

# The State of Missourians' Health



Lewis and Clark Trail Head, Jefferson City, Mo.  
Photo Credit: Missouri Division of Tourism



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## Executive Summary

*The State of Missourians' Health* provides a comprehensive yet concise assessment of the health status of Missouri residents. It highlights the biggest health challenges and opportunities for prevention at each stage of life. Many of the burdens of disease, disability and premature death in our state result from conditions that are preventable. Promoting good health in infancy, childhood and adolescence creates a strong foundation for health throughout the lifespan. Positive changes in health habits, earlier screening and detection of problems and effective management of chronic conditions can enhance the quality of life at each age.

*Key findings of this report include:*

### Key Population Health Indicators

Of the 10 key population health indicators, Missouri fared better than the nation in only health insurance coverage, and fared worse in the other indicators (infant mortality, life expectancy at birth, overall death rate, death rates in the top five leading causes, years of potential life lost, poverty, obesity, smoking and child immunization coverage).

### Population

Between 2000 and 2009, Missouri's population grew by 7 percent. Of all racial and ethnic groups, Hispanics had the fastest growth rate at 70 percent. The number of Missourians age 55-64 years increased by 35 percent.

### Health of Infants and Children (0-9 Years of Age)

- In 2009, 93 percent of Missouri children less than 10 years of age had some type of health insurance. This was higher than the national percentage of 91 percent.

- In 2009, Missouri's infant mortality rate was 7.2 per 1,000 live births. African-American infants were more than twice as likely to die as white infants. More than 60 percent of Missouri infant deaths in 2009 (356 infants) resulted from problems that occurred before or during birth, or during the first 27 days of life.
- Missouri's death rate for children age 1-9 years has been higher than the nation as a whole. Unintentional injuries, cancer and homicide are the top three causes of death for children. African-American children are at a higher risk of death than white children.
- In 2009, 63 percent of Missouri children between the ages of 19 and 35 months received their basic immunization series against diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, Haemophilus influenzae type b, and hepatitis B compared to the national rate of 72 percent.
- In 2009, over 6,732 child maltreatment cases were substantiated by the Missouri Department of Social Services Children's Division. Of those, neglect was the most common problem.
- In 2008, asthma was responsible for 11.1 emergency room visits per 1,000 children age 0-9 years. The rate for African-American children age 0-9 years was six times that of white children.
- The number of children found with elevated blood lead levels has been declining despite increased testing in Missouri. About 45 percent of the children with elevated blood lead levels were found in city of St. Louis.

## Health of Missouri's Adolescents (10-17 Years of Age)

- Missouri adolescents have a somewhat higher death rate than the U.S. as a whole, mainly due to a much higher death rate from unintentional injuries. In 2009, about a quarter of all deaths among Missouri adolescents were caused by motor vehicle crashes.
- The proportion of Missouri adolescents who are overweight is growing rapidly. African-American youth are more likely to be overweight than white youth.
- About one in five Missouri adolescents in grades 9-12 currently smokes cigarettes, although the prevalence has been trending slowly downward since 1997. White adolescents are more likely to smoke than African-American adolescents.
- Almost one in four Missouri teens in grades 9-12 reported that they drank heavily during the last month, although this figure has declined in recent years. White adolescents are almost twice as likely as African-American adolescents to have had heavy drinking during the past month.
- One in five Missouri teens in grades 9-12 uses marijuana, and one in 10 use an inhalant.
- Hospitalizations for mental disorders are particularly high among African-American children age 15-17 years, where health care visits have been increasing steadily since 2000. The rate of emergency room visits have been increasing for both races over the same period.
- African-American teens have a considerably higher birth rate than white teens, although the gap is narrowing.

- About half of Missouri students in grades 9-12 have had sexual intercourse. The percentage of African-American students that have had sexual intercourse is significantly greater than white students.

## Health of Missouri's Adults (18-64 Years of Age)

- In 2009, 21 percent of Missouri adults had no health insurance.
- Missouri adults 18-64 years of age have had a higher death rate than the U.S. rate, and the rate has been markedly higher for African-Americans than for whites. The ten leading causes of death in 2009 were cancer, heart disease, unintentional injuries, suicide, chronic lower respiratory disease, diabetes, stroke, homicide, chronic liver disease and cirrhosis, and septicemia.
- More than one in five Missouri adults 21-64 years of age has a disability that limits their normal way of living.
- More than 5 percent of Missouri adults have doctor-diagnosed diabetes; the prevalence is higher among African-American adults than among white adults.
- Lung cancer causes more deaths than any other type of cancer among male and female adults. Of all newly diagnosed cancers (excluding skin cancer), breast cancer is most common among adult women, whereas prostate cancer is most common among adult men.
- Over a quarter of Missouri adults are current smokers. The rate is higher than the U.S. rate for both African-American and white adults.



- About one in three Missouri adults is obese. Missouri's obesity rate is higher than the U.S. rate for both African-American and white adults.
- About half of Missouri adults are not getting the recommended amount of moderate or vigorous physical activity. More than 80 percent of Missouri adults consume less than the recommended five servings per day of fruits and vegetables.
- One in four Missouri adults has doctor-diagnosed arthritis. Women are more likely to have doctor-diagnosed arthritis than men.
- Suicide was the fourth leading cause of death among Missourians 18-64 years of age in 2009. Hospitalizations for mental disorders are second only to hospitalizations for pregnancy and childbirth among 25-44 year-olds. Drug-induced deaths have increased more than 150 percent over the past decade.
- Chlamydia is the most common type of sexually transmitted disease (STD), and it has been on the rise in recent years. Gonorrhea is the second most frequently reported STD. The number of reported primary and secondary syphilis cases in Missouri adults generally increased from 2000 to 2007, and has decreased through 2009. The rate of reported STDs are much higher in African-Americans than in whites.
- In 2009, 92 Missouri adults died of human immunodeficiency virus infection/acquired immunodeficiency syndrome (HIV/AIDS), down from 164 in 2000.

## Health of Missouri's Seniors (65 Years of Age and Over)

- The death rate among Missouri seniors is higher than the U.S. rate. Leading causes of death in 2009 included heart disease, cancer, chronic lower respiratory disease, stroke, Alzheimer's disease, pneumonia and influenza, and kidney disease.
- In 2009, about 19 percent of Missouri seniors had doctor-diagnosed diabetes.
- About one in 10 Missouri seniors is a current smoker. Many seniors are former smokers.
- One in four Missouri seniors is obese, and the prevalence has been on the rise. Obesity prevalence is much higher among African-Americans than among whites.
- Nearly two-thirds of Missouri seniors are not getting the recommended amount of moderate or vigorous physical activity. More than 73 percent of seniors consume less than the recommended five servings per day of fruits and vegetables.
- In 2009, about 55 percent of Missouri seniors reported that they had doctor-diagnosed arthritis.
- Of all newly diagnosed cancers (excluding skin cancer), breast cancer is most common among senior women, whereas prostate cancer is most common among senior men.
- Pneumonia and influenza combined were the sixth leading cause of death for Missouri seniors in 2009.
- Unintentional injuries were the eighth leading cause of death among Missouri seniors, and the second leading cause of hospitalizations. The two most

common types of unintentional injuries are falls and motor vehicle crashes.

- About 110,000 Missourians are estimated to have Alzheimer's disease, which was the fifth leading cause of death for seniors in 2009.
- More than half of Missouri seniors have lost six or more teeth. Only about two-thirds of seniors had their teeth cleaned by a dentist or dental hygienist in the last year.
- The elderly and disabled comprise 27 percent of all MO HealthNet (Medicaid) enrollees but account for 64 percent of all expenditures.
- In 2008 an estimated \$6.299 billion was spent for Medicare benefit payments in Missouri.

## Infectious Diseases in Missouri

- Significant progress has been made in controlling infectious diseases during the 20th century through improvements in sanitation and hygiene, use of antibiotics and universal childhood vaccination. However, major challenges still remain.
- In 2009, leading causes of death due to infectious diseases in Missouri were pneumonia and influenza, septicemia, viral hepatitis and HIV/AIDS.
- About 12 percent of hospitalizations for Missourians were due to infections. The most common infectious causes of hospitalizations in 2008 were pneumonia, septicemia and infections of the skin and subcutaneous tissue.
- The most frequently reported infectious diseases in Missouri in 2009 were chlamydia, gonorrhea and laboratory-confirmed influenza.

- In 2009, the most reported foodborne diseases in Missouri were shigellosis, campylobacteriosis and salmonellosis.

## Missouri's Health Care System

- Missouri has many excellent health care facilities, but not all areas of the state have ready access to such facilities.
- Many areas of Missouri have been designated as primary care or dental Health Professional Shortage Areas (HPSAs). People who live in these areas do not have optimal access to primary care physician services or dental services.
- The public health system in Missouri consists of the state health department and 114 local public health agencies (LPHAs) in cities and counties throughout the state.
- About 38 percent of Missouri infants and children less than 5 years of age are enrolled in WIC.

## Surveillance and Data Gaps

- Missouri has many good surveillance and data systems that provide valuable information about people's health. However, several key surveillance and data systems need to be strengthened or developed to better assess and monitor the health of Missourians. These include systems to monitor diet and nutrition, obesity and other chronic conditions, occupational health, environmental health, oral health, and the health care system.

# Chapter 1:

## Key Population Health Indicators

Ten key indicators give us a “snapshot” of Missourians’ health and a way of comparing ourselves with the United States as a whole. Missouri fared better in only health insurance coverage and was worse in infant mortality, life expectancy at birth, death rate, leading causes of death (except diabetes), years of potential life lost, poverty, obesity, smoking and child immunization coverage.



## Infant Mortality

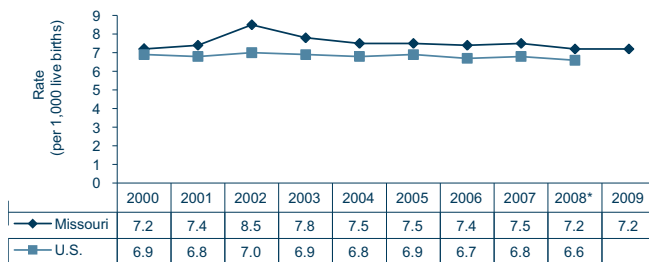
The infant mortality rate (IMR) is an important overall health indicator of a population. The death of an infant is also a tragic occurrence. Missouri's overall IMR (number of deaths divided by the number of live births) has been consistently higher than the national rate since 1996. Similar to national rates, Missouri's IMR increased between 2000 and 2002 but then trended downward to a rate of 7.2 in 2009 (Figure I-1). In 2009, 564 infants whose mothers lived in Missouri died.<sup>1</sup>

African-American infants have been more than twice as likely as white infants to die before their first birthday in both Missouri and the U.S. African-American infants in

Missouri experienced a higher mortality rate than those in the U.S. throughout the last decade (Figure I-2).

In 2009, 356 (63 percent) of the 564 infant deaths in Missouri resulted from problems that occurred before or during birth, or during the first 27 days of life. These problems included complications of pregnancy, labor and delivery; premature birth; disorders of fetal growth; birth trauma and infections. Congenital anomalies (commonly called birth defects) caused 123 deaths, and Sudden Infant Death Syndrome (SIDS) caused 30 deaths.<sup>1</sup>

**Figure I-1. Infant mortality rate, Missouri and the U.S., 2000-2009**

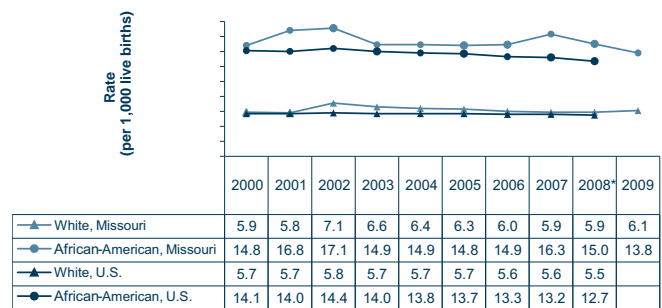


Source (Missouri): DHSS, Missouri Vital Statistics 2000-2009, Table 24

Source (U.S.): CDC, National Center for Health Statistics

\* Preliminary data for the U.S., 2008

**Figure I-2. Infant mortality rate by race, Missouri and the U.S., 2000-2009**



Source (Missouri): DHSS, Missouri Vital Statistics 2000-2009, Table 24

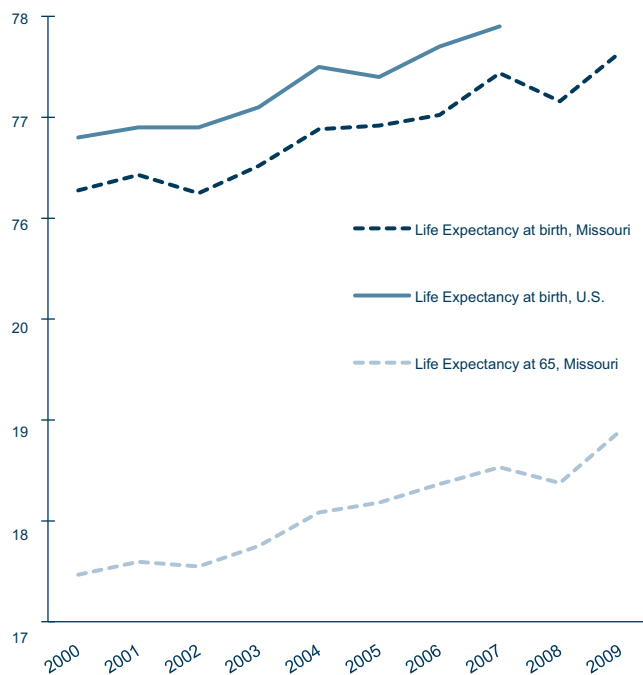
Source (U.S.): CDC, National Center for Health Statistics

\* Preliminary data for the U.S., 2008

## Life Expectancy

Life expectancy increased gradually during the last decade, in both Missouri and the nation. Missouri babies born in 2009 are expected to live for 77.6 years.<sup>2</sup> The 2007 life expectancy for Missourians (77.4 years) was approximately six months shorter than that of all U.S. residents (77.9 years)<sup>3</sup> (Figure I-3). In 2009, Missourians who attained the milestone of their 65th birthday could expect to live 18.9 more years (to 83.9 years) (Figure I-3). This was an increase from 17.5 years of life expectancy for persons age 65 in 2000.

**Figure I-3. Life expectancy (LE) at birth, and at age of 65 years, Missouri and the U.S., 2000-2009**



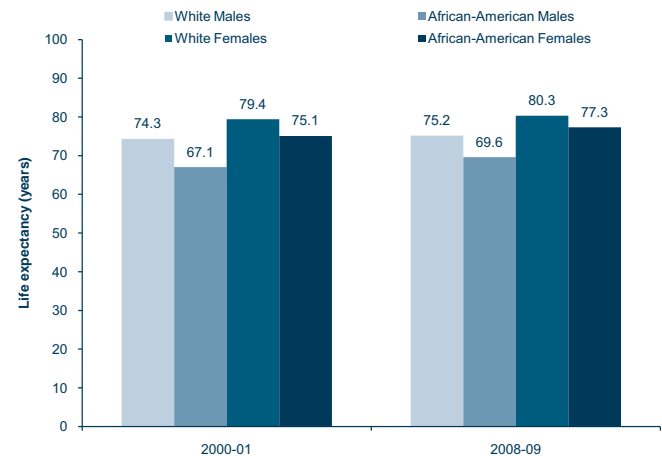
Source (Missouri): DHSS, Bureau of Health Informatics

Source (U.S.): CDC, National Center for Health Statistics, *Health, United States 2009*, accessed February 2011

\* 2008-2009 life expectancy data for the U.S. have not yet been released.

Women enjoy greater longevity than men, regardless of race. Missouri African-Americans have a considerably shorter life expectancy than whites for both sexes (by 5.5 years for men and 3.0 years for women in 2008-2009), although this racial gap in life expectancy has narrowed in recent years, especially among women (Figure I-4).

**Figure I-4. Life expectancy at birth by race and sex, Missouri residents, 2000-01 and 2008-2009**



Source: DHSS, Bureau of Health Informatics



## Overall Death Rate and Leading Causes of Death

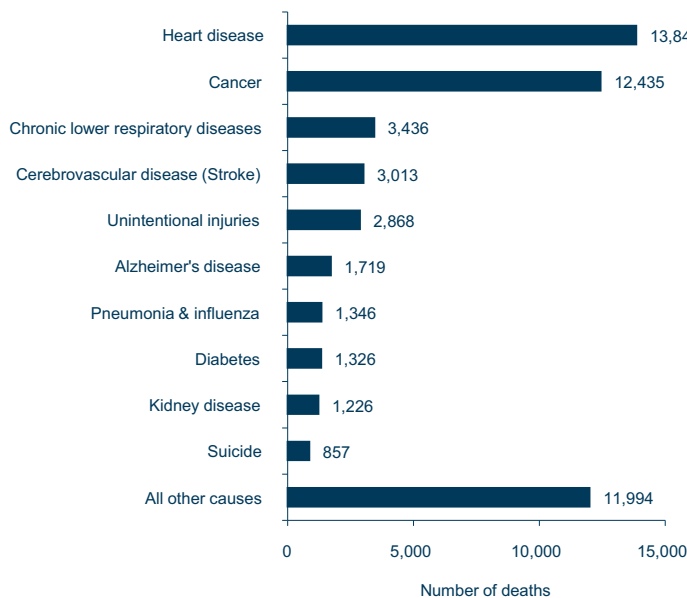
In 2009, 54,064 Missourians died. Almost half of these deaths were caused by heart disease (25.6 percent) and cancer (23.0 percent). Other major causes included chronic lower respiratory tract diseases, stroke, diabetes and unintentional injuries (including motor vehicle and other accidents) (Figure I-5).

Compared with U.S. figures, Missouri's overall age-adjusted death rate in 2007 (823 per 100,000 people<sup>4</sup>) was higher than the nation as a whole (804 per 100,000).<sup>5</sup> Missouri's rates for many leading causes of death, including heart disease, stroke, chronic lower respiratory tract disease, and unintentional injuries, were at least somewhat higher than the national rates,

although death rates for diabetes were actually slightly lower (22 in Missouri and 24 for the U.S.).<sup>3, 4</sup>

As with most of the key health indicators, African-Americans fare worse than whites. In 2009, the overall age-adjusted death rate for Missouri African-Americans was 942 per 100,000, compared with 792 per 100,000 for whites. The top two causes of death for both races were heart disease and cancer, but chronic lower respiratory disease was third for whites, while stroke was third for African-Americans. In addition, homicide and septicemia were among the top 10 causes only for African-Americans, and Alzheimer's disease and suicide were in the top 10 only for whites.

Figure I-5. Leading causes of death, Missouri residents, 2009

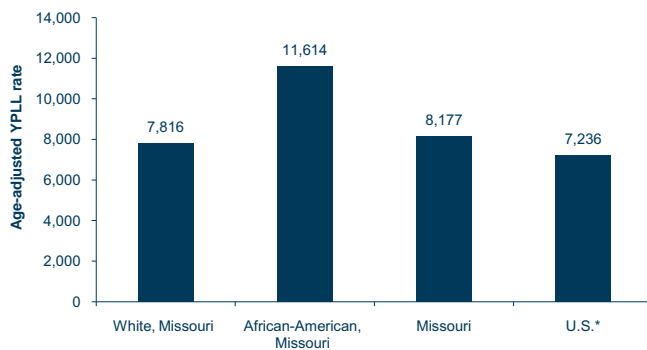


Source: DHSS, Missouri Vital Statistics 2009, Table 19

## Years of Potential Life Lost (YPLL)

One measure of the impact of premature death is years of potential life lost (YPLL). YPLL is a count of the number of potential years lost for each person who died before the age of 75, which is then expressed as a rate. In 2009, there were 8,177 years of potential life lost for every 100,000 Missouri residents.<sup>6</sup> This is higher than the latest available U.S. rate (2007) of 6,792 YPLL per 100,000 people.<sup>7</sup> Missouri African-Americans (11,614 YPLL) experienced a higher rate than whites (7,816 YPLL) (Figure I-6).

**Figure I-6. Age-adjusted YPLL rate (per 100,000 population less than 75 years of age), Missouri and the U.S.,\* 2009**



Source: CDC, National Center for Injury Prevention and Control, WISQARS YPLL Report

\* U.S. rate is 2007



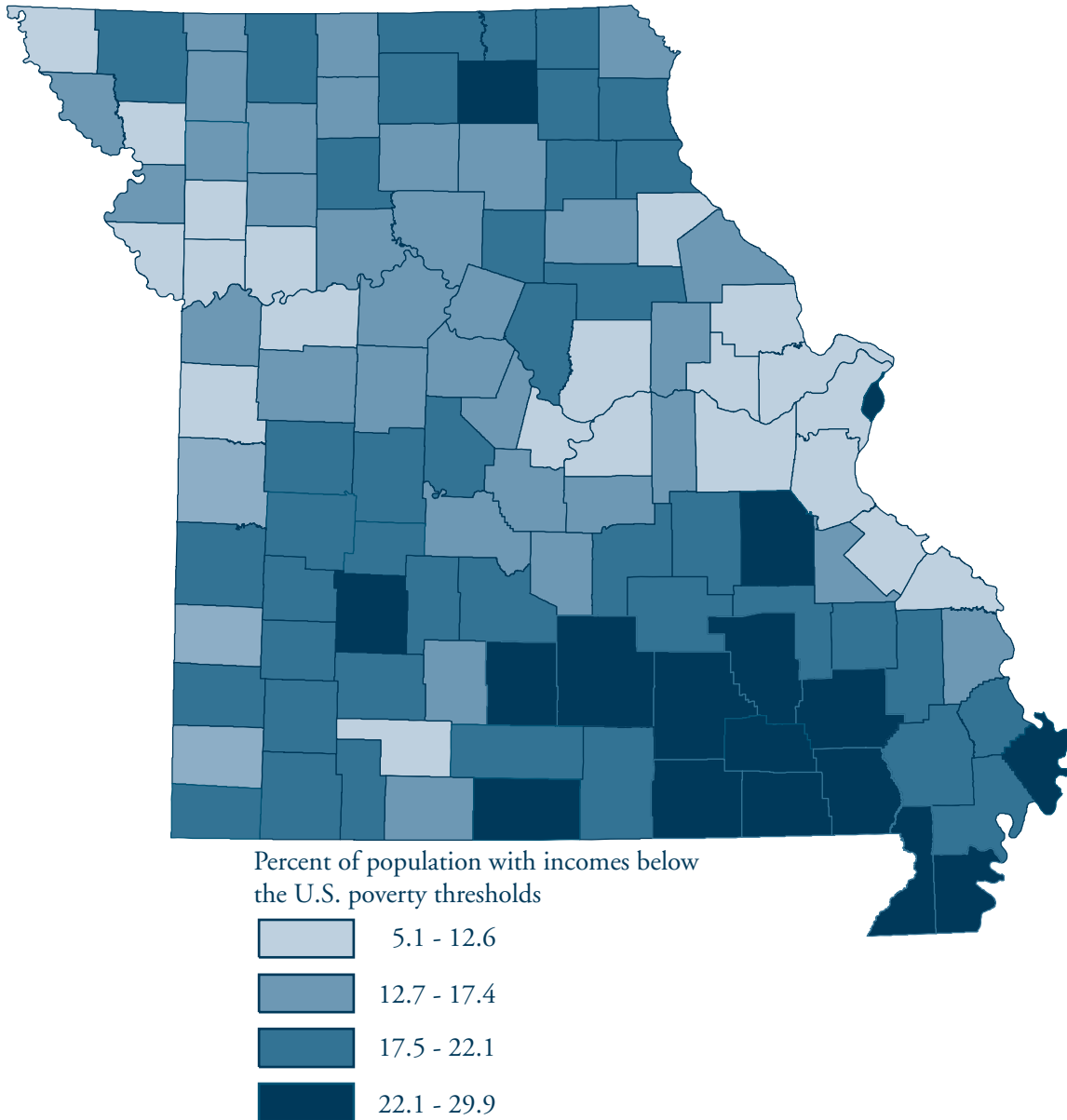
## Poverty

The rate of poverty in a population is an important indicator of health, because poor people are more likely to have health problems. Poverty level is defined based on the number of people living in a household. For example, the 2009 federal poverty threshold for a family of one adult under 65 years old is annual income of \$11,161. For a family of two adults and two children it is \$21,756.<sup>8</sup>

The U.S. Census Bureau reports that in 2009 there were an estimated 850,316 (14.6 percent) Missourians living below the poverty level. This is higher than the national figure of 14.3 percent.<sup>9</sup> Poverty is distributed very unevenly within the state. In 2009, poverty rates ranged from only 5.1 percent in St. Charles County to 29.9 percent in Shannon County (Figure I-7). Overall, the 2009 poverty rate is over twice as high among Missouri African-Americans (27.8 percent) as among whites (12.5 percent).



Figure I-7. Estimated poverty rate (%) by county, Missouri, 2009



Source: U.S. Census Bureau, Small Area Income and Poverty Estimates Branch

## Obesity

Obesity is on the rise in Missouri, and contributes to serious health problems, including heart disease and stroke, two of the leading causes of death. Being overweight or obese also increases the risk of hypertension, high blood cholesterol, diabetes, and many other diseases and conditions. The prevalence of obesity among Missouri adults has more than doubled since 1990, consistent with the national trend. Obesity is defined according to body mass index (BMI), which is a person's weight (in kilograms) divided by his or her height (in meters) squared. For example, a person who weighs 203 pounds (92 kilograms) and is 5'9" tall (1.75 meters) has a BMI of 30.0. A person with a BMI of 30.0 or more is considered to be obese. Missouri's obesity prevalence has been consistently higher than the national prevalence in the last decade. A steady upward trend was observed for both Missouri and the U.S. during 2000-2009. In 2009, more than 30 percent of Missouri adults, age 18 or older, were obese (Figure I-8). African-American adults had a higher rate of obesity than white adults (42.5 percent vs. 29.7 percent in 2009).<sup>10</sup>

**Figure I-8. Prevalence of obesity\* among adults 18 years and older, Missouri and the U.S., 2000-2009**



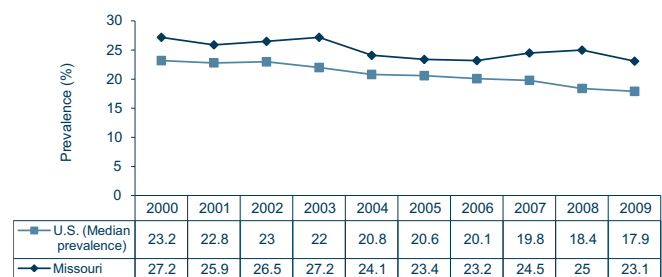
Source: Behavioral Risk Factor Surveillance System  
\*Body mass index (BMI) of 30 or more

## Tobacco Use

Smoking damages nearly every organ in the human body, causing many diseases and harming the user's general health. It damages the immune system and increases the risk of infections. Smokers are much more likely to suffer from coronary heart disease, the leading cause of death in Missouri and the U.S. Smoking also causes many types of cancer, most notably lung cancer.<sup>11</sup> Smoking is estimated to be responsible for one of every five deaths in Missouri.<sup>12</sup>

The proportion of Missourians who are current smokers is higher than that in the U.S., and has been consistently higher since at least 1990. In 2009, 23.1 percent of Missouri adults, 18 years and older, smoked cigarettes, compared with 17.9 percent nationally (Figure I-9).

**Figure I-9. Prevalence of current smokers\* among adults 18 years and older, Missouri and the U.S., 2000-2009**



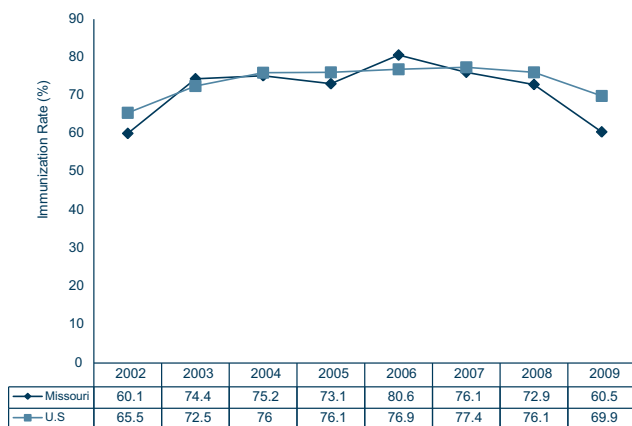
Source: Behavioral Risk Factor Surveillance System  
\*All respondents who have ever smoked 100 cigarettes in their lifetime and reported smoking every day or some days.



## Childhood Immunization Coverage

Immunization helps protect young children in Missouri against potentially deadly childhood diseases. The percentage of children in Missouri and throughout the U.S. who received immunizations against diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, Haemophilus Influenzae Type B, Hepatitis B and varicella steadily increased from the beginning of the last decade until the mid-2000's (Figure I-10). However, a decline in more recent years has been observed in Missouri and on the national level with only 60.5 percent of Missouri children up to date on these vaccinations (4:3:1:3:3:1 series) in 2009, a 25 percent decrease from 2006.

**Figure I-10. Estimated vaccination coverage for the 4:3:1:3:3:1\* vaccination series among children 19-35 months of age, Missouri and the U.S., 2002-2009**



Source: National Immunization Survey

\*4:3:1:3:3:1 series includes  $\geq 4$  doses of DTP/DT/DTaP,  $\geq 3$  doses of poliovirus vaccine,  $\geq 1$  doses of any measles-containing vaccine,  $\geq 3$  doses of Hib vaccine,  $\geq 3$  doses of hepatitis B vaccine, and  $\geq 1$  doses of varicella vaccine.



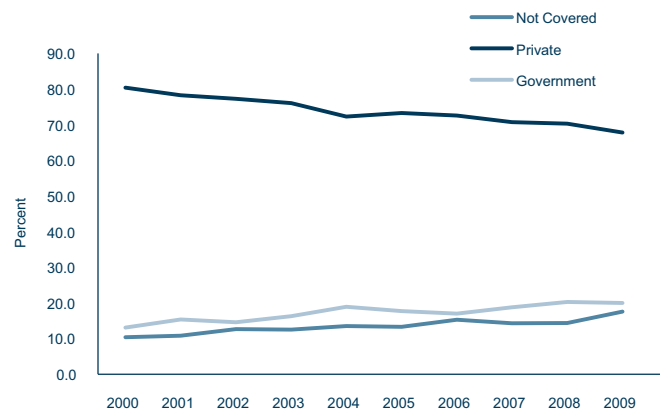
## Health Insurance Coverage

Health insurance coverage is important to maintaining health. Uninsured adults and children are less likely to receive preventive health services and often delay seeking medical care when they are sick. As a result, many serious medical conditions are identified late and are more costly to treat. Uninsured people have higher rates of avoidable hospitalizations and emergency room use.<sup>10, 11</sup>

According to the 2010 Current Population Survey, 15.3 percent of Missourians had no health insurance coverage for 2009, compared with 16.7 percent nationally.<sup>13</sup> The rate was 17.6 percent for people under 65 years of age, compared with 18.8 percent nationally. A higher percentage of Missouri's African-American residents (25 percent) have no health insurance coverage, compared to whites (14 percent).

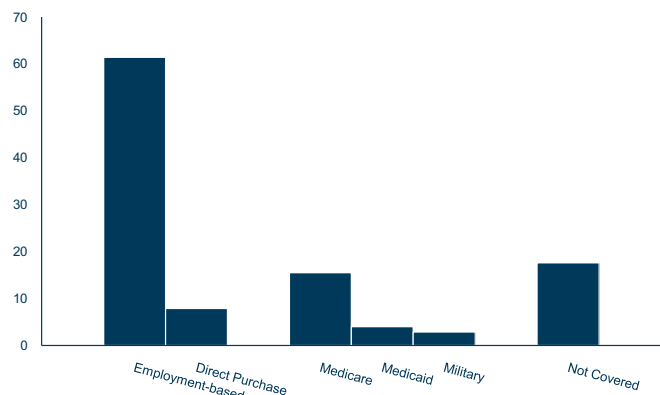
Most Missourians under age 65 receive their health care coverage through private health insurance (from an employer, a union or direct purchase). However, private insurance coverage declined from 80 percent of residents under age 65 in 2000 to 68 percent in 2009 (Fig I-11). About 61 percent of persons under age 65 received their health insurance through their employment (Figure I-12). Only 7.9 percent purchased individual insurance. As the percent of residents with private insurance dropped over the last decade, the percent of those with government-covered insurance has risen, as has the percent of residents not covered by any health insurance. In 2009, government health care plans (Medicaid, Medicare, or military health care) covered 20.0 percent of Missourians under age 65, with 15.5 percent covered by Medicaid (Figure I-12). All of these figures reflect coverage for at least part of the year.

