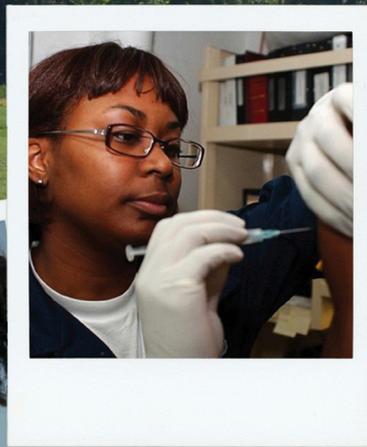


# Missouri Rural Health Biennial Report

2010 - 2011



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# Rural Health Biennial Report 2010-2011

The Missouri Rural Health Biennial Report 2010-2011 is produced by the Office of Primary Care and Rural Health, Center for Health Equity, Department of Health and Senior Services.

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# Executive Summary

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The Missouri Office of Rural Health (the Office) was established by the 1990 General Assembly (192.604 RSMo) to “assume a leadership role in working or contracting with state and federal agencies, universities, private interest groups, communities, foundations and local health centers to develop rural health initiatives and maximize the use of existing resources without duplicating existing efforts.” The authorizing legislation also requires the Office to submit a biennial report of its activities and recommendations to the Governor and members of the General Assembly on or before November 15th of odd-numbered years. This report is submitted in compliance with that statute.

The Office is located within the Office of Primary Care and Rural Health (OPCRH), Center for Health Equity, Missouri Department of Health and Senior Services. The Office, in addition to the statutory roles, analyzes and disseminates rural health information and conducts outreach activities to improve the health of rural Missourians.

When reviewing indicators of health status, economics or health infrastructure, the rural areas of Missouri are at a disadvantage, compared with the state as a whole or with urban counties. These indicators are directly related, as the socioeconomic status and health infrastructure of a community determine, in large part, to the overall health status of the community. In order to address the health outcomes in rural communities, the Office partners with national, state and local organizations to implement an array of interventions and programs designed to enhance and improve the socioeconomic and health infrastructure issues in rural areas.

In Missouri, 89.4 percent of the land is located within rural counties. In contrast, only 37 percent of Missouri’s population lives in rural counties. The 2010 U.S. Census population figures indicates a

loss of residents in Missouri’s northern region. Eighteen rural counties had population losses of up to 5 percent. An additional 11 rural counties had population losses of greater than 5 percent. Conversely, 72 rural counties experienced population gains. The largest gains were in rural counties adjacent to urban counties.

Missouri’s rural poverty rate (17.2 percent) is higher than its urban poverty rate (13.1 percent). Of the 44 counties with a poverty rate statistically significantly higher than the state rate, 40 are rural. The majority of rural counties with the highest poverty rate are in southeast Missouri. For the population under age 18, the difference between urban and rural poverty rates is even more pronounced. The rural poverty rate for this population is 25.3 percent, while the urban rate is 18.2 percent. The percentage of children living below poverty is significantly higher than the state percentage in 43 rural counties. The most impoverished county is Wright, with 45.1 percent of children under age 18 living in poverty.

Rural areas are prone to higher poverty rates for a number of reasons. An area’s remoteness can be associated with the quality and quantity of jobs available. “Good” jobs—those with higher pay, stability and benefits—are more prevalent in urban areas. As of July 2011, 55 counties in Missouri had an annual average unemployment rate higher than the state rate. Fifty-one of those counties are rural. Statewide, employment increased by 40,544 jobs over the past year.

A person in a rural community can earn less income than his or her urban counterpart doing the same job, though their education, job skills and experience are equivalent. This is due to rural labor markets being typically smaller and having fewer large employers, which limits the bargaining power of workers to receive higher wages and benefits such as health care coverage. The 2007 County-Level Study indicates 33 Missouri counties have a rate of adults without

<sup>1</sup>U.S. Census Bureau, State & County QuickFacts

<sup>2</sup>U.S. Census Bureau, 2000 Census and 2010 Census

health insurance that is statistically significantly higher than the state rate of 15.3 percent. All of those counties are rural. The majority of those counties are in southern Missouri.

Health resources such as hospitals, full-time physicians and dentists are relatively scarce in Missouri's rural areas. Only 68 of the 118 hospitals (58 percent) are located in rural areas and many of these are small facilities with less than 25 beds. Rural areas are also less likely to have an adequate number of primary care physicians. Only 18 percent of primary care physicians are located in rural areas. To qualify as a Health Professional Shortage Area (HPSA), the federal definition is one physician for every 3,500 persons. Twenty-nine rural counties fall below this population-to-primary care physician ratio. Dentists are even scarcer in rural areas. Seventy-five rural counties either have no dentist or fall below the federal standard of one dentist for every 3,000 residents.

One important indicator of health status is life expectancy at birth. The 2005-2009 average life expectancy for people in rural areas is 76.2 years compared to 77.6 years for urbanites. Another indicator

of the disparity in health status between Missouri's urban and rural populations is the variation among death rates for various diseases and health conditions. The mortality rate from all causes of death in Missouri's rural counties (905.6 deaths per 100,000 residents) is statistically significantly higher than the rate for Missouri's urban counties (849.7 deaths per 100,000 residents) in 1999 to 2009. The rural mortality rate is higher than the urban mortality rate for the ten leading causes of death. The rural-urban rate difference is statistically significant for eight of the 10 causes.

Given the implications of poverty in rural Missouri, a multifaceted approach is necessary to make a positive impact. To create the conditions for decent living, policymakers, employers and the community must look for ways to enhance employment, increase income and provide affordable health care. Recruitment and retention of primary health care providers in rural Missouri must be addressed in order to make a positive impact on access to health care. When national, state and local organizations work together to undertake these issues, improved health outcomes for rural Missourians can be achieved.

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<sup>3</sup>All calculations of statistical significance utilize a 95 percent confidence level.

<sup>4</sup>This report uses the regional classifications developed by the Behavioral Risk Factor Surveillance System (BRFSS) at [www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf](http://www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf).

<sup>5</sup>U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)

<sup>6</sup>Missouri Department of Economic Development, Missouri Economic Research and Information Center (MERIC), Local Area Unemployment Statistics

<sup>7</sup>Missouri Department of Health and Senior Services, Community Data Profiles, 2007 County-Level Study – Health and Preventive Practices Profile

<sup>8</sup>Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination

<sup>9</sup>Missouri Department of Health and Senior Services, MICA (Missouri Information for Community Assessment), Death MICA

# Introduction

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The Missouri Office of Rural Health (the Office) was established by the 1990 General Assembly to “assume a leadership role in working or contracting with state and federal agencies, universities, private interest groups, communities, foundations, and local health centers to develop rural health initiatives and maximize the use of existing resources without duplicating existing efforts.” The authorizing legislation, 192.604 RSMo 2004, also requires the Office to submit a biennial report of its activities and recommendations to the Governor and members of the General Assembly on or before November 15th of odd-numbered years. This report is submitted in compliance with that statute.

The Office is located within the Office of Primary Care and Rural Health, Center for Health Equity, Missouri Department of Health and Senior Services (DHSS). The Office, in addition to its statutory roles, analyzes and disseminates rural health information and conducts outreach activities to improve the health of rural Missourians.

One outreach activity included town hall meetings to develop the 2010-2013 Rural Health Plan. Four goals were identified to improve health outcomes in rural Missouri:

- Increase access to and utilization of health care services;
- Expand access to affordable and available transportation;
- Support emergency medical service providers in their efforts to provide optimal care; and,
- Coordinate efforts to improve the rural health workforce.

These goals are based on individual comments heard at 15 statewide town hall meetings held from November 2009 to June 2010. The activities necessary to achieve each goal have been identified. The feasibility of implementing these activities has also been studied. No single agency or program can meet the needs of a community. Efforts must be focused together to expand, engage and inspire community resources.

## Challenges in Rural Missouri

The local health care delivery systems in many rural areas of Missouri often have challenges. Limited resources make recruiting and retaining medical, dental and behavioral health professionals difficult. Rural communities struggle to preserve access to basic and essential health care services. Increasingly diverse cultures, economic stagnation, reimbursement issues, changing physician practice patterns, provider recruitment and retention challenges, and aging equipment and physical facilities all affect the viability of local rural health care delivery systems. Many rural areas have higher percentages of the elderly, higher poverty levels, lower per capita income and higher unemployment rates than their urban counterparts. Lower physician-to-population ratios, less hospital service capacity, fewer paid Emergency Medical Services (EMS) providers, fewer emergency departments in rural hospitals and fewer trauma centers characterize the health infrastructure of many rural counties.

Further, sparsely populated rural areas present a unique set of problems for the delivery of health services due to the lack of critical population mass, which can financially sustain basic and emergency services. While 89.4 percent of the land in Missouri is located within rural counties, only 37 percent of the population lives in rural counties.<sup>10</sup> Difficulties in recruitment and retention of needed professionals compel rural communities to find creative solutions in order to maintain their health care workforce. In spite of these challenges, the goals of rural communities continue to be the efficient use of resources and the identification of strategies and methods for tracking, reporting, and improving performance and quality in their systems of care.

Additionally, the growth in the Hispanic and Asian populations continues to challenge economically stressed rural communities in terms of language and cultural barriers. Rural communities have limited financial and human resources to influence efforts to address health care disparities and the quality of care in rural communities.

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<sup>10</sup> U.S. Census Bureau, State & County QuickFacts

## Defining Rural Missouri

The United States Census Bureau and various federal agencies use different definitions of rural. Each definition emphasizes different criteria, such as commuting patterns, population size and population density. As a result, different definitions generate different numbers of rural people. This report defines urban counties as those with a population density over 150 persons per square mile, plus any county that contains at least part of the central city of a Census-defined Metropolitan Statistical Area (MSA). Using this definition, 14 Missouri counties are urban. The remaining 101 counties in Missouri are rural. Map 1 illustrates the rural and urban counties in Missouri.



**Map 1 Rural and Urban Counties Based on Population Density and MSA Central Cities, 2010**

Source: Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination, using the 2010 U.S. Census





Missouri's population continues to diversify. This diversity presents challenges for rural communities in terms of language and cultural barriers. Hispanics are the fastest-growing ethnic group in Missouri. The Hispanic population, 2.1 percent in the 2000 Census, grew to 3.5 percent in the 2010 Census, an increase of 79.2 percent. The counties with the highest Hispanic population rates are Sullivan (18.6 percent), McDonald (11.2 percent), Pulaski (9.0 percent), Jackson (8.4 percent), Saline (8.2 percent) and Barry (7.7 percent).

Missouri's largest minority group, African-Americans, constituted 11.6 percent of the state population in 2010. The African-American population increased by 6.7 percent between 2000 and 2010. However, African-Americans primarily live in urban areas. Only 3.0 percent of the rural population is African-American. The Hispanic population is somewhat more dispersed geographically compared to African-Americans. Thirty-three counties had fewer than 50 African-Americans in 2010. In contrast, 10 counties had fewer than 50 Hispanic residents in 2010.<sup>12</sup>

Minorities are moving into Missouri's rural counties at an increasing rate. Of the 101 rural counties, 93 experienced an increase in minority populations between 2000 and 2010. In 17 rural counties, minority populations more than doubled during this time period. These counties are dispersed throughout the state.<sup>13</sup> The changes facing rural communities in terms of language barriers and cultural differences are compounding problems of inadequate infrastructure and resources.

Medical providers must understand and be sensitive to their patients' cultures in order to effectively treat them. Physicians must provide care at an appropriate level to ensure information and services are understood and used by the population. A person's health literacy is dependent upon his or her ability to obtain, process and understand basic health information.



