of 20% to 50%. A massive effort to eradicate smallpox in the first part of the 20$^{th}$ century allowed the World Health Organization to declare the disease eradicated from the world in 1979. However, there is some concern that smallpox may be used as a bioterrorism agent. For this reason, smallpox is listed as a group A bioterrorism agent by the CDC (i.e., it is easily disseminated or transmitted from person to person; has a high mortality rate; has the potential for major public health impact; and requires special action for public health preparedness).

The last case of smallpox in Virginia occurred in 1944.

## Streptococcal Disease, Group A, Invasive

Group A streptococci (GAS) are bacteria that can be found in the throat or on the skin of many people without signs or symptoms of disease. Most infections are relatively mild (e.g., skin infection). However, GAS can occasionally become invasive (i.e., the bacterium infects normally sterile sites such as blood, muscle, or the lungs) and cause life-threatening infections such as necrotizing faciitis or streptococcal toxic shock syndrome (STSS). Even with appropriate medical therapy patients with necrotizing faciitis and STSS are at a high risk of death. Transmission of invasive GAS generally occurs when the bacteria enter through breaks in the skin, or when a person has a decreased ability to fight off infection.

Seventy-four cases of GAS, invasive were reported in Virginia during 2004. This is a 33% decrease from the 111 cases reported in 2003, but similar to the five year average of 73 cases per year (Figure 54). In 2004, no cases were reported with streptococcal toxic-shock syndrome. One case was reported with necrotizing fasciitis.




The highest incidence rate was reported in the less than one year age group (4.0 per 100,000), followed by the 50 year and older age group (2.1 per 100,000). The other age groups all had rates less than 0.9 per 100,000. The white and black populations had similar incidence rates (0.9 and 1.0 per 100,000, respectively), and females and males had the same incidence rate (1.0 per 100,000, each). The northwest region reported the greatest number of cases and highest incidence rate (22 cases, 2.0 per 100,000). Most cases occurred during the first and second quarters of the year (28 cases in each quarter).

## ***Streptococcus pneumoniae*, Invasive, in Children Less than 5 Years of Age**

*Streptococcus pneumoniae*, invasive disease is an acute lower respiratory tract infection that leads to a sudden onset of high fever with chills and myalgia, pleural pain, difficulty breathing, rapid breathing, and a productive cough. If meningitis results from disease, neurological damage and learning disabilities may also occur. Pneumococcal pneumonia is the most common community-acquired pneumonia in the United States, and is an important cause of death in infants. Before the advent of the pneumococcal conjugate vaccine, invasive disease affected 21-33 people per 100,000 in the United States; however, in 2002 this number decreased to 13 cases of invasive disease per 100,000. Transmission is person to person and occurs via droplet spread, direct contact with oral secretions, or contact with clothing soiled with respiratory discharge of infected patients. In Virginia, invasive *Streptococcus pneumoniae* in children less than five years of age is required to be reported.

Thirty-five cases of *S. pneumoniae* were reported in Virginia during 2004. This is a 30% increase over the 27 cases reported in 2003 and the third consecutive increase in cases reported since 2001. More cases (11) were reported in infants (11.0 cases per 100,000 population) than in children between 1-4 years of age. The black population had a higher incidence rate (9.0 per 100,000) than the white population (5.5 per 100,000). Males also had a higher rate of *S. pneumoniae* (7.9 per 100,000) than females (6.2 per 100,000). The eastern region had the highest incidence rate (12.8 per 100,000), followed by the northwest region (9.0 per 100,000). Cases occurred throughout the year, but peaked during the fourth quarter.