**Figure I-11. Health insurance coverage status,\***  
Missouri residents under age 65, 2000-2009



Source: U.S. Census Bureau, Current Population Survey  
\*Some residents have more than one type of insurance, thus the percentages do not total 100 percent.

**Figure I-12. Health insurance coverage type,\***  
Missouri residents under age 65, 2009



Source: U.S. Census Bureau, Current Population Survey  
\*Some residents have more than one type of insurance, thus the percentages do not total 100 percent.

## Chapter 2: Missouri's Population

To understand the state of Missourians' health, it is helpful to have some basic facts about the people who live here. Health status is related to many demographic factors, including age, race, ethnicity, educational attainment and socioeconomic status. Who we are affects how healthy we are as a group.

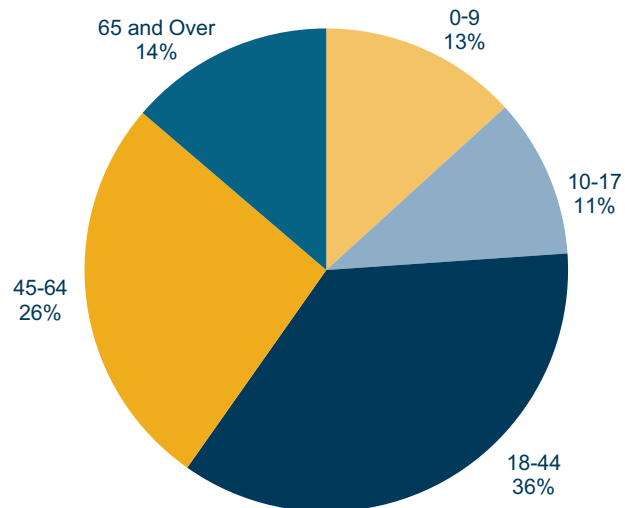


## Age

According to the U.S. Census 2009 population estimates, Missouri has 5,987,580 residents, representing about 2 percent of the U.S. population.<sup>1</sup> About 36 percent (2,146,845) of Missourians are adults aged 18 to 44 years; an additional 26 percent (1,586,972) are older adults aged 45 to 64 years. Together, these two age groups make up 62 percent of the population. The age distribution of Missouri's population is shown in Figure II-1. It is similar to the age distribution of the U.S. as a whole, although Missouri's median age is slightly older than the U.S. median age (37.6 years vs. 36.8 years for the U.S.).<sup>2</sup> Missouri also has a higher proportion of people aged 65 years and older (13.7 percent for Mo. vs. 12.9 percent for U.S.).



Figure II-1. Population estimates by age (years), Missouri, 2009

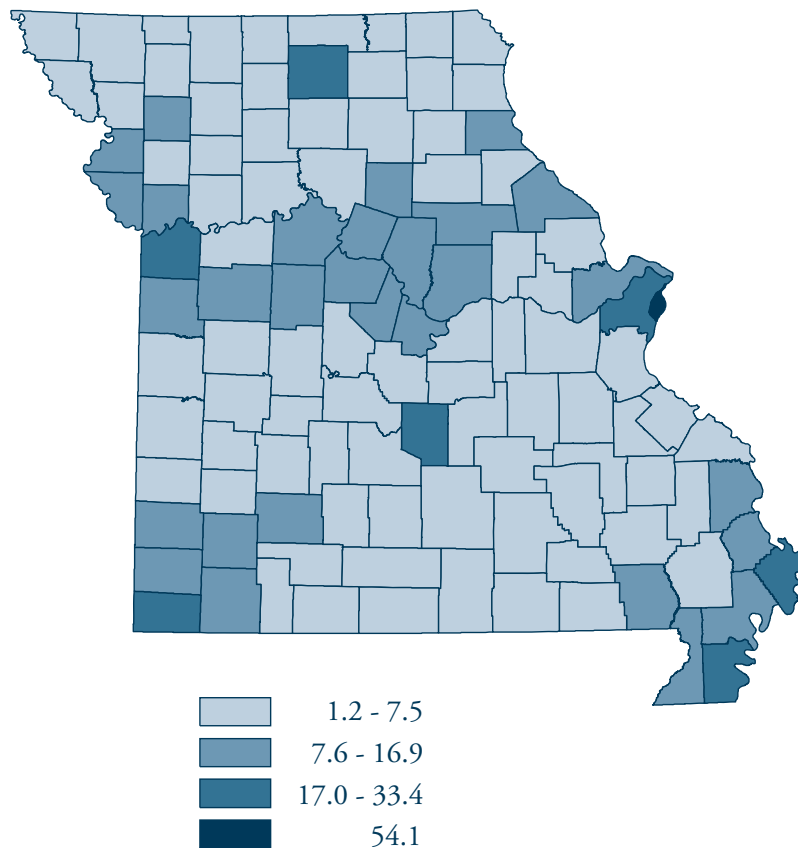


Source: DHSS, Population MICA (Missouri Information for Community Assessment)

Missouri has a relatively large African-American population and a small but growing Hispanic population. Racial and ethnic minorities make up a somewhat smaller proportion of Missouri's population than that of the U.S. as a whole. In 2009, 11.9 percent of Missourians were African-American and 2.4 percent were other non-white races.<sup>1</sup> For the U.S., these figures were 13.4 percent and 6.2 percent, respectively. The

Hispanic population in Missouri comprises 3.4 percent of the total population, which is much lower than the national percentage of 15.8 percent. The proportion of racial and ethnic minorities varies widely in different areas of the state, from a low of 1.2 percent of the population in Mercer County to 54.1 percent in St. Louis City (Figure II-2).

**Figure II-2. Racial and ethnic minority population (%), by county, Missouri, 2009**



Source: CDC, National Center for Health Statistics, Bridged-Race Population Estimates (Vintage 2009)

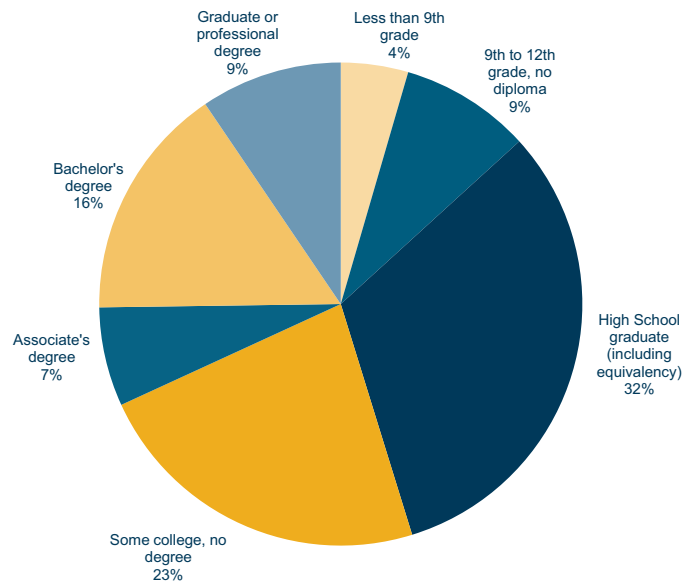


## Education

Another factor that influences health is educational attainment, shown in Figure II-3. The proportion of Missourians with at least a high school diploma is 86.8 percent, compared with 85.3 percent nationally.<sup>2</sup> However, the proportion of residents with a bachelor's degree or higher is somewhat lower in Missouri, 25.2 percent compared with 27.9 percent nationally.

Educational levels vary in different areas of Missouri, as shown in Figure II-4. A cluster of 16 counties in southeast Missouri had the lowest high school graduation rates in 2009. In that cluster, 25 percent to 33 percent of the population did not have a high school diploma or equivalent. The highest high school graduation rates in the state are found in the urban areas and those counties with universities.

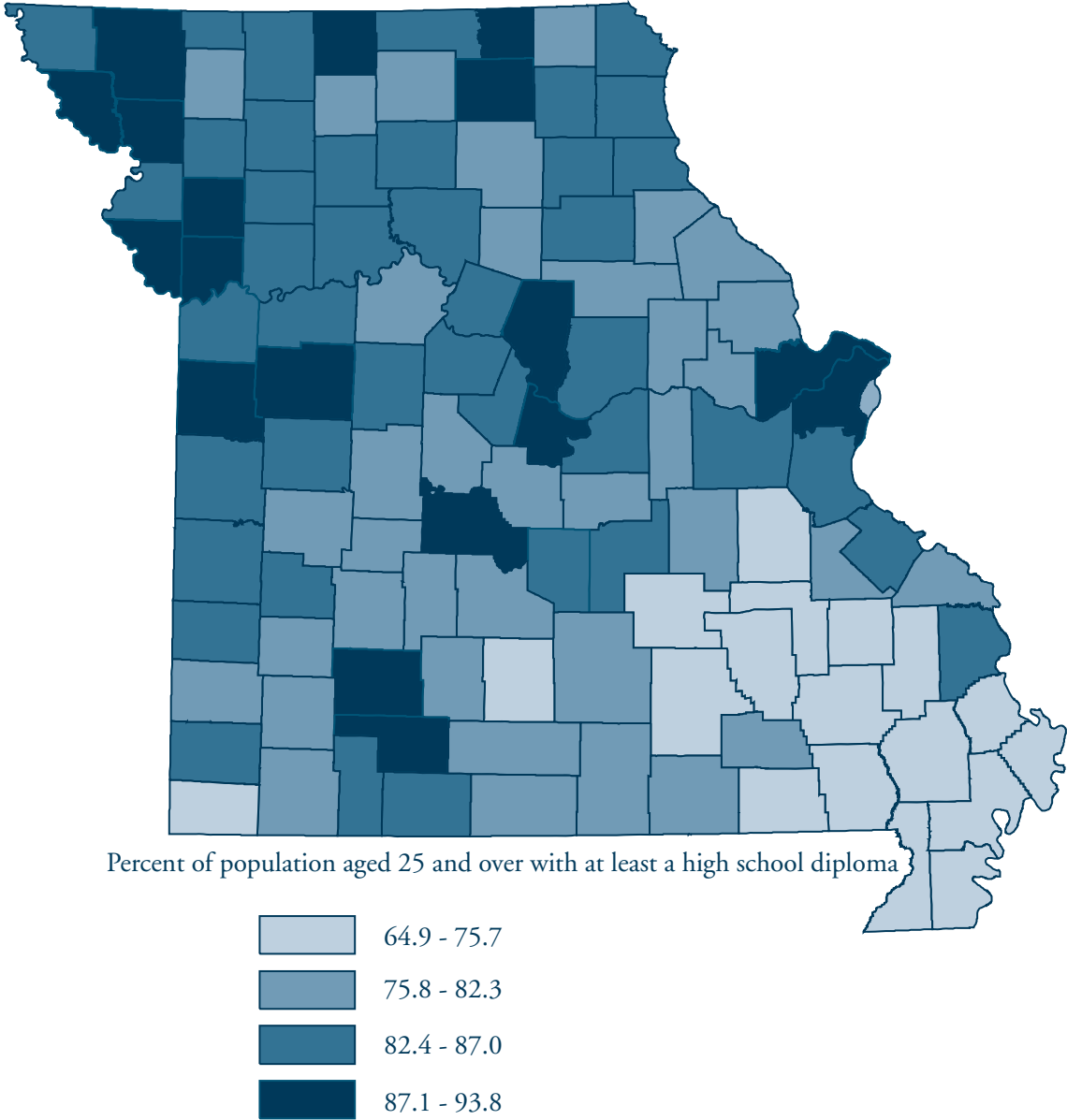
**Figure II-3. Educational attainment among residents aged 25 years and over, Missouri, 2009**



Source: U.S. Census Bureau, American Community Survey 2009

Note: The American Community Survey excludes persons living in group quarters (college dorms, military barracks, prisons and other institutions).

Figure II-4. Persons with at least a high school diploma or equivalent (%) among residents aged 25 years and over, by county, Missouri, 2005-2009



Source: U.S. Census Bureau, American Community Survey 2005-2009

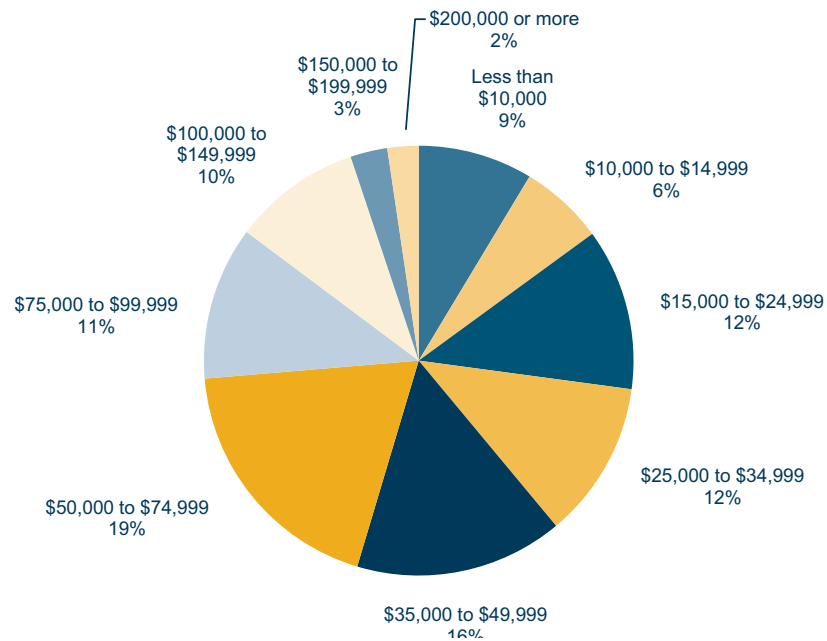
## Household Income

Socioeconomic status is an important determinant for a population's health. The distribution of annual household income and benefits in Missouri is shown in Figure II-5. A little over a quarter of all households in Missouri make less than \$25,000 and a little over half of all households make less than \$50,000.<sup>2</sup>

Missouri's median household income and benefits are lower than the U.S. median (\$45,229 vs. \$50,221). The

median is the midpoint, so half of Missouri households make less than \$45,229 and half make more than that amount. The discrepancy in the average (mean) household income and benefits is even larger, with the Missouri average at \$59,707, compared with the U.S. at \$68,913. The proportion of Missouri households with incomes/benefits of \$75,000 or more, 26 percent, is lower than the national figure of 32 percent.

**Figure II-5. Percentages of households by annual household income and benefits, Missouri, 2009 (in 2009 inflation-adjusted dollars)**



Source: U.S. Census Bureau, American Community Survey 2009

Note: Income and benefits include wage or salary income; net self-employment income; interest, dividends, or net rental or royalty income or income from estates and trusts; Social Security or railroad retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income.<sup>3</sup>

## Population Trends

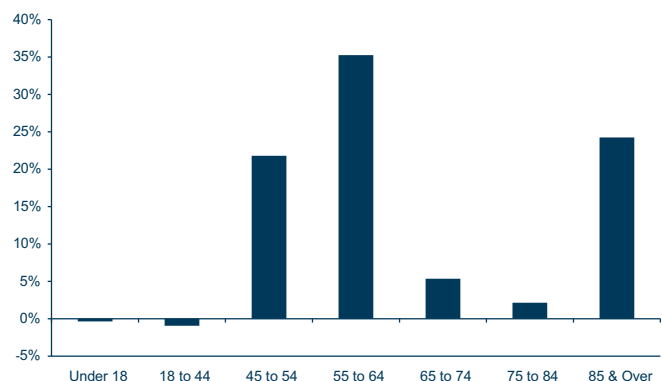
Trends over the past decade show that Missouri's population is changing in several important ways. Missouri's population is estimated to have increased by 6.8 percent during the 2000-2009 time period.<sup>1</sup> This increase is slightly higher than the combined population increase of Missouri's eight border states, which saw an increase of 5.8 percent. However, Missouri's population growth was slower than the nation's growth of 8.8 percent during the same time period. This trend is reflected in the fact that Missouri, for the second time in the last four decades, lost a Congressional seat during the 2010 reapportionment process.

The population increase in Missouri has not been distributed equally across all age groups. The number of persons under age 45 remained stable. However, the number in the older age groups increased dramatically. The impact of the "Baby Boom" generation is reflected in the large population increases for the 45 to 54 and 55 to 64 age groups. In fact, the largest percentage change occurred in the 55 to 64 age group, which increased by 35 percent. Missouri's 85 and older population also saw large population increases. Due to increased life expectancy coupled with the Baby Boom generation moving into the senior population over the next few years, large increases in the number of older Missourians are forecast. The aging of Missouri has broad implications for public health as we move forward in the twenty-first century.

Over the past 10 years Missouri's minority racial and ethnic populations increased by varying degrees. The largest growing minority segment was persons of Hispanic ethnicity. The Hispanic population increased by 70 percent from an estimated 119,740 persons in 2000 to 203,907 persons in 2009. The racial group with the largest percentage increase in population was Asian/

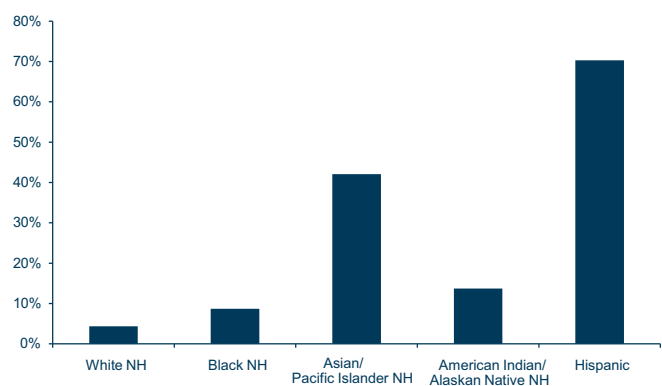
Pacific Islanders at 42 percent. The two largest racial groups in Missouri, whites and African-Americans, saw more modest gains. The white population increased by 4.4 percent, while the African-American population grew by 8.7 percent during 2000-2009.

**Figure II-6. Population increase by age group, Missouri, 2000-2009**



Source: CDC, National Center for Health Statistics, Bridged-Race Population Estimates (Vintage 2009)

**Figure II-7. Population increase by race, Missouri, 2000-2009**



Source: CDC, National Center for Health Statistics, Bridged-Race Population Estimates (Vintage 2009)

## Chapter 3: Infants and Children (Age 0-9 Years)

The foundation for health is laid during a child's earliest years. The health of infants and children sets the stage not only for their health as adults but also for the health of future generations. To reach their potential, they need healthy environments at home and in their communities, adequate health care, proper nutrition, physical activity and protection from injuries.

In 2009, there were an estimated 793,000 infants and children under 10 living in Missouri, making up 13 percent of the population.<sup>1</sup> It is estimated that 93 percent of Missouri children under 10 had some type of health insurance in 2009. Most (61 percent) of Missouri children under 10 years of age were covered by private health insurance (including employment-based and directly purchased); 39 percent were covered by Medicaid. In comparison, nationally these figures were 91 percent, 57 percent, and 37 percent, respectively. (Note: People can be covered by more than one type of health insurance during the year.)<sup>2</sup>

While most children live with two parents (or step-parents), a significant number live with their mothers only. In 2009, 69 percent of the family households in Missouri with children under 12 were married couples and 24 percent were female single parents. This is very close to the national figures of 71 percent and 23 percent. The remaining 7 percent of Missouri family households with children under 12 were single male householders.<sup>3</sup>





## Mortality and Leading Causes of Death

By far the most vulnerable period in a child's life is the first year. In 2009, 564 Missouri infants whose mothers lived in Missouri died before the age of one. The infant mortality rate (7.2 per 1,000 live births) was 30 times higher than the death rate for children 1-9 years of age.<sup>4,5</sup>

More than 60 percent of Missouri infant deaths in 2009 (356 infants) resulted from problems that occurred before or during birth, or during the first 27 days of life, such as complications of pregnancy, labor and delivery, premature birth, disorders of fetal growth, birth trauma and infections.<sup>5</sup>

Congenital anomalies (commonly called birth defects) caused an additional 123 deaths, and Sudden Infant Death Syndrome (SIDS) caused 30 deaths. SIDS deaths accounted for 12 percent of infant deaths after the first 27 days of life in 2009.<sup>5</sup>

African-American infants were more than twice as likely as white infants to die before their first birthday. In 2009, the death rate (per 1000 live births) for African-American infants was 13.8, compared with 6.1 for white infants.<sup>5</sup>

Death is relatively rare among children in this country. Only 171 Missouri children age 1-9 years died in 2009.

Unintentional injuries are by far the leading cause of death in this age group, with 63 deaths in 2009. Nearly 40 percent (24 deaths) resulted from motor vehicle crashes. Cancer was the second leading cause, with 20 deaths. Sadly, homicide was third, with 19 deaths in 2009.<sup>4</sup>

Missouri's all-cause death rate for children 1-9 years of age was higher than that for the U.S. as a whole in 2007. Missouri's rate (per 100,000) was 24.4,<sup>4</sup> compared with 20.4 nationally.<sup>6,7</sup> Rates for all three leading causes mentioned above were slightly higher in Missouri than in the U.S.<sup>4,6,7</sup>

As in infancy, African-American children are at higher risk of death during childhood. In 2009, the overall mortality rate for African-Americans age 1-9 years was 43.0 per 100,000, compared with 21.3 per 100,000 for whites.<sup>4</sup>



## Health-Related Problems and Potential Opportunities for Prevention

### Low birth weight and very low birth weight

Low birth weight (LBW) is the most important factor in infant deaths during the neonatal period (birth through the first 27 days of life). It also affects the rate of infant mortality after the neonatal period. LBW is defined as a weight of less than 2,500 grams (about 5 pounds, 9 ounces) at birth. Very low birth weight (VLBW) is defined as a weight of less than 1,500 grams (about 3 pounds, 5 ounces).

In 2009, 8.1 percent of Missouri resident babies were born LBW, and 1.6 percent were born VLBW.<sup>8</sup> These figures are very close to the preliminary 2009 national rates of 8.2 percent and 1.5 percent, respectively.<sup>9</sup> After a small upward trend in these rates in the late 1990's and early 2000's, the overall percentage of Missouri babies born with LBW seems to have leveled off around 8 percent.

Similar to infant death rates significant racial disparities exist with LBW rates. In 2009, the LBW rate was 14.2 percent and 7 percent among infants born to African-American and white women respectively (Figure III-1).

VLBW showed the same pattern as LBW in Missouri, with a 2009 rate of 3.3 percent in African-Americans compared with 1.3 percent in whites.<sup>8</sup> The reasons for the higher rate of LBW and VLBW among African-Americans are not clear. Some, but not all, of the disparity can be explained by differences in risk factors such as the mother's age, education and income. There may also be racial differences in mothers' medical condition, stress, lack of social support, bacterial vaginosis, previous preterm delivery and maternal health status and history.<sup>10</sup>

What can be done to reduce the number of babies born too small?

- Reduce teen pregnancies

Figure III-1. Percent of low birth weight (LBW) by race of mother among resident live births, Missouri, 2000-2009



Source: DHSS, Birth MICA

- Improve women's health before they get pregnant
- Provide interventions to help women stop smoking, alcohol and drug use during pregnancy
- Refine assisted reproductive technology techniques
- Avoid unnecessary medical induction of labor

Many other interventions have been and are being tested, but they have not been clearly shown to prevent LBW or pre-term birth.

### Inadequate prenatal care

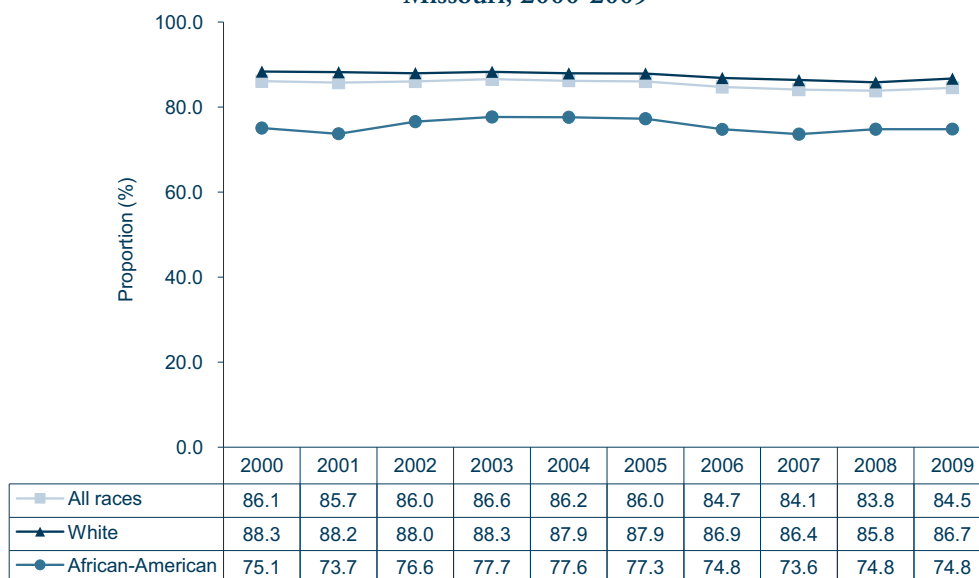
Prenatal care is important for a healthy pregnancy and birth. Early prenatal care can help reduce illness, disability and death during the first month of the baby's life. Health care providers give advice to expectant

mothers and identify and manage any health problems they may have.

Babies born to mothers who received no prenatal care are three times more likely to be born at low birth weight, and five times more likely to die, than those whose mothers received prenatal care.<sup>11</sup>

The proportion of pregnant women in Missouri, receiving early prenatal care, has decreased slightly over the past decade. In 2000, 86.1 percent of pregnant women in Missouri received first trimester prenatal care; by 2009 that number fell to 84.5 percent. The proportion of African-American women receiving early prenatal care has consistently remained lower at 75 percent for the past decade. While the racial disparity in first trimester prenatal care rates was lowest between

Figure III-2. Proportion of live births whose mothers began receiving prenatal care in the first trimester, Missouri, 2000-2009



Source: DHSS, Birth MICA

2003 and 2006, the disparity in 2009 is smaller than it was in 2000 (Figure III-2).

First trimester prenatal care rates among Hispanic women have followed a similar pattern to those of African-American women; in 2009 around 75 percent of women in either sub-group received first trimester prenatal care.<sup>8</sup>

The proportion of infants born to women that do not receive prenatal care until the third trimester, or who get no care at all, also varies with race and ethnicity. In 2009, the rate of late or no prenatal care in Missouri was 2.4 percent overall (1.8 percent among whites, 4.9 percent among African-Americans, and 3.3 percent among Hispanics).<sup>8</sup>

What can be done to increase the number of mothers receiving early, adequate prenatal care?

- Improve women's access to insurance coverage and to health care providers
- Make sure that women who become eligible for Medicaid when they get pregnant can be enrolled and see a health care provider quickly
- Improve outreach to women who do not seek early prenatal care
- Educate and encourage prenatal care providers to provide the whole range of services needed, including: appropriate counseling on smoking; alcohol and drug use; screenings for diseases and risk factors; breastfeeding education; and nutrition information including folic acid supplementation

## Motor vehicle fatalities

The latest national data available, 2007, indicated that unintentional injuries, including motor vehicle crashes (MVC), were the leading cause of death for children 1-9 years of age in the U.S. They were also the leading cause in Missouri. MVCs accounted for the largest percent of these deaths, 42 percent nationally and 39 percent in Missouri. The Missouri MVC death rate (per 100,000) in this age group has been higher than the national rate (4 vs. 3 in 2007).<sup>12, 13, 14</sup>

In 2009, 24 Missouri children age 1-9 years died as a result of MVC, a rate of 3 deaths per 100,000 population. Fourteen percent of all deaths among children 1-9 years of age in Missouri were caused by MVC.

Restraint use is known for children who died or were injured in 2008. Injured includes children coded as having disabling or evident injuries by the investigating officer. Of the 240 such children age 0-4 years with known restraint use, 63 (26 percent) were not in child safety seats. Of the 320 killed or injured children age 5-9 years, 43 (14 percent) were not using a safety belt.<sup>15</sup>

Another major contributor to the problem is drunk driving. In 2008 nationwide, 807 children age 0-9 years were killed in traffic crashes. Of these deaths, 129 (16 percent) were the result of a crash involving a driver impaired by alcohol (blood alcohol content [BAC]) of .08 grams per deciliters or higher). Another 42 (5 percent) children died in a crash involving a driver with .01-.07 BAC.<sup>16</sup>

What can be done to decrease the number of children killed in motor vehicle crashes? Several approaches have been shown to work, including:

- Child safety seat distribution programs that provide free loaner seats, low-cost rentals, or direct giveaways with education about correct usage
- Strict child safety seat laws
- Programs that provide community-wide information and enforcement for the use of child safety seats
- Education, law enforcement and treatment programs that reduce drinking and driving

## Vaccine-preventable diseases

Vaccines offer safe and effective protection from infectious diseases. By making sure children are up-to-date on the recommended vaccines, parents can protect their children, friends and communities from serious, life-threatening infections.

The use of vaccines has eradicated smallpox, eliminated wild poliovirus in the U.S. and significantly reduced many other diseases. However, the viruses and bacteria that cause vaccine-preventable diseases still exist. They can be passed to people who are not protected. These diseases have many social and economic costs: missed school days, missed parental work time, hospitalizations and even deaths. Immunization is one of the most cost-effective public health measures available.

Most young children in Missouri are protected against vaccine-preventable diseases. In 2009, 63 percent of Missouri children between the ages of 19 and 35 months received their basic immunization series against diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, *Haemophilus influenzae* type b, and hepatitis B compared to the national rate of 72 percent.<sup>17</sup> The Centers for Disease Control and Prevention's

(CDC's) Advisory Committee on Immunization Practices (ACIP) provides immunization recommendations against vaccine-preventable diseases. As new vaccines are licensed and recommended for use, the standards for being considered fully vaccinated change to include the new recommendations. When comparing national and state immunization rates, Missouri must factor in the amount of time it takes to incorporate newly recommended vaccines into child care immunization requirements for the state.

Unfortunately, many children are still at risk for vaccine-preventable diseases. In 2009, 1,304 children age 0-14 years had vaccine-preventable diseases reported to DHSS, not including influenza and *Haemophilus influenzae* type b (Hib). (Influenza is reported seasonally and Hib is not reported individually but included in the category of all *haemophilus influenzae* types.) Missouri reported 30,567 total influenza cases during the 2009-10 influenza season which begins in early October (week 40) of one calendar year and ends in late May (week 20) of the next calendar year. Of that number, 19,912 or 65 percent laboratory-confirmed influenza cases were reported among children age 0-14 years. This influenza season included the 2009 H1N1 pandemic that occurred worldwide. (The diseases included in the query for vaccine reportable included diphtheria, hepatitis B acute, measles, mumps, rubella, pertussis, tetanus, polio paralytic and varicella.)<sup>18</sup>

What can be done to increase the number of children who receive all the recommended immunizations?

- Continue to educate parents about the benefits of immunization and the risks of vaccine-preventable diseases
- Assure that vaccines are widely available from health care providers

- Educate and encourage health care providers to implement patient reminder/recall systems and use every opportunity to appropriately immunize children
- Educate parents and health care providers about the Vaccines for Children program, a federally funded program for children birth to 18 years old to receive free vaccines if they meet one of the following eligibility criteria - Medicaid eligible; uninsured; American Indian or Alaska native; and underinsured (only if served through a Federally Qualified Health Center or Rural Health Clinic)
- Notify health care providers, school and child care facilities about ShowMeVax. ShowMeVax is a comprehensive web-based immunization registry that offers a one-stop shop for tracking clients, immunization records and vaccine inventory. By tracking individual immunization records using ShowMeVax, users can access those records anywhere in the state to evaluate an individual's immunization status.