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<sup>12</sup>U.S. Census Bureau, 2010 Census

<sup>13</sup> U.S. Census Bureau, 2000 Census and 2010 Census

# Socioeconomic Indicators

Several socioeconomic characteristics have a direct relationship to the health status of a community or region. The impact of poverty, unemployment, and lack of educational attainment and health insurance on health status are well documented. The remoteness of rural areas can be associated with all of these factors due to the quality and quantity of jobs available, especially jobs that provide benefits, such as health insurance, and a lack of educational opportunities. In the following sections, several indicators are used to compare rural and urban counties in the state.

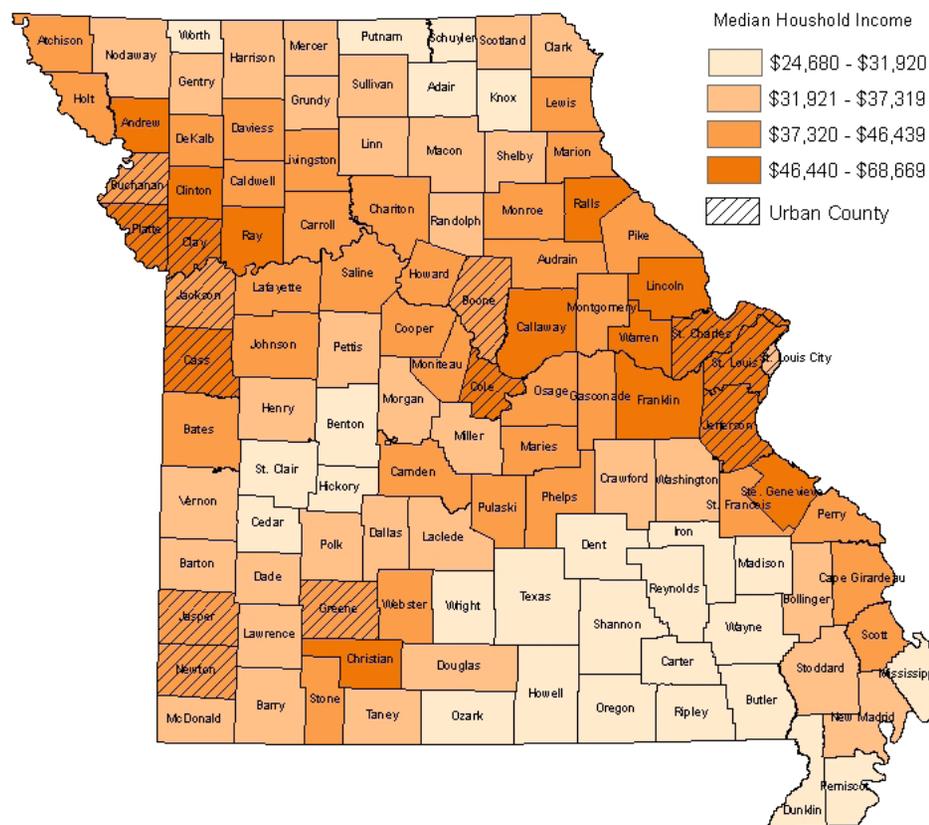
## Poverty

Poverty decreases a person's ability to pay for health services. People living in poverty also have less access to both fitness activities and healthier foods. A person in a rural community can earn less than his or her urban counterpart with the same job, despite having comparable education, job skills and experience. The smaller labor markets and lack of large employers in rural areas limit workers' ability to bargain for higher wages. According to estimates from the U.S. Bureau of Economic Analysis (BEA), Missouri's total personal income rose by 2.2 percent from 2009 to 2010, lagging behind the overall U.S. increase of 3.0 percent. Missouri's urban areas had a higher average per capita income (\$36,273) in 2009, the most recent year for which data is available, than rural areas (\$29,552). Missouri's median household income in 2009 was \$45,149. In general, Missouri's urban areas had a higher median household income than rural areas, as Map 3 illustrates.<sup>14</sup>

As per capita personal income and median household income decrease, poverty rates increase. The statewide poverty rate in 2009 was 14.6 percent, an increase from 10.6 percent in 2000. Of the 89 Missouri counties with a 2009 poverty rate above the state

**Map 3 Median Household Income**  
**2009 U.S. Census Estimates Missouri Median Income: \$45,149**

Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)



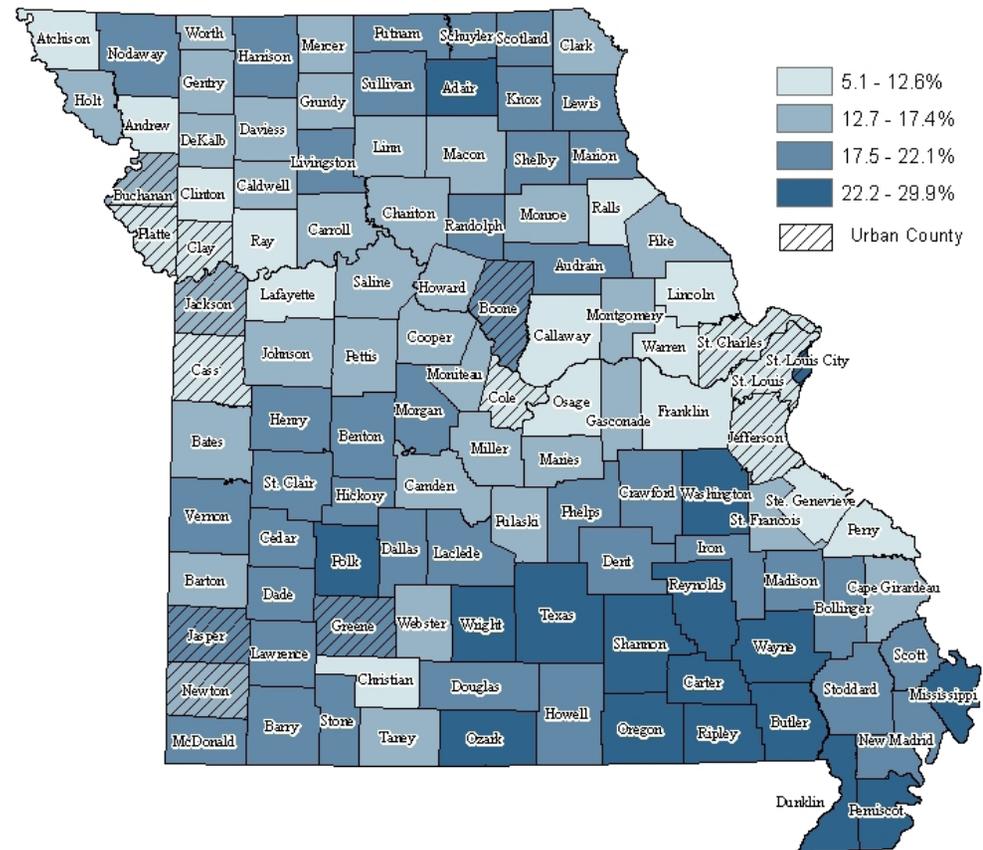
<sup>14</sup>U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)

average, 82 were rural. The average poverty rate for Missouri's rural counties was approximately 17.2 percent, for urban counties, 13.1 percent. Also of note, the rural counties with the lowest poverty rates were adjacent to urban areas. The majority of counties with the highest poverty rates are in southeast Missouri, where the average poverty rate is 22.3 percent.<sup>15,16</sup> Map 4 shows the distribution of poverty rates across Missouri.



**Map 4 Percent of Population below Poverty**  
**2009 U.S. Census Estimates Missouri Rate: 14.6 Percent**

Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)



<sup>15</sup>Ibid.

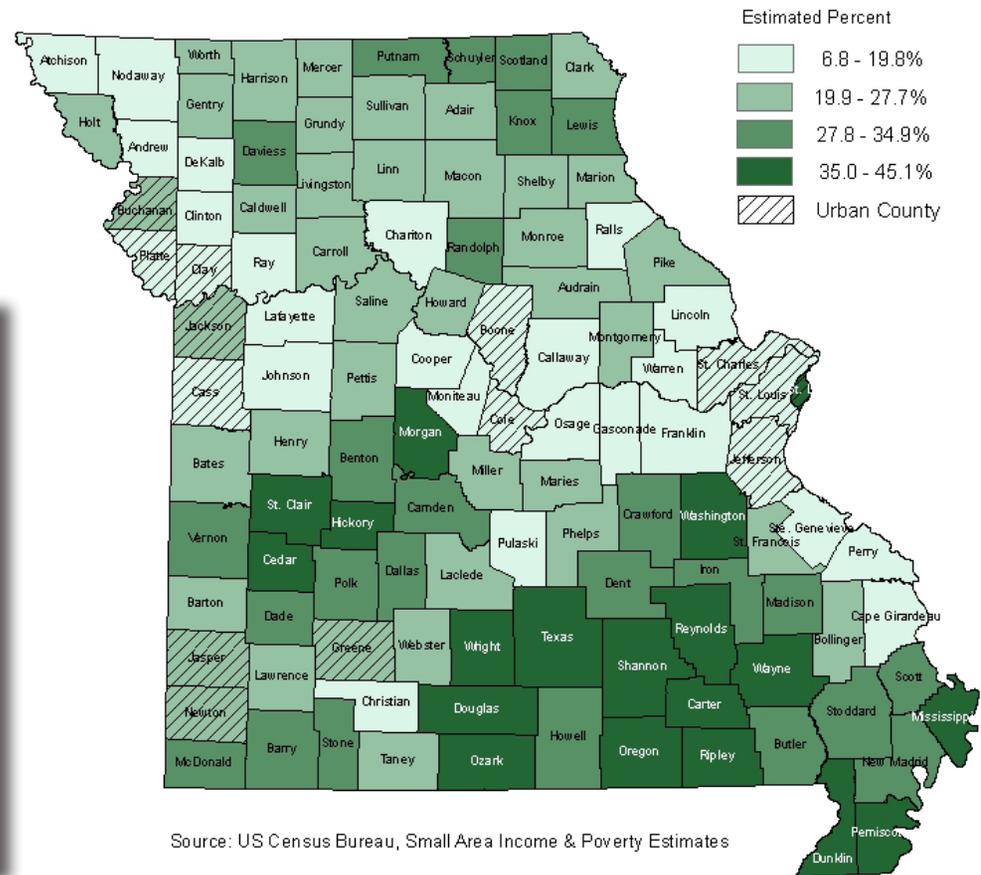
<sup>16</sup>This report uses the regional classifications developed by the Behavioral Risk Factor Surveillance System (BRFSS) at [www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf](http://www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf).

The disparity in poverty rates between urban and rural counties is even more pronounced for the population under age 18. The percentage of children living below poverty is higher than the state percentage in 77 rural counties. The poverty rate for the under 18 population in Missouri's rural counties is 25.3 percent; for urban counties, 18.2 percent. Wright County has the highest childhood poverty rate at 45.1 percent. Map 5 shows the childhood poverty rates in Missouri Counties.