## Syphilis

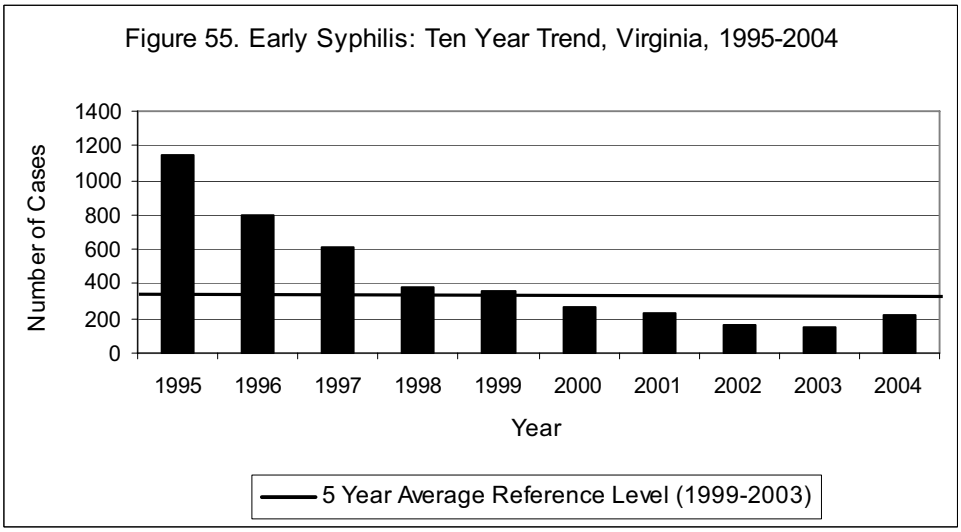
Syphilis is caused by infection with a spirochete, which is transmitted primarily through sexual intercourse, but also may be spread from mother to child through the placenta and via blood transfusion from an infected donor in the early stage of disease. Approximately 30% of exposed individuals will become infected. The incubation period extends from 10 days to three months, but is usually three weeks. Syphilis is characterized by different stages of infection. The primary stage is characterized by a chancre and the secondary stage includes a skin rash, lesions of the mucous membranes, and other symptoms such as fever and swollen lymph glands. Early infections may be treated with antibiotics. If untreated, symptoms will resolve and the disease will become latent, a stage in which no symptoms appear. In late syphilis, the central nervous system may become sufficiently damaged to cause death. Symptoms of this late stage may include difficulty coordinating muscle movements, paralysis, numbness, gradual blindness, and dementia.

### Early Syphilis

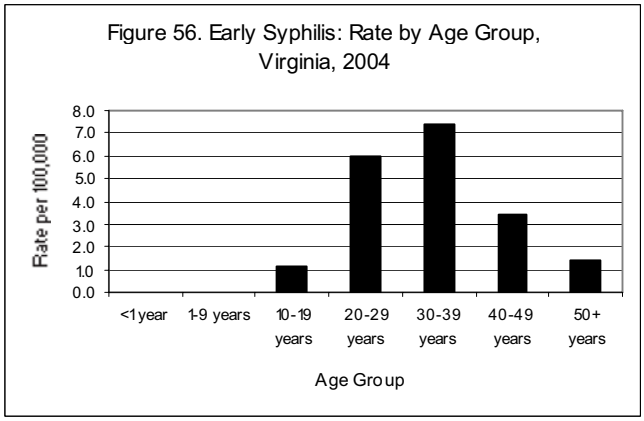
Early syphilis includes primary, secondary and early latent syphilis cases diagnosed within one year from the time of infection.

There were 224 cases of early syphilis reported in Virginia during 2004. This is a 44% increase from the 156 cases reported in 2003, but a 6% decrease from the five year average of 237.2 cases per year (Figure 55).

Figure 55. Early Syphilis: Ten Year Trend, Virginia, 1995-2004




The highest incidence rate was reported in the 30-39 year old age group (7.4 per 100,000), followed by the 20-29 year age group with 6.0 per 100,000 (Figure 56). The incidence in the black population was more than six times that in the white population (8.8 versus 1.4 per 100,000) and the rate in males (5. 3 per 100,000) was 6.6 times that of females (0.8 per 100,000). The eastern region had the highest rate (5.8 per 100,000), followed by the northern region (3.4 per 100,000).




In addition to the early syphilis cases discussed above, 380 cases of late syphilis were reported in Virginia in 2004.

**Congenital Syphilis**

Three cases of congenital syphilis were reported in Virginia during 2004. One case each was reported in the black, white, and Hispanic populations. There were two females and one male. Two cases were reported from the eastern region and one from the northwest.