## Violence

Child maltreatment is a serious problem in Missouri and the U.S. The costs and consequences of child maltreatment are high. Child maltreatment can lead to various health problems, including physical injuries, and impact on early brain development, and functioning of the nervous and immune systems. Maltreated children are at higher risk for problems as adults such as alcoholism, depression, drug abuse, obesity, sexual promiscuity, smoking, suicide and certain chronic diseases.<sup>19</sup> It is difficult to know the true magnitude of child maltreatment as it is underreported.

During 2008, there were 6,732 children substantiated for abuse or neglect in Missouri, a decrease of 30 percent from the 9,643 children substantiated in 2004. Of all substantiated cases, 38.8 percent were under 6 years of age. The most prevalent category of abuse/neglect cases was neglect (43.8 percent), followed by physical abuse (26.0 percent), sexual abuse (23.1 percent) and emotional maltreatment (5 percent). Of the 30 child abuse and neglect fatalities in 2008, 25 (83.2 percent) were among children under 6 years of age.<sup>20</sup>

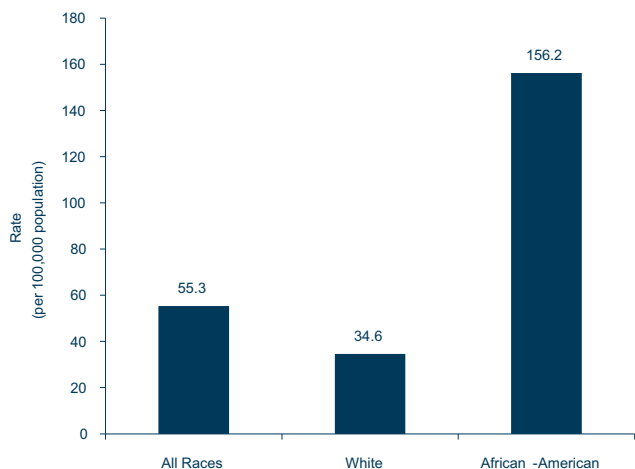
According to Missouri Injury MICA, in 2008, there were 653 ER visits and hospitalizations due to abuse/neglect/rape for children under age 15 in Missouri - a rate of 55.3 per 100,000, slightly decreased from 59.6 per 100,000 in 2004.

African-American children were more than four times as likely as white children to have such ER visits and hospitalizations in Missouri in 2008 (156.2 vs. 34.6 per 100,000) (Figure III-3). Comparison with national data is not possible because the definitions and reporting systems vary from state to state.

## Asthma

Asthma is a serious chronic lung disease and one of the most common conditions of childhood.<sup>23</sup> It is also a leading cause of disability, and health care use for children.<sup>24, 25</sup> Children with asthma are limited in their ability to participate in usual children's activities and frequently miss school. Children with asthma who use emergency room (ER) care are significantly more likely than children without asthma to be hospitalized.<sup>25</sup> In 2008, asthma hospitalization charges for children age 0-9 years in Missouri totaled \$13.8 million or 14 percent of all asthma inpatient charges.<sup>26</sup>

**Figure III-3. Rate of emergency room visits and hospitalizations due to injuries resulting from abuse, neglect or rape\* among children 0-9 years of age, by race, Missouri residents, 2008**



Source: DHSS, Bureau of Health Informatics

\*Principal Diagnosis

The proportion of U.S. children who suffer from asthma increased substantially between 1980 and the mid-1990s and remains at increased levels.<sup>27</sup> A statewide health survey conducted by DHSS in 2007 reported the childhood prevalence of current asthma was highest in children aged 5-9 (10.2 percent), followed by age 10-17 (9.9 percent), and age 0-4 (4.8 percent).<sup>28</sup> In 2008, over 145,000 Missouri children 17 years of age and younger were living with asthma.<sup>29</sup>

Asthma can be difficult to control, especially if families do not have access to self-management education and continuous, comprehensive, coordinated care. Asthma severity ranges from mild to life-threatening. Asthma is characterized by episodes of shortness of breath, coughing, wheezing or chest tightness. Infants

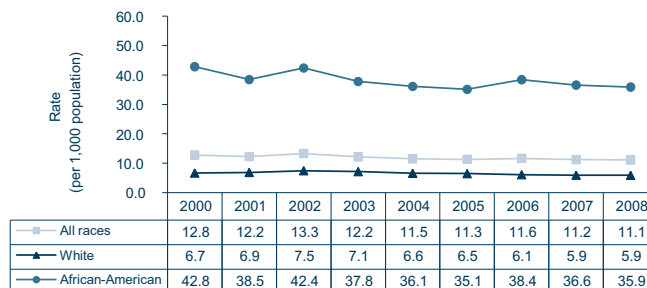
and toddlers with asthma are especially vulnerable to respiratory distress due to small airways. Many children are taken to emergency rooms for treatment of asthma.

During 2008, 8,742 emergency room visits, or 11.1 visits per 1,000 Missouri children age 0-9 years, were due to asthma.<sup>30</sup> Within this age group, the highest rates of asthma emergency room visits and hospitalizations are among children from 1 to 4 years of age followed by children 5-9 years of age. Asthma ER visits have remained relatively steady for the last decade. ER visits were much more likely for African-American children than for white children (Figure III-4).

What can be done to decrease the impact of asthma on Missouri's children and reduce emergency care for asthma attacks? Currently, there are no preventive measures or cure for asthma, so the focus must be on measures to control it, such as:<sup>31, 32, 33</sup>

- Proper diagnosis, medication and effective breathing to assure medication reaches the affected air passages

**Figure III-4. Rate of asthma\* ER visits among infants and children 0-9 years of age, by race, Missouri residents, 2000-2008**



Source: DHSS, Emergency Room and Population MICAs

\*Principal Diagnosis



- Avoiding contact with environmental “triggers.” Environmental triggers include allergens, irritants and pollutants such as cockroaches, dust mites, furry pets, mold, tobacco smoke and certain chemicals
- Early recognition of symptoms with prompt relief measures as well as treatment of contributing conditions such as obesity and acid reflux
- Reimbursement from health plans for self-management education
- Programs that educate children and families to improve their asthma control, promote clinical guidelines adoption by health professionals (National Heart Lung and Blood Institute Expert Panel Review III),<sup>34</sup> support healthy homes, and assist schools and child care centers in helping children control asthma. These programs are being implemented and evaluated in several states.

## Lead Poisoning

Lead poisoning can affect nearly every system in the body. Because lead poisoning often occurs with no obvious symptoms, it frequently goes unrecognized. Lead can damage the brain and nervous system, cause hearing loss, anemia, slowed growth and behavior problems, depending on the amount of lead. Behavior problems and lowered IQ have been associated with blood lead levels as low as 10 micrograms per deciliter (µg/dL) in children. Lead is used in many products. Missouri has been the top lead-producing state in the U.S. since 1907.

Fine particles of lead are hazardous when inhaled or swallowed. Children who are at higher risk for lead poisoning include: those living in older housing units with lead-based paint; homes undergoing remodeling;

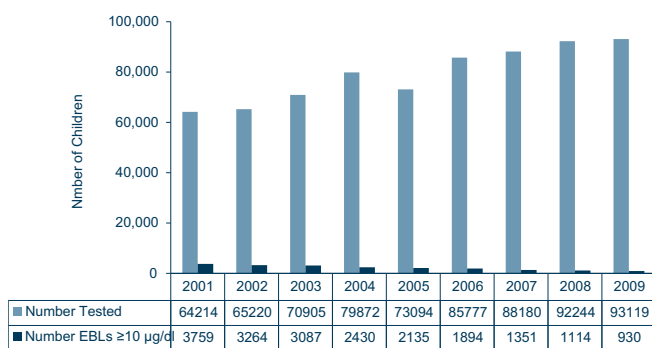
families with lower socioeconomic status; and the former mining, milling and smelting areas of the state.<sup>35</sup>

Environmental policy changes over the past few decades, including the removal of lead from gasoline, have markedly decreased children’s exposure to lead. Nationally, the overall prevalence of children 1-5 years of age with lead poisoning has declined from 8.6 percent in 1988-1991 to 1.4 percent in 1999-2004.<sup>36, 37</sup>

Missouri has seen a similar trend since 2001. Despite an increase in the number of young children being tested for lead poisoning, the number found with elevated blood lead levels has decreased from 3,759 (5.9 percent) children in 2001 to 930 (1.0 percent) children in 2009 (Figure III-5).<sup>38</sup>

Children living in areas with older housing are at higher risk for lead poisoning. Missouri has an average of 23.6 percent of housing units built before 1950, which is slightly higher than the national average of 22.0 percent according to 2000 census data. In the major Missouri metropolitan areas, the proportion of pre-1950 housing is highest in St. Louis City (64.6 percent), Kansas City (36.0 percent) and St. Louis County (18.4 percent). The average proportion in outstate Missouri is 19.6 percent, although in some rural counties the proportions are much higher.<sup>39</sup> St. Louis City has the highest number of children with an elevated blood level of 15 µg/dL or higher. In 2009, of the 281 Missouri children found to have blood lead levels this high, 127 (45.2 percent) were in St. Louis City, 39 (13.9 percent) in Kansas City, 23 (8.2 percent) in St. Louis County, and 92 (32.7 percent) were elsewhere in the state.<sup>38</sup>

**Figure III-5. Missouri's children <6 years of age tested for lead poisoning and those with elevated blood lead levels  $\geq 10$   $\mu\text{g}/\text{dL}$ , 2001-2009**



Source: DHSS, Childhood Lead Poisoning Prevention Program

What can be done to decrease the number of children with elevated blood lead levels?

- Encourage lead hazard abatement in housing in the highest-risk areas
- Make sure appropriate blood lead tests are done annually on all children under 6 living in high-risk areas
- Provide follow-up services for children found to have elevated lead levels, including parental education, environmental investigation, lead hazard control and case management

## Obesity

Health habits and other behavior patterns developed during childhood have a strong impact throughout life. Being obese results from an energy imbalance involving too few calories expended for the amount of calories consumed.<sup>40</sup> Obesity for children age 2-5 years is defined as a body mass index (BMI)-for-age at or above the 95th percentile.<sup>41</sup> Obese children are more likely to become obese adults, and if obesity begins before age 8, adulthood obesity is more likely to be severe.<sup>42, 43, 44</sup> Obese children are at higher risk for health consequences such as heart disease risk factors, type 2 diabetes, asthma and sleep apnea.<sup>42, 45, 46, 47, 48</sup> Obese children often experience social discrimination, which can lead to low self-esteem, interfering with their academic and social functioning.<sup>46, 49</sup>

The Healthy People 2020 objective is to reduce the proportion of children age 2-5 years who are considered obese to 9.6 percent.<sup>50</sup> Unfortunately, the prevalence of childhood obesity has increased over the past three decades. Among children age 2-5 years, obesity increased from 5 percent in 1976-1980 to 10.4 percent in 2007-2008.<sup>51</sup>

There is no data to directly measure the proportion of Missouri children who are obese. However, the Pediatric Nutrition Surveillance System (PedNSS) includes data on children participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), which provides an obesity measure for children enrolled in WIC. PedNSS reveals that the proportion of obese WIC children age 0-4 years increased from 11.6 percent in 2000 to 13.9 percent in 2009. In the 2009

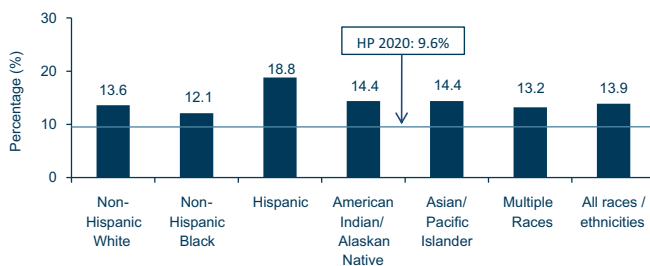
PedNSS, Hispanic children had the highest prevalence (18.8 percent) and non-Hispanic black children had the lowest prevalence (12.1 percent) of obesity. None of the racial or ethnic groups met the HP 2020 objective of 9.6 percent (Figure III-6).<sup>52</sup>

What can be done to decrease the number of obese children? Healthy lifestyle habits, including healthy eating and physical activity, can lower the risk of becoming overweight and developing related diseases.<sup>53</sup> To support children’s healthy habits, we can:

- Incorporate good nutrition and physical activity into child care facilities and schools
- Limit children’s access to food choices of poor nutritional value in schools

- Improve access to places for physical activity by building or enhancing trails, sidewalks and recreational facilities
- Encourage family and community involvement in promoting healthy lifestyles

**Figure III-6. Prevalence of obesity\* by race/ethnicity among children aged 2-5 years enrolled in WIC, Missouri, 2009**



Source: DHSS, 2009 Missouri Pediatric Nutrition Surveillance System

\* Obesity is based on the 2000 CDC growth chart percentiles of ≥95th percentile BMI-for-age for children 2 years of age and older.



## Chapter 4: Adolescents (Age 10-17 Years)

Adolescence is a time of transition from childhood to adulthood. It is one of the most dynamic and important stages of human development, a time of great physical, emotional, intellectual and social change. Unhealthy behaviors established during this time of life can become risk factors for chronic health conditions in adulthood. Healthier adolescents are more likely to succeed in school, and grow up to be healthier adults. Adolescence is an opportunity to involve and partner with youth to address the issues that affect their health.

In 2009 there were an estimated 638,000 adolescents between 10-17 years of age in Missouri, who made up 10.8 percent of the population.<sup>1</sup>



## Mortality and Leading Causes of Death

Missouri's adolescent death rate was higher than the U.S. rate in 2007. Two hundred and fifteen adolescents age 10-17 years died in Missouri, a rate of 32.9 per 100,000, compared with 28.2 per 100,000 in the U.S. as a whole. Missouri adolescents had a higher rate of deaths from unintentional injuries, including motor vehicle crashes, as well as homicide and suicide. The cancer death rate was lower than the U.S. overall (Table IV-1).

In 2009, the Missouri death rate (per 100,000) from unintentional injuries in this age group was higher for

whites (11.8) than for African-Americans (7.2). African-Americans had a much higher death rate (per 100,000) from homicide than whites (29.8 vs. 2.3); 29 of the 42 homicide victims in 2009 were African-American.<sup>2</sup>

One measure of the impact of premature death is years of potential life lost (YPLL). YPLL is a count of the number of potential years lost to each person who has died before the age of 75. In 2009, there were 11,839 years of potential life lost by adolescents age 10-17 years who lived in Missouri.<sup>2</sup>

**Table IV-1. Overall mortality rate and chief causes of death among children 10-17 years of age, Missouri and nationwide, 2007**

Cause of Death	Number of Mo. Deaths	Rate of Mo. deaths per 100,000 population	Number of U.S. deaths	Rate of U.S. deaths per 100,000 population
All Causes	215	32.9	9,410	28.2
All Unintentional Injuries	104	15.9	4,093	12.3
Motor Vehicle Crashes	70	10.7	2,894	8.7
Homicide	31	4.7	1,124	3.4
Suicide	22	3.4	834	2.5
Malignant neoplasms (cancer)	11	1.7	841	2.5
Heart disease	7	1.1	291	0.9
Congenital anomalies (birth defects)	4	0.6	292	0.9

Source (Missouri): DHSS, Bureau of Health Informatics

Source (U.S.): Centers for Disease Control and Prevention, National Center for Health Statistics, 2007. Analysis by DHSS, Bureau of Health Informatics.



## Health Problems and Potential Opportunities for Prevention

### Motor vehicle crashes and fatalities

Motor vehicle crashes (MVC) cause many injuries and deaths, as well as tremendous social and economic losses, including health care costs, lost school time, lost work time for parents, rehabilitation costs, and the long-term effects of permanent disability.<sup>3</sup>

About a quarter of all deaths among adolescents in Missouri are caused by MVC. In 2009, 45 adolescents age 10-17 years died as a result of MVC, a rate of seven deaths per 100,000. The Missouri MVC death rate (per 100,000) in this age group has been higher than the national rate (11 vs. 9 in 2007) (Table IV-1).

White youths are more likely to be killed in MVC than African-Americans in Missouri (7 vs. 6 per 100,000 in 2009). African-American youth also have lower rates of ER visits plus hospitalizations for injuries due to motor vehicle crashes (traffic plus non traffic). In 2008, the rate

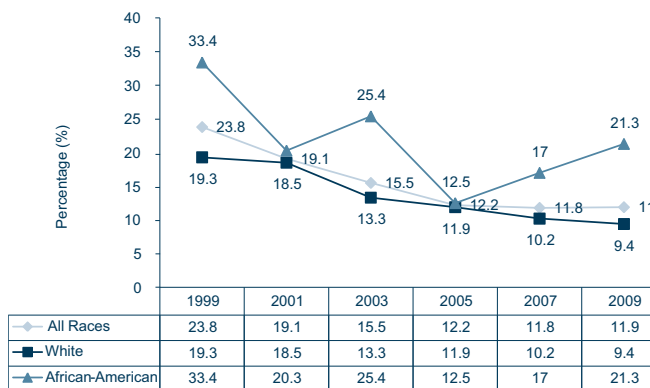
for 10-17 year-olds was 1,733.2 per 100,000 population for whites and 1,697.7 for African-Americans. Since 2000, the rate has dropped 34 percent for all races combined, from 2,648.5 per 100,000 population to 1,754.1 in 2008.

Results from the Youth Risk Behavioral Surveillance System (YRBSS) indicate that an increasing number of students are wearing seat belts (Figure IV-1). However, many still do not. Nationally, 9.7 percent of students in grades 9-12 during 2009, reported never or rarely wearing a seat belt when riding in a car driven by someone else, while in Missouri the percentage was 11.9 percent. African-American students in Missouri are less likely than U.S. students as a whole to wear seat belts (21.3 percent of Missouri African-American students versus 11.7 percent of U.S. African-American students never or rarely use seat belts when riding).

What can be done to decrease the number of adolescents injured and killed in motor vehicle accidents? Some approaches that may work are:<sup>3</sup>

- Media campaigns and public education to encourage safety belt use
- Primary enforcement of safety belt laws for all occupants of motor vehicles
- Education, law enforcement and treatment programs that reduce drinking and driving
- Raising the driving age and instituting driver education requirements
- Improving road and automobile designs to prevent accidents

**Figure IV-1. Percentage of students in grades 9-12 who never or rarely wear a seat belt when riding in a car driven by someone else, Missouri, 1999-2009**



Source: Youth Risk Behavior Surveillance System



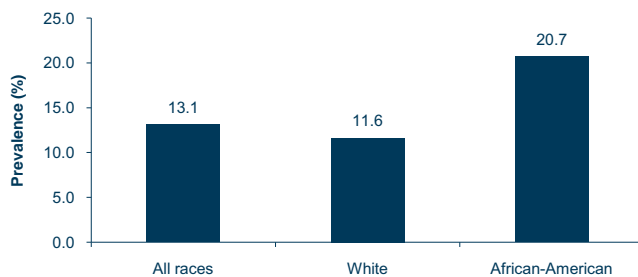
## Obesity

The health risks of obesity are well documented. Eating and exercise habits formed during adolescence have a lifelong impact, and obese adolescents have a 70 percent chance of becoming overweight or obese adults.<sup>4</sup> People who are overweight and obese are more likely to develop chronic health problems, including heart disease, type 2 diabetes, arthritis, stroke, asthma, and some types of cancer. For adolescents, weight is a sensitive social and emotional issue as well.

Being obese results from caloric imbalance (i.e., too few calories expended for the amount of calories consumed). Obesity in children and teenagers is determined based on age, height and weight.

The proportion of Missouri pre-teens and teens that are obese has grown significantly in the past few years. The 1999 Missouri Youth Tobacco Survey (YTS) data showed that 9.1 percent of children in grades 6-8 were obese, whereas the 2009 YTS data showed that this proportion

**Figure IV-2. Prevalence of obesity\* by race among middle school students in grades 6-8, Missouri, 2009**



Source: Youth Tobacco Survey

\*Obesity is defined as at or above the 95th percentile of body mass index (BMI) for age based on the 2000 CDC growth charts for the U.S.

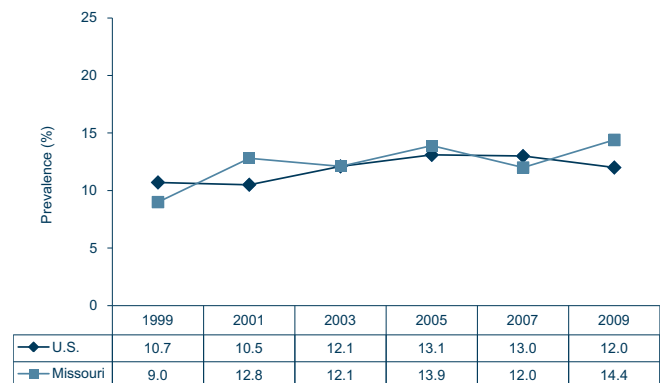
has increased to 13.1 percent. The proportion was higher among African-American children than white children (Figure IV-2).

According to Youth Risk Behavior Surveillance System (YRBSS) data, the proportion of obese teens in grades 9-12 in Missouri was 14.4 percent in 2009, slightly higher than the national figure (12.0 percent). The proportion had increased from 1999-2009, both in Missouri and the U.S. (Figure IV-3).

What can be done to decrease the number of obese adolescents? Healthy eating behaviors and regular physical activity are the keys to reaching and maintaining a healthy weight. A healthier adolescent lifestyle includes:<sup>5</sup>

- Eating 5-9 servings of fruit and vegetables every day
- Increasing calcium and dairy product consumption

**Figure IV-3. Prevalence of obesity among students in grades 9-12, Missouri and the U.S., 1999-2009**



Source: YRBSS

\*Obesity is defined as at or above the 95th percentile of BMI for age based on the 2000 CDC growth charts for the U.S.



- Decreasing portion sizes
- Consuming fewer sweetened beverages
- Watching less television
- Daily moderate or vigorous physical activity, such as physical education classes

Communities can promote and support these lifestyle changes in schools, workplaces and through community programs that provide opportunities and encourage good nutrition and physical activity.



### Tobacco use

Tobacco use has serious health and economic consequences. In Missouri, smoking is the leading cause of premature death, and caused 9,377 deaths annually during 2005-2007.<sup>6</sup> An estimated 140,000 Missouri youth living today will eventually die of smoking-related

diseases.<sup>7</sup> In 2010 dollars, the cost of smoking-related health care in Missouri was \$2.5 billion, the productivity losses due to smoking-related deaths were \$2.8 billion,<sup>8</sup> and Medicaid care for smoking-related illnesses cost \$609 million.<sup>9</sup>

Early adolescence (age 11-15, grade 6-10) is the time when most smokers first try cigarettes. The majority of adult smokers become regular smokers before the age of 18. Youth whose parents or guardians smoke, and those whose parents have less than a high school education, are most vulnerable to starting to use tobacco themselves.<sup>10</sup>

The 2009 Missouri YTS found that 5.7 percent of children in grades 6-8 had smoked cigarettes within the past 30 days. By high school, the figures are much higher. In 2009, almost one-fifth (18.9 percent) of Missouri youth in grades 9-12 reported smoking cigarettes within the past 30 days. According to data from the YRBSS, prevalence of current cigarette smoking among Missouri students in grades 9-12 has been trending downward since 2001 (Figure IV-4).

**Figure IV-4. Prevalence of current cigarette smokers\* among high school students in grades 9-12, Missouri, 2001-2009**



Source: YRBSS

\*All respondents who reported having smoked cigarettes on one or more of the 30 days prior to the survey.

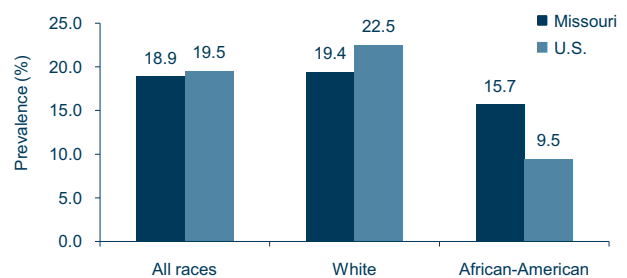
Smoking prevalence among Missouri high school students (18.9 percent) was slightly lower than the national prevalence of 19.5 percent in 2009 (Figure IV-5). A similar picture was observed among white youth, but the prevalence among African-American youth was higher than the national figure.

Tobacco use prevalence increases steadily from grade 6 through high school. The 2009 YTS found that 28.1 percent of Missouri high school seniors smoked cigarettes within the past 30 days, and the figure was 36.0 percent for use of any form of tobacco (Figure IV-6).

What can be done to reduce smoking among adolescents? Studies have shown that effective interventions include strategies to:<sup>11</sup>

- Increase the price of tobacco products so they are less affordable for youth
- Improve youths' knowledge, beliefs and skills to help them resist societal pressures to smoke
- Create tobacco-free school and community environments, so that smoking does not appear to be the norm
- Decrease youth access to tobacco by enforcing laws against retail sales to minors
- Promote quitting. Most youth who smoke report that they know it is unhealthy and have tried to quit. Due to the addictive nature of nicotine, counseling and support programs are often needed to succeed.

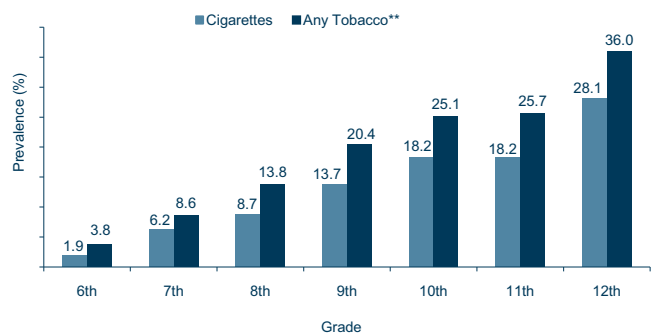
**Figure IV-5. Prevalence of current cigarette smokers\* among high school students in grades 9-12, Missouri and the U.S., 2009**



Source: YRBSS

\*All respondents who reported having smoked cigarettes on one or more of the 30 days prior to the survey.

**Figure IV-6. Prevalence of current tobacco use\* by grade among Missouri students, 2009**



Source: YTS

\*Respondents who reported having smoked cigarettes, or any form of tobacco on one or more of 30 days prior to the survey.

\*\*Includes cigarettes, cigars, bidis, kreteks, pipes and smokeless tobacco.

## Alcohol and substance abuse

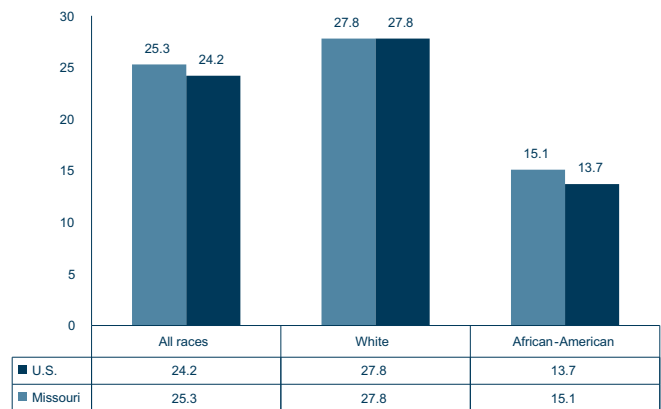
The adolescent life stage can be a time of turmoil, with rapidly changing social roles, relationships and expectations. Many adolescents develop behavioral and emotional problems. Mental illness and alcohol and substance abuse are among the leading causes of hospitalization for this age group.

Underage drinking is common. In 2009, approximately one fourth (25 percent) of Missouri teens in grades 9-12 reported that they drank heavily (defined as having five or more drinks in a row, within a couple of hours) during the last month (Figure IV-7), which is similar to the national figure of 24 percent. Heavy drinking among Missouri teens of all races in grades 9-12 decreased by 37 percent between 1995-2009 (40 percent vs. 25 percent in 2009). While the percentage of heavy drinking among white Missouri teens in grades 9-12 is identical to the national rate, they are almost twice as likely to drink heavily than Missouri's African-American youth (28 percent vs. 15 percent in 2009) (Figure IV-7).

Marijuana use was reported by 21 percent of teens in the 2009 YRBSS. This is the same figure reported nationally. African-American adolescents are substantially more likely to use marijuana than white adolescents in Missouri (Figure IV-8).

Teen inhalant use (including sniffing glue, breathing the contents of aerosol spray cans, or inhaling paints or sprays to get high) in Missouri appears to be similar to the U.S. as a whole. In 2009, 10.2 percent of Missouri teens reported ever having used an inhalant, compared with 11.7 percent nationally. Only 9.3 percent of African-American adolescents reported inhalant use, which is slightly higher than the national percentage of 8.2.<sup>12</sup>

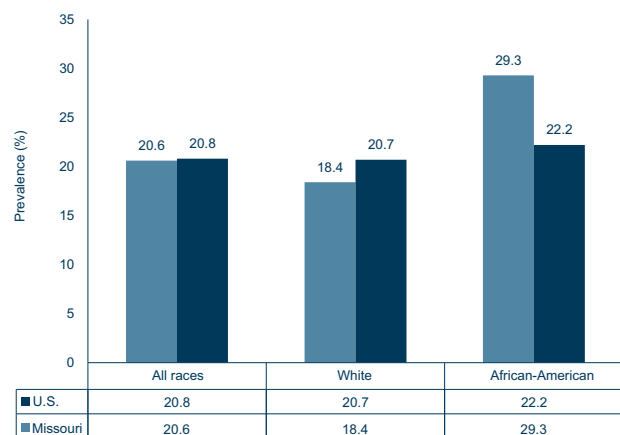
Figure IV-7. Prevalence of episodic heavy alcohol drinking\* among students in grades 9-12, Missouri and the U.S., 2009



Source: YRBSS

\*Heavy drinking defined as having had five or more drinks in a row, that is, within a couple of hours, on one or more of the 30 days prior to the survey.

Figure IV-8. Prevalence of current marijuana use among students in grades 9-12, Missouri and the U.S., 2009

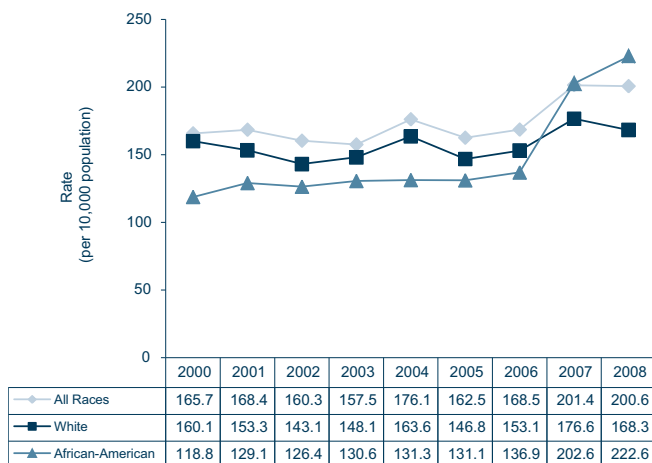


Source: YRBSS

## Mental health

The number of hospitalizations for mental disorders among Missouri adolescents has risen between 2000 and 2008, from 8,388 to 9,604, respectively. This equates to a 14 percent increase, from 129.5 to 148.2 per 10,000 adolescents age 10-17 years. These disorders include a wide variety of problems, including affective and anxiety disorders, schizophrenia, and others. The rate among African-American adolescents had been consistently lower than that of whites until 2005. By 2008, the rate for African-Americans age 10-17 years was 32 percent higher than that for whites (167.0 vs. 126.7 per 10,000 population). The highest rate has been among the 15-17 year-olds, where the rate for African-Americans rose 87 percent, from 118.8 per 10,000 population in 2000 to 222.6 in 2008 (Figure IV-9).