**Map 5 Percent of Children (Under 18 Years of Age) below Poverty  
2009 U.S. Census Estimates Missouri Rate: 20.7 Percent**

Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)



Source: US Census Bureau, Small Area Income & Poverty Estimates

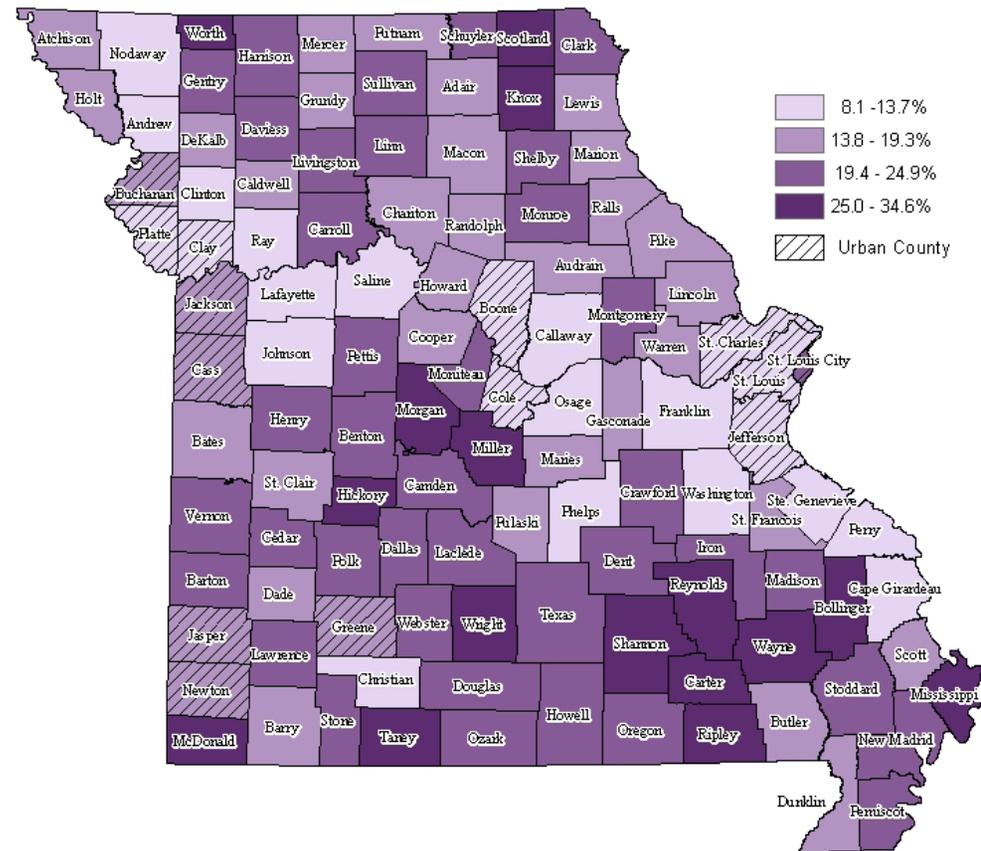


## Uninsured Populations

The smaller size of rural labor markets and lack of many large employers limit workers' ability to bargain for benefits such as health insurance. Health insurance is an important determinant of health status and is also highly correlated with income and health care access. Lack of insurance, along with reduced access to health care delivery services, exists disproportionately in rural Missouri. The 2007 County-Level Study – Health and Preventive Practices Profile estimates the age-adjusted percentage of the uninsured adult population (at least 18 years of age) in each county and for the state overall. Thirty-three Missouri counties have an uninsured rate that is statistically significantly higher than the state rate of 15.3 percent.<sup>17</sup> All of those counties are rural. Rural rates are generally higher than both the state average and urban rates. The northeast (18.4 percent) and southwest (18.0 percent) rates are statistically significantly higher than the state rate. Map 7 shows the distribution of counties according to the estimated percentage of uninsured adult residents.

**Map 7 Adult Residents (At Least 18 Years of Age) with No Health Care Coverage**  
**2007 County-Level Study Missouri Rate: 15.3 percent**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, 2007 County-Level Study – Health and Preventive Practices Profile



Percentages are age-adjusted to the U.S. 2000 Standard Population.

<sup>17</sup>All calculations of statistical significance utilize a 95 percent confidence level.

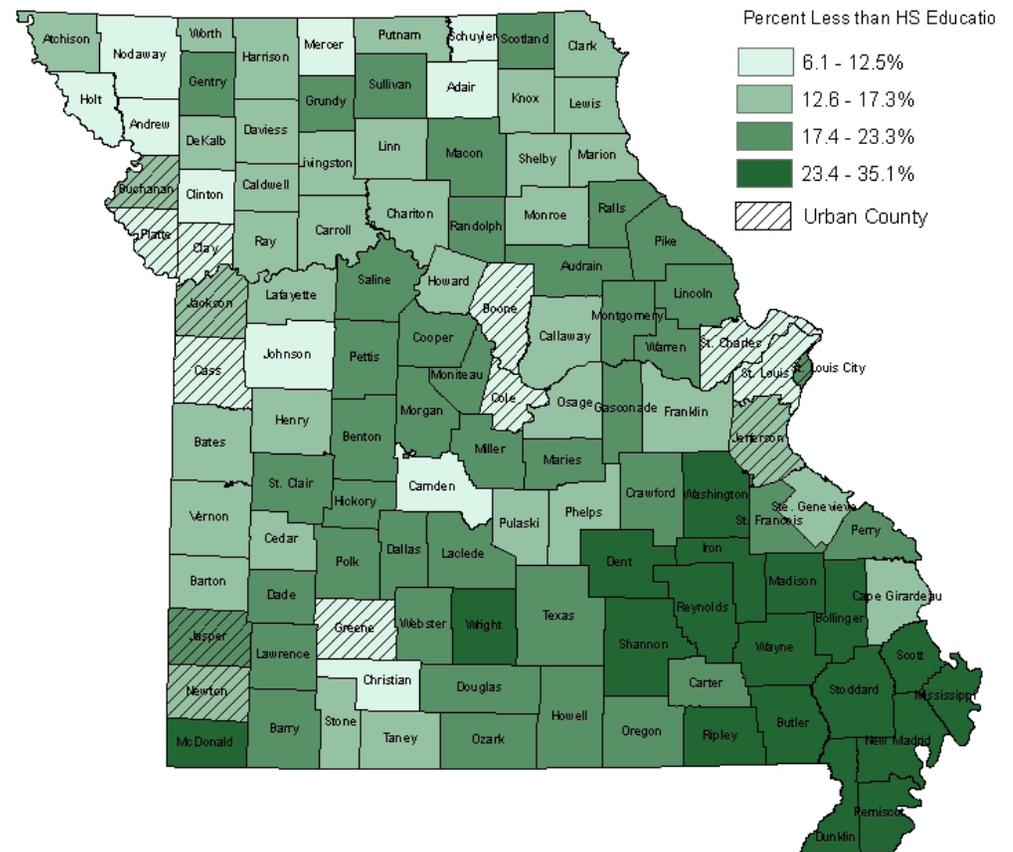
## Education

Education and income are highly correlated with health status. The higher the education and income level of a population, the better the health status. People with higher education are more likely to find jobs that pay more and provide benefits such as health insurance. Higher education also increases one's chances for stable income, job security and job satisfaction. Education makes it easier for people to access information and resources in order to make decisions about their health. In general, people with higher education have better health practices and outcomes.

In rural Missouri, the lack of education, as measured by the percentage of those without a high school education, is a very serious issue. Although the state rate of 14.4 percent is less than the national rate of 15.4 percent, more than 20 percent of residents age 25 years and over lack a high school education in 37 rural Missouri counties. Mississippi County has the highest rate at 35.1 percent. Only three rural counties match or exceed the state rate (31.0 percent) for percentage of the population with at least an associates degree. They are Christian (32.7 percent), Adair (31.3 percent) and Johnson (31.1 percent). The average percentage of the population with at least an associates degree is 19.3 percent for Missouri's rural counties; 34.2 percent for its urban counties. This lack of education is a critical factor in developing intervention strategies to impact health in rural Missouri. Map 8 illustrates the number of Missourians without a high school education.

**Map 8 Percent of Adults Age 25 Years and Over without a High School Education**  
**2005-2009 Census Estimates Missouri Rate: 14.4 percent**

Source: U.S. Census Bureau, American Community Survey (ACS)





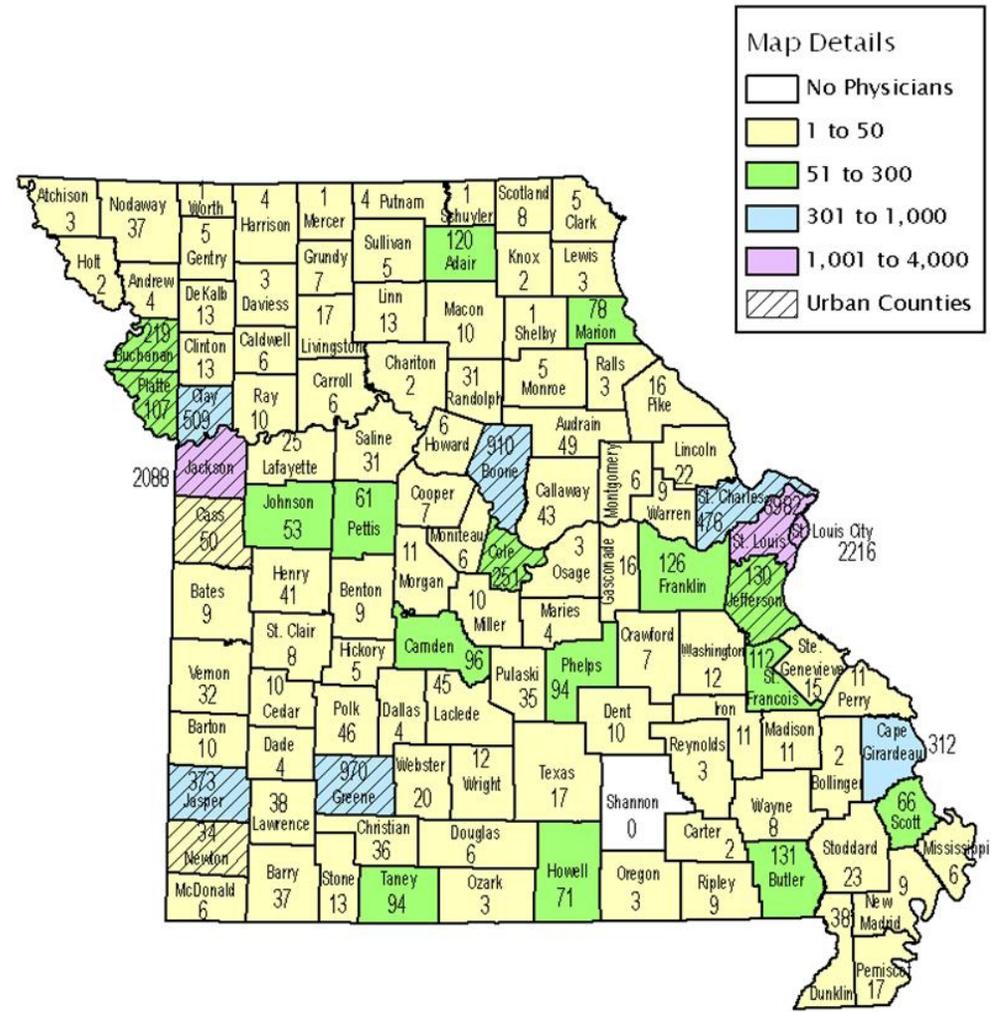


Twenty-nine counties in Missouri, all rural, have a population-to-primary care physician ratio that exceeds 3,500 to 1, the federal standard for health professional shortage areas. While 37 percent of Missouri's population lives in rural counties, only 18 percent of the primary care physicians are located in rural areas. Decreasing this disparity in primary care medical practitioners is critical in assuring access to preventive and maintenance health services in rural Missouri. The distribution of primary care physicians in Missouri is shown on Map 11.