## Tetanus

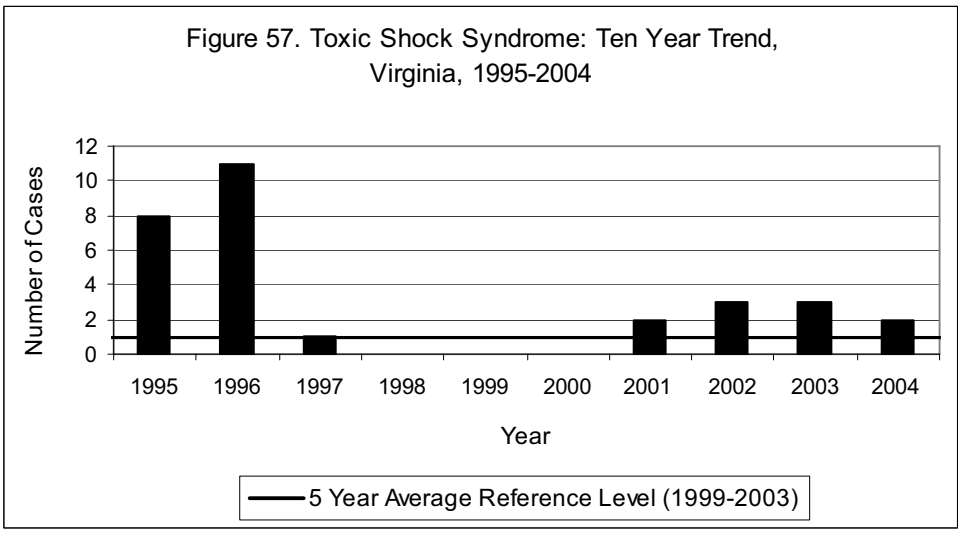
Tetanus is an acute disease caused by a toxin secreted by the bacteria *Clostridium tetani.* Symptoms include painful muscle contractions, particularly of the neck muscles. In older children and adults, a first sign may be abdominal rigidity. Generalized muscle spasms also occur, especially of the face. The case-fatality rate of tetanus ranges from 10% to 80% and depends on the length of incubation and the availability of experienced medical personnel. Tetanus spores exist everywhere in the environment; the disease is usually transmitted when contaminated soil, dust, or animal or human feces infect a wound. Infections have occurred for wounds thought to be too trivial to seek medical care. Tetanus vaccine is available as part of the diphtheria/tetanus/pertussis (DTaP) vaccine for children under seven years of age.

One case of tetanus was reported in Virginia during 2004. The case was a white female in the 50 year and older age group, from the eastern region. Prior to 2004, the last reported case of tetanus in Virginia occurred in 1998.

## Toxic Shock Syndrome

This section summarizes reports of toxic shock syndrome (TSS) due to *Staphylococcus aureus,* or non-streptococcal TSS (Streptococcal TSS is discussed under the Streptococcal Disease, Group A, Invasive section). Non-streptococcal toxic shock syndrome is a severe disease with acute onset of high fever, vomiting, watery diarrhea, myalgia, and eventual hypotension and shock in severe cases. Rash can also be present during the acute phase of illness, usually 1-2 weeks after infection. At least three organ systems are usually involved (e.g., gastrointestinal, muscular, renal, or hepatic). Toxin-producing *S. aureus* has been associated with most cases of TSS. The majority of early cases were reported in women during menses; however, in recent years usually only 55% of cases are reported to be among women of child-bearing age.

Two cases of TSS were reported in Virginia during 2004, a slight decrease from the 3 cases reported in 2003 (Figure 57). One case each was reported in the 10-19 year age group and the 40-49 year age group. Both of the cases were white, one was female and one was male. One case was reported from the northwest region and one was reported from the eastern region.




## Toxic Substance-Related Illness

Toxic substance-related illnesses include adverse health affects resulting from exposure to toxic substances normally found in the workplace or in the home. The threat to human health from a toxic substance is dependent on the amount and duration of exposure. Toxic substances can cause serious disease or even death. Several substances, such as asbestos and arsenic, have been linked to cancer. Toxic substance-related illness data in Virginia are gathered from laboratories (diagnostic tests for heavy metals exposure), physicians, worker compensation claims, and death certificates.

During 2004, 317 incidents of adult toxic substance-related illness were reported in Virginia. The three most frequently reported toxic substance-related illnesses were: asbestosis (76 cases, 24%) and coal worker's pneumonia (115 cases, 36%). Twelve cases (4%) of pneumoconiosis were reported. Among those with pneumoconioses (including coal workers pneumonia), 87% worked in the coal mining industry.

## Trichinosis

Trichinosis is caused by roundworms that infect the intestines when undercooked contaminated meat (including bear, pork, wild feline (such as a cougar), fox, dog, wolf, horse, seal, or walrus) is eaten. Signs and symptoms include nausea, diarrhea, vomiting, fatigue, fever, and abdominal discomfort. Headaches, fevers, chills, cough, eye swelling, aching joints and muscle pains, itchy skin, diarrhea, or constipation may follow. The offspring of the ingested parasites migrate to the host's muscles where they encyst (become enclosed in a capsule). Individuals may be asymptomatic, but severe infections can cause death.