**Figure IV-9. Hospitalization rate for mental disorders\* by race among adolescents 15-17 years of age, Missouri residents, 2000-2008**



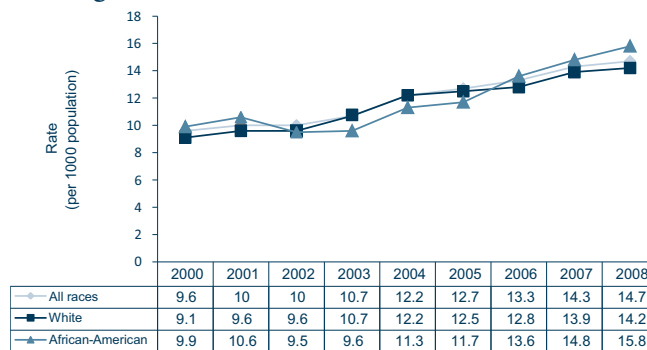
Source: DHSS, Hospitalization MICA  
\* Principal diagnosis

The rate of emergency room visits for mental disorders among 10-17 year-olds has increased 44 percent from 2000 to 2008 (6.4 to 9.2 per 1,000 population). The rate among 10-17 year-olds has been the highest in the adolescent group. The rate for 15-17 year-old African-Americans has slightly exceeded that of their white counterparts early in the decade and since 2006 (Figure IV-10).

What can be done to reduce substance use or mental health problems among youth? Studies show that the following approaches may work:

- Programs that encourage early recognition and referral for treatment of mental health problems, especially in schools
- Systems of care for treating mental health and substance use issues among adolescents and their families
- Efforts to change social norms that support underage drinking and drug experimentation

**Figure IV-10. Rate of emergency room visits for mental disorders\* by race among adolescents 15-17 years of age, Missouri residents, 2000-2008**



Source: DHSS, Emergency Room MICA  
\* Principal diagnosis

- Reducing the availability of alcohol to minors

## Asthma

Asthma is one of the most common chronic diseases of childhood and is a leading cause of disability and health care utilization among adolescents.<sup>14, 15, 16</sup> Students with asthma frequently miss school. In a statewide health survey conducted by DHSS in 2007, 9.9 percent of Missouri’s children 10-17 years of age were reported to currently be living with asthma.<sup>17</sup>

Asthma can be difficult to control, especially if families have not been instructed in self-management or do not have access to continuous, comprehensive, coordinated care. Asthma severity ranges from mild to severe, and at times may be fatal. Many adolescents are taken to emergency rooms for treatment of asthma, although the rate is lower than in children under 10. From ages 0-14 years, males visit the ER more than females; however, females age 15 years and older visit the ER more often than males.<sup>18</sup>

In Missouri, there were 3,900 emergency room visits with asthma as the principal diagnosis among adolescents 10-17 years old in 2008.<sup>17</sup> This is a rate of 6.0 visits per 1,000 youths. The rate of ER visits has remained relatively steady for the past decade. However, the rate of ER visits for African-American adolescents is much higher than for white adolescents (19.8 vs. 3.3 visits per 1,000 youths) (Figure IV-11).

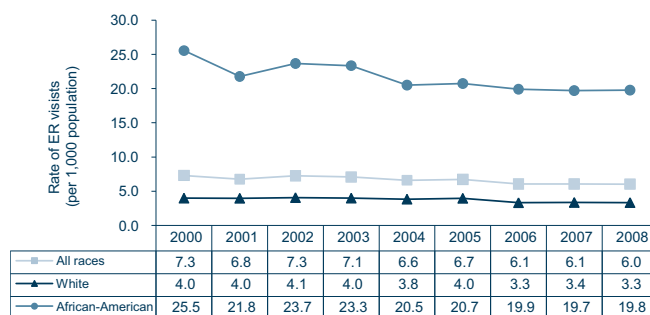
In 2008, there were a total of 643 hospital stays (10.0 per 10,000 youths) with asthma as the principal diagnosis among Missouri adolescents age 10-17 years with the rate higher for African-Americans than whites (39.4 vs. 4.3 per 10,000 youths).<sup>19</sup> The hospitalization

charges for adolescents ages 10-17 years totaled \$5.4 million in 2008.

What can be done to decrease the impact of asthma on Missouri’s youth and reduce emergency care for asthma attacks? Currently, there are no preventive measures or cure for asthma, so the focus must be on controlling it. Studies have suggested that:

- Proper diagnosis and medication, particularly the use and proper handling of a daily control medication
- Avoiding contact with environmental “triggers” is also important. Environmental triggers include cockroaches, dust mites, furry pets, mold, tobacco smoke, and certain chemicals. This strategy calls for preventing youth initiation of smoking, educating parents who smoke and making cessation strategies accessible
- Coordinated school health programs that include asthma management programs can help youth manage their disease

**Figure IV-11. Rate of asthma\* emergency room (ER) visits among adolescents 10-17 years of age, Missouri, 2000-2008**



Source: DHSS, Emergency Room MICA  
\* Principal diagnosis

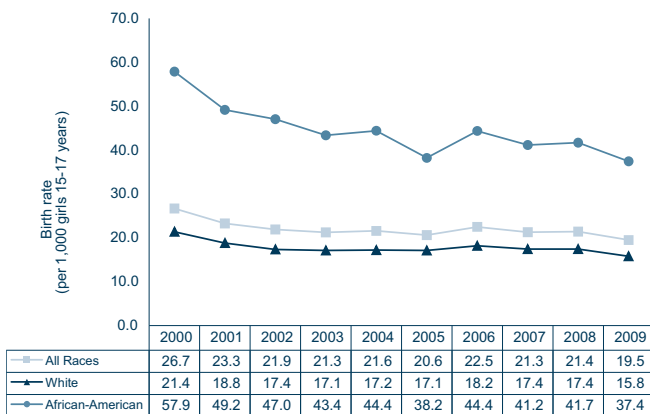
- A written asthma action plan (AAP) created by a health care provider and the person with asthma (or their care giver) to guide treatment and care
- Monitoring the airflow, impairment and risks to assess control and provide information to guide treatment

### Teen births

Teen childbearing has serious consequences for teen parents, their children, and society. Teenage mothers are less likely to complete high school, more likely to be single parents, and more likely to live in poverty than other teens.<sup>20</sup> These factors put them at risk for poorer health as adults. Babies conceived by teen mothers are more likely to have low birth weight, prematurity and growth restriction in the uterus.<sup>21</sup>

In 2009, there were 2,371 babies born to teens 15-17 years old, a rate of 19.5 for every 1,000 girls that age. Teen births in Missouri trended downward from 1990-

**Figure IV-12. Birth rate for teenagers 15-17 years of age, Missouri, 2000-2009**

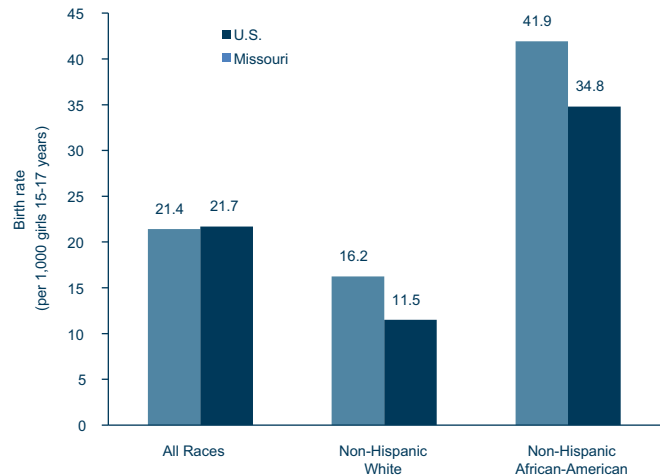


Source: DHSS, Birth MICA

2005 then increased from 2005-2006. From 2006-2007, births to 15-17 year-olds in Missouri showed a slight decline for whites and overall. The decline was larger for African-Americans. The rates did not show much change between 2007 and 2008, but decreased for all three groups between 2008 and 2009 (Figure IV-12).

Missouri's overall birthrate for teens is comparable to the national rate. Missouri's teen birthrate is, however, higher than the national teen birthrate for both Non-Hispanic whites and Non-Hispanic African-Americans (Figure IV-13).

**Figure IV-13. Birth rate for teenagers 15-17 years of age, Missouri and the U.S., 2008**



Source (Missouri): DHSS, Birth MICA

Population data for white and African-Americans obtained from DHSS, Bureau of Health Informatics

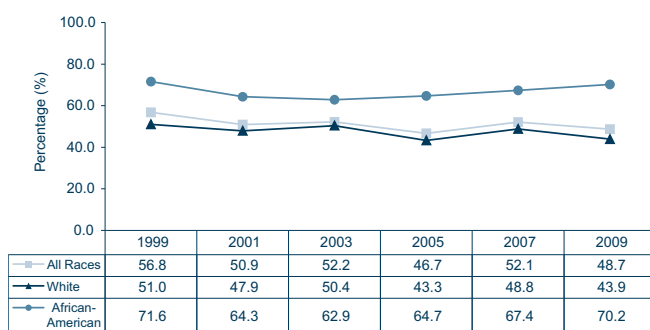
U.S. and Missouri All Races birth rate: Martin JA, et.al. Births: Final Data for 2008

White and African-American figures do not include individuals of Hispanic origin. The overall birth rate for Missouri was obtained from the National Center for Health Statistics and may differ from other Missouri-specific figures due to differences in population estimates between sources.

Youth at greatest risk of pregnancy are those who live in areas with high poverty, low levels of education, high residential turnover, and high divorce rates. Other risk factors include school failure, drug and alcohol use, early sexual activity, and having an older teen or adult man as the first sex partner.<sup>20</sup>

The overall percentage of Missouri students in grades 9-12 who report ever having had sexual intercourse has decreased since 1999. The percentage among African-American students has increased since 2003 and remains consistently higher than the percentage among white students (Figure IV-14). In 2009, the overall Missouri percentage (49 percent) is higher than the U.S. figure (46 percent).

**Figure IV-14. Percentage of students in grades 9-12 who ever had sexual intercourse, Missouri, 1999-2009**



Source: YRBSS

What can be done to prevent births to teen mothers? Research strongly suggests that youth development programs that include service learning and promotion of healthy behavior, life skills development, and a sense of purpose can reduce teen pregnancy. Delaying the start of sexual intercourse and improving contraceptive practices have contributed to declines in pregnancy rates among teens.<sup>20</sup> Other approaches include:

- Strengthen parent and adolescent communication, emotional bonds, monitoring and relationships
- Discourage teens from dating partners older than their own age
- Educate teens about how alcohol and drug use can put them at risk for pregnancy and related consequences
- Support school, community and faith-based programs to educate youth and parents and provide positive youth development opportunities
- Replicate evidence-based and promising practices program models
- Promote developmentally appropriate physical and mental health services to meet the needs of adolescents
- Age appropriate sex education



## Chapter 5: Adults (Age 18-64 Years)

During the adult years, the risk of disease and disability increases as people age. Adulthood is the time of peak responsibility and productivity, so illness and disability have a heavy economic and social impact during this life stage. However, much illness, disability and premature death is avoidable through regular physical activity, healthy eating, avoiding tobacco use, responsible sexual behavior, safe driving behavior (including safety belt use and not driving while impaired), screening for chronic diseases and depression, and care management for chronic diseases.

In 2009, there were an estimated 3,733,000 adults between 18 and 64 years of age in Missouri, who made up 62 percent of the population.<sup>1</sup>

According to the 2010 Current Population Survey, in 2009, 21 percent of Missouri adults had no health insurance. Most adults (68 percent) age 18 to 64 receive coverage via private health insurance provided through an employer or union or purchased individually. Government plans (Medicaid, Medicare, or military health care) covered an additional 14 percent, including 9 percent covered by Medicaid. All of these figures reflect coverage for part or all of 2009. (Note: People can be covered by more than one type of health insurance during the year.)<sup>2</sup>

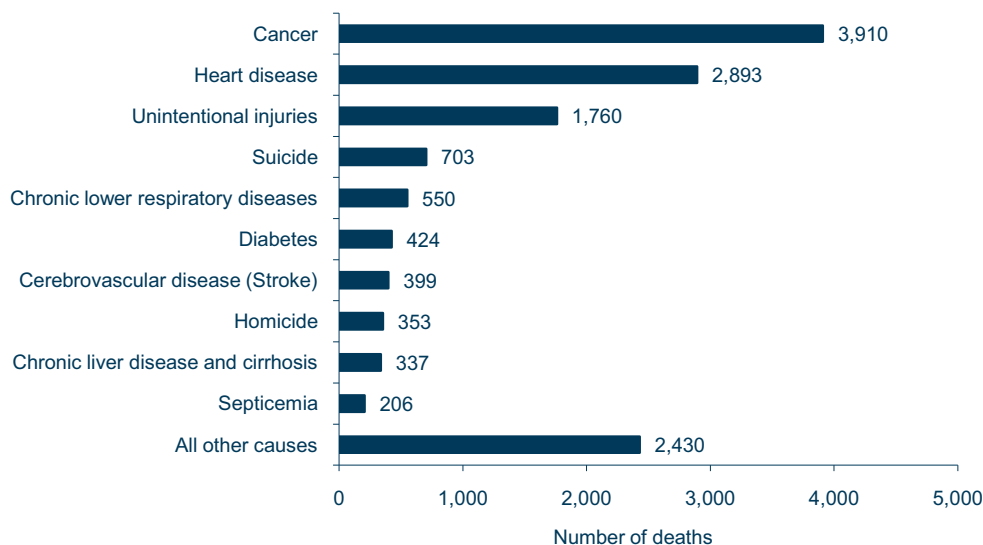


## Mortality and Leading Causes of Death

Missouri's adult death rate was higher than the U.S. rate in 2007. The death rate (per 100,000) for adults age 18-64 years was 358 for Missouri,<sup>3</sup> compared with 328 for the U.S.<sup>4,5</sup> The leading causes of death in Missouri in 2009 are shown in Figure V-1.

For nine of the top 10 causes of death for Missouri adults, Missouri had higher death rates than the U.S. in 2007 (the most recent year U.S. data were available).<sup>3-5</sup> The greatest discrepancies by percentage difference were in death rates (per 100,000) due to chronic lower respiratory disease (13 for Missouri vs. 10 for the U.S.), suicide (18 for Missouri vs. 15 for the U.S.), and kidney disease (5 for Missouri vs. 4 for the U.S.).

**Figure V-1. Leading causes of death among adults 18-64 years of age, Missouri residents, 2009**



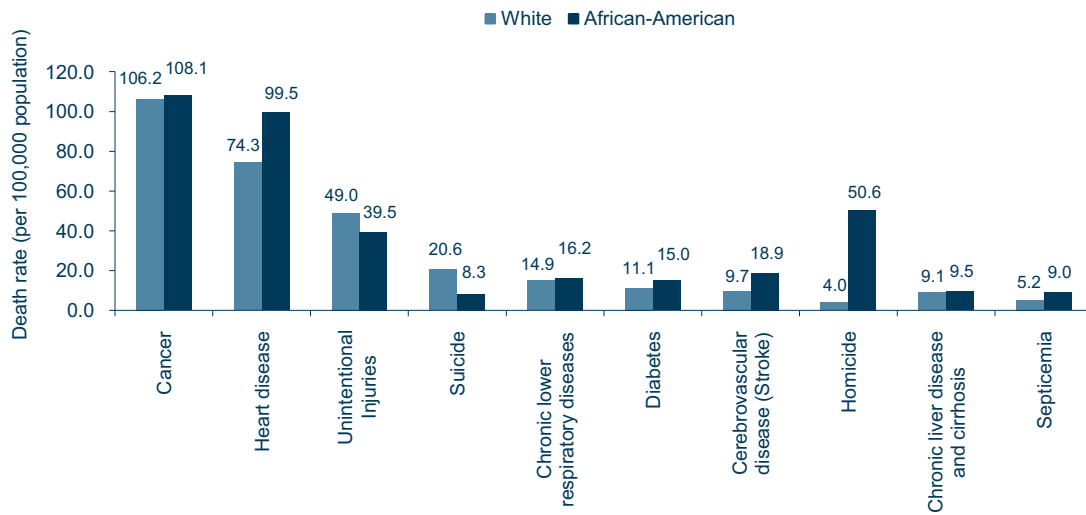
Source: DHSS, Bureau of Health Informatics

In 2009, African-American adults in Missouri had a higher overall death rate than whites (477 vs. 367 per 100,000), as well as higher rates for eight of the top 10 causes of death for Missouri adults. Compared with whites, African-American adults had 13 times the death rate due to homicide and twice the rate due to stroke, although the death rate due to suicide was more than double for whites compared to African-American adults (Figure V-2).

One measure of the impact of premature death is years of potential life lost (YPLL). YPLL is a count of the number of potential years lost for each person who died before a specified age. Usually premature death is defined as death before age 65 or 75. In 2009, there were 3,733,817 years of potential life lost (a rate of 9,141 per 100,000) among adults age 18-64 years living in Missouri. Cancer caused the most years of potential life lost for this age group, followed by heart disease and unintentional injuries (Figure V-3).

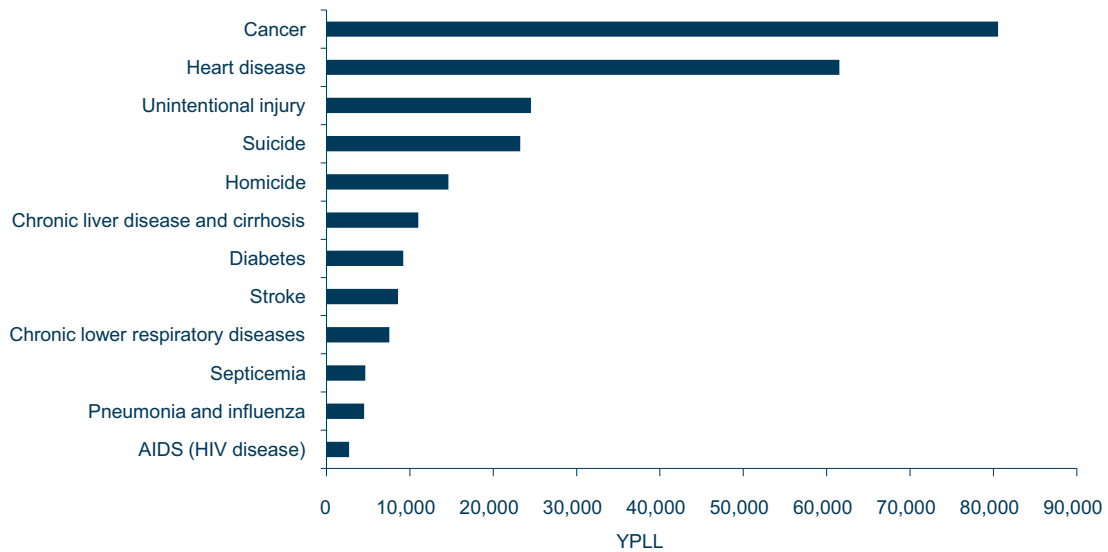


Figure V-2. Death rate for leading causes of death among adults 18-64 years of age, Missouri residents, 2009



Source: DHSS, Bureau of Health Informatics

Figure V-3. Leading causes of years of potential life lost (YPLL) for adults 18-64 years of age, Missouri residents, 2009

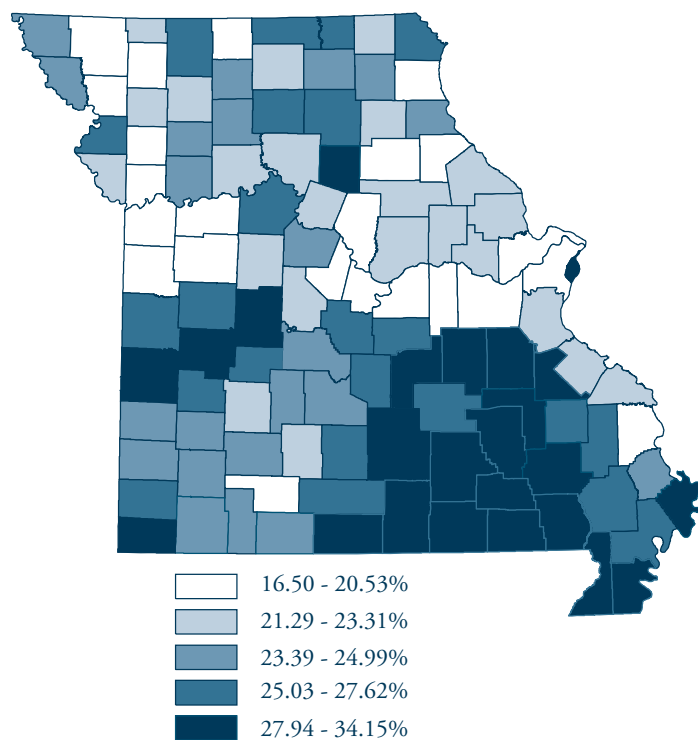


Source: DHSS, Death MICA

## Activity Limitation

According to the 2007 Missouri County Level Study, 22.0 percent of Missouri adults age 18 and older were limited in their usual activities due to physical, mental or emotional problems.<sup>6</sup> The percentage of adults with activity limitation varies by counties from 16.50 percent to 34.15 percent (Figure V-4).

**Figure V-4. Adults with activity limitation, by county, Missouri, 2007**



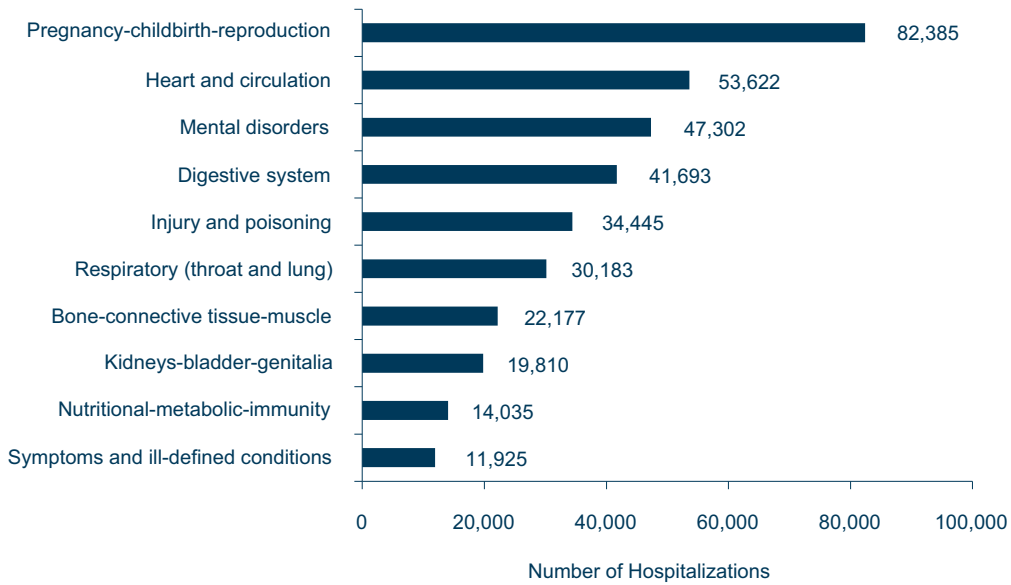
Source: Missouri 2007 County Level Study



## Hospitalization

Apart from pregnancy and childbirth (which is not a disease or disorder), the two most common causes of hospitalization for this age group were heart and circulatory disease and mental disorders (Figure V-5).

**Figure V-5. Leading causes\* of hospitalization among adults 18-64 years of age, Missouri residents, 2008**



Source: DHSS, Hospitalization MICA

\*Principal diagnosis

## Health Problems and Potential Opportunities for Prevention

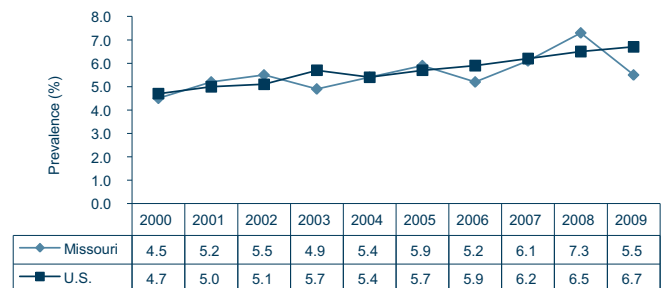
### Chronic diseases influenced by health behaviors

Many of the leading causes of death, hospitalization and disability are strongly influenced by lifestyle and health behaviors. Tobacco use, overweight and obesity, and lack of physical activity contribute to heart disease, diabetes, chronic lower respiratory disease, stroke, and many types of cancer (including cancers of the lung, mouth, throat, esophagus, stomach, pancreas, colon, rectum, anus, cervix uteri, kidney, bladder, and leukemia).<sup>7</sup> These diseases caused 54 percent of all deaths of Missouri adults 18-64 years of age in 2009.<sup>3</sup> Lung cancer causes more deaths than any other type of cancer among both men and women. In 2009, 626 men age 18-64 years and 522 women in that age group died of lung cancer in Missouri.<sup>3</sup> In 2008, 53,622 hospitalizations in Missouri in this age group were due to heart and circulatory diseases alone (Figure V-5).



The prevalence of doctor-diagnosed diabetes for Missourians 18-64 years of age was similar to the national figure. In 2009, the prevalence of doctor-diagnosed diabetes was 5.5 percent in Missouri, compared to 6.7 percent in the U.S. The prevalence was higher among African-Americans than whites, both in Missouri and the U.S. Diabetes prevalence has increased steadily in the U.S. over the past decade. In Missouri, however, the prevalence has fluctuated in the past decade. It reached its highest point of 7.3 percent in 2008 and then decreased to 5.5 percent in 2009 (Figure V-6).

Figure V-6. Prevalence of doctor-diagnosed diabetes among adults 18-64 years of age, Missouri and the U.S., 2000-2009



Source: Behavioral Risk Factor Surveillance System

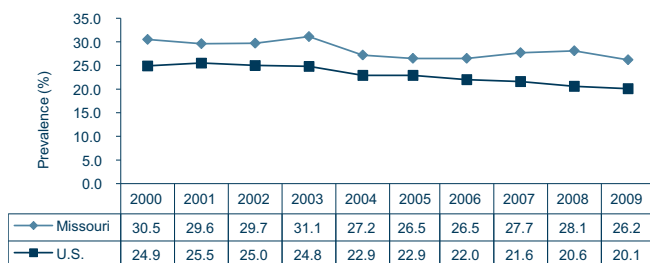
Unfortunately, some Missourians engage in behaviors, such as the following, that result in chronic diseases causing lost productivity, disability and deaths.



**Tobacco use**—Over one quarter of Missouri adults smoke. The smoking prevalence in this age group in Missouri has always been higher than that in the U.S. In 2009, the prevalence of current smoking in Missouri was 26.2 percent, higher than the U.S. prevalence of 20.1 percent (Figure V-7). A similar picture was seen for both white adults (25.1 percent in Missouri vs. 20.8 percent in the U.S.) and African-American adults (30.5 percent in Missouri vs. 21.5 percent in the U.S.). Both Missouri and U.S. have experienced a significant decline in adult smoking prevalence during last decade.

**Impact of tobacco use**—Tobacco use damages nearly every organ in the human body, causing many diseases and harming the general health. It damages the immune system and increases the risk of infections. Smokers are much more likely to suffer from coronary heart disease, the leading cause of death in Missouri and the U.S. Tobacco use also causes many types of cancer.<sup>7</sup> It is

**Figure V-7. Prevalence of current smoking\* among adults 18-64 years of age, Missouri and the U.S., 2000-2009**



Source: BRFSS

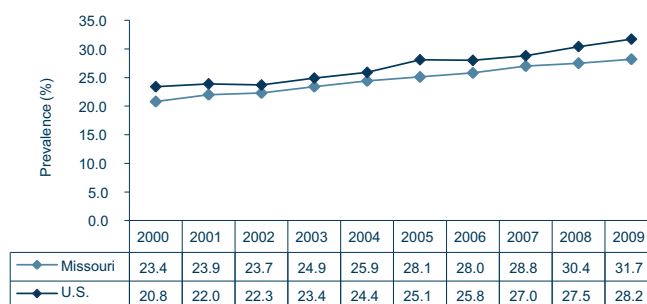
\*Respondents who have ever smoked 100 cigarettes in their lifetime and reported smoking every day or some days

estimated to be responsible for one of every five deaths in Missouri. Smokers who quit before the age of 50 can cut the risk of dying in the next 15 years by a half.<sup>8</sup>

**Obesity and Overweight**—The prevalence of obesity among Missouri adults has more than doubled since 1990, consistent with the national trend. About one in three (31.7 percent) Missourians 18-64 years of age are now obese, compared with 28.2 percent nationally (Figure V-8). Obesity is defined according to body mass index (BMI), which is a person's weight (in kilograms) divided by his or her height (in meters) squared. For example, a person who weighs 203 pounds (92 kilograms) and is 5'9" tall (1.75 meters) has a BMI of 30.0. A person with a BMI of 30.0 or more is considered to be obese.

A large proportion of African-Americans are obese, both in Missouri and nationally. In 2009, obesity prevalence

**Figure V-8. Prevalence of obesity\* among adults 18-64 years of age, Missouri and the U.S., 2000-2009**



Source: BRFSS

\*BMI 30.0 or more

was higher in Missouri than in the U.S. for both white adults (30.7 percent in Missouri vs. 26.7 percent in the U.S.) and African-American adults (43.8 percent in Missouri vs. 38.1 percent in the U.S.) (Figure V-9).

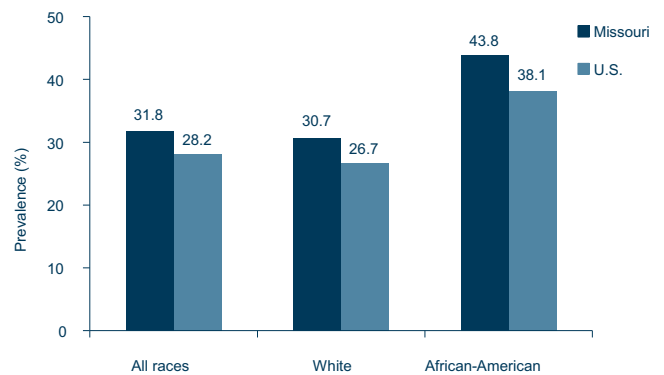
People with a BMI of 25-29.9 are defined as overweight. Over one-third (33.8 percent in 2009) of Missouri adults 18-64 years of age are overweight, which puts them at increased risk of becoming obese. The proportion of overweight among Missouri adults has remained relatively stable since 2000.

*Impact of obesity and overweight*—Obesity can lead to serious health problems, including heart disease and stroke, two of the leading causes of death. Being overweight or obese also increases the risk of hypertension, high cholesterol, diabetes, arthritis, several types of cancer, asthma, reproductive problems and other diseases and conditions.

*Low physical activity*—About half of Missourians do not get the recommended amount of moderate or vigorous physical activity. Recommended moderate physical activity is defined as at least 30 minutes of moderate physical activity per day, five or more days per week; recommended vigorous physical activity is defined as at least 20 minutes of vigorous physical activity per day, three or more days per week. In 2009, the most recent year this information was collected, 47.2 percent of Missouri adults 18-64 years of age did not exercise enough, which was about the same as in the U.S. as a whole (48.7 percent). The Missouri percentage in 2001 was 58.4 percent, so there appears to have been some improvement during the past decade. More African-Americans than whites reported not getting enough physical activity (58.9 percent vs. 46.8 percent in 2009).



Figure V-9. Prevalence of obesity\* by race among adults 18-64 years of age, Missouri and the U.S., 2009



Source: BRFSS

\*Body Mass Index (BMI) 30.0 or more

*Impact of low physical activity*—Obesity and overweight result from caloric imbalance (too few calories expended for the amount of calories consumed). Physical activity is very important in maintaining a healthy weight and preventing the many health risks of obesity and overweight.

*Low consumption of fruits and vegetables*—A large majority of adults 18-64 years of age consume less than the recommended five servings per day of fruits and vegetables. In Missouri in 2009, the percentage was 81.7 percent, slightly higher than the national rate of 77.0 percent. This proportion has been stable over the last decade. The difference between African-Americans and whites is small.

*Impact of low consumption of fruits and vegetables*—Eating fruits and vegetables, which are rich in nutrients and low in calories, helps adults maintain a healthy weight. People who eat few fruits and vegetables are likely to consume more calories in their daily diet.