**Map 11 Primary Care Physicians per 10,000 Residents, March 2010**

Source: Missouri Department of Health and Senior Services, License Renewal Data



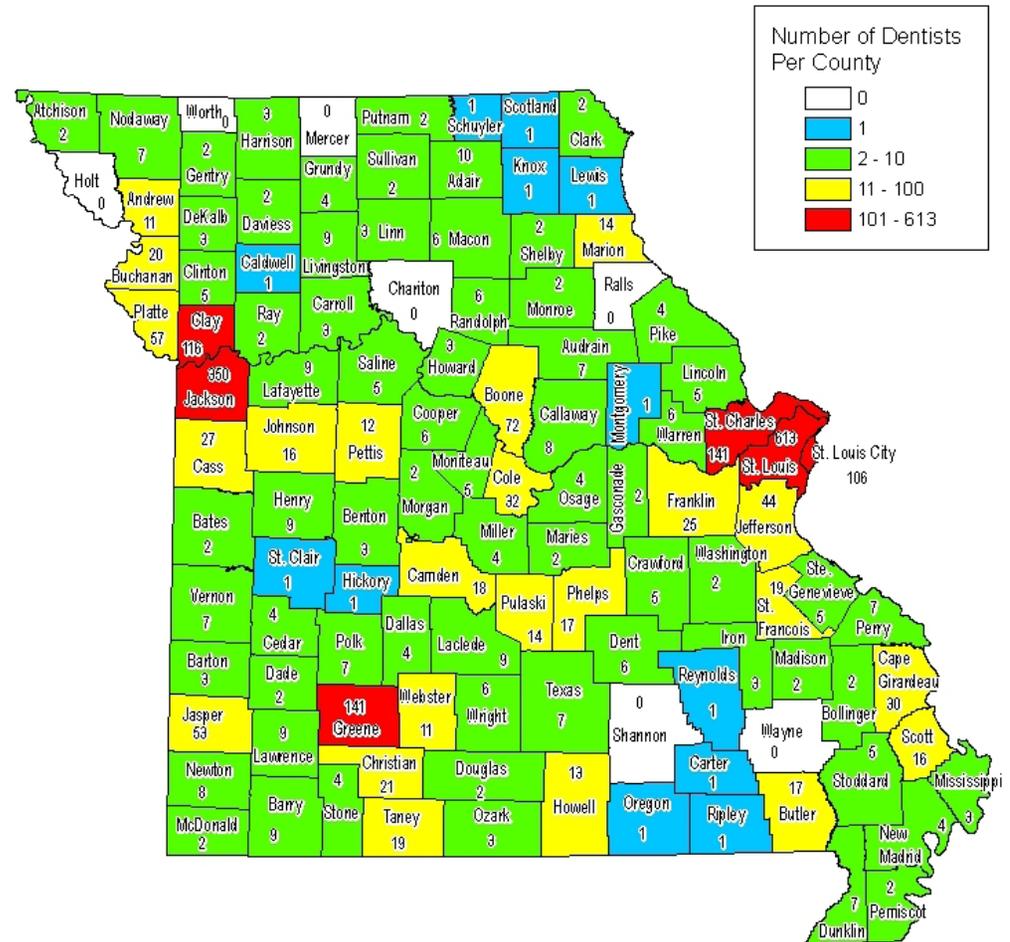
## Primary Care Dentists

Primary care (general) dentists are also key health care practitioners. Recent research and findings indicate the importance of maintaining good oral health. Further studies show oral disease contributes to many serious overall health conditions, such as heart and digestive disease, diabetes, and premature and low birth weight babies. The need for dentists is not exclusively a rural problem, although access to dental services is a much greater issue in rural communities. The average number of patient visits a dentist can provide each year is fewer than 3,000. In Missouri, there are 72 counties with a population-to-dentist ratio exceeding 3,000 to 1. Of those counties exceeding this standard, 69 are rural.

Additionally, there are six rural counties without a dentist. The dentists in rural Missouri represent only 28 percent of licensed dentists, while the population in those counties constitutes 37 percent of the state population. The distribution of dentists in Missouri is represented on Map 12.

**Map 12 Primary Care Dentists, January 2011**

Source: Missouri Department of Health and Senior Services, Professional Registry



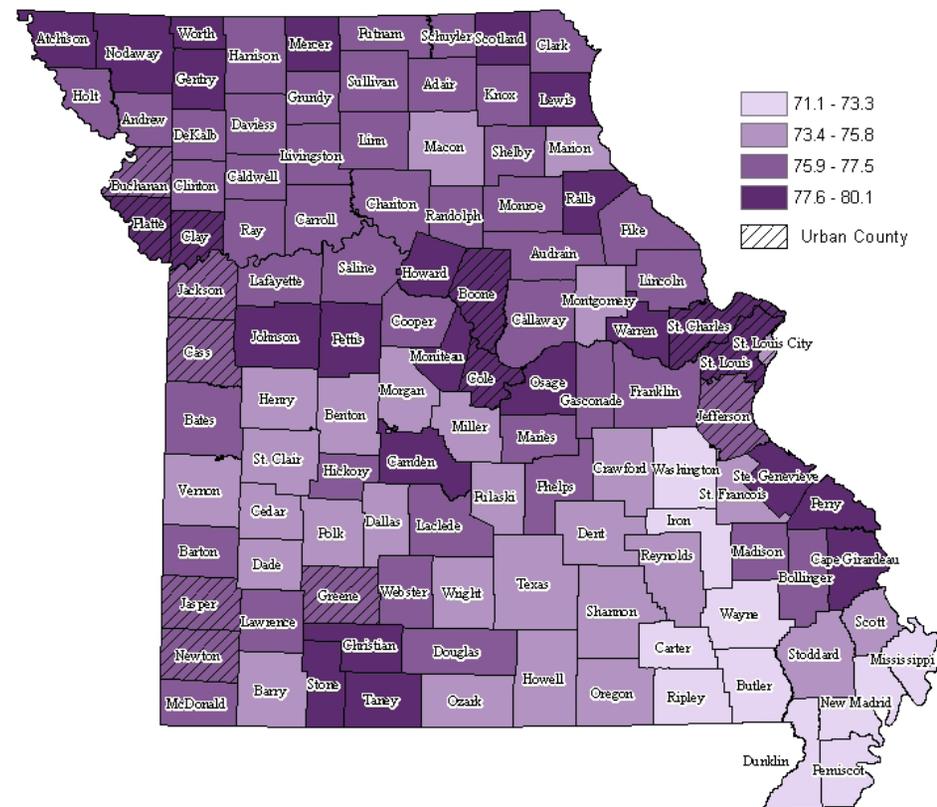
# Health Status

A good measure of the overall health of an area is life expectancy at birth, which is calculated using birth, death and population data for a given area. In Missouri and throughout the nation, average life expectancy has steadily increased due to vast improvements in most areas of health care. In Missouri, average life expectancy at birth (based on data from 2005-2009) rose to 77.1 years, an increase from 75.4 years in 1990 and from 76.2 years in 2000. While most Missouri counties have also experienced increases in life expectancy during the past two decades, disparities remain for some counties across the state and between urban and rural areas. The 2005-2009 life expectancy at birth for Missouri's urban areas is 77.6 years compared to 76.2 years for its rural areas. Platte County has the highest life expectancy at 80.1 years; Ripley County the lowest, at 71.1 years. The southeast region, which does not include any urban counties, has the lowest regional life expectancy --- 74.8 years. Map 13 shows the distribution of life expectancy across Missouri's counties.

Another way to measure the disparity in health status between the urban and rural populations is the variation among death rates for various diseases and health conditions. This section looks at the top 10 causes of death identified by the Missouri Department of Health and Senior Services in the Leading Causes of Death Profile and the Death MICA (Missouri Information for Community Assessment). The causes of death are: heart disease, cancer, stroke, chronic lower respiratory disease, unintentional injuries, diabetes, pneumonia and influenza, Alzheimer's disease, kidney disease and suicide. The rural rates are higher than the urban rates

**Map 13 Life Expectancy at Birth (in years), 2005-2009**  
**Missouri Life Expectancy: 77.1 years**

Source: Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination



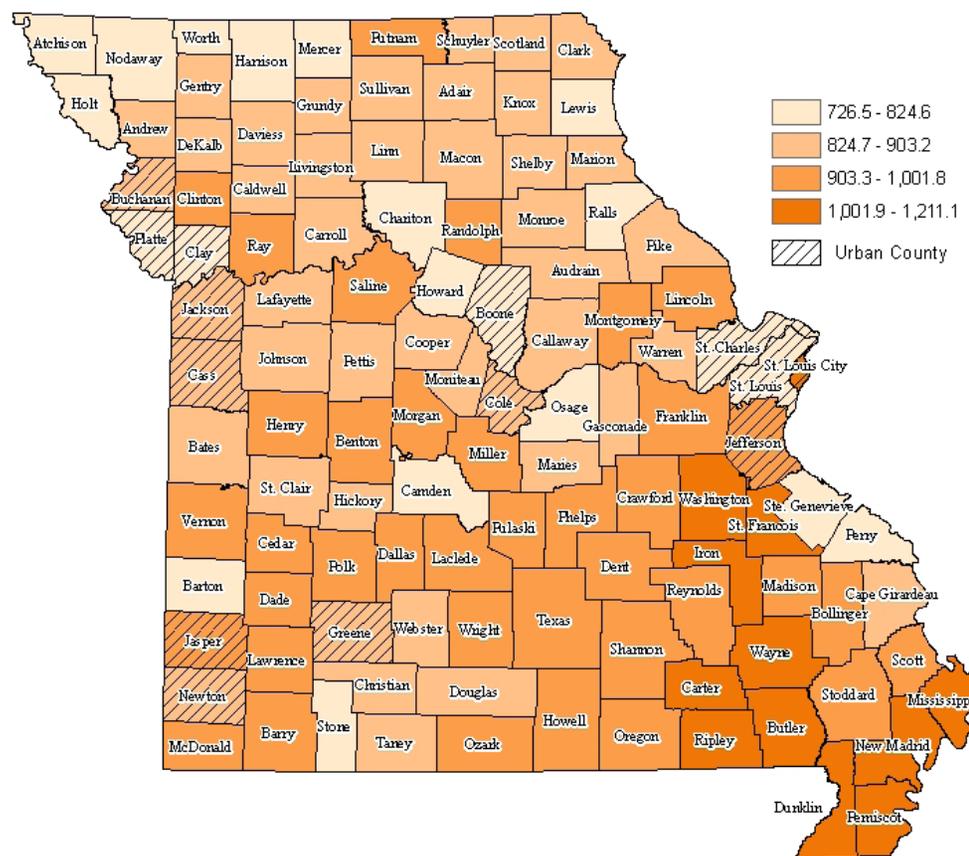
for all 10 causes. For eight of the 10 causes, the rural-urban difference is statistically significant. The following sections examine Missouri's death rates from all causes and for the state's 10 leading causes of death in more detail. They include comparisons between the urban and rural rates and identify the regions and counties with the highest mortality rates. Unless otherwise noted, all rates used in this analysis represent years 1999 through 2009, are per 100,000 residents, and are age-adjusted to the U.S. 2000 Standard Population.

### All Causes

The age-adjusted state rate for mortality from all causes of death is 871.5 per 100,000 residents. The rural rate of death from all causes (905.6) is statistically significantly higher than the urban rate (849.7). Of the 50 counties with an age-adjusted death rate from all causes that is significantly higher than the state rate, 46 are rural. The majority of these counties are located in the southern areas of the state, primarily in the "Bootheel." In fact, 21 (84 percent) of the 25 counties in the southeast region have a significantly higher death rate than the state as a whole. Iron County has the highest death rate from all causes at 1,211.1; Mercer County the lowest, at 726.6. Map 14 illustrates the distribution of mortality rates from all causes across all counties in Missouri.