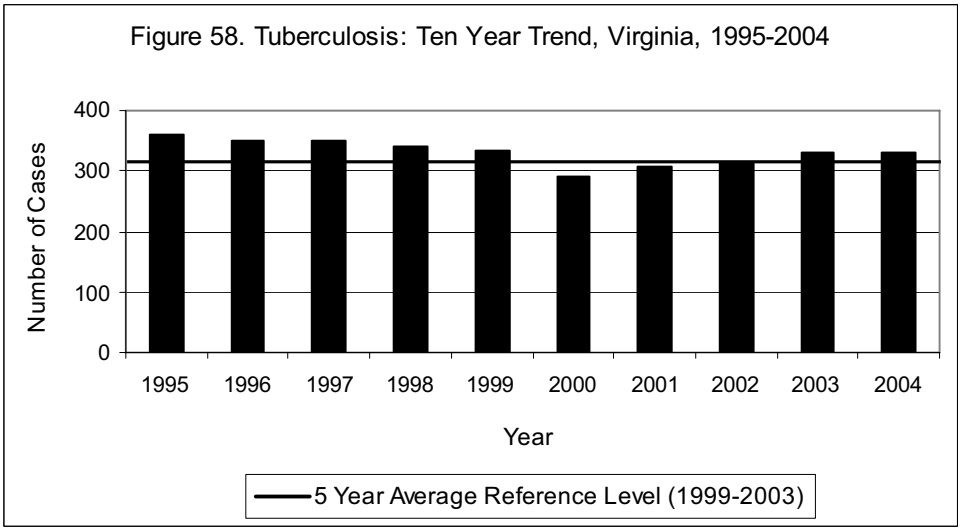
One case of trichinosis was reported in Virginia during 2004 in a 10-19 year old from the northern region. No data on race or sex were reported.

## Tuberculosis

Tuberculosis (TB) is a mycobacterial disease with an initial infection that usually goes unnoticed. About 10% of those infected with TB will go on to develop active disease, and 90% of those who develop active disease do so within the first two years after infection. Antibiotic treatment during the latent TB phase greatly reduces the risk of developing active TB. Active TB may be extra-pulmonary or pulmonary (most common). The organism can affect all organs, but most commonly affects the lungs, pleura, lymph nodes, pericardium (the lining around the heart), kidneys, bones, and joints. In untreated active TB, 65% of patients die within 5 years. Transmission occurs via respiratory droplets when infected patients with active pulmonary or respiratory tract infections exhale the tubercle bacilli (e.g., through coughing, singing, or sneezing). The tuberculin skin test is useful for detecting infection 2 to 12 weeks after exposure.

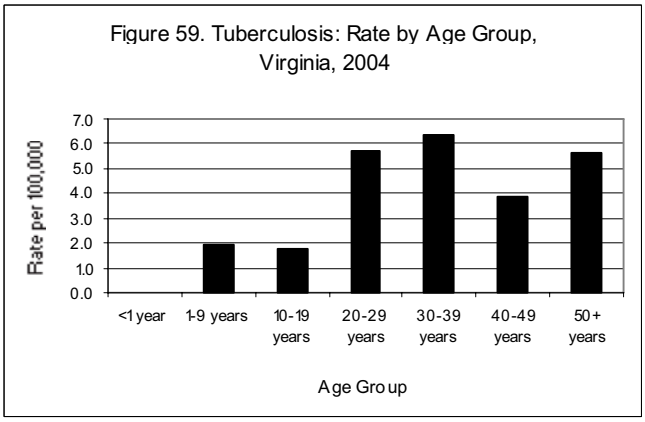
The number of tuberculosis cases reported in 2004 decreased slightly, from 332 reported in 2003 to 329 reported in 2004, though this is a 4% increase over the five year average of 315.8 cases per year (Figure 58).