What can be done to increase the number of adults who practice healthy behaviors? Some effective strategies are:

- Foster changes in the workplace to improve physical activity and nutritional habits, including environmental and policy changes and education programs
- Provide assistance and support for communities to improve physical activity and nutritional habits, including environmental and policy changes, community coalitions and family-focused community activities

- Improve health care providers' knowledge, skills and resources to enhance prevention, treatment and management of weight<sup>9</sup>
- Motivate people to quit smoking through effective media messages
- Increase access to affordable smoking cessation services, which are more cost-effective than many other common clinical services
- Increase the price of tobacco products, which decreases consumption
- Train and encourage health care providers to counsel patients to quit smoking
- Decrease exposure to secondhand smoke through public awareness and policy changes<sup>8</sup>
- Encourage the use of appropriate screening tests for chronic diseases, and assure access to screening
- Promote the use of care management for people with chronic diseases

## **Mental health problems**

Mental health problems create a significant burden, both for those directly affected and for the society as a whole. Mental illness and abuse of alcohol and other substances affect individuals' quality of life, family and community relationships, and productivity, as well as the health care system. The causes of these problems may include physical changes in the brain, genetic factors, and social and behavioral factors. People with mental health problems often face stigma and discrimination.<sup>10</sup>

There are many different types of mental health problems, including affective disorders such as depression and bipolar disorder, anxiety and personality disorders, alcohol and substance abuse, schizophrenia, senility and organic mental disorders, and mental retardation.<sup>10</sup>

Suicide was the fourth leading cause of death among Missourians 18-64 years of age in 2009, with 703 deaths (Figure V-1). Research has shown that more than 90 percent of people who commit suicide have depression or another diagnosable mental or substance abuse disorder, often in combination with other mental disorders.<sup>11</sup>

In 2008, mental disorders were the third leading cause of hospitalization in Missouri adults, with 48,302 hospital admissions, accounting for 11.7 percent of all hospitalizations. The trend has been gradually upward over the last decade. The hospitalization rate for mental

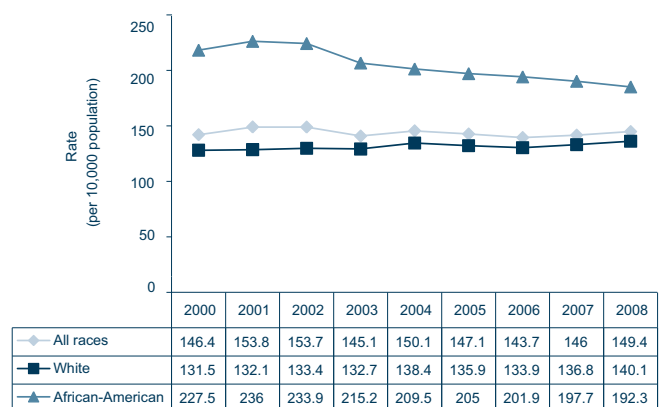


disorders among Missouri adults is consistently higher among African-Americans, where it is highest among those age 25-44 years (Figure V-10).

In 2009, the BRFSS found that 13.4 percent of Missouri adults 18-64 years of age reported frequent mental distress, defined as 14 or more mentally unhealthy days in the past 30 days. This was significantly higher than the United States prevalence of 11.5 percent.<sup>12</sup>

Alcohol and substance abuse contribute to serious health problems as well as lost productivity and social problems within families and communities. Excessive drinking can cause many chronic illnesses, such as liver cirrhosis, pancreatitis, various cancers (including cancer of the liver, mouth, throat, and esophagus), high blood pressure, and psychological disorders. It can also cause acute problems, such as motor vehicle injuries, falls, domestic violence, sexual assault and child abuse.<sup>13</sup>

**Figure V-10. Hospitalization rate for mental disorders\* among adults 25-64 years of age, by race, Missouri residents, 2000-2008**

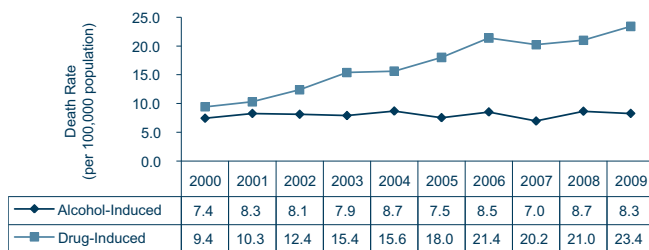


Source: DHSS, Hospitalization MICA  
\*Principal diagnosis

According to Missouri death records, there were 309 alcohol-induced and 874 drug-induced deaths among adults age 18-64 years in 2009. While alcohol-induced deaths were generally stable between 2000 and 2009, drug-induced deaths increased nearly 150 percent (Figure V-11). The alcohol- and drug-induced death rate (per 100,000) has become higher among whites than among African-American adults in Missouri (33 vs. 28 in 2009).<sup>3</sup>

There were 7,837 hospitalizations for mental disorders related to alcohol and substance abuse for Missouri

**Figure V-11. Alcohol- and drug-induced deaths among adults 18-64 years of age, Missouri residents, 2000-2009**



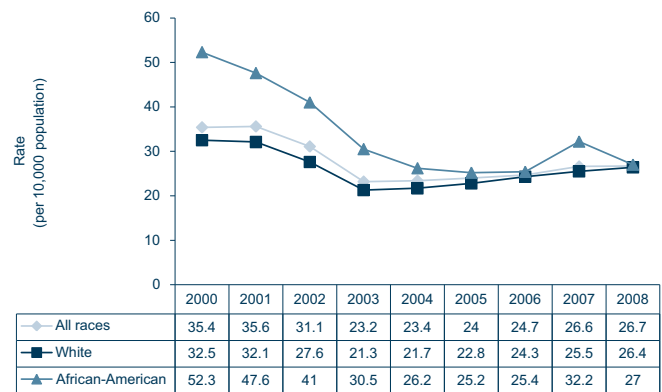
Source: DHSS, Bureau of Health Informatics

Note: For all drugs, including alcohol, deaths were included if attributed to dependence, nondependent use, accidental poisoning, homicidal poisoning or suicide. In addition, alcoholic polyneuropathy, cardiomyopathy and gastritis are included, as are chronic liver disease and cirrhosis when specified as due to alcohol.

adults in 2008, accounting for 16.2 percent of all hospitalizations due to mental disorders. The hospitalization rate for treatment of mental disorders due to alcohol and substance abuse among African-American adults has been substantially higher than that for whites in Missouri, but this disparity has narrowed during the last few years. Among both races, rates in the 25-44 age group have been the highest, and are shown in Figure V-12.

Hospitalization data do not show the whole picture. Outpatient treatment for alcohol abuse (counseling, twelve-step programs, etc.) is common. However, not all who need treatment can access it. According to the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA), the percent of Missourians age 18-25 years that needed treatment for alcohol abuse in the past year but did not receive it ranked among the highest in the country (2002-2003 data).<sup>14</sup>

**Figure V-12. Hospitalization rate for treatment of alcohol- and substance-related mental disorders\* among adults 25-44 years of age, by race, Missouri residents, 2000-2008**



Source: DHSS, Hospitalization MICA

\*Principal diagnosis

What can be done to reduce the number of people with substance abuse or mental health problems? Some approaches that may work are:

- Promote healthy nutrition, physical activity and weight control. All of these help reduce stress that may contribute to mental health problems.<sup>15</sup>
- Encourage primary care providers to use a simple screening protocol to identify depression in all adult patients at all primary care visits
- Follow up with more definitive diagnostic interviews, when indicated, and appropriate patient management
- Provide referrals to needed preventive services (community-based services, education, social services)
- Provide mental health diagnostic services and patient management to adults with chronic diseases

The good news is that most mental health problems can be treated successfully and the affected person can return to a full and productive life.<sup>15</sup>

## **Motor vehicle crashes**

Motor vehicle crashes (MVC) cause many injuries and deaths, as well as tremendous social and economic losses, including health care costs, lost productivity, rehabilitation costs and the long-term effects of permanent disability.<sup>16</sup>

The burden of MVC deaths has been higher in Missouri than nationally. In 2007, the latest national data available, the U.S. rate was 17 deaths per 100,000 population.<sup>3-5</sup> In Missouri, 741 Missouri adults died in motor vehicle crashes, a rate of 20 per 100,000. The rate was slightly higher for whites than for African-Americans (19 vs. 16 per 100,000) in 2009.<sup>3</sup> The death rate from MVC was highest among young adults age 18-19 years (28 per 100,000 in 2009) across all age groups in Missouri.<sup>17</sup>

A large number of people are seen in hospital emergency rooms or hospitalized for injuries from motor vehicle crashes (traffic plus non-traffic). In 2008, 18-64 year-olds accounted for 53,355 such ER visits or hospitalizations, a rate of 1,438 per 100,000 population. The number of ER visits and hospitalizations for African-Americans was substantially higher than that for whites (2,328 vs. 1,289). The overall trend for both whites and African Americans has dropped since 2000.<sup>18</sup>

What can be done to decrease the number of adults injured and killed in motor vehicle accidents? Some approaches that may work are:

- Media campaigns and public education to encourage safety belt use
- Enforcement of safety belt laws for all occupants of motor vehicles



- Education, law enforcement and treatment programs that reduce drinking and driving
- Designing better roads and automobiles to prevent accidents

### **Arthritis**

Arthritis is the leading cause of disability in the U.S. Joint pain and stiffness are its characteristic symptoms. The two most common kinds of arthritis are osteoarthritis and rheumatoid arthritis.<sup>19</sup>

Osteoarthritis is the degeneration of cartilage and its underlying bone within a joint, as well as bony overgrowth. Osteoarthritis begins gradually, usually after age 40, and commonly affects the knees, hips, hands and spine. There is currently no cure.

Rheumatoid arthritis is a systemic inflammatory disease that can start at any age. The inflammation primarily affects the lining of the joints, but can also affect other organs. Genes may play a role in the cause. New drugs are available to treat this disease; however, currently there is no cure.

According to the 2009 Behavioral Risk Factor Surveillance System, a quarter (25.0 percent) of Missourians 18-64 years of age had physician-diagnosed arthritis. This was higher than the U.S. estimate of 20.1 percent. The prevalence of arthritis increases with age, and it is more common in women than in men. There is no marked racial disparity for this disease.

What can be done to reduce the number of people with arthritis and the disability associated with it? Unfortunately, nothing can be done about the currently known risk factors, such as age, sex and genetic predisposition. However, some approaches can help

improve or maintain functioning and quality of life, including:

- Taking appropriate medication
- Receiving physical or occupational therapy
- Maintaining a healthy weight, or losing weight, especially if the knees are affected
- Receiving self-management education and support<sup>19</sup>
- Engaging in physical activity, which can reduce arthritis pain and benefit the associated disability<sup>20</sup>
- Having a surgical intervention, in some cases

### **Breast and prostate cancers**

Of all the new cancer (excluding skin cancer) cases diagnosed every year among Missouri women 18-64 years of age, breast cancer is the most common type of cancer. (Accurate data on skin cancer are unavailable because not all types of skin cancer are reportable to the Missouri Cancer Registry.) In 2008, there were 2,457 new cases of breast cancer in Missouri women in this age group. Breast cancer risk increases with age; the incidence rate (per 100,000) was 18 for women age 25-34 years, and 303 for women age 55-64 years in 2008. The age-adjusted breast cancer incidence rate for adult women in Missouri has decreased significantly during 1999-2009.<sup>21</sup>

Breast cancer claimed the lives of 340 Missouri women 18-64 years of age in 2009. The annual number of deaths has fluctuated during the last decade (326-428 per year). The risk of death is higher for African-American than for white women (21 vs. 18 per 100,000 in 2009).<sup>17, 22</sup> Early detection and treatment of breast cancer greatly improve the chance of survival.



Of all the new cancer (excluding skin cancer) cases diagnosed, prostate cancer is the most common type of cancer for Missouri men 18-64 years of age, with 1,609 diagnosed cases in 2008. The risk of prostate cancer increases with age: the incidence rate (per 100,000) was six for men age 35-44 years, and 374 for men aged 55-64 years.<sup>21</sup> Prostate cancer caused 55 deaths among Missouri men 18-64 years of age in 2009. The death rate (per 100,000) among African-Americans was six, compared with three for whites.<sup>17, 22</sup>

What can be done to decrease the burden of breast and prostate cancer?

- Educate health care providers and the public to promote appropriate screening methods
- Assure availability of mammograms for all women at the recommended frequency, which depends on age and risk factors
- Facilitate rapid referral for diagnostic testing for those with abnormal screening results

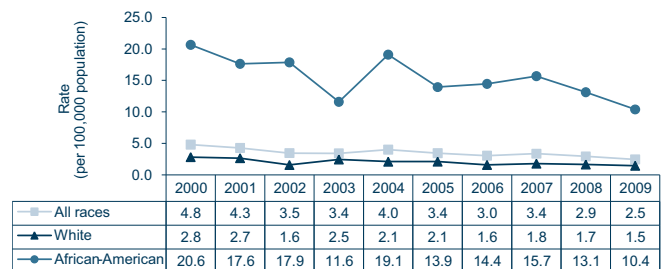
### HIV/AIDS and sexually transmitted diseases (STDs)

The death rate due to HIV/AIDS has fallen dramatically over the past decade, as effective drug therapy has become widely available. In 2009, 92 Missouri adults 18-64 years of age died of HIV/AIDS, down from 164 in 2000. The age-adjusted Missouri death rate was considerably lower than the U.S. rate (3 vs. 6 per 100,000 in 2007).<sup>17, 23</sup>

African-Americans are at much higher risk of dying from HIV/AIDS. In 2009, the death rate (per 100,000) for adults age 18-64 years was 10 for African Americans, compared with two for whites in Missouri (Figure V-13).

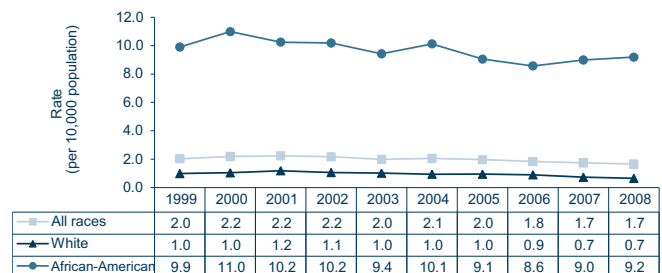
The hospitalization rate for HIV/AIDS among Missouri adults has been generally stable since 1999. There were 618 hospitalizations in 2008. In 2008, the hospitalization rate per 10,000 people was much higher for African-Americans than for whites (9 vs. 1) (Figure V-14).

**Figure V-13. Death rate for HIV/AIDS among adults 18-64 years of age, Missouri residents, 2000-2009**



Source: DHSS, Death MICA  
\*ICD-10 codes have been used

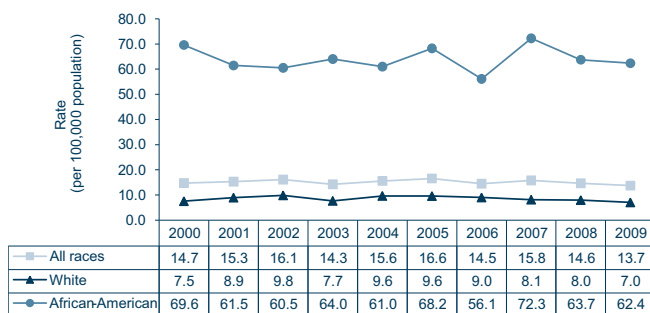
**Figure V-14. Hospitalization rate for HIV infection\* among adults 18-64 years of age, by race, Missouri residents, 2000-2008\*\***



Source: DHSS, Hospital Discharge MICA  
\*Principal diagnosis  
\*\*2009 hospitalization data are not available

The number of newly diagnosed cases of HIV infection has remained generally stable during the past decade. The diagnosis rate per 100,000 people was much higher for African-Americans than for whites (62 vs. 7 in 2009) (Figure V-15).

**Figure V-15. Rate of reported cases of newly diagnosed HIV/AIDS among adults 18-64 years of age, by race, Missouri, 2000-2009**



Source:

Case counts: DHSS, Communicable Disease Surveillance, HIV/AIDS Reporting System

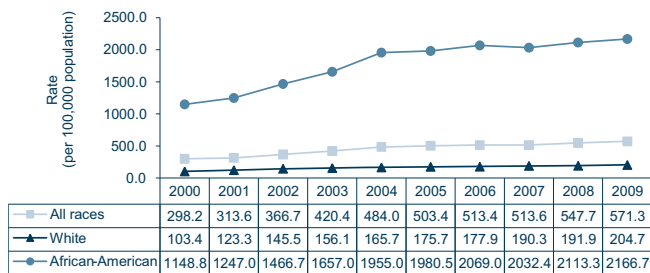
Population estimates: DHSS, Bureau of Health Informatics



Sexually transmitted diseases (STD) caused by bacteria do not commonly cause death or even require hospitalization, but they do cause serious complications, especially in women. Syphilis, if not diagnosed and treated, can progress to a debilitating chronic disease and cause serious health problems in infants infected through their mothers. The number of reported primary and secondary syphilis cases in Missouri adults 18-64 years of age generally increased from 29 cases in 2000 to 228 cases in 2007, and has then decreased, with 165 cases in 2009.<sup>24</sup> In 2009, Missouri ranked 21st among all states in the U.S. for the reported rate of primary and secondary syphilis.<sup>25</sup>

Chlamydia is the most common STD, and it has also been on the rise in recent years. In 2009, Missouri's reported rate of chlamydia infections ranked 15th among all states in the U.S.<sup>25</sup> However, the large number of reported cases (21,331 among adults 18-64 years of age in 2009) represents only the "tip of the iceberg," because most chlamydia infections do not cause symptoms unless severe complications such as pelvic inflammatory disease develop. The rate for African-Americans (2,167 per 100,000) is more than 10 times that for whites (205 per 100,000) in 2009 (Figure V-16).

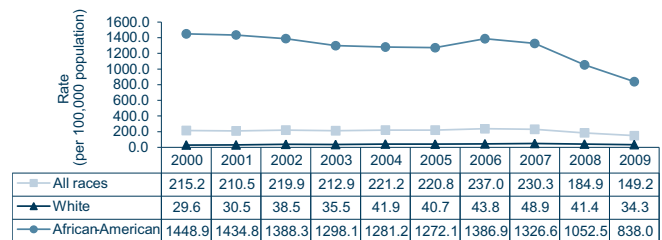
**Figure V-16. Rate of reported cases of chlamydia among adults 18-64 years of age, by race, Missouri, 2000-2009**



Source:  
Case counts: DHSS, Communicable Disease Surveillance  
Population estimates: DHSS, Bureau of Health Informatics

Gonorrhea is the second most frequently reported STD. From 2000 to 2009, there was a 24 percent decrease in the number of reported gonorrhea cases in Missouri adults 18-64 years of age (from 7,345 cases in 2000 to 5,570 cases in 2009). In 2009, the gonorrhea rate per 100,000 people was much higher for African-Americans than for whites (838 vs. 34) (Figure V-17). Missouri ranked 18th among all states in the U.S. for rate of reported gonorrhea cases in 2009.<sup>25</sup>

**Figure V-17. Rate of reported cases of gonorrhea among adults 18-64 years of age, by race, Missouri, 2000-2009**



Source:  
Case counts: DHSS, Communicable Disease Surveillance  
Population estimates: DHSS, Bureau of Health Informatics

What can be done to decrease the incidence of HIV/AIDS and STDs?

- Educate people to reduce risks through safer lifestyle practices
- Target outreach and screening to those at highest risk
- Assure adequate and timely treatment for infected people
- Provide public health intervention (identification, testing and treatment of partners)



## Chapter 6: Seniors (Age 65 years and older)

The risk of disease and disability clearly increases with advancing age, but poor health is not an inevitable consequence of aging. Much of the illness, disability and death associated with chronic diseases is avoidable through known prevention measures. Many seniors can improve and sustain their quality of life by practicing a healthy lifestyle.

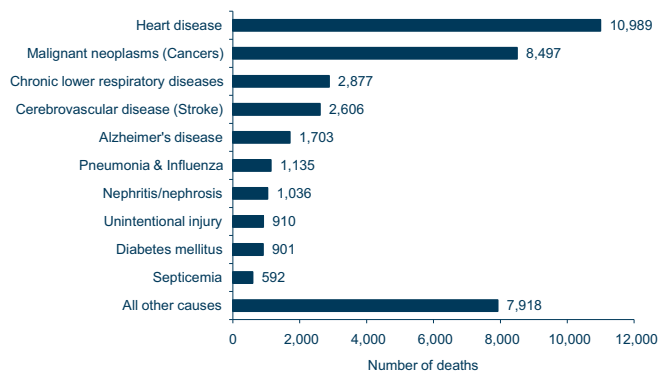
In 2009 there were an estimated 822,000 seniors 65 years of age and over in Missouri.<sup>1</sup> Missouri has a slightly higher proportion of people in this age group (13.7 percent) than the U.S. as a whole (12.9 percent). The senior population in Missouri has grown by 8 percent since 2000, making it one of the fastest growing age cohorts in the state. This trend will accelerate over the next two decades as the large “Baby Boom” population moves into the senior age groups. Missouri population projections forecast that the senior population will rise to 1.25 million persons by 2025, which would be a 52 percent increase from the 2009 population estimate.<sup>2</sup>



## Mortality and Leading Causes of Death

In 2007 the death rate among Missouri seniors was higher than the U.S. rate. In 2007, 39,769 people 65 years of age and older died in Missouri, for a rate (per 100,000 seniors) of 5,002,<sup>3</sup> compared with the U.S. rate of 4,664.<sup>4,5</sup> Chronic diseases caused most deaths among Missouri seniors (Figure VI-1). For eight of the top 10 causes of death, Missouri seniors had higher death rates than the U.S. as a whole in 2007 (the most recent year U.S. data available).<sup>3,4,5</sup> Missouri seniors' death rates (per 100,000) were at least 10 percent higher than the U.S. as a whole for: heart disease (1,450 in Missouri vs. 1,309 in the U.S.); cerebrovascular disease (353 in Missouri vs. 306 in the U.S.); chronic lower respiratory disease (325 in Missouri vs. 289 in the U.S.); influenza and pneumonia (147 in Missouri vs. 121 in the U.S.); kidney disease (nephritis/nephrosis) (127 in Missouri vs. 102 in the U.S.); and unintentional injuries (121 in Missouri vs. 101 in the U.S.).

**Figure VI-1. Leading causes of death among seniors 65 years of age and over, Missouri residents, 2009**



Source: DHSS, Death MICA

Conversely, death rates from septicemia (67 in Missouri vs. 70 in the U.S.) and diabetes (131 in Missouri vs. 136 in the U.S.) were slightly lower in Missouri in 2007.

There were notable differences in death rate and leading causes of death between African-American and white seniors in Missouri. In 2009, the overall death rate for African-American seniors was 3.2 percent lower than for whites (4,662 vs. 4,817 per 100,000), although African-American rates were higher for seven of the top 10 causes of death for Missouri seniors. The death rate due to diabetes was about twice as high for African-American seniors (210 vs. 103 per 100,000) as for whites. African-American death rates were also higher for hypertension (80 percent higher), kidney disease (nephritis/nephrosis) (53 percent higher), and septicemia (41 percent higher).<sup>3</sup>

Hypertension was among the top 10 causes of death for African-American seniors (79 deaths per 100,000), but not for whites.<sup>3</sup>

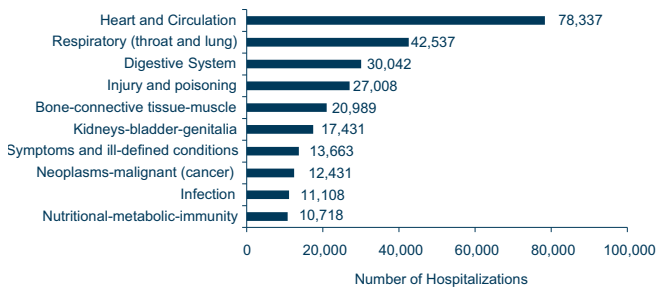
On the other hand, the death rate from chronic lower respiratory disease was more than twice as high for white seniors as for African-American seniors (367 vs. 174 per 100,000). The death rates for whites were also higher for unintentional injuries (113 percent higher), Alzheimer's disease (63 percent higher), and pneumonia and influenza (34 percent higher).<sup>3</sup>

Unintentional injury was among the top 10 causes of death for white seniors (116 deaths per 100,000), but not for African-Americans.<sup>3</sup>

## Hospitalization

There were 290,824 hospitalizations of Missouri seniors in 2008. Heart and circulatory disease is by far the most common cause of hospitalizations for seniors, followed by respiratory diseases and diseases of the digestive system (Figure VI-2).

**Figure VI-2. Leading causes\* of hospitalization among seniors 65 years of age and over, Missouri residents, 2008**



Source: DHSS, Hospitalization MICA

\*Principal diagnosis



## Health Problems and Potential Opportunities for Prevention

### Chronic diseases influenced by health behaviors

Chronic diseases place a heavy health and economic burden on older adults, causing long-term illness, diminished quality of life, and greatly increased health care costs. CDC estimates that at least 80 percent of U.S. seniors have at least one chronic condition, and 50 percent have at least two.<sup>6</sup> Nearly 40 percent of deaths in the U.S. can be attributed to smoking, physical inactivity, poor diet, or alcohol misuse—behaviors practiced by many people every day for much of their lives.<sup>7</sup>

Most of the leading causes of death of Missouri seniors are related to health behaviors (including heart disease, stroke, chronic lower respiratory disease, diabetes, lung and colorectal cancers). For example, in 2009, lung cancer caused the deaths of 1,511 Missouri men and 1,177 Missouri women age 65 and over,<sup>8</sup> more than any other type of cancer deaths among both men and women. The National Cancer Institute estimates that 87 percent of lung cancer deaths are caused by smoking.<sup>9</sup>



As noted in previous chapters of this report, many Missourians do not practice healthy behaviors that can help prevent chronic diseases and the resulting lost productivity, disability and deaths. This is true of seniors as well, according to information about health habits and diseases collected through the Behavior Risk Factor Surveillance System (BRFSS).

**Diabetes**—The prevalence of diabetes is higher in this age group than in younger people, and it has increased over the past decade (Figure VI-3). In 2009, 18.9 percent of Missouri seniors had doctor-diagnosed diabetes, slightly lower than the national prevalence of 20.2 percent. The prevalence was higher among African-Americans than among whites in both Missouri and the U.S.

**Tobacco use**—Smoking prevalence among Missouri seniors is lower than among younger Missourians; however, the rate has been higher than that among U.S. seniors in the last decade. In 2009, 9.7 percent of Missouri seniors were current smokers, slightly higher

than the national prevalence of 8.7 percent (Figure VI-4). About 41 percent of Missouri seniors were former smokers in 2009.

Smoking damages nearly every organ in the human body, causing many diseases and harming the general health of smokers. It harms the immune system and increases the risk of infections. Tobacco use is estimated to be responsible for one of every five deaths in Missouri. Smokers are much more likely to suffer from coronary heart disease, the leading cause of death in Missouri and the U.S., and lung cancer, the leading cause of cancer deaths. Although the effects of smoking may linger for several years, people who stop smoking can effectively reduce their risks for many chronic diseases compared with those who continue to smoke.<sup>10</sup>

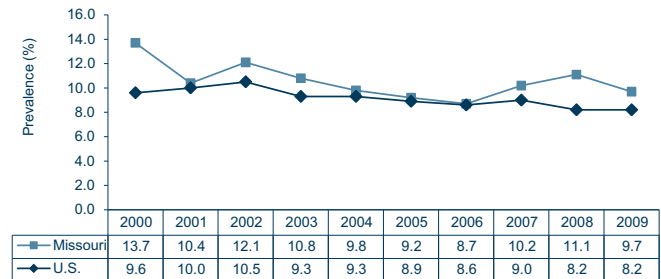
**Obesity and overweight**—The prevalence of obesity among Missouri seniors has increased significantly over the past decade (from 16.5 percent in 2000 to 25.6 percent in 2009), consistent with the national

**Figure VI-3. Prevalence of doctor-diagnosed diabetes among seniors 65 years of age and over, Missouri and the U.S., 2000-2009**



Source: BRFSS

**Figure VI-4. Prevalence of current smoking among seniors 65 years of age and over, Missouri and the U.S., 2000-2009**



Source: BRFSS

\*Respondents who have ever smoked 100 cigarettes in their lifetime and reported smoking every day or some days

trend (Figure VI-5). Obesity is defined according to body mass index (BMI), which is a person's weight (in kilograms) divided by his or her height (in meters) squared. For example, a person who weighs 203 pounds (92 kilograms) and is 5'9" tall (1.75 meters) has a BMI of 30.0. A person with a BMI of 30.0 or more is considered to be obese.

A greater proportion of African-American seniors are obese than white seniors both in Missouri (36 percent vs. 25 percent in 2009) and nationally (35 percent vs. 22 percent in 2009).

People with a BMI of 25.0-29.9 are defined as overweight. A large proportion (41 percent) of Missouri seniors were overweight in 2009, about the same as in 2000.

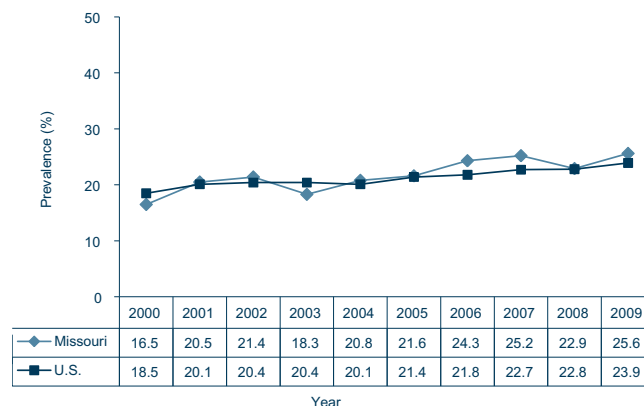
Obesity contributes to many of the serious health problems of seniors, including heart disease and stroke, two of the three leading causes of death. Being overweight or obese also increases the risk of hypertension, high cholesterol, diabetes, arthritis, several types of cancer, and other diseases and conditions.

*Low physical activity*— People tend to be less active as they age. Almost two-thirds of Missouri seniors get less than the recommended amount of moderate or vigorous physical activity. In 2009, 62.3 percent of Missouri seniors did not exercise enough (or at all), similar to the U.S. prevalence of 59.8 percent. This is a slight improvement over the 2001 percentage of 69.1 percent.

Not getting enough physical activity increases health risks. Regular physical activity greatly reduces a person's risk of dying from heart disease, and decreases the risk for colon cancer, diabetes, and high blood



Figure VI-5. Prevalence of obesity\* among seniors 65 years of age and over, Missouri and the U.S., 2000-2009



Source: BRFSS

\*Body mass index (BMI) 30.0 or more

pressure. Physical activity also helps to control weight; contributes to healthy bones, muscles and joints; helps to relieve the pain of arthritis; reduces symptoms of anxiety and depression; and can decrease the need for hospitalizations, physician visits and medications. Physical activity does not need to be strenuous to be beneficial; people of all ages benefit from moderate physical activity.<sup>11</sup>

*Low consumption of fruits and vegetables*—Most seniors consume less than the recommended five servings per day of fruits and vegetables. In 2009, the proportion was 73.4 percent in Missouri, similar to the national proportion of 72.6 percent. The prevalence of inadequate consumption of fruits and vegetables among Missouri seniors has been stable from 2000 to 2005, but increased slightly in 2007 and 2009.

Eating fruits and vegetables, which are rich in nutrients and low in calories, helps adults maintain a healthy weight and may help prevent colorectal cancer. People who eat few fruits and vegetables are likely to consume more calories in their daily diet.

What can be done to decrease the illness, disability, and death associated with chronic diseases? Some effective strategies are:

- Encourage seniors to adopt healthy behaviors, such as eating nutritious foods, being physically active, and avoiding tobacco use<sup>11</sup>
- Provide assistance and support for communities to improve physical activity and nutritional habits, including environmental and policy changes, community coalitions and family-focused community activities

- Improve health care providers' knowledge, skills and resources to enhance prevention, treatment and management of weight<sup>12</sup>
- Train and encourage health care providers to counsel patients to quit smoking
- Increase access to affordable smoking cessation services, which are more cost effective than many other common clinical services<sup>13</sup>
- Encourage the use of appropriate screening tests for chronic diseases, including breast, cervical and colorectal cancers, diabetes and its complications, and depression
- Promote care management for seniors with chronic diseases, including helping seniors follow the doctor's orders, take medications as prescribed, etc.

