



# ealth

## *in Rural Missouri*

Missouri Department of Health and Senior Services  
Office of Primary Care and Rural Health  
Biennial Report



# Health in Rural Missouri

*Health in Rural Missouri* is produced by the Office of Primary Care and Rural Health, Department of Health and Senior Services.

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# EXECUTIVE SUMMARY<sup>1</sup>

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The Missouri Office of Rural Health (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...” Located within the Missouri Department of Health and Senior Services’ Office of Primary Care and Rural Health, the Office reports on current activities and makes recommendations to the Missouri Governor and General Assembly every two years. This report also provides an analysis of the current health of rural Missourians to support those activities and recommendations.

Of the over 6,000,000 residents of Missouri, 2.23 million, or 37 percent, are considered rural.<sup>1</sup> Since 2003, rural areas overall have experienced a 5.9 percent increase in residents; however, this increase is very uneven. Over this time period, 14 rural counties in northern Missouri had population losses of greater than 5 percent, while some rural counties adjacent to urban counties experienced population increases greater than 10 percent.

In terms of socioeconomic, rural Missourians are at a significant disadvantage compared to their urban counterparts when considering income and education. Missouri’s rural poverty rate (18.4 percent) is 27.8 percent higher than its urban poverty rate (14.4 percent). Fourteen Missouri counties are considered to be persistently poor, 13 of those counties being rural, according to the U.S. Department of Agriculture’s Economic Research Service’s definition. U.S. Census Bureau data indicate that rural Missourians are also approximately half as likely to hold a college degree as urban Missourians (16 percent for rural versus 32 percent for urban).

An analysis of standard markers of health status, reveals that rural Missourians are overall less healthy than their urban counterparts and more likely to die at an earlier age. The 2004-2012 average life expectancy for rural areas was 76.8 years compared to 77.8 years for urban areas. The rural death rate for all causes during 2013 was 854.0 deaths per 100,000 residents, while in urban areas this rate was more than 10 percent lower, at 773.6 deaths per 100,000. Additionally, for all of the 10 leading causes of death, rural rates are higher than urban

rates. Emergency room (ER) visit rates were also statistically significantly higher for rural residents than urban residents. The rural ER visit rate is 396.4 per 1,000 residents, which is 7.7 percent higher than the urban rate of 368. In contrast, the *2012-2013 Health in Rural Missouri Biennial Report* found that urban residents tend to have significantly higher inpatient hospitalization rates.

Maternal, infant and child health indicators can also be used to measure the health status of a community as seen in this report. The rural teenage pregnancy rate of 43.9 per 1,000 female residents ages 15-19 is statistically significantly higher than the urban teenage pregnancy rate of 40.2. Higher rates of rural mothers reported that they smoked during pregnancy than urban mothers.

Rural Missourians continue to demonstrate increased levels of health risk factors which affect many of the health conditions discussed in this report. Compared to urban residents, rural residents report significantly higher rates of smoking (25.1 percent versus 18.7 percent), lower levels of physical activity (29.5 percent report no leisure-time physical activity versus

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<sup>1</sup>All data contained in this executive summary are cited in the body of the report.

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23.0 percent), increased rates of obesity (32.5 percent versus 29.8 percent). Rural residents are less likely to wear their seat belts (70.4 percent estimated to always use their seatbelt compared to 82.9 percent of urban residents), and have lower rates of preventive screenings such as mammograms and colonoscopies.

Health care resources in rural Missouri are limited, even for those who have health insurance, have no financial difficulty, and have access to transportation. Of the 167 licensed hospitals in Missouri, 76 (45 percent) are located in rural areas. Of those 76 hospitals, nearly half (37) are Critical Access Hospitals, which have 25 beds or less and provide a limited scope of service. As regards access to primary health care services, the vast majority of rural counties are designated as Health Professional Shortage Areas (HPSAs). Of the 101 rural counties, 98 are Primary Medical HPSAs, 98 are Primary Care Mental HPSAs and 92 are Dental HPSAs.

Overall, this report highlights significant progress in the improvement of the health of rural Missourians over the past 10 years; however, it continues to highlight the significant inequality between rural and urban Missourians. Rural Missourians as a whole display a lower level of income, education, healthy behaviors and access to health care services, which in turn lead to decreases in health status and life expectancy. The Office continues to recommend a holistic approach to improving and equalizing health in Missouri which addresses socioeconomic factors, health behaviors and access to health care services.



# INTRODUCTION

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The Missouri Office of Rural Health (hereinafter referred to as 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...” Located within the Department of Health and Senior Services, Office of Primary Care and Rural Health (OPCRH), the Office reports on current activities and makes recommendations to the Missouri Governor and General Assembly every two years.

In order to contextualize the activities and recommendations of the Office, this report includes an analysis of the health of rural Missourians, as well as a Missouri definition of “rural.” The report covers five specific areas:

- Demographic and Socioeconomic Indicators
- Health Status
- Maternal, Infant and Child Health
- Health Behaviors/Risk Factors
- Health Care Resources

Throughout the report a dichotomy between rural and urban is utilized. This serves two

purposes. First, it allows for a natural, readily understandable comparison to better highlight and understand health in rural Missouri. Second, it presents compelling evidence that geographic location in Missouri has a significant bearing on health.