Figure 58. Tuberculosis: Ten Year Trend, Virginia, 1995-2004



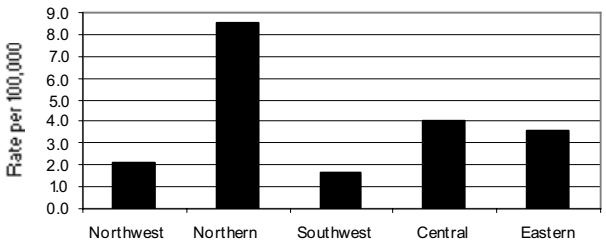

The highest incidence rate occurred in the 30-39 year age group with 6.4 cases per 100,000 population, followed by the 20-29 year age group (5.7 per 100,000) and the 50 year and older age group (5.6 per 100,000). No cases were reported in infants (Figure 59). By race, the highest incidence rate was reported in the black population (6.7 per 100,000), followed by the other race category (3.8 per 100,000) and the white population (0.9 per 100,000). Females and males had similar rates of infection (4.3 and 4.5 per 100,000, respectively).

Figure 59. Tuberculosis: Rate by Age Group, Virginia, 2004



Among Virginia's tuberculosis cases, 66% were foreign born, an increase of 4% from 2003. Before 2000, less than 50% were born outside the United States. The northern region reported the highest number of cases and infection rate (168 cases, 8.5 per 100,000), of which 92% were foreign born (Figure 60). In the other regions, the proportion of cases that were foreign born ranged from 18% to 62%. Eleven cases (3%) were resistant to at least one first-line drug.

Figure 60. Tuberculosis: Rate by Region, Virginia, 2004




## Tularemia

Tularemia is a potentially serious illness caused by the bacterium *Francisella tularensis,* which is found in animals, especially rabbits, hares and rodents. Transmission to humans occurs via bites from infected arthropods; through inoculation of the skin, conjunctival sac or oropharnygeal mucosa with contaminated water, blood or tissue while handling infected carcasses (e.g., skinning, dressing or performing necropsies); by handling or ingesting insufficiently cooked meat of infected animals; by drinking contaminated water; by inhalation of dust from contaminated soil, grain or hay; and from contaminated animal pelts and paws. Signs and symptoms vary depending on the mode of transmission, but usually include sudden onset of high fever, chills, fatigue, general body aches, headache and nausea. Pneumonia may complicate the disease and requires prompt identification and specific treatment to prevent development of serious illness. Tularemia is on the list of level A bioterrorism agents because a small number of organisms can cause infection and because the organism is easily aerosolized.

No cases of tularemia were reported in Virginia during 2004, compared to 4 cases reported in 2003 and the five year average of 1.6 cases per year.

## Typhoid Fever

Typhoid fever is caused by infection with the bacterium *Salmonella typhi,* which produces a sustained fever, headache, malaise, anorexia, fast heart rate, enlarged spleen and a non-productive cough. With antibiotic treatment the case-fatality rate is around 1%. After acute or even sub-clinical illness, a chronic carrier state may develop in up to 5% of infected individuals, especially if they are infected during middle age. Typhoid fever can be contracted through the ingestion of food or water contaminated with the feces or urine of infected individuals in the acute or chronic stage.

Eleven cases of typhoid fever were reported in Virginia during 2004. This is 31% decrease from the 16 cases reported in 2003 and a 24% decrease from the five year average of 14.4 cases per year. The highest incidence rate was reported in the 1-9 year age category (0.5 per 100,000). The other age categories reported between 0 and 0.2 cases per 100,000 population. The majority

(55%) of reports were missing race data. Females and males reported similar rates (0.1 and 0.2 per 100,000, respectively). Cases were reported from the central region (0.3 cases per 100,000 population) and the northern region (0.4 cases per 100,000 population). The largest proportion of cases (36.4%) had onset dates during the third quarter of the year.

## Typhus

"Typhus fever" can refer to any one of three different illnesses caused by three distinct rickettsial bacteria species, epidemic (louse-borne), endemic (flea-borne), or scrub (mite-borne) typhus. These disease are rare in the United States.

No case of typhus were reported in Virginia during 2004. The last case was flea-borne typhus reported in 1993.

## Vaccinia, Disease or Adverse Event

The vaccinia (cowpox) virus is used in the vaccine for smallpox because it helps the body develop immunity to smallpox. The vaccinia virus may cause rash, fever, and head and body aches. In certain groups of people, complications from the vaccine virus can be severe and can even cause death. In the past, about 1 out of every 1,000 people who received the vaccine reported serious side effects. Life-threatening conditions are experienced by 14-52 people out of 1 million vaccinated, and 1-2 out of every 1 million vaccinated individuals may die from these complications. When smallpox is not known to be circulating in the environment, the risk from vaccine complications is greater than the known risk for contracting the disease. For that reason, only laboratory workers who handle smallpox and certain health care workers are recommended to receive the smallpox vaccine. People with deficient immune systems, pregnant women, or those with certain skin conditions should not receive the vaccine unless they are exposed to smallpox.