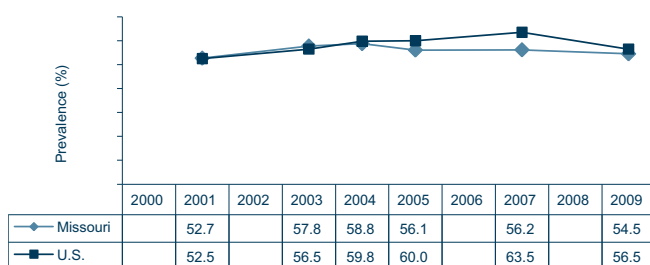
## Arthritis

Arthritis is the leading cause of disability in the U.S. Joint pain and stiffness are its characteristic symptoms. Osteoarthritis is the type that affects the most seniors.<sup>14</sup>

Osteoarthritis is the degeneration of cartilage and its underlying bone within a joint, as well as bony overgrowth. The process begins gradually, usually after age 40, and commonly affects the knees, hips, hands and spine. There is currently no cure. Cost-effective interventions are available to reduce the burden of arthritis, but they are currently underused.<sup>15</sup>

In 2009, 54.6 percent of Missourians aged 65 or older had physician-diagnosed arthritis. This is similar to the U.S. estimate of 56.5 percent (Figure VI-6). The prevalence of arthritis increases with age, and it is more common in women than men.

**Figure VI-6. Prevalence of doctor-diagnosed arthritis among seniors 65 years of age and over, Missouri and the U.S., 2000-2009\***



Source: BRFSS

\*Missouri data were not available for 2000, 2002, 2006 and 2008.

What can be done to reduce the pain and disability associated with arthritis? There are several approaches that help improve or maintain functioning and quality of life:

- Appropriate medication
- Physical or occupational therapy
- Maintaining a healthy weight, or losing weight, especially if the knees are affected
- Patient self-management education and support<sup>14</sup>
- Regular, moderate exercise, which can decrease disability by reducing joint pain and stiffness, building strong muscle around the joints, and increasing flexibility and endurance<sup>6</sup>
- Surgical intervention in some cases

### Breast and prostate cancers

Of all the new cancer (excluding skin cancer) cases diagnosed every year among Missouri women 65 years of age and over, breast cancer is the most common type

of cancer. (Accurate data on skin cancer are unavailable because not all types of skin cancer are reportable to the Missouri Cancer Registry.) In 2008, 1,921 cases of breast cancer were newly diagnosed among Missouri women in this age group.<sup>16</sup> Breast cancer claimed 517 lives among Missouri women 65 years of age and over in 2009. The annual death rate from breast cancer in this age group has not changed much since 2000. Early detection and treatment of breast cancer improve the chance of survival.

As with breast cancer in women, prostate cancer is the most common type of cancer (excluding skin cancer) diagnosed every year in Missouri men 65 years of age and over, with 2,120 newly diagnosed cases in 2008. The risk is highest in men age 65-74 years.<sup>13</sup> Prostate cancer caused 519 deaths in Missouri men 65 and over in 2009, with a death rate of 149.7 per 100,000. This was a significant decrease from 189.4 per 100,000 in 2000. The death rate was considerably higher among African-American seniors than whites (279 vs. 142 per 100,000 in 2009).<sup>17</sup>

What can be done to decrease the burden of breast and prostate cancers?

- Educate health care providers and seniors to promote appropriate screening methods
- Assure availability of mammograms for all women at the recommended frequency for their age
- Facilitate rapid referral for diagnostic testing for those with abnormal screening results
- Make high-quality treatment available and accessible to seniors

## Pneumonia and influenza

Although great progress has been made in controlling infectious diseases in the past century, pneumonia and influenza still ranked among the most important causes of deaths for Missouri seniors. During 2000-2009, pneumonia and influenza combined were the sixth cause of death for Missouri seniors.<sup>18</sup> In 2009, pneumonia and influenza were responsible for 1,135 deaths or 2.9 percent of all deaths, among people 65 years of age and older in Missouri.<sup>18</sup>

The death rate due to pneumonia and influenza for seniors in Missouri in 2007 (147 per 100,000)<sup>18</sup> was higher than in the U.S. as a whole (121 per 100,000).<sup>19,20</sup> In every year from 2000 to 2009, the rate for white seniors has been higher than that for African-American seniors in Missouri.<sup>18</sup>

There were a total of 16,285 hospitalizations of seniors due to pneumonia and influenza in Missouri in 2008, a rate of 200 per 10,000 population.<sup>7</sup> This is a drop of 19 percent from 247.3 per 10,000 in 2003, the high point of the decade.<sup>21</sup>

Fortunately, effective vaccines are available for influenza and pneumococcal pneumonia. Influenza vaccination can reduce health care costs (physician visits, antibiotic use, and hospital stays) and the risk of life-threatening complications of influenza, including pneumonia. Pneumococcal vaccine reduces the risk of serious types of pneumonia. Influenza vaccine must be administered annually, but the pneumococcal vaccine may require only one shot.<sup>22</sup>

In 2009, 27.5 percent of Missouri seniors reported that they had not had an influenza shot in the last 12

months, according to the BRFSS data. This is close to the U.S. figure of 31.2 percent (Figure VI-7). About a third (31.7 percent) of Missouri seniors had never had a pneumonia shot; this is also close to the 33.3 percent in the U.S.

What can be done to decrease the risk of pneumonia and influenza?

- Use every available means to encourage people 65 years of age and older to get an annual influenza immunization
- Make influenza immunization readily available, accessible and affordable for seniors and those who care for seniors
- Encourage health care providers to review senior patients' pneumococcal immunization status and administer the vaccine to those who need it
- Encourage long-term care facilities to immunize their patients

**Figure VI-7. Percentage of seniors age 65 years and over with no flu shot within 12 months, Missouri and the U.S., 2000-2009\***



Source: BRFSS

\*No data for 2000

## Unintentional injuries

Unintentional injuries are the eighth leading cause of death among Missouri seniors, and the fourth leading cause of hospitalizations. There are two main causes of these injuries: motor vehicle crashes (MVC) and falls.

*MVC*—Nationally, motor vehicle traffic-related deaths and nonfatal injuries to seniors have been declining.<sup>23</sup> Death rates have declined 15 percent between 2000 and 2007, while nonfatal injuries have declined 14 percent between 2001 and 2008.<sup>24</sup> In Missouri, MVC caused 157 deaths of Missourians 65 years of age and over in 2009, the lowest number in a decade.<sup>25</sup> Missouri seniors had 4,324 emergency room (ER) visits and hospitalizations due to MVC in 2008, accounting for 6 percent of the total ER visits and hospitalizations due to injuries in this age group.<sup>26</sup>

What can be done to decrease the number of injuries and deaths due to MVC among seniors? The Missouri State Highway Patrol has developed a variety of programs to help seniors drive safely. For example, troopers regularly speak to senior groups about occupant safety, defensive driving, and winter driving hazards. The State Highway Patrol also provides in-service training to troopers on how to recognize and interact with people who have Alzheimer's disease and other dementias.<sup>27</sup> Also, any licensed physician, therapist, nurse, chiropractor, social worker or psychologist by Missouri law may report to the Missouri Department of Revenue any patient having a disorder or condition that may prevent the patient from safely operating a motor vehicle.<sup>28</sup>



In addition, studies have suggested the following strategies:

- Increase the awareness of doctors caring for seniors about diseases that may affect driving ability (e.g., dementia or chronic obstructive pulmonary disease), and encourage them to report the cases to state authorities
- Help seniors check with the pharmacist about the side effects and interactions of the medications that may affect their ability to drive safely (e.g., anti-depressants and opioid analgesics)
- Have their vision checked at least once a year



- Advocate and provide acceptable alternative transportation (e.g., sidewalks, public transit and paratransit) to reduce miles driven
- Establish policies to regulate the appropriate interval between license renewals for older drivers,<sup>21</sup> and to make licensing decisions based on medical assessment<sup>29</sup>
- Improve vehicle designs with considerations of the needs of older drivers
- Improve roadway designs (e.g., change highway signs to improve their legibility and visibility, and use more protected left turn operations)

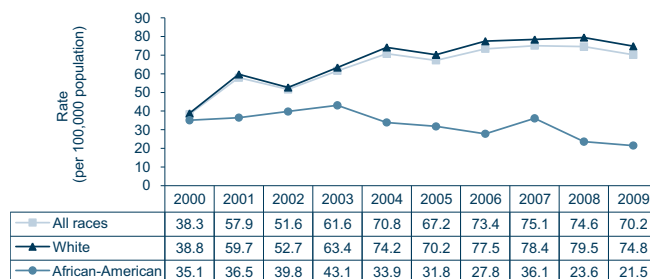
*Falls*—Falls are the leading cause of injury-related deaths among people 65 years of age and over,<sup>30</sup> and the most common cause of nonfatal injuries and hospital admissions for trauma.<sup>31</sup> Each year, about 35-40 percent of seniors fall at least once.<sup>32</sup> Among those who fall, 20-30 percent suffer moderate to severe injuries such as lacerations, hip fractures or head traumas, resulting in immobility, making it hard to get around or live independently and increasing the risk of early death.<sup>33</sup>

Falls can be caused by impaired vision or balance, loss of muscle mass, and chronic or short-term illnesses that impair your mental or physical functioning. They can be caused by the effects of certain medications, including sedatives or tranquilizers, sleeping pills, antidepressants, anticonvulsants, muscle relaxants, some heart medicines, blood pressure pills, and diuretics. Use of four or more prescription medications has been shown to increase the risk for falling. Drinking alcoholic beverages is another risk factor. If you have osteoporosis, it is important to be aware of any physical changes you may be experiencing that affect your balance or gait and to discuss these

changes with your doctor or other health care provider. It is important to have regular checkups and tell your doctor if you have had problems with falling.<sup>34</sup>

The majority of deaths due to injuries among Missourians 65 years of age and over result from falls. In 2009, falls caused 577 (63 percent) of the 910 unintentional injury deaths in this age group. The death rate among white seniors from falls is consistently higher than the rate among African-American seniors (Figure VI-8).

**Figure VI-8. Death rate due to falls among seniors 65 years and over, by race, Missouri residents, 2000-2009**



Source: DHSS, Bureau of Health Informatics



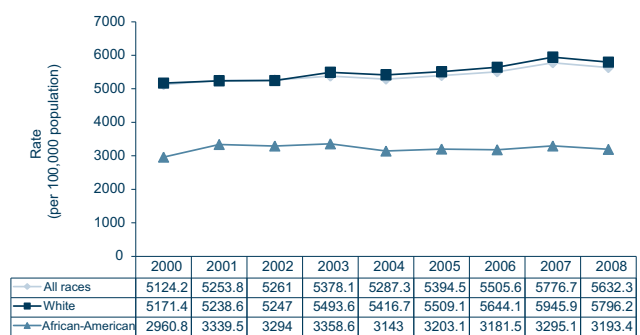
Falls are also a significant cause of ER visits and hospitalizations for people 65 and over. In 2008, there were 45,700 ER visits and hospital discharges for unintentional (accidental) falls to seniors, about two-thirds (65 percent) of all unintentional ER visits and hospital discharges for this group.<sup>35</sup> There has been an upward trend among whites since 2000, while the trend among African-Americans has been slightly downward since 2001 (Figure VI-9). The rate of ER visits and discharges due to unintentional falls has been consistently lower among African-Americans than among whites (Figure VI-9).

What can be done to decrease the number of injuries and deaths due to falls among seniors? The following are some of the effective strategies:

- Increase physical activity that improves balance and coordination such as Tai Chi
- Reduce home hazards and make living areas safer by eliminating tripping hazards; minimize use of a step stool or unsteady furniture; keep cords out of the way; improve lighting in the home; have handrails and lights put in on all staircases; install grab bars next to toilets and in the tub or shower; and use non-slip mats in the bathtub or on shower floors
- Wear shoes that give good support and have thin, non-slip soles
- Consult with a doctor or pharmacist to review all medications to reduce side effects and interactions
- See a health care provider regularly for chronic conditions such as osteoporosis that may increase the risk of falls

- Check vision at least once a year by an eye doctor. Incorrect glasses or a condition such as glaucoma or cataracts that limit vision can increase the chance of falling.<sup>36</sup>

**Figure VI-9. Rate of ER visits and hospitalizations due to unintentional falls\* among seniors 65 years and over, by race, Missouri residents, 2000-2008**



Source: DHSS, Injury MICA

\*Principal diagnosis

## Alzheimer's disease and other dementias

Alzheimer's Disease (AD) is the most common cause of dementia in older people. Dementia is a medical condition that disrupts the way the brain works. AD is a progressive brain disorder that gradually destroys a person's memory and ability to learn, reason, make judgments, communicate and carry out daily activities. As AD progresses, individuals may also experience disorientation, confusion, behavior changes, difficulty speaking, swallowing, walking, change in mood and personality, and withdrawal from work or social activities.<sup>37</sup> Dementia can also be caused by infection; drug interactions; metabolic disorders of the thyroid, liver, pancreas or kidneys; nutritional deficiencies,

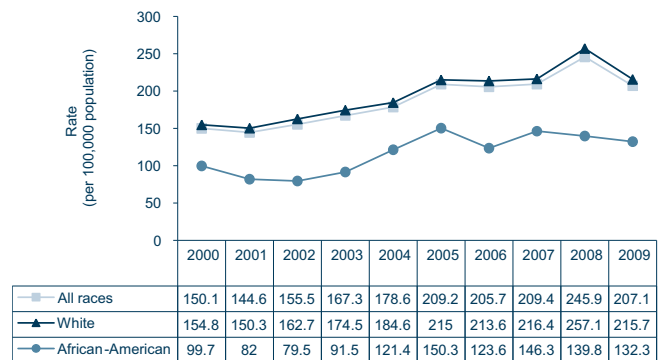
especially the lack of vitamin B-12; head injury; brain tumors; depression; or other progressive disease such as Parkinson's, Lewy-body, Huntington's or Pick's.<sup>38</sup>

The first of the baby boomers are now turning 65. By 2030, the U.S. population aged 65 and over is expected to double, meaning there will be more Americans with Alzheimer's. One in eight baby boomers will get the disease after they turn 65. At age 85 that risk increases to nearly one in two.<sup>39</sup> When the first wave of baby boomers reaches age 85 years (2031), an estimated 3.5 million people aged 85 and older will have Alzheimer's.<sup>40</sup>

Estimates from different studies on the prevalence and characteristics of people with Alzheimer's and other dementias vary depending on how a study is conducted.<sup>47</sup> The Alzheimer's Association has estimated that about 110,000 Missourians have AD, and that this number will grow by 18 percent, to 130,000 by 2025.<sup>47</sup> It is expected an estimated 10 million baby boomers will develop Alzheimer's. Because there is no way to prevent, cure or even slow the progression of the disease, every one of these 10 million baby boomers will either die with Alzheimer's or from it.<sup>48</sup> Most people survive an average of four to six years after a diagnosis of Alzheimer's, but many live for as long as 20 years with the disease. For people with Alzheimer's, 75 percent reside in a nursing home by age 80.<sup>48</sup>

The total annual costs to all payers for the care of people with Alzheimer's disease and other dementias will increase from \$172 billion in 2010 to \$1.08 trillion in 2050.<sup>41</sup> Medicare costs for the care of people with Alzheimer's and other dementias will increase more than 600 percent, from \$88 billion in 2010 to \$627 billion in 2050. Medicaid costs will increase 400 percent, from

**Figure VI-10. Death rate for Alzheimer's disease among seniors 65 years of age and over, Missouri residents, 2000-2009**



Source: DHSS, Death MICA

\$34 billion in 2010 to \$178 billion in 2050.<sup>41</sup> Out-of-pocket costs to people with Alzheimer's and other dementias and their families will increase more than 400 percent, from \$30 billion in 2010 to \$157 billion in 2050.<sup>41</sup> The annual cost per person with dementia in the United States is \$48,605 including direct medical and nonmedical costs.<sup>42</sup> The average lifetime cost per AD patient is \$174,000.<sup>43</sup>

AD is responsible for a growing number of deaths among Missouri seniors. Just between 2000 and 2005, the death rate due to AD had increased from 150 to 209 per 100,000 Missouri seniors (Figure VI-10). In 2009, AD was the fifth leading cause of death, causing 1,703 deaths for Missouri seniors. Missouri's death rate due to AD for seniors was above the national rate (209 vs. 195 per 100,000 in 2007).<sup>44, 45, 46</sup>

What can be done to reduce the number of people who develop Alzheimer's Disease, and to slow its progression?

Unfortunately, the causes of AD are not well understood, and the most significant risk factors seem to be age and family history of the disease. Medications are available that may temporarily delay the decline of memory for some people, but there is no long-term treatment or cure yet.<sup>44</sup> Some preliminary research findings suggest that general healthy aging may reduce the risk of AD.

The following actions may lower the occurrence of other diseases and help maintain and improve overall health and well-being. It is important to remember that they will not necessarily prevent or delay AD in any one person.<sup>49</sup>

- Exercise regularly and maintain a healthy weight
- Eat a healthy diet that is rich in fruits and vegetables
- Engage in social and intellectually stimulating activities such as puzzle games and reading
- Control type 2 diabetes
- Lower high blood pressure levels
- Lower high blood cholesterol levels
- Identify and treat other health problems that may contribute to memory loss and other symptoms of AD



## Oral health

Many older adults experience problems with their teeth and gums that can seriously affect their quality of life. Oral diseases and conditions are common among people 65 years of age and over, who grew up without the benefit of community water fluoridation and other fluoride products.<sup>50</sup> Such problems include loss of teeth, periodontal (gum) disease, dental decay and oral and pharyngeal cancers.

According to CDC data, about 18 percent of adults 65 years old and older in the U.S. no longer have any natural teeth. The rate of toothlessness varies greatly by state. Having missing teeth can affect nutrition, since people without teeth often prefer soft, easily chewed foods. Because dentures are not as efficient in chewing performance as natural teeth, denture wearers also may choose soft diets and avoid fresh fruits and vegetables.<sup>50</sup> The 2008 Missouri BRFSS revealed that 53.5 percent of seniors had lost six or more teeth. This percentage decreased slightly from 57.7 percent in 2001.

Access to dental care is a problem for many seniors. Many do not have dental insurance, especially older women. Medicare, the most common source of health insurance for seniors, does not cover routine dental care. Seniors with the poorest oral health are those who are economically disadvantaged, lack insurance and are members of racial and ethnic minorities. Seniors who are disabled, homebound, or institutionalized are also more likely to have poor oral health.<sup>50</sup>

In Missouri, only about two-thirds (66.7 percent) of people 65 years of age and over reported they had their teeth cleaned by a dentist or dental hygienist in the last year, according to the 2008 BRFSS data; nationally, this figure is 74.2 percent.

### Insurance status of seniors

The availability, accessibility and cost of health care are major concerns for seniors. Most seniors have chronic conditions that require medical attention. Missouri seniors almost universally have health care coverage, with less than 1 percent uninsured, the lowest of any age group. The vast majority (99 percent in 2007) are covered by government health insurance, mostly Medicare.<sup>51</sup> However, Medicare coverage was not designed to cover dental care or ongoing needs such as pharmaceuticals, community based services and long-term care.

### Medicaid expenditures for seniors

Low income seniors who meet income and resource requirements become eligible for Medicaid coverage in Missouri. In January 2011, 72,808 individuals 65 years of age and older were enrolled in Medicaid.<sup>52</sup> In the state fiscal year 2008, Missouri spent \$4.3 billion or about 78 percent of its budget as follows: hospitals (\$985 million); managed care premiums (\$1 billion); nursing facilities (\$855 million); pharmacy services (\$637 million); mental health services (\$408 million); and physician services (\$381 million). The elderly and disabled comprise 27 percent of all Missouri Medicaid enrollees but account for 64 percent of all expenditures.<sup>53</sup>

### Medicare payments

The Centers for Medicare & Medicaid Services (CMS) administers Medicare, the nation's largest health insurance program, which covers nearly 40 million Americans. Medicare is a health insurance program for people age 65 or older, some disabled people under age 65, and people of all ages with end-stage renal disease (permanent kidney failure treated with dialysis or a transplant).<sup>54</sup> In the Kaiser State Health Facts the total

number of Missouri Medicare beneficiaries in 2010 was 992,968.<sup>55</sup> In 2008 an estimated \$6.299 billion was spent for Medicare benefit payments in Missouri.<sup>56</sup> In 2004, the average Medicare spending per enrollee was \$7,029.<sup>57</sup>

### Community-based vs. nursing home care

According to data provided by the DHSS Division of Senior and Disability Services, community-based care for seniors is much more cost-effective than nursing home care. Many seniors with chronic conditions can be cared for at home, with the proper mix of community-based services. Based on FY10 data, DHSS calculated that the average annual cost for Medicaid in-home services was \$8,219 per client, compared with \$38,214 for nursing facility care per resident.

What can be done to reduce the costs of health care for seniors?

- Strengthen the focus on healthy lifestyles and prevention of illness at all life stages, so people stay healthy longer
- Promote the use of care management for people with chronic diseases
- Increase the accessibility of community-based services, and improve the system of referrals for in-home care options
- Facilitate the sharing of medical records among health care providers by the use of electronic medical records
- Improve the ways drugs are dispensed, through the use of electronic prescribing and alert systems for medication regimens

## Chapter 7: Infectious Diseases

Infectious diseases are caused by microorganisms, which are transmitted through the environment, animals, and/or people. They affect all age groups and social classes. The history of infectious disease control and prevention in the 20th century was mostly a success story. Deaths from infectious diseases in the U.S. and Missouri declined remarkably. Control of infectious diseases partially contributed to a sharp drop in infant and child mortality and to a 30-year increase in life expectancy in the U.S. during the 20th century.<sup>1</sup>

In 1900, the top three leading causes of death were pneumonia, tuberculosis (TB), and diarrhea and enteritis, which (together with diphtheria) caused one third of all deaths. Today, however, a much smaller percentage of deaths are due to infectious diseases.<sup>2</sup> For example, in 2007, only 4.1 percent was attributable to pneumonia, influenza, septicemia, and human immunodeficiency virus (HIV) infection, whereas heart disease and cancers accounted for 48.6 percent of all deaths.<sup>3</sup>

The overwhelming success seen in the early part of the 20th century in controlling infectious diseases, in hind sight, created a false sense of security. In fact, in the late 1960's the U.S. Surgeon General made the now infamous declaration that "(it) is time to close the book on infectious diseases and declare the war against pestilence won." Improvements in health and sanitation, the discovery of antibiotics and the implementation of childhood immunization programs led to major reductions in the incidence of common infectious diseases and his statement reflected the general sentiment in the medical community at the time. Unfortunately, the past few decades have revealed how inaccurate that sentiment was. In 1976, 221 persons attending the Annual Convention of the Pennsylvania American

Legion at the Bellevue-Stratford Hotel in Philadelphia were stricken with an undiagnosed pneumonia and 34 died. The disease known as "Legionnaire's Disease" was found to be caused by a previously existing but unknown organism that had caused disease for decades without detection. In 1981, public health officials became aware of the occurrence of cases of serious, rare, unexplained illnesses among homosexual men in Los Angeles, New York and other locations. These cases were the first recognized manifestation of what came to be known as the AIDS epidemic. HIV/AIDS has killed millions of people worldwide and will continue to be a major threat for years to come. In 2002-2003 the epidemic of Severe Acute Respiratory Syndrome, or SARS, emerged in China and rapidly spread causing disease in countries throughout the world. In 2009 this century's first pandemic of influenza started in Mexico and spread rapidly throughout the world. Although pregnant women, young adults and children were hit hard, the novel 2009 H1N1 strain of influenza proved to be fairly mild, compared to previously recorded influenza pandemics, but provided the modern world a look at how fast novel strains can cross the globe, and stressed the importance of preparedness. The biggest setback concerning the control of infectious diseases is related to bacteria causing common infectious diseases, which were previously controlled with the wonder drugs of the 20th century. They developed resistance to those antibiotics rendering them useless in an era when fewer antibiotics are being developed. A parade of antibiotic-resistant organisms such as Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant enterococci (VRE), Carbapenam-resistant enterobacteriaceae, Penicillin-resistant pneumococci, multidrug-resistant and extensively drug-resistant tuberculosis have all replaced their easily treated counterparts with probably more to come.



These are a few examples of what are now known as “emerging infections,” which include new diseases, previously unrecognized diseases and old diseases that have developed resistance to previous treatments. During the last decade the Institute of Medicine has warned of a disturbing trend. The numbers of new infections are on the rise. These include the diseases mentioned above along with others such as Monkeypox, West Nile virus and Hantavirus. In addition, diseases once thought to be nearly eliminated in the United States, such as measles, mumps, pertussis and malaria have reappeared. For example, in 1998 there were only 69 cases of pertussis (whooping cough) identified in Missouri. In 2009 the case count rose to 1,015. Some of the increase was due in part to improved awareness and better testing; however, decreased vaccination rates in children and the waning immunity is felt to have played a role in the dramatic rise of pertussis. The spread of sexually transmitted diseases once slowed appears to be accelerating again. There are many reasons for this trend, but the prime reason could be a change in our way of life. The following are a few of the changes that have increased the likelihood of people and microorganisms coming together.

1. Microbes adapt to their environment and evolve, making it more difficult to create vaccines, and lead them to develop resistance to treatments. Overuse and misuse of antibiotics has amplified this problem greatly.
2. Climate and weather affect the spread of diseases. Heavy rains and warmer than normal temperatures, for instance, can increase the number of mosquitoes that spread disease. Flooding can lead to the spread of waterborne diseases.
3. Population growth increases the spread of infectious disease as people come in closer contact with each other.

4. International travel, and the increase in the speed of travel, has meant that people, as well as animals, foods and other goods can travel quickly making it easier for diseases, and the agents that cause them, to spread.
5. Economic development and changes in land use can have unintentional effects on the environment. Clearing forests, for example, can make it easier for people and rodents to come into contact with one another; this can spread disease.
6. Human behaviors such as sexual behavior, illegal drug use, tattooing and body piercing increase the possible exposure to infectious diseases.
7. The growth of medical technology, such as blood transfusions, organ transplants and new invasive medical devices, has created new paths for the spread of infection.
8. War and natural disasters that cause destruction or disruption of systems delivering public health and disease treatment allow disease to spread.
9. Deliberate biological attacks are a new threat in the world today. Public health preparedness is essential to combat these threats.
10. A breakdown in public health systems and services, such as the lack of clean water or sanitation, inadequate vaccine supplies, low immunization rates, and a lack of knowledge about how diseases spread or what measures are available to control them, has been a major contributor to the rise of new diseases and the reoccurrence of older previously controlled infections.
11. Reduced funding of public health services.

Controlling the spread of these emerging infectious disease threats will depend upon a strong system for public health protection.

## Mortality and Leading Causes of Death

Few infectious diseases were among the leading causes of death in Missouri in 2009. Only pneumonia/flu ranked among the top 10 (see Chapter 1, Figure I-5.). Table VII-1 shows the leading infectious causes of death in Missouri.

**Table VII-1. Leading causes of death due to infectious diseases, Missouri residents, 2009**

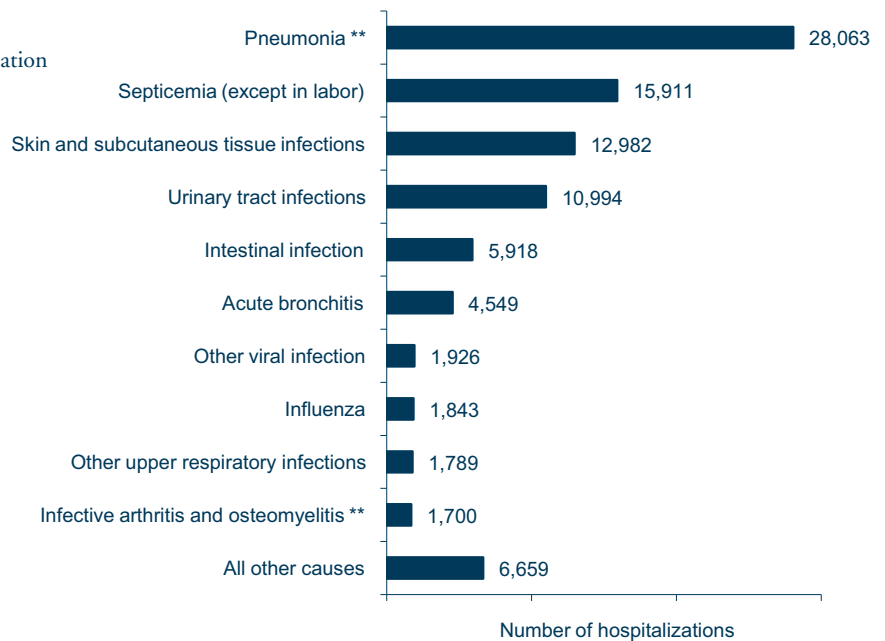
Cause of Death	Number of deaths	Death rate (per 100,000)	Age-adjusted death rate* (per 100,000)
Pneumonia & influenza	1,346	22.5	19.4
Septicemia	801	13.4	11.9
Viral hepatitis	126	2.1	1.8
AIDS (HIV disease)	99	1.7	1.6

Source: DHSS, Bureau of Health Informatics  
\*Age adjustment used the U.S. 2000 standard population

## Hospitalization

There were 92,340 hospitalizations of Missouri residents in 2008 due to infections, which made up 12 percent of the total hospitalizations that year. Of the hospitalizations due to infections, 38 percent were due to pneumonia, 17 percent due to septicemia and 14 percent due to infections of the skin and subcutaneous tissue (Figure VII-1).

**Figure VII-1 Infectious disease\* hospitalizations, Missouri residents, 2008**



Source: DHSS, Hospital Discharges MICA  
\*Principal diagnosis  
\*\*Except that caused by tuberculosis or sexually transmitted disease



## Reportable Diseases

The public health system plays an active role in tracking, preventing and controlling the spread of certain diseases called “reportable diseases” that are designated by the Missouri Code of State Regulations. Health care providers and laboratories are required to report cases of these diseases to DHSS when they are identified.<sup>4</sup> Not all infectious diseases are reportable by law. For example, many of the leading infectious causes of hospitalization (e.g., skin infections, pneumonia) are not reportable, since they do not require direct public health intervention. The most commonly reported diseases in 2004 and 2009 are shown in Table VII-2. Two of the top reportable diseases, gonorrhea and chlamydia, are sexually transmitted diseases that have been discussed in more detail in Chapter 5.

**Table VII-2. Most frequently reported infectious diseases, Missouri, 2004 and 2009**

2004		2009	
Reportable diseases	Number of cases	Reportable diseases	Number of cases
Chlamydia	21,319	Chlamydia	25,868
Influenza*	17,834	Influenza*	11,137
Gonorrhea	9,218	Gonorrhea	6,488
Latent TB Infection	3,963	Hepatitis C, Chronic	4,848
Hepatitis C, Chronic	3,146	Latent TB Infection	3,393
Campylobacteriosis	745	Shigellosis	1,046
Salmonellosis	628	Pertussis	1,015
Pertussis	595	Campylobacteriosis	770
Giardiasis	578	Salmonellosis	657
HIV Disease	467	Varicella (Chickenpox)	573

Source: DHSS, Communicable Disease Surveillance

\*Influenza data is collected on a seasonal basis with the beginning of the season occurring in October (Week 40) of one year and ending in May (Week 20) of the following year. The 2004 data cited is for the 2003-2004 influenza season and the 2009 data is for the 2008-2009 season.