**Map 14 Deaths Due to All Causes, 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 871.5 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile



## Heart Disease

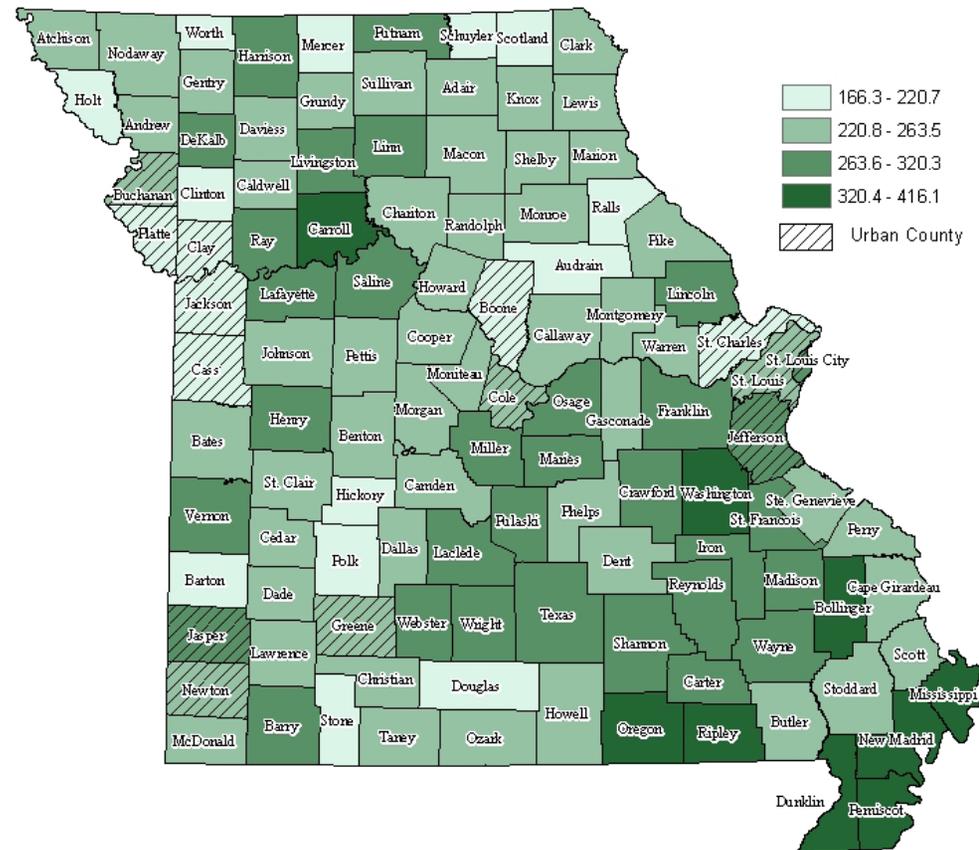
Although the state rate trend shows a statistically significant decrease, heart disease continues to be the leading cause of death in Missouri. Between 1999 and 2009, 172,202 Missourians died of heart disease at a rate of 245.6 deaths per 100,000 residents. The rural heart disease mortality rate (261.5) is statistically significantly higher than the urban rate (235.0).

- Thirty-nine of 115 Missouri counties have a heart disease mortality rate significantly higher than the state rate. Thirty-six of these are rural counties.
- Sixty percent of the counties in the southeast region have a significantly higher heart disease mortality rate than the state. This is the highest percentage for any region in the state.
- The four counties with the highest heart disease mortality rates are Washington (416.1), Mississippi (398.1), Pemiscot (387.6), and New Madrid (370.9). Schuyler County has the lowest rate, at 166.3 deaths per 100,000 residents.

Map 15 shows the distribution of counties by heart disease mortality rates.

**Map 15 Deaths Due to Heart Disease, 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 245.6 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile



## Cancer

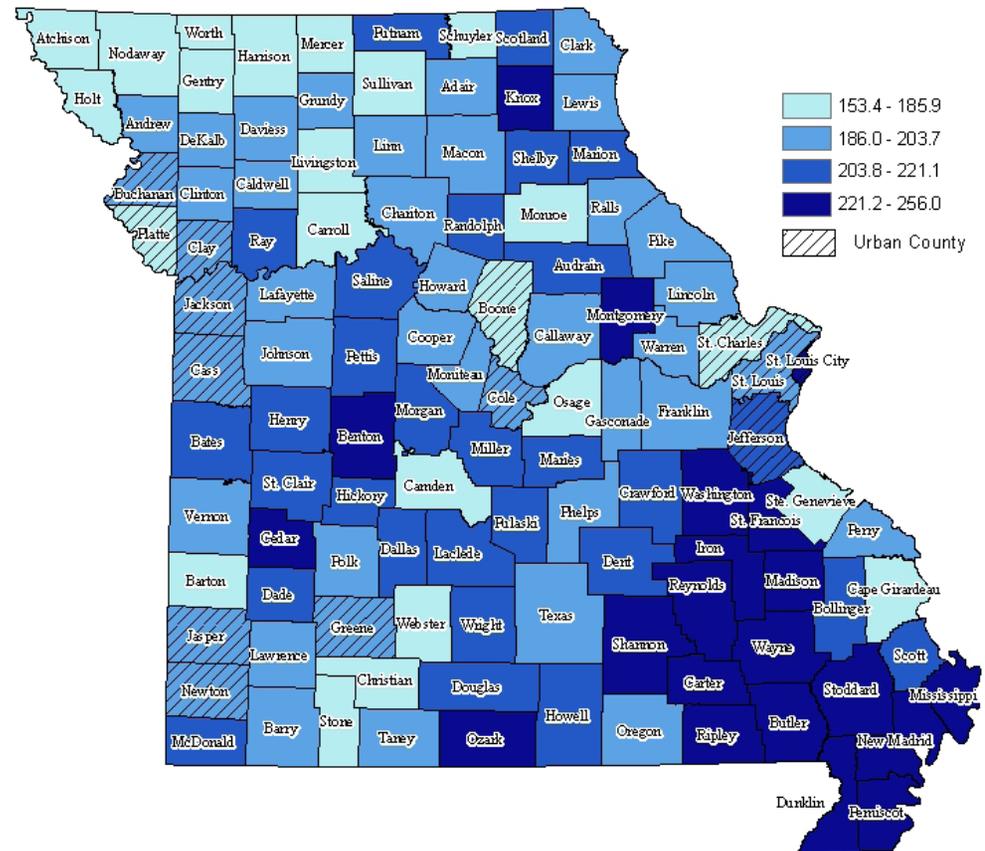
The trend for the state's death rate from all cancers shows a statistically significant decrease from 1991 through 2009. However, cancer continues to rank as the second leading cause of death for the state. Between 1999 and 2009, 135,732 Missourians died of cancer at a rate of 197.7 deaths per 100,000 residents. The cancer mortality rate for rural counties is 203.1, which is statistically significantly higher than the urban rate of 194.3.

- Of the 24 Missouri counties that have a cancer mortality rate significantly higher than the state rate, 22 are rural.
- Fifty-six percent of the counties in the southeast region have a cancer mortality rate significantly higher than the state rate.
- The four counties with the highest cancer mortality rates are Carter (256.0), Iron (254.4), Mississippi (247.3) and Dunklin (242.9). Holt County has the lowest rate at 153.4.

The distribution of counties by cancer mortality rates is shown in Map 16.

**Map 16 Deaths Due to Cancer 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 197.7 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile





## Chronic Lower Respiratory Disease

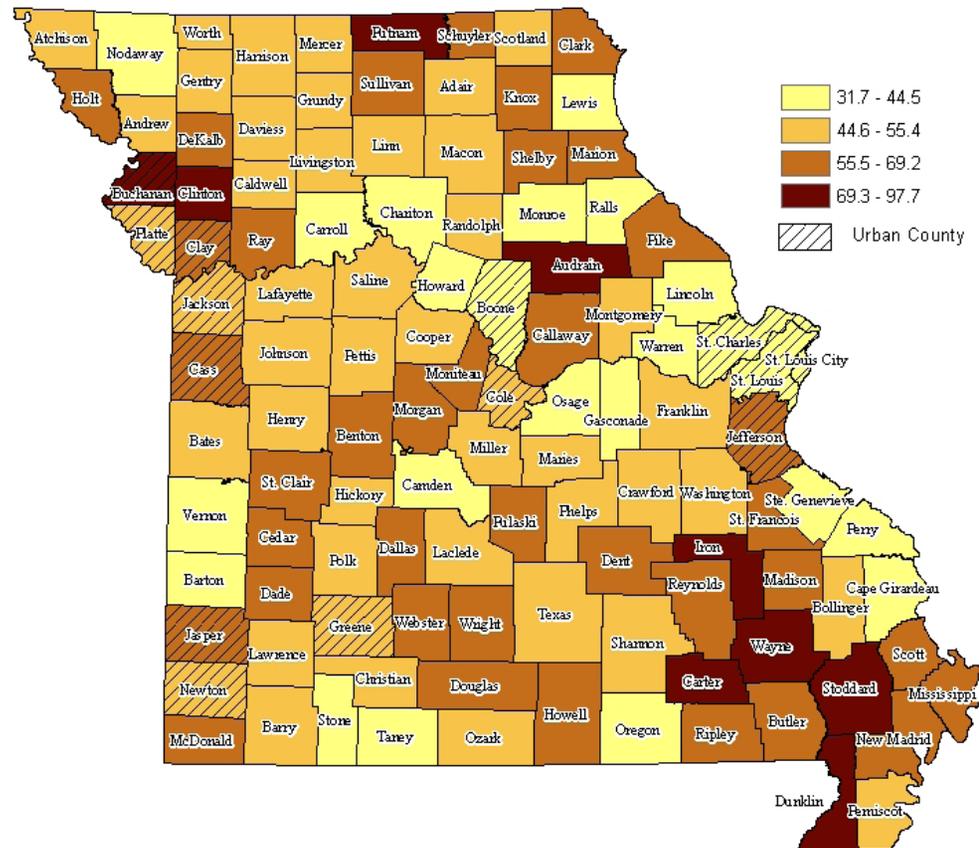
Chronic lower respiratory disease (CLRD) is the fourth leading cause of death in Missouri. It is defined as “resident deaths for which the underlying cause of death was given on the death certificate as chronic obstructive pulmonary disease and allied conditions. . . Included are: Bronchitis (unless it is specified as acute bronchitis), emphysema, asthma, bronchiectasis, and chronic airway obstruction not elsewhere classified. The vast majority of the deaths in this category are attributed to ‘chronic airway obstruction not elsewhere classified’.”<sup>20</sup> The CLRD mortality rate has increased significantly since 1991. Between 1999 and 2009, 33,585 Missourians died of chronic lower respiratory disease, for a rate of 48.7 deaths per 100,000 residents. The rural mortality rate due to CLRD (53.2) is significantly higher than the urban rate (45.6).

- Thirty-one Missouri counties have a chronic lower respiratory disease death rate that is significantly higher than the state rate. Twenty-six of those counties are rural.
- Fifty-six percent of the counties in the southeast region have a CLRD mortality rate significantly higher than the state rate.
- The counties with the highest CLRD mortality rates are Carter (97.7), Wayne (92.4), Iron (84.0) and Dunklin (77.4). Chariton County has the lowest rate at 31.7.

Map 18 displays the distribution of counties based on CLRD mortality rates.