Vaccinia became a reportable disease in Virginia in 2003. No cases of vaccinia were reported during 2004.

## Vancomycin-Resistant *Staphylococcus aureus* Infection

*Staphylococcus aureus* bacteria are commonly found in the nose and skin of normal, healthy people and are one of the most common causes of skin infections in the United States. Many staphylococcal infections do not require the use of antibiotics, but serious illness requiring the use of antibiotics may occur. Over the years, some *S. aureus* bacteria have become resistant to antibiotics, including vancomycin. Fortunately, all vancomycin-resistant *Staphylococcus aureus* (VRSA) organisms isolated to date have been susceptible to other types of drugs. Most people who have developed VRSA infections thus far have had risk factors making them susceptible to VRSA infection. These include underlying health problems, previous exposure to methicillin-resistant *Staphylococcus aureus*, body tubes, recent hospitalization, or recent exposure to vancomycin. It is important to continue surveillance of VRSA; if organisms that are resistant to

methicillin also become resistant to vancomycin, then there will be little means of fighting severe staphylococcal infections.

No cases of VRSA infection have ever been reported in Virginia.

## *Vibrio* Infection

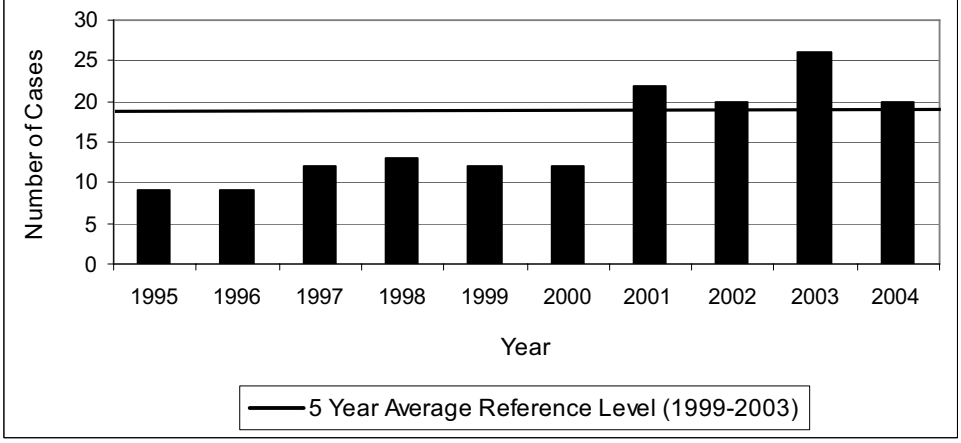
*Vibrio* infections can be caused by a number of different serotypes of this bacterium. The most commonly reported serotypes in Virginia are *V. parahaemolyticus* and *V. vulnificus*.

*V. parahaemolyticus* is found in brackish saltwater and is generally transmitted by eating undercooked, contaminated shellfish, or, less often, through contact of an open skin wound with warm, contaminated seawater. Infection with *V. parahaemolyticus* causes watery diarrhea, usually with abdominal cramping, nausea, vomiting, fever and chills. Symptom onset occurs within 24 hours of infection, and the disease is self-limiting. However, severe illness may result in persons with weakened immune systems.

*V. vulnificus* generally produces septicemia in people with chronic liver disease, alcoholism, hemochromatosis (a disorder of iron metabolism), or the immunocompromised. For these individuals, infection usually occurs from eating raw or undercooked shellfish. In healthy people, the disease is transmitted through open skin wounds that have come in contact with estuary waters. Mild, self-limiting lesions are the primary symptoms, but rapidly progressive cellulitis may also develop.

There were 20 cases of *Vibrio* infection reported in Virginia during 2004. This is a 23% decrease from the 26 cases reported in 2003 (Figure 61). Among the 20 *Vibrio* cases, 6 cases were caused by *V. parahaemolyticus*, 4 were *V. vulnificus* and 10 were other unspecified species of *Vibrio*. Wounds were the site of infection for 7 cases (35%).