## Health Problems and Potential Opportunities for Prevention

### Pneumonia and influenza

Pneumonia and influenza can cause severe disease in the respiratory system. They are important causes of hospitalization and death in Missouri and in the nation. People 65 years of age and over, and those with chronic diseases (such as heart disease, diabetes, and lung disease) are at highest risk of dying from pneumonia and influenza. Influenza also causes widespread epidemics among people of all age groups each year, resulting in increased health care costs, and causing school absenteeism and lowered worker productivity, in addition to physical discomfort, hospitalization, and death.

### 2009 H1N1 Influenza A Pandemic

Occasionally influenza viruses mutate drastically (reassortment, or antigenic shift) and when this happens worldwide epidemics (pandemics) occur which can result in severe disease in large parts of the population

and can exacerbate the above mentioned outcomes. Sometimes a slight mutation in the influenza A virus (antigenic drift) can also cause a pandemic. The 2009 H1N1 Influenza A pandemic virus was a drifted strain of a previously circulated H1N1 influenza A virus. It was the predominant strain that circulated during the 2009-2010 season, almost completely replacing other seasonal strains of influenza. Although the actual number of 2009 H1N1 cases that occurred in Missouri is difficult to assess, 99 percent of all influenza A isolates submitted nationally, including from Missouri, were characterized as 2009 H1N1. So, it is highly likely that overwhelming majority of 27,243 of the reported influenza A cases in Missouri during the pandemic were due 2009 H1N1 pandemic virus. Usually there are two distinct age groups affected by influenza, those under the age of 15 and those 50 years or older. Approximately 65 percent of all reported cases during the H1N1 pandemic were less than 15 years of age. This is likely due to the fact that many older people were exposed to a similar virus many years ago thus affording them some protection against the 2009 H1N1 strain. Young people were disproportionately affected by this virus with 90 percent of the complicated cases of influenza occurring in those less than age 65. The influenza experts predict that the pandemic 2009 H1N1 Influenza A virus would likely continue to spread for years to come, like a regular seasonal influenza virus. This prediction appears accurate. During the 2010-2011 flu season, among the 674 influenza A viruses that were subtyped by CDC, approximately 57 percent were influenza A (H3N2) viruses and 43 percent were 2009 H1N1.

The reportable disease system does not mandate reporting of pneumonia cases, and does not give a true picture of influenza since only laboratory-confirmed

cases are counted. Therefore, a more complete picture comes from the hospitalization and death data given earlier. For more information about the impact of these diseases on older adults, please see Chapter 6.

Fortunately, effective vaccines are available for influenza and pneumococcal pneumonia. Annual influenza immunizations can reduce health care costs (physician visits, antibiotic use, and hospital stays) and the risk of life-threatening complications of influenza, including pneumonia. Pneumococcal vaccination reduces the risk of serious types of pneumococcal infection caused by the invasion of bacteria into the blood stream (such as septicemia, meningitis and invasive pneumococcal pneumonia).

What can be done to decrease the risk of pneumonia and influenza? The most important way is to make influenza and pneumococcal immunization readily available, accessible, and affordable for those who need it. Recommendations from the Centers for Disease Control and Prevention (CDC) are updated annually.

CDC recommends that the following groups of people receive influenza vaccine annually.<sup>5</sup>

- Everyone 6 months of age and older
- People at high risk of serious flu complications including young children, pregnant women and people with chronic health conditions such as asthma, diabetes, heart and lung disease, and people 65 years and older

Vaccination of high risk persons is especially important to decrease their risk of severe flu illness. Vaccination is also important for health care workers and other people who live with or care for high risk people to keep from spreading flu to high risk people. Children younger than



6 months are at a high risk of serious flu illness, but are too young to be vaccinated. People who care for them should be vaccinated instead.

In recent years there have been problems with the influenza vaccine supply. When that happens, health authorities prioritize the groups that should receive the vaccination first. Specific recommendations are issued by CDC annually.

Pneumococcal vaccine is recommended by CDC for:<sup>6</sup>

- People 65 years of age and older
- People with serious chronic health conditions such as heart disease, sickle cell disease, alcoholism,

diabetes, liver disease including cirrhosis, persons with cochlear implants, cerebrospinal fluid leaks, smokers, and those with lung disease including COPD, emphysema and asthma

- People with lowered resistance to infections due to HIV/AIDS or other medical conditions or treatments

Pneumococcal immunization should be incorporated into routine medical care for these groups, and especially for residents of long-term care facilities.

### **Tuberculosis**

Tuberculosis (TB) is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but may attack other parts of the body. If not treated properly, TB disease can be fatal. TB disease was once the leading cause of death in the U.S., and it is still a leading killer worldwide.

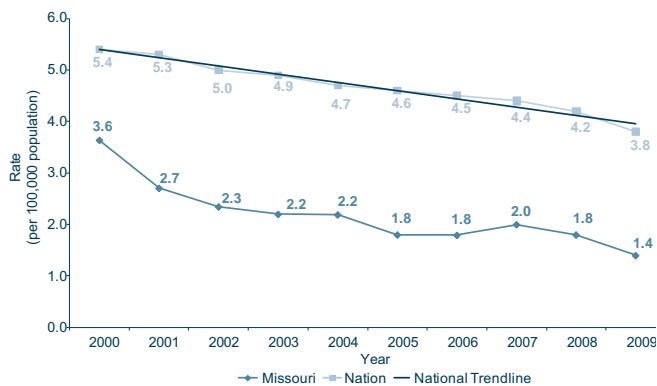
TB is spread through the air when a person with active TB disease of the lungs or throat coughs or sneezes. People nearby may breathe in these bacteria and become infected. An infected person may develop active TB disease, or may have a latent TB infection, without any symptoms. Latent TB infection may develop into active disease later in life, at which time the person can transmit the disease to others.

Treatment with specific antibiotics can usually cure active TB disease. People with latent TB infection can be treated with antibiotics so that they will not develop active TB disease.

Fortunately, due to diligent public health intervention, TB cases in the U.S. and in Missouri have been decreasing.<sup>7</sup> In 2009, Missouri's rate was 1.4 per 100,000, considerably lower than the national rate of 3.8 (Figure VII-2).

There were 107 new cases of TB reported in Missouri in 2010, a rate of 1.8 per 100,000. People 45 years of age and over accounted for 50 percent of all cases, with a rate of 2.2 per 100,000.

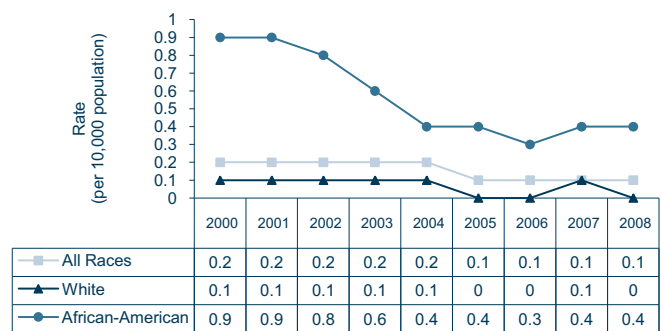
**Figure VII-2. Rate of reported tuberculosis cases, confirmed and probable, Missouri and the U.S., 2000-2009**



Source: DHSS Websurv

The hospitalization rate of TB disease has decreased in recent years as well. Still, the hospitalization rate among African-Americans was measurably higher than among whites in 2008 (Figure VII-3).

**Figure VII-3. Hospitalization rate for tuberculosis cases, age-adjusted, Missouri residents, 2000-2008\***



Source: DHSS, Hospital Discharges MICA

\*Tuberculosis as principal diagnosis; age adjustment used the U.S. 2000 standard population

Deaths from tuberculosis have been relatively rare. The annual number of persons who died with TB disease during the last decade has ranged between two and 16. There were five deaths in 2009, compared with 12 in 2000.<sup>9</sup>

What can be done to decrease the risk of tuberculosis? CDC recommends the following measures:<sup>10</sup>

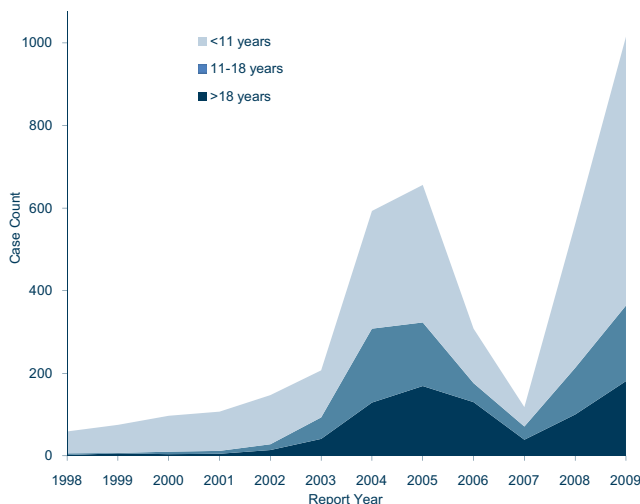
- A strong surveillance system to identify each new case of active TB disease
- Follow-up by local public health agencies to assure that each patient receives appropriate medical treatment
- Outreach to all contacts of the patient who may have been exposed to TB, with testing and, if needed, treatment and follow-up services provided
- Close collaboration among health care providers, public health agencies and community agencies to prevent and control TB

- Targeted screening and prevention activities for high-risk populations
- Increase completion of therapy utilizing directly-observed therapy

### Pertussis

Pertussis is an exclusively human infection causing respiratory illness in people of all ages, and could be especially dangerous for young infants (Figure VII-4). An estimated one to three million pertussis cases occur each year in the U.S. There were 12 infant deaths due to pertussis in the U.S. in 2009. Pertussis cases continued to increase in Missouri throughout the last decade, most likely due to several different reasons mentioned previously. Public health measures to control pertussis include increased disease awareness, proper vaccination, timely identification of disease outbreaks and implementation of preventive measures against further spread of outbreaks.

Figure VII-4. Pertussis cases by age group, Missouri, 1998-2009



Source: DHSS WebSurv

### Foodborne illnesses

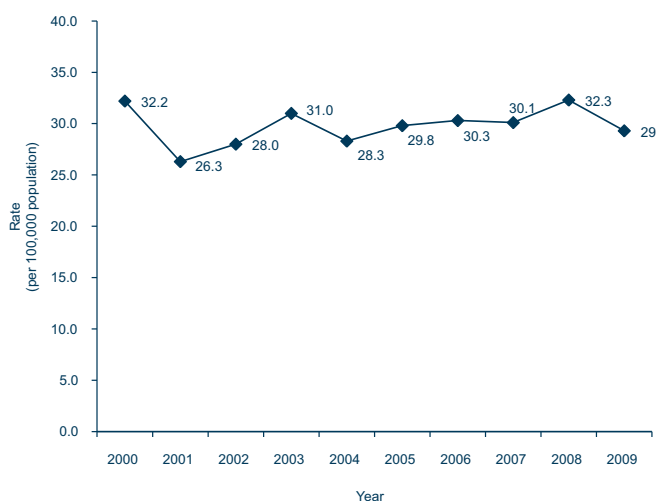
Many people do not think about food safety until a food-related illness affects them or a family member. While the food supply in the U.S. is one of the safest in the world, CDC estimates that roughly 1 out of 6 Americans (or 48 million people) get sick, 128,000 are hospitalized and 3,000 die each year from foodborne illnesses. Preventing foodborne illnesses and death remains a major public health challenge.<sup>11</sup>

Several of the most common reportable diseases are infections that may be transmitted through food or by close personal contact with an infected person. The category of foodborne diseases includes botulism, campylobacteriosis, cyclosporiasis, hepatitis A, hemolytic uremic syndrome (HUS), listeriosis, salmonellosis, shiga toxin-producing *E. coli* (STEC), trichinosis, typhoid fever, and yersiniosis. [Shiga toxin-producing *E. coli* (STEC) included *E. coli* O157:H7, shiga toxin-positive, serogroup non-O157, and shiga toxin-positive, not serogrouped.]

Most of these diseases cause gastrointestinal symptoms (diarrhea, vomiting, fever, etc.) and sometimes they can cause serious complications and death. Incidence of these diseases has declined over the past decade (Figure VII-5), in part due to increased public attention and public health interventions to improve food safety.

In 2009, the most-reported enteric diseases in Missouri were campylobacteriosis (770 cases) and salmonellosis (657 cases).<sup>12</sup> Both of these diseases are caused by bacteria, which usually come from contaminated animal products such as meat, poultry and raw milk. Children 12 years of age and under accounted for 210 cases of salmonellosis (32 percent of all cases), with a rate of 21 per 100,000 population (vs. 12 per 100,000 in

**Figure VII-5. Rate of reported cases of foodborne diseases, Missouri, 2000-2009**



Source: DHSS, Communicable Disease Surveillance

all age groups). For campylobacteriosis, children 12 years of age and under accounted for 215 cases (28 percent of all cases) in Missouri, with a rate of 21 per 100,000 population (vs. 14 per 100,000 in all age groups).<sup>8</sup>

Another important enteric disease is shiga toxin-producing *E. coli* (STEC). There were 143 cases of this disease reported in 2009; 71 (50 percent) of them were children 12 years of age and under. The STEC bacteria that cause this infection come from animal products. Infection with STEC, or with certain strains of shigella and other bacteria, can cause hemolytic uremic syndrome (HUS), a serious complication that affects the kidneys. There were seven reported cases of HUS in Missouri in 2009, five of them in children 12 years of age and under.

Shigellosis, which causes gastrointestinal infection often called dysentery, is usually transmitted person to person, therefore data on shigellosis cases have not been included in the above graph. The young children in the child care setting are especially vulnerable to shigellosis. Missouri reported 1,046 cases of shigellosis for 2009, of which 801 cases were reported in children 12 years of age and under (77 percent of all cases).<sup>8</sup>

One other disease frequently transmitted through food, as well as personal contact, is hepatitis A, caused by a virus. The reported incidence of hepatitis A declined sharply over the past decade due to the introduction of an effective vaccine, which has been widely used among children and food handlers in many cities and counties that previously had high rates of hepatitis A, and for people who travel to less developed countries.<sup>13</sup> The number of hepatitis A cases in Missouri in 2000 was 258, but in 2009 there were only 27 reported cases.<sup>12</sup>

Since 2006, a rare disease called paragonimiasis has re-emerged in Missouri. Paragonimiasis is a parasitic disease caused by *Paragonimus trematodes*, commonly known as lung flukes. Humans become infected by eating raw or undercooked crayfish (also known as crawfish and crawdads) or freshwater crabs that harbor the parasites. Paragonimiasis most frequently involves the lungs, but can affect other organs, including the brain and skin. From July 2006 to September 2010, nine persons, age 10-32 years, were diagnosed with Paragonimiasis in Missouri. All had fever, cough, pleural effusion and eosinophilia and had eaten raw or undercooked crayfish from rivers in Missouri while on canoeing or camping trips within four months of illness onset. The state health department now recommends



that health care providers consider paragonimiasis when examining patients experiencing the symptoms mentioned previously and should ask patients whether they have eaten raw or undercooked crayfish.

What can be done to decrease the risk of foodborne diseases? CDC and other federal, state and local agencies recommend the following measures:

- Educate consumers about handling food safely at home
- Educate food handlers throughout the food distribution system about how to handle food safely
- Encourage/require food production and processing industries and retailers to develop and follow procedures that minimize food contamination
- Coordinate a system of inspection and testing throughout the food chain to assure the safety of the food supply

Consumer education to promote food safety emphasizes four simple steps to minimize risk:<sup>14</sup>

- Clean food preparation surfaces, utensils and hands
- Separate raw foods from cooked foods
- Cook foods to temperatures that are adequate to kill bacteria
- Chill foods to temperatures that slow bacterial growth





## Viral hepatitis

Viral hepatitis is a serious illness caused by viruses that damage the liver. In addition to hepatitis A, discussed earlier, the two most common types of viral hepatitis are hepatitis B and hepatitis C. These viruses are transmitted from one person to the other through contact with blood and other body fluids, including the body fluids exchanged during sexual contact.

Hepatitis B can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. Some people experience acute illness when they are newly infected, but most infections are silent until symptoms indicative of liver complications develop many years later. The chances of developing a chronic infection vary, with the highest risk (90 percent) in infants exposed at birth who do not receive hepatitis B vaccine and hepatitis B immune globulin at birth. Death from chronic liver disease resulting in liver failure occurs in 15-25 percent of chronically infected people.<sup>15</sup>

Fortunately, the reported incidence of acute hepatitis B has declined over the past several years, from 149 in 2000 to 47 in 2009.<sup>12</sup> But the reports of chronic hepatitis B have increased from 95 cases in 2003 (the first year it was reportable to CDC) to 239 in 2009. The number of hospitalizations because of hepatitis B in Missouri fluctuated during the past decade, from 42 in 2000 to 81 in 2004 and 2008. Annual deaths from hepatitis B ranged from five in 2000 to 14 in 2005. The reported increases in chronic hepatitis B cases indicates ongoing need for preventive efforts to decrease the number of future cases.

What can be done to reduce the number of hepatitis B infections? Three factors have contributed to the decline in hepatitis B infections:

- Wide use of a safe and effective vaccine
- Implementation and enforcement of precautions against exposure to blood and body fluids in the health care workplace
- Screening of the blood supply for hepatitis B virus (already in place)

The vaccine is helping to protect future generations from hepatitis B infection. Infants are now routinely immunized against hepatitis B. Immunization is recommended for all newborns prior to discharge from the hospital; it is required for school attendance; and health care workers routinely receive the vaccine. The number of susceptible young people is declining.



Since the risk of chronic infection is greatest among unvaccinated infants and next highest among unvaccinated young people, efforts to immunize all newborns before they leave the hospital has been recommended by the American Academy of Pediatrics as well as the Advisory Committee for Immunization Practices. As more and more people are immunized, chronic hepatitis B infections and deaths from progressive liver disease, cirrhosis, liver cancer, liver failure, liver transplants and premature deaths should continue to decline.

Acute hepatitis C is also a reportable disease. Before 1992, most hepatitis C infections were due to blood transfusion. In recent years, long-term kidney dialysis, needle sharing during drug use, or exposure at birth account for a large proportion of the new infections. Sexual contact or needle stick injuries are rare causes of infection. Most hepatitis C infections are “silent” at first, but 70 percent to 80 percent develop into chronic infections with progressive liver disease, 5-20 percent of chronically infected people develop cirrhosis, and up to 5 percent die from cirrhosis or liver cancer.<sup>17</sup> Because most people do not know they are infected until they develop appreciable liver complications some 20 or more years later, no reliable data are currently available on the true incidence of this disease.

Hospitalizations due to hepatitis C in Missouri also fluctuated during the past decade, but totaled 189 in 2000 and 197 in 2008.<sup>16</sup> Deaths increased from 70 in 2000 to 147 in 2007 before decreasing again to 116 in 2009.<sup>16</sup>

What can be done to reduce the number of hepatitis C infections? There is no vaccine to protect against hepatitis C currently, but there are important precautions:

- Decrease injection drug use and STOP sharing needles or works
- Implement and enforce workplace precautions against exposure to blood and body fluids in the healthcare setting
- Routinely screen the blood supply and transplant organs of hepatitis C (already in place)
- Avoid “home-made” or jail/prison tattoos
- Ask your health care provider about hepatitis C testing if you have ever had risk factors for hepatitis C; know your status
- Use barrier protection, such as condoms, for sexual activities with persons of unknown hepatitis C status

## Chapter 8:

# Missouri's Health Care System

Many determinants can impact a Missourian's overall health, including the availability and accessibility of quality health care. As a strategy to improve health, primary health care must focus on the individual and community strengths and the opportunities for improvement. Preventive measures must be taken to prevent the development of diseases. Primary prevention strategies can include immunization, well child screenings and exams, screening and treatment for risk factors such as hypertension and high cholesterol. Preventive care can be tailored to an individual's age, health and family history. For example, a person should begin screening at an earlier age and/or more frequently if they have a family history of certain cancers or other diseases. Other preventive services may include the many worksite health promotion activities being developed to encourage individuals to take preventive measures to avert the onset or worsening of an illness or disease and to adopt healthier lifestyles. In addition, early intervention and treatment limit the negative consequences of chronic diseases. Further, individuals and their care providers are beginning to understand the need to improve their chronic disease management by planned, regular interactions, with a focus on prevention.

Missouri works to ensure access to and availability of health care services for all of Missouri's populations. This chapter describes the major types of public rural health facilities and primary care providers in Missouri.

### Missouri's Health System



Missouri's health systems consist of hospitals, federally qualified health centers, rural health clinics, local public health agencies and emergency medical services. These systems of care deliver essential health services to the community and are an important source of economic growth and stability in their local economy. The growth and stability comes from their direct provision of jobs, indirect support of local services and health care employees spending on commodities and services. In addition, they offer health insurance for their employees and pay taxes to the community.

### Hospitals

There are 159 hospitals in Missouri. They consist of 134 general acute hospitals, of which 36 are designated as critical access hospitals, and 25 other hospitals including psychiatric, long term rehabilitation and children's hospitals. In addition, there are five Veteran Administration hospitals to provide health care to Missouri's veterans. Figure VIII-1 shows the distribution of hospitals in Missouri.

## Federally Qualified Health Centers

Federally Qualified Health Centers, also referred to as Community Health Centers, are local, nonprofit, community-owned health care providers serving low-income and medically underserved communities. Missouri's health centers provide high quality, affordable primary care and preventive services. Many sites also deliver dental, pharmaceutical and behavioral health services.

Over the past 40 years, Missouri's community health center system has evolved into an expanding network of 21 health centers providing primary care services through nearly 180 community-based delivery sites, serving nearly 375,000 individuals through almost 1.4 million visits annually. Health centers are present in every region of the state and serve the residents of 111 of Missouri's counties plus the City of St. Louis. Nearly 1,300 dedicated health care professionals at these centers provide health care to the underserved, making their services available to all residents, regardless of insurance and income status, and within the health center's capacity. Missouri's health center patients receive high quality, compassionate care through a system which offers the community a strong voice in local health care delivery. Figure VIII-2 shows the locations of Federally Qualified Health Centers in Missouri.

Figure VIII-1. Missouri hospitals

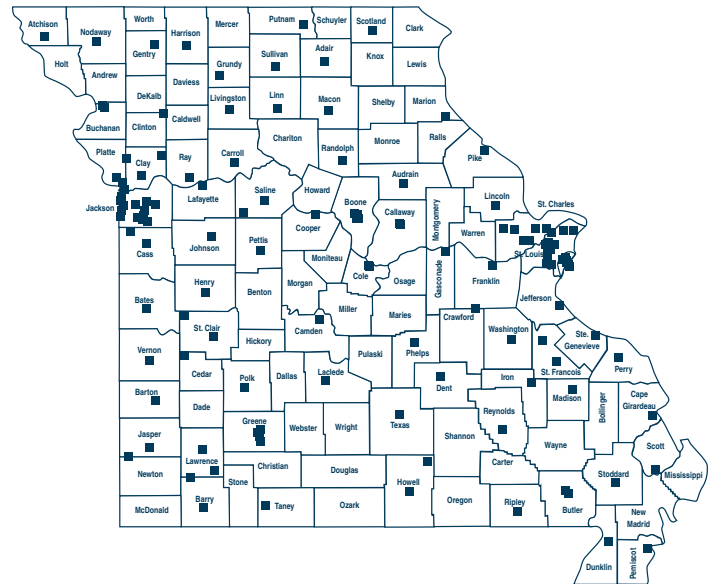
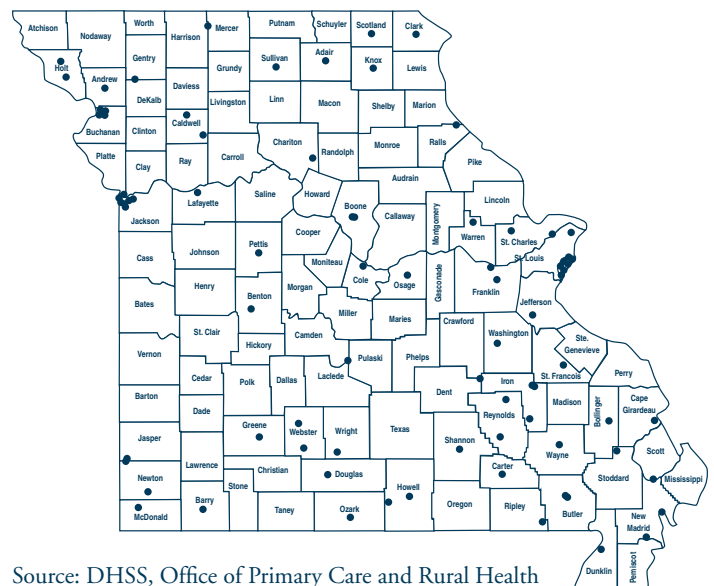


Figure VIII-2. Missouri Federally Qualified Health Centers



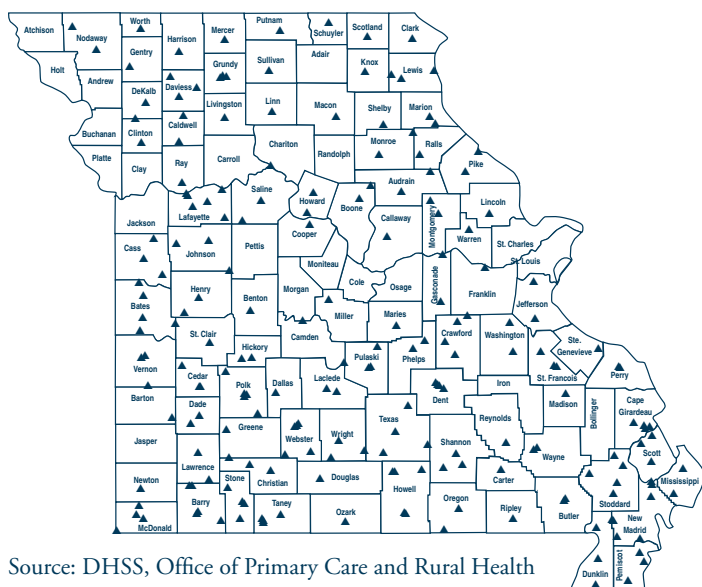
Source: DHSS, Office of Primary Care and Rural Health

## Rural Health Clinics

Certified Rural Health Clinics (RHC) must be located in rural areas designated by the Health Resources and Services Administration (HRSA) as a health professional shortage area. To date, 348 rural health clinic providers serve 96 Missouri counties. RHCs improve access to primary care by using nurse practitioners (NPs), physician assistants (PAs) and certified nurse midwives (CNM) under the direction of a physician. The NP, PA or CNM must be on-site to see patients at least 50 percent of the time the clinic is open. A physician must supervise the midlevel practitioner in a manner consistent with state and federal law. RHCs are required to provide out-patient primary care services and basic laboratory services. Figure VIII-3 shows the distribution of RHCs in Missouri.



Figure VIII-3. Rural health clinics



Source: DHSS, Office of Primary Care and Rural Health

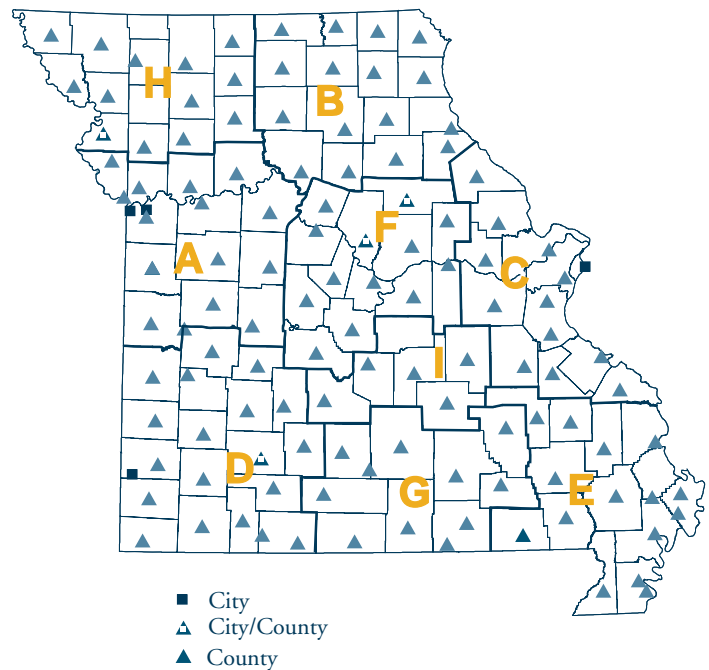
## Local Public Health Agencies

The public health system in Missouri consists of Missouri Department of Health and Senior Services (DHSS) and 115 local public health agencies (LPHAs) in cities and counties throughout the state. These agencies are responsible for protecting the health of their citizens and provide a wide and varying range of services. They receive funding from local taxes, fees, contracts with DHSS and grants from other sources. Various essential services, referred to as “core public health functions,” are provided by all LPHAs in the state. Some of these services are partially funded by DHSS from general revenue. They include:

- Issuance of vital records (birth and death certificates)
- Communicable disease surveillance, investigation and follow-up
- Environmental sanitation services such as food safety education and inspection of food warehouse facilities, retail food establishments, lodging establishments, and onsite sewage systems
- Planning, preparation, and public health response to emergencies, including natural disasters, incidents that may compromise the food supply (e.g., fires in food establishments or truck wrecks involving food) and acts of bioterrorism
- Assessment of the local population’s health status, and leadership to coordinate needed services in communities
- Immunization of adults and children for vaccine-preventable diseases such as influenza, measles, mumps, rubella, hepatitis A, hepatitis B, chickenpox, pertussis, etc.

The distribution of LPHAs around the state is shown in Figure VIII-4, along with the boundaries of the state’s Emergency Response Planning Regions.

Figure VIII-4. Local public health agencies



Source: DHSS, Office of Primary Care and Rural Health



## Emergency Medical Services

Emergency medical services (EMS) comprise a system of care for victims of sudden and serious injury or illness. It is estimated that the average U.S. citizen will require the services of an ambulance at least twice in the course of their lives. Thus, the development of effective EMS systems is crucial.

The department's Section for Health Standards and Licensure, Bureau of Emergency Medical Services (BEMS) is responsible for protecting the health, safety and welfare of the public. Activities include trauma center designation throughout the state and assuring that emergency medical services provided by ambulance services, emergency medical response agencies, trauma centers, training entities and emergency medical technicians meet or exceed established standards. BEMS investigates complaints and may exercise its authority to deny, place on probation, suspend or revoke the licensure of an ambulance service, training entity, emergency medical response agency, and/or emergency medical technician when statutory or regulatory violation is substantiated.