It should be noted that the health of both rural and urban Missourians, in general, have improved, and is improving, when compared to any point in the past. However, significant inequity in health between rural and urban Missourians persists with evidence of little change over time.

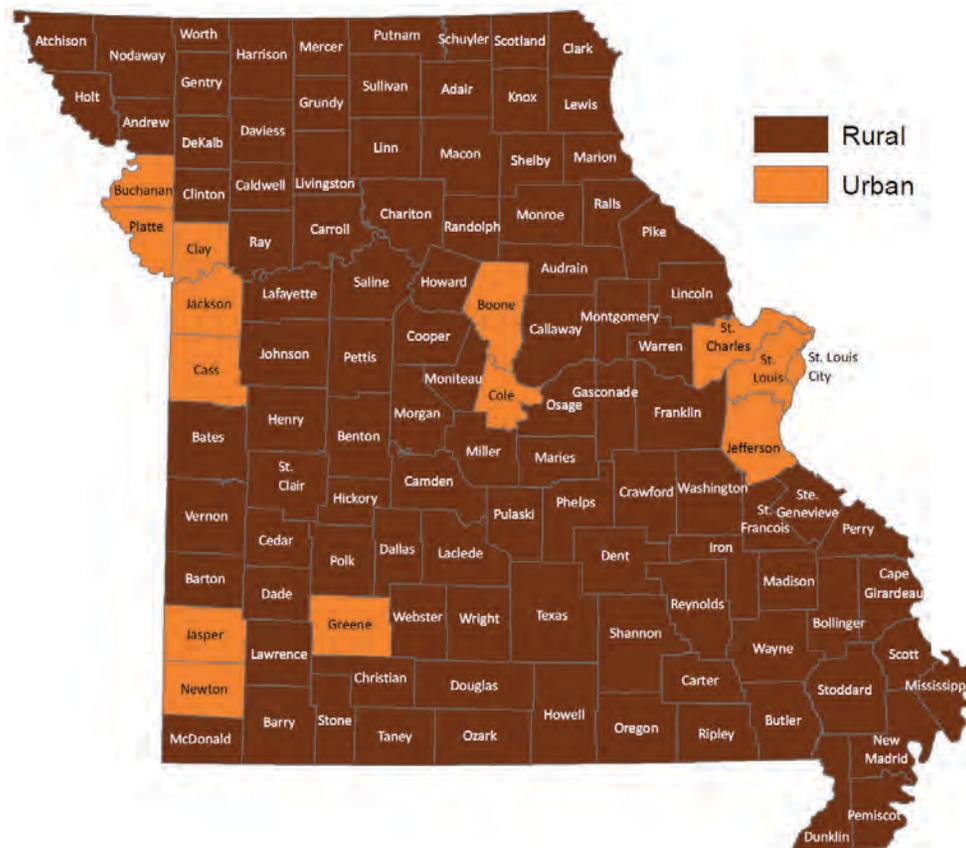


# DEFINING RURAL MISSOURI

The U.S. 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 residents. This report defines urban counties as those with a 2013 population density of greater than 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.<sup>2</sup> The remaining 101 counties in Missouri are rural.

The following map illustrates the rural and urban counties in Missouri.

**2014-2015 Health in Rural Missouri Biennial Report**  
**Rural/Urban County Classification**



Developed by the Bureau of Health Care Analysis and Data Dissemination using 2013 population estimates from the National Center for Health Statistics

<sup>2</sup>St. Louis City is an independent city which functions as its own county. It is therefore included as one of the 14 urban counties.

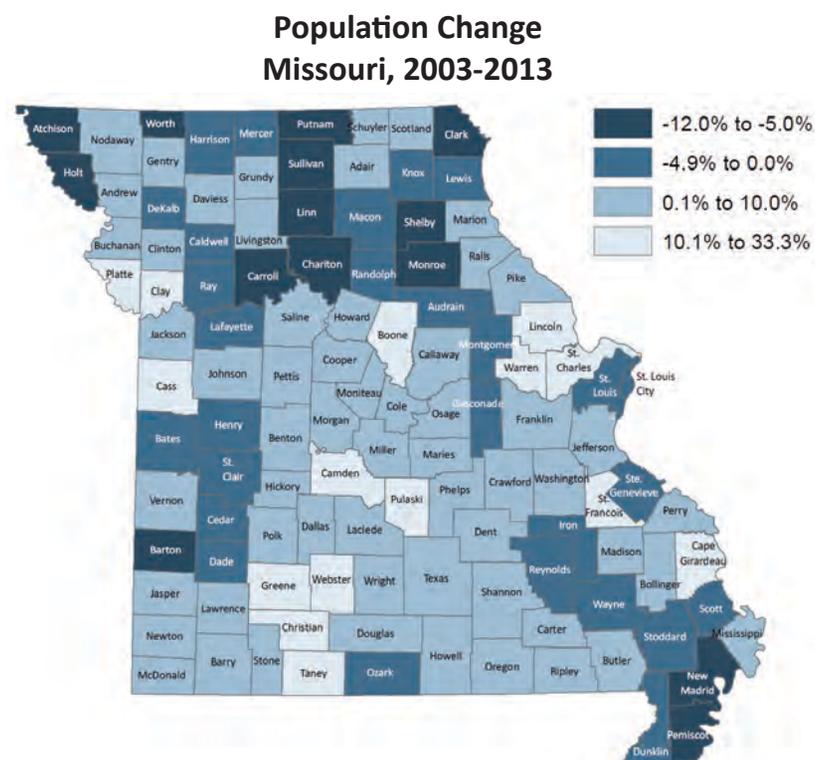
# DEMOGRAPHIC AND SOCIOECONOMIC INDICATORS