Figure 61. *Vibrio* Infections: Ten Year Trend, Virginia, 1995-2004



The 10-19 year age group and 50 year and older age group both had incidence rates of 0.4 per 100,000. The 30-39 and 40-49 year age groups followed with 0.3 cases per 100,000 population. The black and white populations had similar rates of infection (0.1 and 0.2 per 100,000, respectively). Males had twice the infection rate (0.4 per 100,000) as females (0.2 per 100,000). Almost half of the cases were reported from the eastern region (9 cases, 0.5 per 100,000) between the months of July and September.

**Cholera**

*V. cholerae* may also be found in Virginia waters. *V. cholerae* infection causes profuse watery diarrhea, vomiting, and leg cramps. Although some infections can be mild or asymptomatic, 1 in 20 patients develop serious disease. With severe dehydration from excessive diarrhea a person can die within a few hours. Without proper treatment, the case-fatality rate can be as high as 50%; however, simple and timely rehydration lowers this to 1%. *V. cholerae* infection is acquired through ingestion of contaminated food or water. Water becomes contaminated by the feces of infected persons, and can contaminate foods. Unclean hands can also contaminate food during preparation or eating.

No reported cases of cholera occurred in Virginia during 2004. The last case of cholera in Virginia occurred in 1994.

## Viral Hemorrhagic Fever

Viral hemorrhagic fever (VHF) refers to a group of illnesses that are caused by several distinct families of viruses, *Arenaviruses, Filoviruses*, *Bunyaviruses*, and *Flaviviruses*. These are all RNA viruses, and their survival is dependent on animal or insect hosts, which act as natural reservoirs for the virus, depending on the specific virus type (e.g., *Arenaviruses* depend on rodents and *Bunyaviruses* depend on arthropods). Humans are not the natural reservoir for any of these viruses, but can be infected when they come into contact with urine, fecal matter, saliva, or other body secretions of a natural host. After the accidental transmission to humans from the host, some viruses can then be transmitted from person to person. VHF does not naturally occur in Virginia.

In general, the term "viral hemorrhagic fever" describes a severe multisystem syndrome, particularly vascular system damage. This often leads to hemorrhage. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many of these viruses cause severe, life-threatening disease. Due to the severity of disease and highly infectious nature of some VHF agents (e.g., Ebola; Marburg; Lassa fever; New World *Arenaviruses* such as Junin, Machupo, Guanarito, and Sabia; Rift Valley fever; Yellow fever; Omsk hemorrhagic fever; and Kyasanur Forest disease), they are considered leading potential agents for bioterrorism (i.e., CDC Category A).

No cases of VHF have ever been reported in Virginia.

## Yellow Fever

Yellow fever is a viral disease transmitted between humans by infected *Aedes* mosquitoes and occurs only in Africa and South America. In South America sporadic infections occur almost exclusively in forestry and agricultural workers from occupational exposure in or near forests. Yellow fever is a very rare cause of illness in travelers, but most at-risk countries have regulations and requirements for yellow fever vaccination for that must be met prior to entering the country. General precautions to avoid mosquito bites should be followed. The disease manifests itself with varying levels of severity. Typical first symptoms include a sudden onset of fever, chills, headache, backache, generalized muscle pain, prostration, nausea, and vomiting. Jaundice is usually mild in early disease but intensifies later on. After a brief period of remission, some cases may progress to a life-threatening illness. Twenty percent to 50% of cases with jaundice are fatal.

No cases of yellow fever have been reported in Virginia since the nineteenth century.

## Yersiniosis

Yersiniosis is an infection caused by bacteria in the genus *Yersinia* (most commonly *Y. enterocolitica* in the U.S.). Transmission occurs by eating raw or undercooked contaminated food, especially pork products, and drinking unpasteurized milk or contaminated water. Infants can also contract the disease from their caretakers if the caretakers do not properly clean their hands after handling contaminated pork. Signs and symptoms of infection vary depending on the age of the infected person. In children, fever, abdominal pain, and bloody diarrhea generally occur, while the predominant signs and symptoms in adults include right-lower quadrant pain and fever. Most infections occur during the winter.

Ten cases of yersiniosis were reported in Virginia during 2004. The majority of cases were reported in infants (7 cases, 7.0 per 100,000). Among the eight cases with a reported race, all were white. The same number of cases (5) was reported for males and females. Five cases were reported form the southwest region, two each were reported from the eastern and northwest, and one was reported from the central region. Most cases (70%) occurred during the fourth quarter of the year.