**Map 18 Deaths Due to Chronic Lower Respiratory Disease, 1990-2009**  
**Age-adjusted Death Rates Missouri Rate: 48.7 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile



<sup>20</sup>Missouri Department of Health and Senior Services, Leading Causes of Death Profile, Definitions

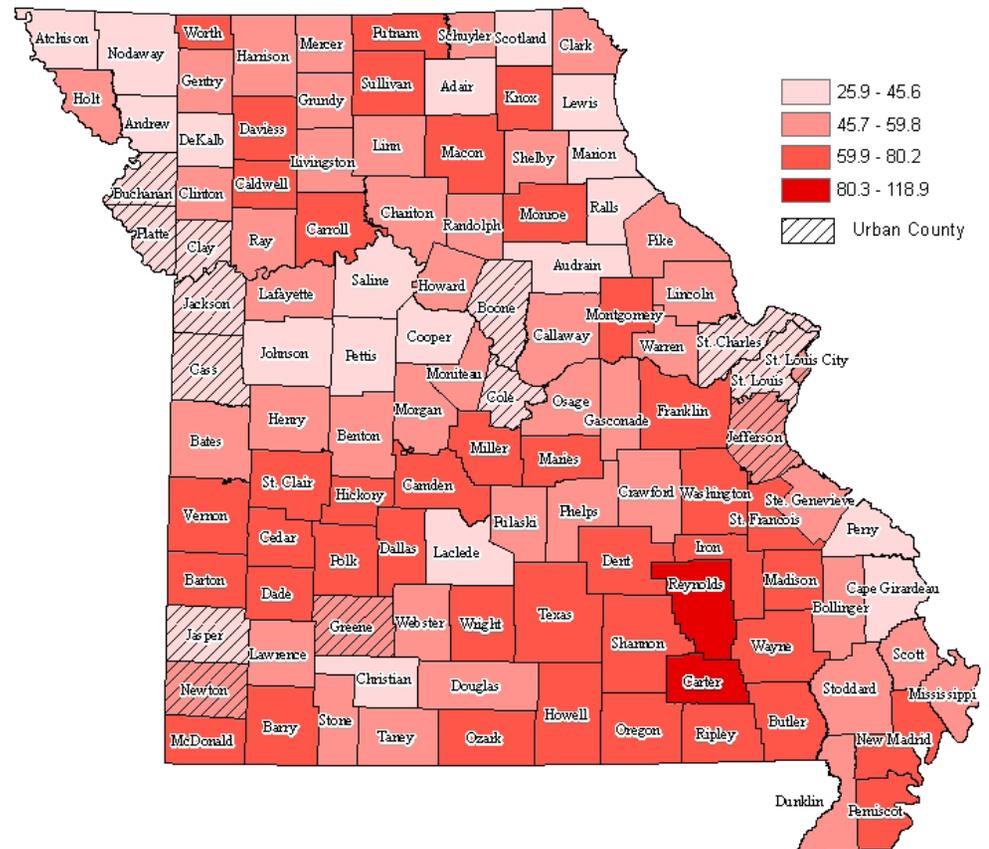
## Unintentional Deaths

The fifth leading cause of death in Missouri is unintentional injuries. Common unintentional injuries include motor vehicle accidents, falls, drug overdoses, fires and drownings.<sup>21</sup> The overall unintentional injury rate is 45.0 per 100,000 residents. There has been a statistically significant increase in this rate since 1991. Map 19 shows the distribution of unintentional injury mortality rates for Missouri.



**Map 19 Deaths Due to Unintentional Injuries, 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 45.0 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile



<sup>21</sup>Ibid

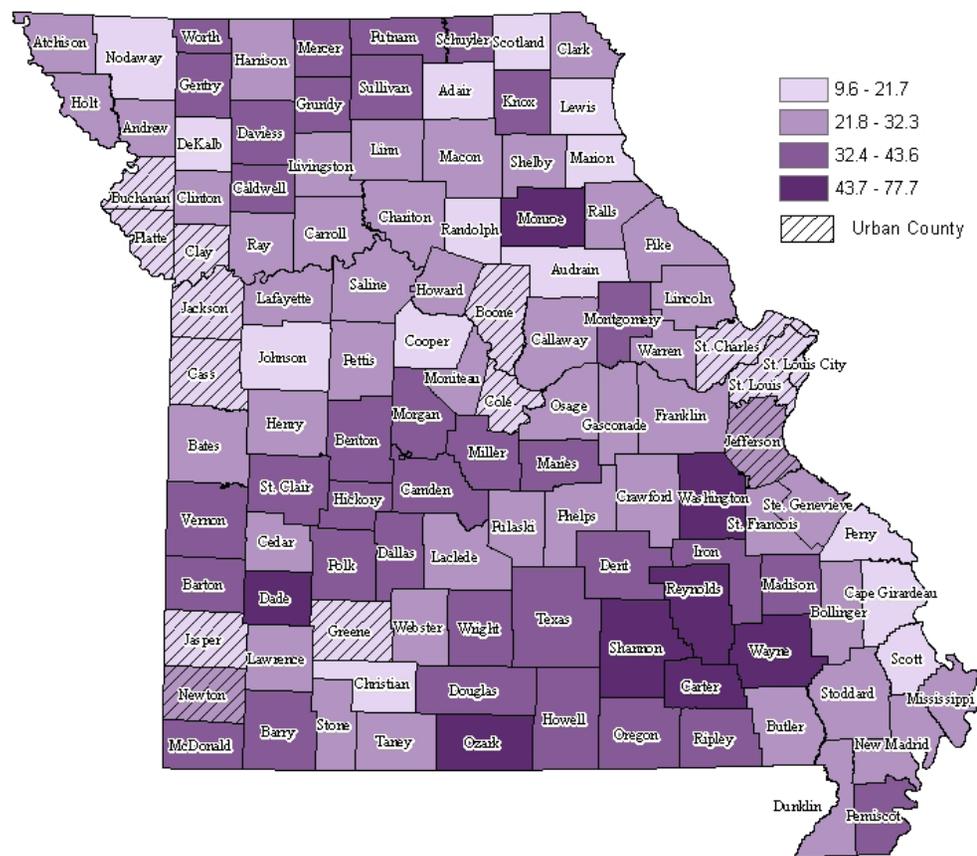
The type of unintentional injury with the greatest impact on rural areas is motor vehicle accidents. While there is no statistically significant difference between the rural (26.3) and urban (26.6) rates for all other types of unintentional injury deaths, deaths due to motor vehicle accidents are the most dramatic indicator of disparity between rural and urban communities. For motor vehicle accident deaths, the rural rate of 28.0 is double the urban rate of 13.2. Accidents along the rural roadways of Missouri resulted in more deaths due to geographic isolation, conditions of the highways, types of traffic, and the lack of health system infrastructure to meet emergency needs. Since 1991, the state rate of motor vehicle accident deaths has significantly decreased. However, motor vehicle accidents still account for more than 40 percent of all unintentional injury deaths. Between 1999 and 2009, 11,926 Missourians died due to a motor vehicle accident, a rate of 18.6 deaths per 100,000 residents.

- Seventy-nine Missouri counties have motor vehicle accident death rates significantly higher than the state rate. Seventy-seven of those counties are rural.
- In three regions, more than 80 percent of the rural counties have motor vehicle accident mortality rates significantly higher than the state rate. They are the southwest region (94 percent), the southeast region (88 percent) and the central region (83 percent).
- The counties with the highest motor vehicle accident mortality rates are Carter (77.7), Reynolds (66.6), Dade (55.7) and Wayne (50.1). St. Louis County has the lowest rate at 9.6.

The distribution of counties by their respective motor vehicle accident mortality rates is shown in Map 20.

**Map 20 Deaths Due to Motor Vehicle Accidents, 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 18.6 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile











## Suicide

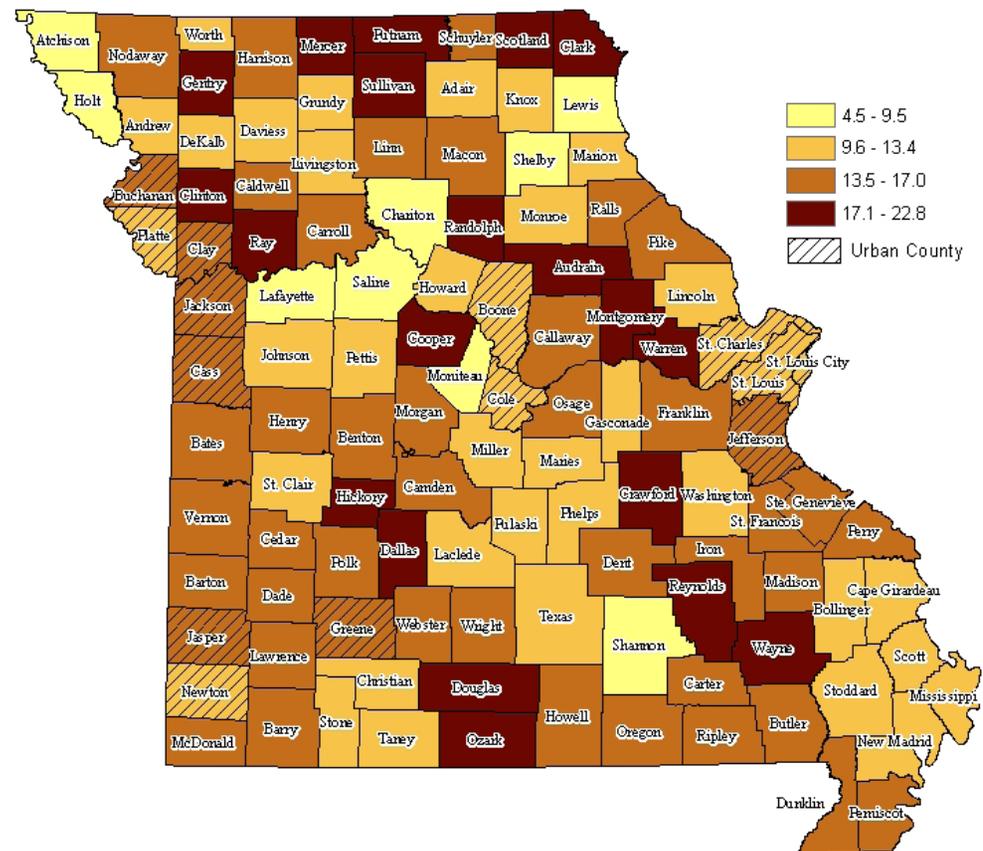
Suicide is the tenth leading cause of death in Missouri. This health status indicator illustrates the behavioral health needs of Missouri communities. Between 1999 and 2009, 8,211 Missourians died of suicide at a rate of 12.9 deaths per 100,000 residents. The rural suicide mortality rate (13.9) is statistically significantly higher than the urban rate (12.2).

- Seven rural Missouri counties have a suicide death rate statistically significantly higher than the state rate. They are Hickory (22.8), Dallas (19.8), Warren (19.0), Audrain (18.5), Howell (17.1), Callaway (16.8) and Franklin (16.0).
- Five of the counties that rank in the top 10 for highest suicide death rates can not be classified as significantly higher than the state rate. Each has a small (fewer than 20) number of suicide deaths, which results in an unstable rate. The counties are Mercer (22.7), Reynolds (22.0), Gentry (20.7), Putnam (19.9) and Scotland (19.8).
- Chariton County has the lowest suicide death rate at 4.5 (based on five deaths).

Map 25 shows the county distribution rate of suicide deaths.

**Map 25 Deaths Due to Suicide, 1999-2009**  
**Age-adjusted Death Rates Missouri Rate: 12.9 per 100,000 residents**

Source: Missouri Department of Health and Senior Services, Community Data Profiles, Leading Causes of Death Profile



# Activities and Programs

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The programs and activities of the Office of Primary Care and Rural Health (OPCRH) are designed to address the health infrastructure, outcomes and economy of rural communities. The programs listed are initiatives to improve outcomes within the emergency medical, hospital and primary care services in rural communities. Although these entities are often the direct recipients of the technical assistance or services provided by the Office, all other aspects of the rural community, including local public health, education, local government, businesses and social service agencies, are encouraged or required to be partners and participants in the overall efforts.

The programs are described below.

## Health Systems Development

A health system is the sum total of the organizations, institutions and resources whose primary purpose is to improve health.<sup>23</sup> Strengthening health systems and making them more equitable are key strategies in fighting poverty and fostering development. The Office works with multiple entities to increase resources for the development of health systems in rural areas.

- **Primary Care Delivery System Development**

Economically sustainable health care delivery systems that provide high-quality, accessible, primary medical, dental and mental health services are necessary to assure the survival of rural communities. To assist communities in the development of these systems, the Office continues to work with the partners dedicated to this task, namely the Health Care Delivery System Development component of the Primary Care Office (PCO) and the Primary Care Resource Initiative for Missouri (PRIMO) program.

The Health Care System Development component of the PCO and PRIMO programs provides financial resources to community-based organizations to create new or to expand existing primary medical, dental and mental health services in underserved communities. In state fiscal years 2009 and 2010, the programs invested \$3,480,317 in rural communities. As a result of this investment, access to care increased by 118,572 patient health encounters. Counties with communities receiving these investments include Cole, Osage, Franklin, Lincoln, St. Charles, Warren, Webster, Butler, Carter, Iron, Reynolds, Ripley, Shannon, Marion, Ralls, Lewis, Clark, Shelby, Monroe, Scotland, Clay, Jackson, Platte and Ray.