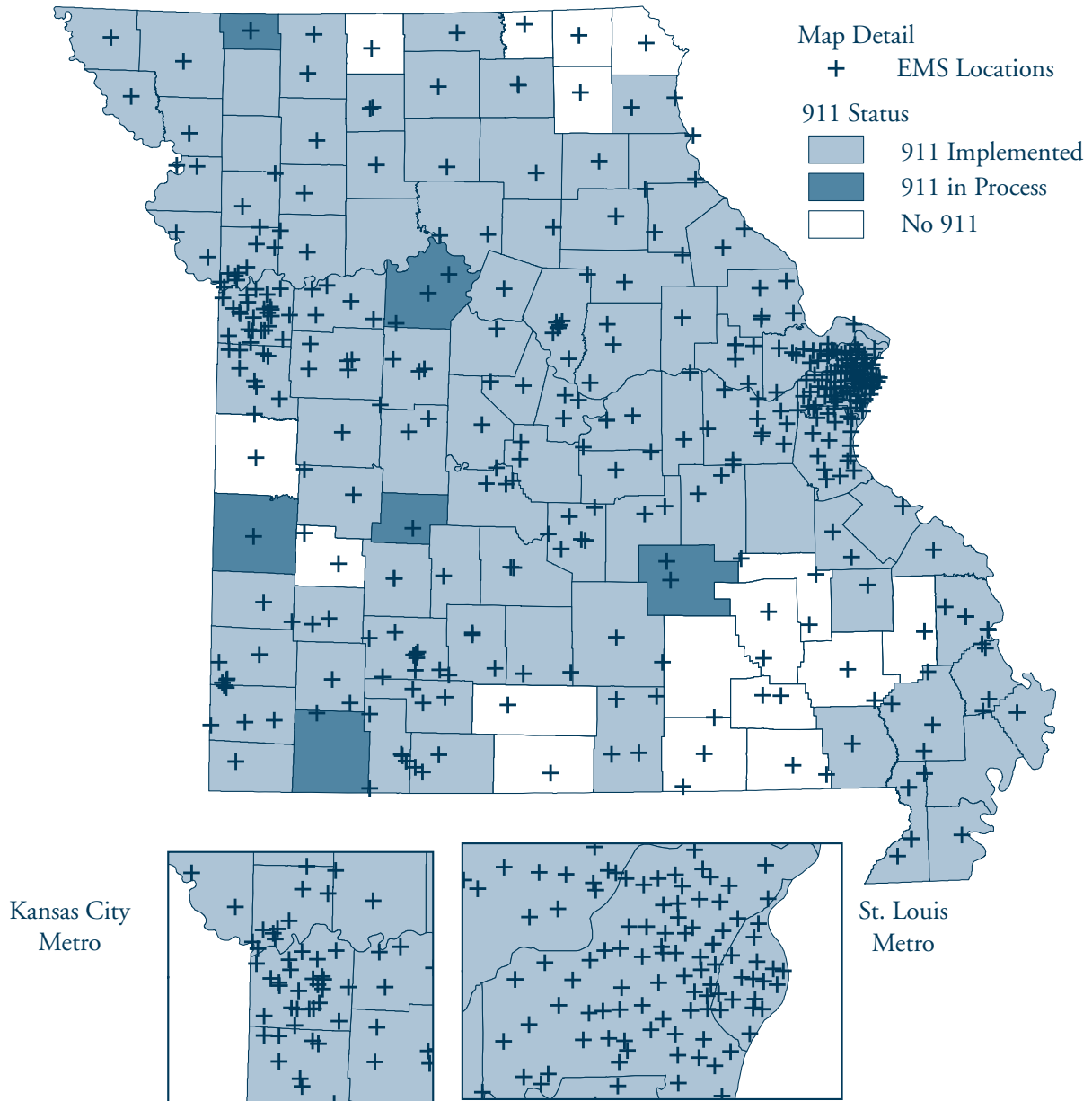
In Missouri, 911 is not coordinated by a single agency. The Missouri Department of Health and Senior Services and the Department of Public Safety have historically had statutes and activities regarding 911. The BEMS, with the State EMS Medical Director and DHSS Deputy Director, has been actively engaged in efforts to improve 911 by meeting with members of the State Legislature, 911 coordinators and other interested parties. Currently, 85 percent of the state has 911, and 97.6 percent of the population is covered. Figure VIII-5 shows the distribution of Missouri EMS and 911 status.



Missouri also passed new legislation in 2008 that creates a new emergency medical care system for individuals suffering from trauma, stroke and a specific type of heart attack called 'STEMI', or ST-Elevation MI. This system currently under development builds on the existing trauma system model and infrastructure. Plans for system development include a focus on primary, secondary, and tertiary prevention for trauma, stroke, and STEMI, surveillance and future growth. Among the goals of the new system are advancements in the response to and management of individuals suffering acute trauma, stroke and STEMI in the state. The underlying goal of the system is to improve health outcomes of Missourians.



Figure VIII-5. Missouri Emergency Medical Services (EMS) and status of 911 services, 2009



Source: DHSS, Geographical Information Systems (GIS) Network Data

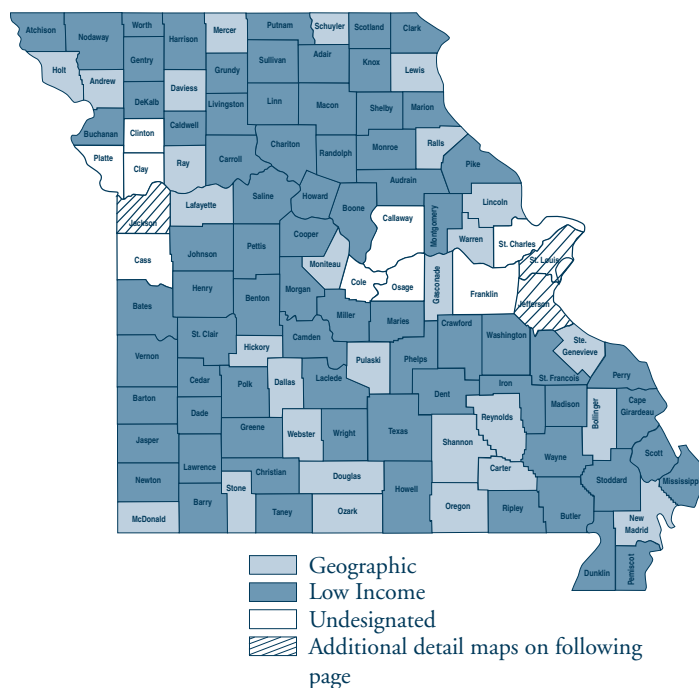
## Primary Medical Care

Primary care is care provided by health practitioners who see people with common medical concerns. Practitioners are specifically trained to provide the first contact for undiagnosed health concerns and continuing care of various medical conditions. The U.S. Health Resources and Services Administration, Shortage Designation Branch (SDB) provides criteria for determining whether an area has a shortage of primary care physicians to meet the population's needs. These include service areas with less than 20 percent of the population below poverty that have less than one full-time primary care physician per 3,500 people, and those with greater than 20 percent of the population below poverty that have less than one full-time primary care physician per 3,000 people. An area that meets one of these criteria, and has no contiguous resources available within a travel time of 30 minutes, may be designated as a Geographic Health Professional Shortage Area (HPSA).

Even if an area does not meet the criteria for a Geographic HPSA, there may not be enough primary care physicians who are serving the low-income population. SDB has also established a formula for determining if an area qualifies as a Low Income HPSA. The formula involves the number of people below 200 percent of poverty and the number of full time equivalent primary care physicians who serve them (based on Medicaid and sliding-fee scale encounters).

Most of Missouri has been designated by HRSA as either a Geographic or Low Income HPSAs. Primary Care HPSAs, are shown in Figures VIII-6-10. People who live in these areas do not have optimal access to primary care physician services.

**Figure VIII-6. Primary care health professional shortage areas (HPSAs), Missouri, February 2011**



Source: DHSS, Office of Primary Care and Rural Health

Figure VIII-7. Jackson County primary care HPSA, February 2011

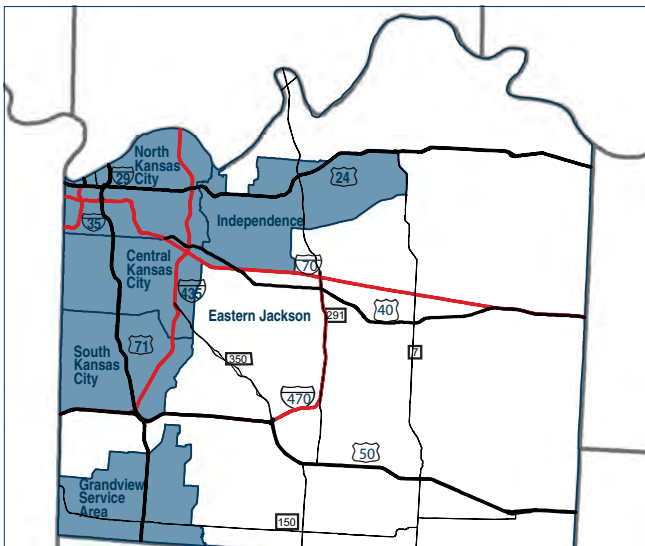


Figure VIII-8. St. Louis City primary care HPSA, February 2011

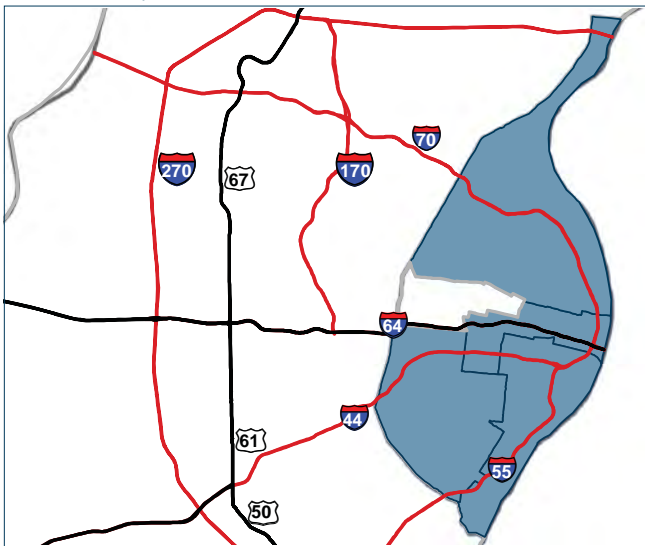


Figure VIII-9. St. Louis County primary care HPSA, February 2011

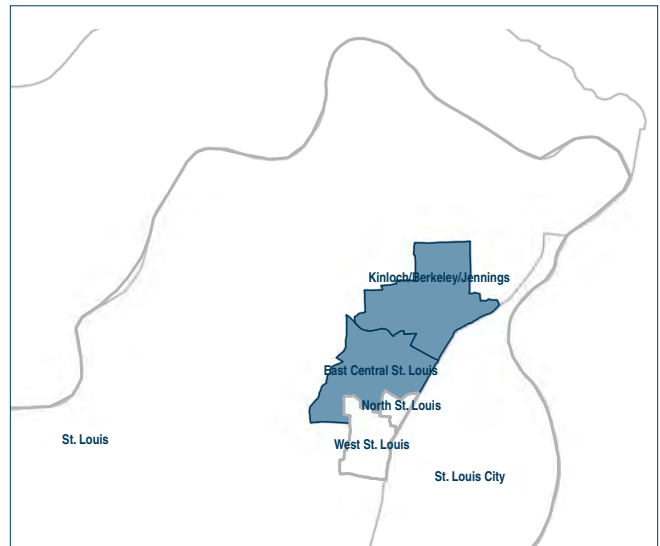
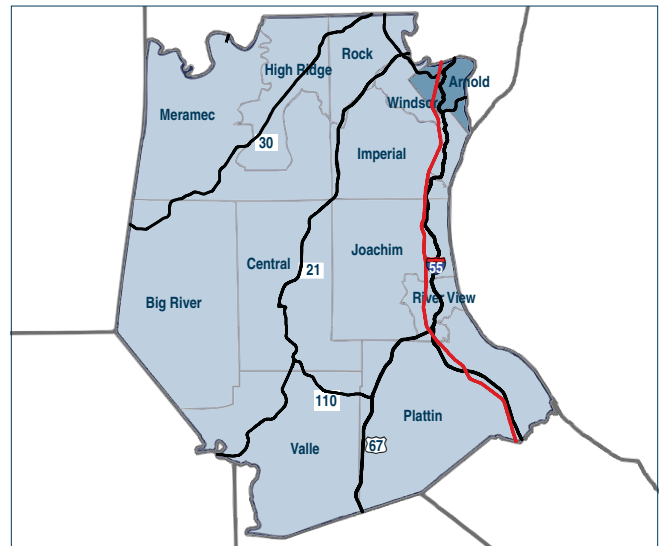


Figure VIII-10. Jefferson County primary care HPSA, February 2011



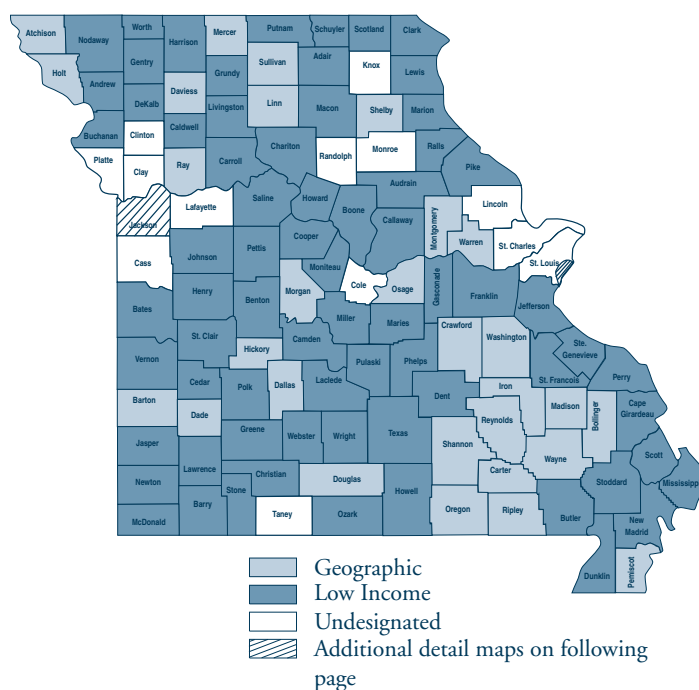
## Dental Health Providers

Primary care/general dentists are also key health care providers. Access to oral health services is also important to the health and quality of life for Missourians. Oral disease contributes to serious overall health conditions and issues related to quality of life. Such associations are heart and lung disease, diabetes, stroke and low weight babies born prematurely to mothers with chronic oral infections. SDB also provides criteria for determining whether an area has a shortage of dentists to meet the population's needs. A Geographic Dental HPSA may be determined if a service area with less than 20 percent of the population below poverty has less than one full-time dentist per 5,000 people, or a service area with more than 20 percent of the population below poverty has less than one full-time dentist per 4,000 people. Criteria are also based on the percentage of the population that has a fluoridated water supply and also whether contiguous resources are available within a travel time of 40 minutes.

Even if an area does not meet the criteria for a Geographic Dental HPSA, there may not be enough dentists who are serving the low-income population. SDB has also established a formula for determining if an area meets the criteria to be designated as a Low Income Dental HPSA.

As Figures VIII-11-13 show, many areas in Missouri have been designated as Dental HPSAs. People who live in these areas do not have optimal access to dental services. Many of the counties that are not designated as Dental HPSAs are in the process of being reviewed to determine eligibility as a HPSA.

Figure VIII-11. Dental HPSAs, Missouri, February 2011



Source: DHSS, Office of Primary Care and Rural Health

Figure VIII-12. Dental HPSAs, Jackson County, February 2011

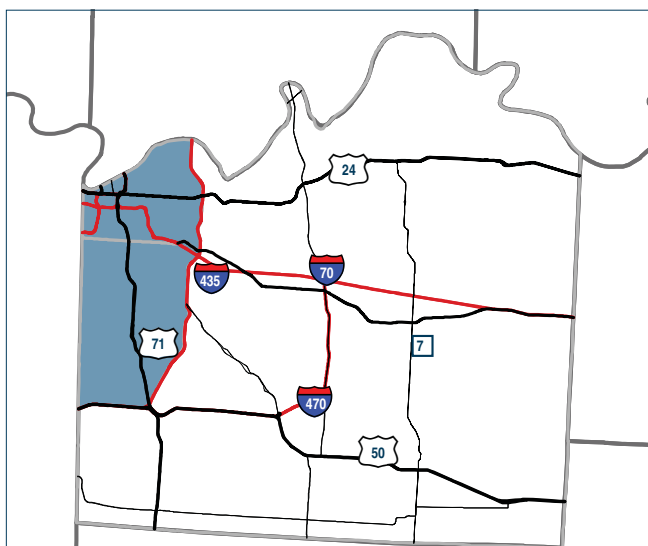
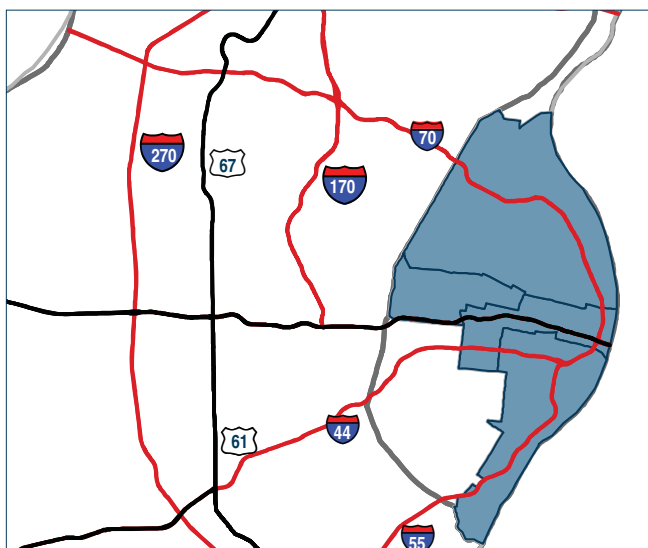


Figure VIII-13. Dental HPSAs, St. Louis City, February 2011



## Special Supplemental Nutrition Program for Women, Infants and Children (WIC)

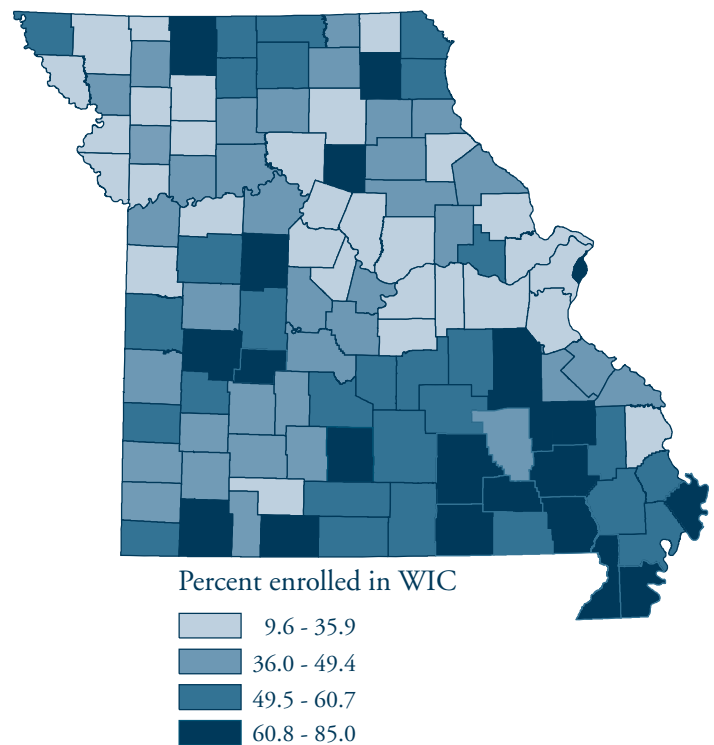
Another key public health service provided throughout the state is the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). This program is funded by the U.S. Department of Agriculture and administered by the state health department through contracts with local public health agencies, community action agencies and other service providers.

The purpose of the WIC program is to provide nutritious foods to supplement the diets of pregnant women, new mothers, infants, and children up to 5 years of age. The program also provides nutrition counseling and access to some health services. Participation is based on income and on nutrition-related medical risk factors. WIC participation has been shown to improve the nutritional status of women and children, and to be cost-effective.

In 2009, 38 percent of all infants and children at age less than 5 years in Missouri were enrolled in WIC.<sup>1,2</sup> The percentage of WIC participation by county is shown in Figure VIII-14.



**Figure VIII-14. Infants and children age <5 years enrolled in WIC program (%), by county, Missouri, 2009**



Source: DHSS, 2009 Missouri Pediatric Nutrition Surveillance and MICA

Note: The number of children <5 years of age enrolled in WIC was available for Gasconade and Osage Counties combined. Therefore, the total population of children <5 years of age for both counties was used to calculate the percent of this population enrolled in WIC. The result was a percent for both counties combined.

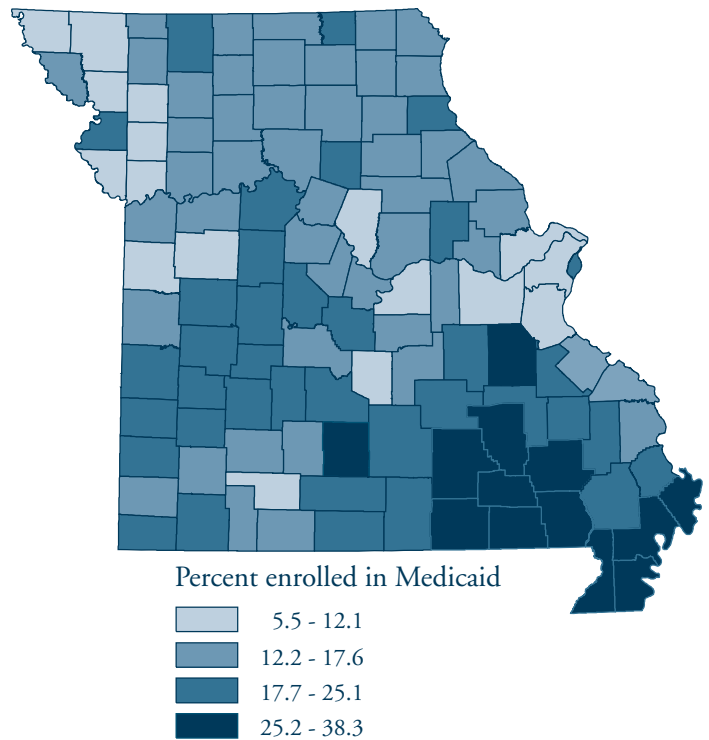
## Medicaid Enrollment

The Medicaid program is a federal/state partnership designed to provide health care coverage for Missourians who are uninsured and do not have the means to pay for health care. Most Medicaid participants are children, disabled persons and seniors.

The percentage of the population enrolled in Medicaid varies among Missouri counties (Figure VIII-15). The highest percentages are in the City of St. Louis and several counties in the southeastern part of the state.



Figure VIII-15. Missouri Medicaid enrollment (%) by county, 2009



Source: Department of Social Services, Research and Evaluation



## Chapter 9: Surveillance and Data Gaps

The Missouri-specific information contained in this report was collected from many different sources, including vital records (birth and death certificates), hospital databases (discharge diagnoses, hospital electronic syndromic surveillance), reportable disease surveillance systems (infectious diseases and cancer), Behavioral Risk Factor Surveillance System (BRFSS), other surveys (e.g., Youth Risk Behavior Surveillance System, Youth Tobacco Survey, Health Care Insurance and Access Survey), Missouri Regional Poison Center and U.S. Census.

To yield reliable, useful information, a data source should be population-based; that is, it should draw information either from the entire population or from a sample that represents the population. A good data source or “surveillance system” should also be:

- Ongoing—collects comparable data year after year
- Sensitive—able to detect the events it is looking for
- Timely—collects and analyzes data when it is needed
- Accurate—categorizes the data correctly, records it accurately and avoids duplication
- Efficient in its use of resources

Missouri has a wealth of information about people’s health, but there are still several gaps that make it difficult to see the whole picture.



## **Syndromic Surveillance**

Real-time hospital electronic syndromic surveillance data provide information on chief complaints and basic demographics from 84 Missouri hospitals. A major limitation of this data source is that chief complaints do not represent a final diagnosis; rather, they provide the reason for admission to the emergency department. However, because the data are available in real time, they provide information necessary for early detection of outbreaks and provide essential information during response to public health events.

Another source of syndromic surveillance data comes from the Missouri Regional Poison Center. Each day, our partners at the Poison Center share all of their call data with DHSS for surveillance. These data are monitored for trends in questions about certain vaccines, prescription and non-prescription drugs, pesticides and consumer products.

## **Reportable Disease Surveillance System**

The Missouri Health Surveillance Information System (WebSurv) application is a centralized and integrated database that allows the state health department and local public health agency staff, the ability to enter and/or update case report information related to over 90 communicable/infectious diseases/conditions that are reportable in Missouri (CSR 20-20.20, Missouri's reporting rule for communicable diseases). The application includes electronic forms corresponding to the Disease Case Report (CD1) form and the various disease-specific forms used for reporting general communicable diseases to the Centers for Disease Control and Prevention (CDC). WebSurv data is

stored nightly to a data warehouse that allows for use of predefined, prompted reports as well as creation of complex, individualized reports.

Data sources for this system include physicians, hospitals, clinics, schools, infection control nurses, and many other reports, with the bulk of the first notifications coming from laboratory result reporting. Currently this reporting arrives via many routes such as mail, fax, phone and some electronic messaging. Work is underway to allow for standardized electronic messaging to receive laboratory results. This should shorten the time frame for notification of reportable conditions in order to enhance investigation and intervention activities. WebSurv is a component of MOHSAIC (Missouri Health Strategic Architecture and Information Cooperative).

## **Diet and Nutrition**

What people eat affects their health. Unhealthy dietary behavior is a major risk factor for obesity and related chronic diseases and conditions. At the national level, the National Health and Nutrition Examination Survey (NHANES) collects nutritional status and dietary intake data among adults and children in the United States. However, at the state level, only fruit and vegetable consumption data from BRFSS, YTS and YRBS, and milk and sugar-added drink consumption among public middle and high school students from YTS and YRBS are available. Without a comprehensive nutritional surveillance system with relevant dietary data, what Missourians are eating cannot be assessed, how their eating habits are changing over time, and whether the interventions related to healthy eating make a difference.

## Childhood Obesity

The most frequent data request sent to the DHSS Office of Epidemiology relates to childhood obesity prevalence data at the county level. Currently, there is no population-based surveillance system that captures the weight status of preschool and elementary school children either at the state or county level. The childhood obesity data presented in this report come from clients of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Although about 38 percent of low income children were included in 2009, these data do not represent the entire population of Missouri children age 0-5 years. Data for elementary school children are not available.

The apparent increase in the number of children who are overweight or obese (see Chapter 3) has huge implications for Missouri's health in the future. Complete, accurate information about weight status and trends in children is therefore a high priority data need. A surveillance system should be developed both at the state and local level to assist in program planning and evaluation.

## Obesity, High Blood Pressure, High Blood Cholesterol and Diabetes

Obesity, high blood pressure, high blood cholesterol and diabetes are chronic conditions that cause serious complications and disability. BRFSS collects self-report data on these conditions. However, it has been shown that BRFSS underestimates obesity prevalence by about 10 percentage points;<sup>1</sup> and about one-fourth of people with diabetes, one in five people with hypertension, and one-half of people with high cholesterol are not

aware that they have these conditions.<sup>2</sup> The percentages could be even higher among people with lower social economic status, who are at high risk of developing these conditions and their associated complications. The percent of people with high blood pressure, high cholesterol or diabetes having their conditions under control is unknown in Missouri. A more complete surveillance system with actual measures of weight, height, blood pressure, blood cholesterol and blood sugar level is needed so health care providers and public health professionals can use it to guide chronic disease education, prevention and treatment services.

## Outpatient Data

Chronic disease management is important for people with chronic diseases for reducing complications and improving quality of life. Chronic disease management is mostly carried out in outpatient settings. Outpatient data are not currently available to DHSS for monitoring quality of care. With increasing availability of electronic medical records, the state should take action to fill this surveillance gap.

## Occupational Health

In 2005, there were 5,734 work-related fatalities in the U.S, and 4.2 million nonfatal injuries and illnesses were reported in private industry alone according to the Bureau of Labor Statistics (BLS).<sup>3</sup> The general trend of workplace fatalities since the inception of the surveillance system in 1992 has been downward. CDC's National Institute of Occupational Safety and Health (NIOSH) gathers information from various sources to make these estimates. NIOSH collects data related to anxiety, stress and neurotic disorders, blood borne infections

and percutaneous exposures, fatal injuries, hearing loss, lead toxicity, musculoskeletal disorders, nonfatal injury, disorders due to physical agents, poisoning, respiratory diseases, and skin diseases and disorders. Missouri, like many others states, has not yet developed the critical infrastructure needed to support fundamental occupational health and safety surveillance programs. While various Missouri agencies participate in gathering some of this data, these efforts are fragmented and incomplete. Current data collection systems rely on passive reporting by medical providers and laboratories, so occupational illnesses and injuries are under-reported. There is no strong system to pull together and analyze information about occupational injuries and deaths collected by various state agencies. Such a system is needed to help guide efforts to prevent work-related illness, injury, disability and death.

The Bureau of Labor Statistics estimated private sector workforce injury and illness incidence rate in 2005 at 4.6 cases per 100 full-time-equivalent (FTE) workers. This rate declined to 3.6 cases per 100 equivalent full-time workers in 2009, and the total number of illnesses and injuries in 2009 fell to 3.3 million cases.<sup>4</sup> The estimated 2009 Missouri rate was 3.5 per 100 full-time workers, which was not significantly different from the national rate. Work-related injuries and illnesses are preventable, and the key to prevention is to control hazards in the workplace. Data trend analyses are needed to evaluate the effectiveness of occupational illness and injury prevention programs, including regulations to protect workers.

A preliminary total of 4,340 fatal work injuries were recorded in the United States in 2009. The 2009 total represents the smallest annual preliminary total since the

Census of Fatal Occupational Injuries program was first conducted in 1992. Based on this preliminary count, the rate of fatal work injury for U.S. workers in 2009 was 3.3 per 100,000 FTE workers.

In Missouri, 156 workers died due to workplace injury or illness in 2007, 148 in 2008, and 142 in 2009.<sup>5</sup> The hours-based fatal work injury rates in Missouri were 5.7 per 100,000 workers in 2007 and 5.4 per 100,000 workers in 2008.<sup>6</sup> Prior to 2007, state fatality rates were employment-based and cannot be directly compared to hours-based rates.

Surveillance of work-related fatalities can identify hazards and case clusters and lead to the development of new interventions and prevention programs, including regulations to protect workers.

## **Environmental Health**

Many aspects of the environment affect people's health. Exposure to air and water pollution, hazardous substances, heavy metals, carbon monoxide, and chemicals including pesticides and herbicides can have serious health effects.<sup>7, 8</sup>

In Missouri, all blood lead and other heavy metal laboratory data are required to be reported by laboratories. There is a well-developed system for surveillance of lead poisoning in children and adults, which is funded in part by CDC and includes case management and risk assessment information. While laboratory analyses for arsenic, mercury, cadmium and carboxyhemoglobin are collected in an electronic database, actual case information is limited, and systematic information about other environmental health problems is limited. The state reporting requirements

are not widely known or understood, and this results in under-reporting of acute poisoning incidents. In addition, many of the effects of environmental exposures are chronic health problems, not acute incidents.

Missouri is a participating state in the CDC funded Environmental Public Health Tracking (EPHT) network. The network involves the ongoing collection, integration, and analysis of data about environmental hazards, exposure to environmental hazards, and health effects potentially related to exposure to those hazards. The goal of EPHT is to protect communities by providing federal, state and local agencies with information they can use to plan, apply and evaluate environmental public health actions.

Since joining the program in 2002, Missouri has collaborated with federal, state and local partners to bring together its distributed environmental data. These efforts have provided a means to evaluate the effectiveness of environmental monitoring in the state and to address the gaps in our knowledge about environmental exposures.

## **Oral Health**

Mouth and throat diseases, which range from cavities to cancer, cause pain and disability for millions of Americans. This is disturbing because almost all oral diseases can be prevented.

Cavities are a common problem that begins in early childhood and continues throughout life. Tooth loss continues to be a problem among adults and seniors. In addition, oral cancers pose a threat to the health of American adults. In 2009, 107 Missouri residents died of cancers of the lip, oral cavity or pharynx.<sup>9</sup>

We know very little about the oral health status of Missouri's population. The BRFSS collects minimal information about adults' loss of teeth and recent preventive care.

Access to dental care appears to be limited, but the extent of the need is not well documented. A crude measurement of access to dental services is provided by the Health Professional Shortage Designations discussed in Chapter 8. However, this is not a population based measure and does not provide a comprehensive picture of oral health needs at a community level.

Missouri oral health surveillance efforts are limited and do not assess the actual oral health needs among subgroups of the population, particularly vulnerable populations, adults and seniors. Population-based data on children's oral health are also limited. An open mouth survey of third (and sometimes sixth) graders is completed every five years. Results from the 2010 survey indicate that 52 percent of third graders have experienced caries, 24 percent have untreated decay and 24 percent had dental sealants.<sup>10</sup>

## **Health Care System**

This report has used available data to provide information about the various health care systems in Missouri. However, there is no data to compare the adequacy of Missouri's system to national standards or the systems of other states. There are federal criteria for Primary Health Care and Dental Health Care Professional Shortage Areas (see Chapter 8), but standards for the availability and accessibility of other health care services are not well defined. For example, a wide range of service levels are provided by the

various ambulance services within the state, but more information and analysis are needed to determine which areas of the state are adequately covered and which are not. We also lack high quality data to evaluate Missouri's health care system over time.





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