- **Primary Care Health Professional Recruitment and Retention**

Several factors influence the recruitment and retention of health care providers. OPCRH supports the belief that the best chance for finding and keeping rural health care practitioners, is to “grow our own.” This mission is supported by improving and enhancing capacity in communities across the state to identify, encourage and provide financial support to individuals from rural and underserved communities who want to pursue health care careers. Upon graduation and licensure, these individuals work in rural and underserved areas of Missouri to earn forgiveness for the student loans they received. Currently, eight dentists, two dental hygienists and 43 physicians are earning forgiveness. Additionally, over 90 nurses (associate and bachelor’s degree as well as licensed professional nurses) are earning forgiveness for student loans provided through OPCRH.

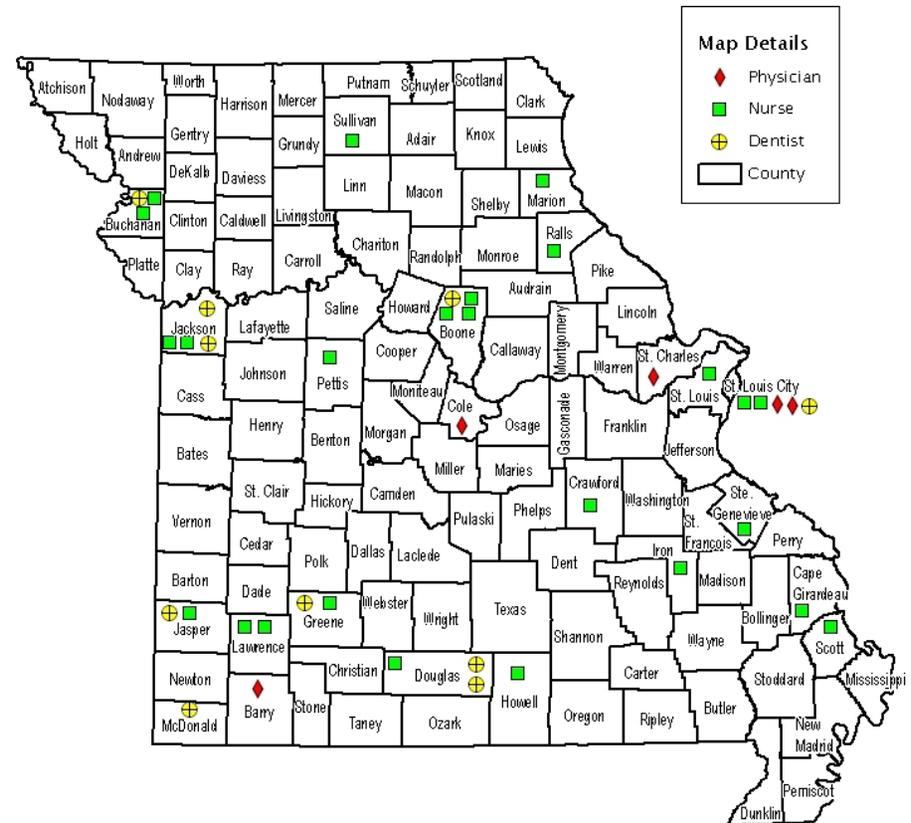
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<sup>23</sup>From [www.who.int/features/qa/28/en/](http://www.who.int/features/qa/28/en/) accessed on 8-31-11

In state fiscal year 2010, nine health care professionals were awarded educational debt assistance by utilizing funds from PRIMO as the required match funds. Due to a state budget reduction in fiscal year 2011, only three nurse practitioners were provided loan repayment. Upon graduation, the scholarship recipients serve as primary health care providers in the most underserved areas of the state. Of those placed, 75 percent were in rural counties.



**Map 26 Health Professional Loan Repayment Placements by County, as of August 2011**



The OPCRH is involved in the recruitment and placement of health professionals in underserved Missouri communities. One way to assist communities with recruitment and retention efforts is by partnering with the Missouri Primary Care Association (MPCA) to implement the PRIMO Missouri Health Professional Placement Services Program (MHPPS). MHPPS helps communities recruit and retain dedicated and caring health care providers who have expressed an interest in practicing in rural and underserved areas, and are committed to providing high-quality, accessible, primary medical, dental and mental health services. Experienced staff focuses on both the interests of the health care providers and the communities they serve. Through interviews, correspondence, data collection and management, MHPPS maintains a listing of interested health care providers and job opportunities in Missouri.

MHPPS offers a variety of services. Services include: detailed practice and community profiles; information on health professional incentive programs; and, linkages to local, state and national health care organizations. MHPPS also provides marketing of practice opportunities and referrals of qualified health care professionals, assists with developing recruitment and retention strategies, and provides information on workshops related to recruitment and retention. MHPPS simplifies the entire recruitment and retention process by allowing communities to focus on what is truly important: accessible quality health care.

The National Health Service Corp (NHSC) has been a long-time partner to OPCRH. Together, viable practice locations are identified and health professionals are recruited into the state. The OPCRH is able to provide technical assistance and insight on practice locations by using statewide needs assessments, availability of practitioners, Community Health Center new starts and expansions, and community health care system development efforts.

Through the implementation of the American Recovery and Reinvestment Act (ARRA) funding, the Missouri PCO has been able to hire and pay for two-thirds salary of one staff member to work with NHSC approved sites and assists with the loan repayment and Scholarship Programs. The PCO has been instrumental in furthering

the development of health care delivery systems in Missouri that provide high-quality, accessible care to Missourians. Currently Missouri boasts 400 NHSC clinicians (385 loan repayors and 15 scholars) and 557 approved NHSC health care delivery sites, an increase of 162 obligated NHSC providers and 95 approved sites over the previous project year.

Up to 30 additional physicians may be accepted into Missouri each year through the Conrad 30/J-1 Visa Waiver program. This program allows foreign medical graduating students to practice in HPSAs or medically underserved areas throughout the state. During fiscal years 2009 and 2010, the PCO recommended 59 placements throughout Missouri. Of these placements, 29 percent are in rural areas and 71 percent are in urban areas.



## **Emergency Medical Care Training**

Rural facilities often lack trauma or general surgeons, specialists and diagnostic tools, unlike emergency departments of urban hospitals. Transport of seriously ill patients to tertiary centers might take hours. A patient's life depends on the skill and knowledge of a health care team that may consist of only a family physician and several general care nurses.

The Office contracted with the University of Missouri - Columbia, to provide Rural Trauma Training Development courses from March 2010 to August 31, 2011, to improve the quality of care in the community by developing a timely, organized and rational response to the care of the seriously ill or injured patient. The basic premise of the course is the assumption that, in most situations, rural hospitals can provide three individuals to form the core trauma team consisting of a team leader (a physician), a nurse, and an additional individual who could be a nurse, aide, technician, pre-hospital provider or clerk. A team approach addresses the initial assessment and stabilization of the injured while improving the efficiency of resource utilization and early transfer of the most severely injured to higher levels of care. Funding for this program was provided through the Medicare Rural Hospital Flexibility grant (Flex). Five trainings were held throughout the state. Eighty-five participants received training.

Legislation was enacted in August, 2008 creating the Time Critical Diagnosis Task Force, which increased attention on timely and appropriate treatment for trauma, stroke and ST-segment elevation myocardial infarction (STEMI). Through coordination with the Department of Health and Senior Services' State Emergency Medical Services Director, three webinars assisted rural hospitals in understanding the intent of the legislation, allowed input into the process and the opportunity to ask questions.

## **Small Rural Hospital Improvement Program**

The Small Rural Hospital Improvement Program is a federally funded program that provides funding to small rural hospitals. To be eligible for funding, a hospital must have 49 or fewer staffed beds and be located outside a Metropolitan Statistical Area (urban area). The funding period of September 1, 2009 through August 31, 2010 consisted of \$418,742 which was distributed among 44 hospitals to pay for costs related to: 1) computer software and hardware focusing on quality improvement, performance improvement and patient safety; 2) education and training for hospital staff on computer information systems; and, 3) Prospective Payment Systems (PPS) implementations. Seventy-three percent of the funds were used for software and hardware purchases focusing mainly on quality improvement measures, 14 percent for PPS implementation and 13 percent for education and training.

The funding period of September 1, 2010 through August 31, 2011 consisted of \$350,200 which was distributed among 39 hospitals to pay for costs related to: 1) PPS implementation; 2) Accountable Care Organizations (ACO); 3) Payment Bundling; and, 4) Value-Based Purchasing (VBP). The majority of funds were used for purchases under the ACO category related to improving quality outcomes (76 percent), PPS implementation (17 percent), VBP (7 percent). The majority of these purchases consist of software, hardware, education and training pertaining to electronic health record implementation.

## **Network Development**

The Office encourages health care providers to develop networks around patient care and health information technology. Assistance applying for federal grants is provided when requested.

In January 2005, the Office, the Missouri Hospital Association, the Missouri Rural Health Association and Primaris (Missouri's health care facility quality improvement organization as designated by the Centers for Medicare and Medicaid Services) formed a statewide technical support and communications network for Missouri Critical Access Hospitals. The network, referred to as "CAHNet," was created to identify and deliver essential technical assistance and

services for Critical Access Hospitals (CAHs). CAHNet activities are to strengthen and sustain quality and safety by:

- Enhancing and sustaining operational efficiencies and continuity;
- Developing and implementing strategies that lead to increased organizational effectiveness;
- Engaging customers and community stakeholders in creating an effective and efficient system of care; and,
- Defining, building and participating in local and regional partnerships.

In 2009, the CAHNet expanded to include the Scotland Samaritan Putnam Rural Health Network. Meetings are held face-to-face, with telephone conferencing option available. CAHNet members are instrumental in planning the CAHNet annual conference by assisting in identifying topics and locating speakers.

## Quality Improvement

Improving quality within health care settings focuses around patient safety. Improving patient safety not only saves lives, but also impacts health care providers financially. Effective and efficient care positively impacts the cost of providing care.

- **Quality Health Indicators (QHI)**  
To further assist hospitals in tracking their performance, a web-based database specifically designed to facilitate benchmarking for small rural hospitals is available. The database, QHI, allows hospitals to enter data for pre-defined indicators on a real-time basis for a more accurate tracking of each indicator. The purpose of QHI is to provide CAH with a user-friendly instrument to evaluate internal processes and to compare their performance to similar facilities. Participants make comparisons on clinical quality measures, employee contribution, financial and operating statistics, and patient satisfaction.
- **Medicare Beneficiary Quality Improvement Project (MBQIP)**

MBQIP's goal is for CAHs to implement quality improvement initiatives to improve their patient care and operations. Through MBQIP, the state Flex program supports CAHs with technical assistance to improve health care outcomes on measures included in Hospital Compare and other national benchmarks. Hospital Compare, created through the efforts of the CMS, along with the Hospital Quality Alliance, is a consumer-oriented website that provides information on how well hospitals provide recommended care to their patients being treated for a heart attack, heart failure, pneumonia, asthma (children only) or having surgery. Participating CAHs will report on a specific set of annual measures and engage in quality improvement projects to benefit patient care. To facilitate the use of Hospital Compare reporting to improve quality, the Federal Office of Rural Health Policy (ORHP) will be analyzing the data in each of the phases for reporting back to the State Flex programs and CAHs. By providing consent, CAHs allow ORHP access to all the non-beneficiary level data that is submitted to Hospital Compare and will ensure thorough and timely analysis and feedback of the results. Technical assistance is provided through webinars, on-site meetings and regional meetings to assist hospitals in understanding the data and implementing best practices.

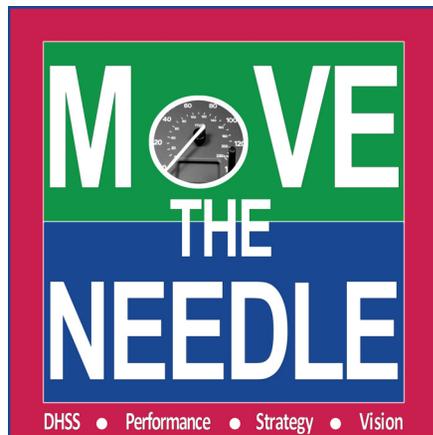
- **Partnership for Patients**  
Hospitals are encouraged to sign the pledge for the Partnership for Patients: Better Care, Lower Costs, a new public-private partnership that will help improve the quality, safety and affordability of health care for all Americans. The Partnership for Patients brings together leaders of major hospitals, employers, physicians, nurses and patient advocates, along with state and federal governments, in a shared effort to make hospital care safer, more reliable and less costly. Two goals of this new partnership are to keep patients from getting injured or sicker and help patients heal without complication. Participants in the Partnership for Patients pledge to join in a shared effort to save thousands of lives, stop millions of injuries and take important steps toward a more dependable and affordable health care system.

- **TruServe**

A main component of the State Office of Rural Health grant is to track the technical assistance provided. Through the National Organization of State Offices of Rural Health, the Office is able to utilize TruServe, a web-based activity tracking system that allows users to add, update and report activities and their impacts using a series of easy to use forms. Information within TruServe can be used to provide detailed and accurate reports for staff, the organization, funders, decision makers, legislators and others. TruServe effectively tracks activities and associates them with other variables such as time, budget, specific program goals, level of assistance, location of customers, staff and much more. Reports can be saved and shared with others and include impressive maps. Graphs can be generated showing activities over time or types of partner organizations.

- **Move the Needle**

The Department of Health and Senior Services (DHSS) has developed a quality improvement process called Move the Needle. The goal of the Move the Needle Initiative is to instill continuous quality improvement in the department's strategic direction and day-to-day operations. Staff is encouraged to share ideas for improving the efficiency and effectiveness of DHSS.



## Clearinghouse and Information Dissemination

A primary function within the Office is to facilitate the collection and dissemination of information to rural areas.

- The *Rural Spotlight* is a quarterly publication containing health related information, healthy eating recipes and safety tips. Articles also provide information directing the reader on how to locate additional information. Hard copies of the newsletters are mailed to 4,000 rural day care providers, hospice, home health agencies, long-term care providers, hospitals, rural health clinics, fire departments, ambulance districts, local public health agencies and contractors of the OPCRH. A survey is being conducted to obtain input on future articles and customer satisfaction.
- The Office continues to maintain a web-based resource directory, [health.mo.gov/living/families/ruralhealth/blog/](http://health.mo.gov/living/families/ruralhealth/blog/) for rural hospitals and health care providers. This website provides a one-stop place for an up-to-date calendar of events and the latest health reports, legislation, regulations and funding opportunities.
- In coordination with universities, DHSS staff and other health care partners, webinars are hosted for rural health care providers and administrators on topics such as programmatic changes, professional educational opportunities or recruitment and retention opportunities.

Electronic copies of the Rural Spotlight newsletter are available at [health.mo.gov/living/families/ruralhealth/publications.php](http://health.mo.gov/living/families/ruralhealth/publications.php).



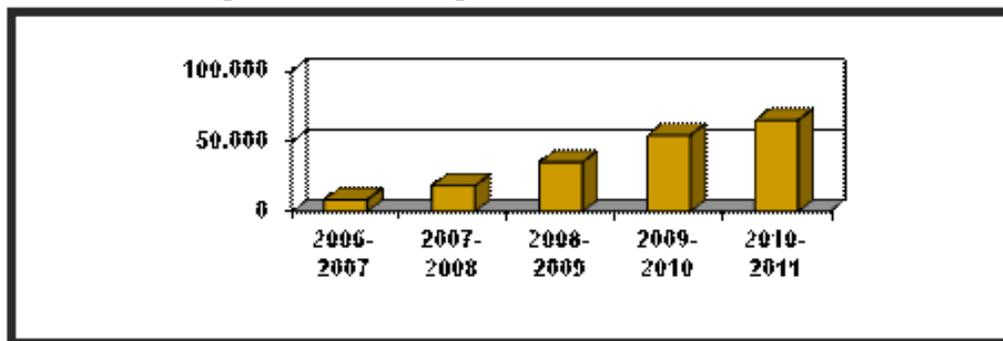
## Oral Health

The Oral Health Program located within the OPCRH, focuses on monitoring and reducing oral health disease among Missouri citizens and provides a broad range of core public oral health services. Preventive and clinical efforts include the Preventive Services Program (PSP), the Community Water Fluoridation Program, the Donated Dental Services Program and oral health education and outreach.

PSP was implemented in 2005 in response to findings from a 2004-2005 surveillance project. This surveillance project was conducted to document the oral health of Missouri's third and sixth grade children. The findings reflected the growing dental need of children, revealing the percentage of children with untreated dental decay rose from 22 percent in 2000 to 24 percent in 2005. More information regarding the survey and survey results is available at [health.mo.gov/living/families/oralhealth/oralhealthsurv.php](http://health.mo.gov/living/families/oralhealth/oralhealthsurv.php).

PSP includes oral health screenings, oral health education with dental hygiene materials (such as toothbrushes, toothpaste and dental floss), fluoride varnish applications and referrals. PSP is available to children attending Early Childhood Learning Centers, Early Head Start, Head Start, elementary and secondary schools including schools, for the developmentally disabled. Since 2005, the number of children and communities participating in PSP has steadily grown with 64,657 children receiving the benefits of the program in 2010-2011, as reflected in the following graph.

**Graph 1: PSP Participants for the Past Three Years**



This program has grown as a result of communities interested in improving the oral health of its children. The DHSS' Oral Health Consultants (dental hygienists) assist the communities in implementing PSP by providing guidance, training and supplies as well as making presentations to community meetings and associations. The participation of oral health professionals, schools and volunteers is key to making PSP active in a community. More information regarding PSP can be found at [health.mo.gov/living/families/oralhealth/index.php](http://health.mo.gov/living/families/oralhealth/index.php).

The most recent data collected as part of PSP's surveillance component indicate 6 percent of Missouri's children have urgent dental treatment needs. Urgent care is defined as a child with

pain or acute infection so severe he or she is unable to play or concentrate at school. Furthermore, a trend in the descriptive data indicates between 9 and 10 percent of Missouri's children can be described as having had rampant decay (seven or more areas of treated or untreated decay). Table 1 displays some of the statistics obtained through PSP.

PSP surveillance data reveals the oral hygiene status of the children screened. In 2010-2011, 81 percent presented with satisfactory oral hygiene. Satisfactory is defined as teeth displaying no obvious signs of debris. The remaining 19 percent of the PSP participants were evaluated as having unsatisfactory oral hygiene care. This emphasizes the value of the oral health education component of PSP.

**Table 1: Descriptive PSP Statistics for Treated, Untreated and Rampant Decay**

Condition	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Treated Decay	26.5 percent (n=8,198)	29.6 percent (n=18,538)	32 percent (n=34,798)	33 percent (n=53,498)	35 percent (n=64,051)
Untreated Decay	33.3 percent (n=8,230)	31.3 percent (n=18,590)	29 percent (n=34,820)	28 percent (n=53,775)	27 percent (n=64,368)
History of Rampant Decay (7 or more areas of treated or untreated decay)	10 percent (n=8,191)	10.5 percent (n=18,554)	9 percent (n=34,534)	10 percent (n=52,477)	10 percent (n=64,145)

*Note: These numbers are meant for descriptive information only and cannot be used in comparison of one year to the next. However, general trends can be assumed.*

# Future Action and Next Steps

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The Office has identified additional areas of concentration for the future. Much of past programming will continue, with an increased focus on measurable health outcomes. The identified areas of concentration include: Statewide Planning and Evaluation; Quality Improvement Activities; Network Development; Outreach and Emergency Medical Services Enhancement.

## **Statewide Planning and Evaluation**

A three-year Rural Health Plan was developed to assist in the planning and evaluation of rural health care. Missourians gave their input in 15 town hall meetings in Lexington, Joplin, Kirksville, Potosi, Fulton, Portageville, Louisiana, Kennett, Dexter, West Plains, Bolivar, Hollister, Milan, Memphis and Versailles. Activities of the plan will be implemented and monitored to improve health outcomes of rural Missourians.

## **Quality Improvement**

Quality and performance improvement programming will continue to be an emphasis for all activities. The Office will participate in the National Organization of State Offices of Rural Health's Web-based tool, TruServe, to track technical assistance. Hospitals will be encouraged to participate in the MBQIP and Partnership for Patients projects, Quality Health Indicators and other quality improvement initiatives.

## **Network Development**

Networking within and among rural communities holds the key to improving and sustaining health care outcomes as the need for health care services increases in rural Missouri while the total amount of resources available holds constant. The Office will partner with communities for the expansion of community-level network activities and participants. This expansion is a key element

to increasing opportunities for communities to share technical and financial resources.

## **Outreach**

Outreach activities are targeted to health care associations, organizations, federally qualified health centers and rural hospitals to increase access to care. The Office will increase outreach activities to certified rural health clinics (RHCs), which are vital health care providers in rural areas. Activities will be identified through collaboration with the Missouri Association of Rural Health Clinics and DHSS' Bureau of Health Services Regulation.

## **Emergency Medical Services Enhancement**

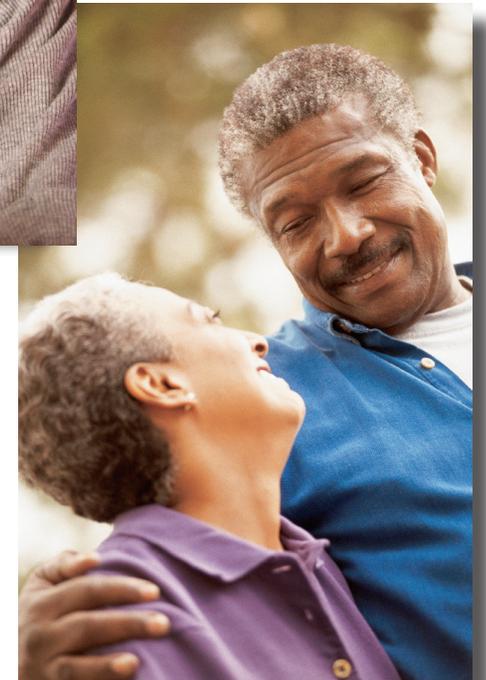
Emergency medical services will continue to be a priority for the Office. The Office is partnering with DHSS' State Emergency Medical Services Director to identify and provide appropriate rural emergency medical training. The Time Critical Diagnosis Task Force was created by legislation in 2008, to increase attention and focus on timely and appropriate treatment for trauma, stroke and ST-segment elevation myocardial infarction (STEMI).

# Conclusion

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The health care workforce shortage is as real in Missouri as it is nationally. Workforce issues permeate the health care system, affecting providers, patients, insurers and communities at large. The shortage problems are more prominent in rural areas due to the aging workforce population; lack of educational and training opportunities; difficulty in recruitment and retention of workers; high turnover and vacancy rates; lack of opportunities for career advancement; and/or, increased work load demand. Health resources, essential elements in the prevention and treatment of disease and health conditions, are scarcities in most rural communities. Small rural towns may lack the critical population mass or income to support full-time physicians or dentists, and other health care professionals. Impacting the health care workforce shortage will require fundamental changes in medical education; increasing compensation to attract more doctors into primary care; decreasing the debts incurred by medical students through the NHSC and State Loan Repayment Program; and, expanding the role of community health centers.

DHSS' OPCRH will continue to provide resources to community organizations, facilities and individuals in order to improve operational efficiencies, program effectiveness and health outcomes in rural Missouri. The Office also welcomes input and the opportunities to work with federal, state and local partners to expand and improve office operations and goals, in order to assure optimal impact for the populations served.



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