## Population<sup>3,4</sup>

The U.S. Census Bureau estimates the 2013 Missouri resident population to be 6,044,171. Most of Missouri's population resides in counties designated by this report as urban. The resident population for these counties is estimated to be 3.82 million. Only 2.23 million people, or 36.9 percent of the state's total population, live in counties designated as rural. The 2013 Missouri population estimate represents a 5.9 percent increase over the 2003 estimate. In comparison, the U.S. population growth between 2003 and 2013 was larger at 9.0 percent.

Within Missouri, population growth during these years was not evenly distributed between rural and urban areas. The rural population increased by 5.5 percent between 2003 and 2013, while the urban population increased by 6.1 percent during this time period. Furthermore, the 5.5 percent rural growth was not distributed equally across all rural counties. Some rural counties experienced population increases of greater than 10 percent. These counties are distributed across the state, but most could be described as adjacent to urban counties or part of the suburban fringe. Exceptions to this characterization are Camden and Taney counties (both popular retirement areas) and Pulaski County, where the Fort Leonard Wood military base plays a large role in the county's population fluctuations.

On the other hand, a large number of rural counties experienced a population decrease. Of the 101 rural Missouri counties, 40 (39.6 percent) lost population between 2003 and 2013. (In contrast, only 2 of the 14 urban counties, St. Louis City and St. Louis County, experienced population losses during the same time period.) Statewide, 14 counties lost at least 5 percent of their population. All of these 14 counties are rural, with 11 located north of the Missouri River. Atchison and Holt, two small rural counties in the extreme northwest corner of the state, sustained population losses of more than 10 percent.



Developed by the Bureau of Health Care Analysis and Data Dissemination using population estimates from the National Center for Health Statistics

<sup>3</sup>All Missouri population figures included in this report were obtained from: National Center for Health Statistics. *Vintage 2013 Postcensal Estimates of the Resident Population of the United States (April 1, 2010, July 1, 2010-July 1, 2013), by Year, County, Single-year of Age (0, 1, 2, ..., 85 Years and Over), Bridged Race, Hispanic Origin, and Sex*. Prepared under a collaborative arrangement with the U.S. Census Bureau. Available from [http://www.cdc.gov/NCHS/nvss/bridged\\_race.htm](http://www.cdc.gov/NCHS/nvss/bridged_race.htm) as of June 30, 2015, following release by the U.S. Census Bureau of the Unabridged Vintage 2013 Postcensal Estimates by 5-Year Age Group on June 26, 2014. Accessed July 22, 2015.

<sup>4</sup>All U.S. population figures included in this report were obtained from: U.S. Census Bureau. Historical Data. Population Estimates. Accessed July 22, 2015, from <http://www.census.gov/popest/data/historical/index.html>.

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## Natural Increase

Natural increase is commonly used to track population trends. This value is calculated by subtracting the number of deaths in a geography from the number of births. If a location has more births than deaths, it will have a positive natural increase, which indicates population growth. Conversely, if a geography has more deaths than births, it will have a negative natural increase (natural decrease), which indicates population loss. The overall Missouri natural increase during the 2011-2013

time period was 58,075. Over 84 percent of this natural increase occurred in urban counties, and all urban counties experienced a natural increase. However, during this same time period, 44 rural counties experienced a natural decrease.

An alternative way of analyzing natural increase is to calculate the ratio between births and deaths. A ratio above 1.00 indicates that more births than deaths occurred. The Missouri

urban birth-death ratio for 2011-2013 was 1.50 compared to only 1.13 for rural counties. If this pattern continues, rural areas will need large positive migration totals in order to keep pace with the growth in urban areas.

**Natural Increase, 2011-2013**

	<b>Births</b>	<b>Deaths</b>	<b>Natural Increase</b>	<b>Number of Births for Every 1 Death</b>
<b>Missouri</b>	<b>226,713</b>	<b>168,638</b>	<b>58,075</b>	<b>1.34</b>
<b>Rural Missouri</b>	<b>80,225</b>	<b>71,113</b>	<b>9,142</b>	<b>1.13</b>
<b>Urban Missouri</b>	<b>146,458</b>	<b>97,521</b>	<b>48,937</b>	<b>1.50</b>

Source: Missouri Vital Statistics

## Gender and Age

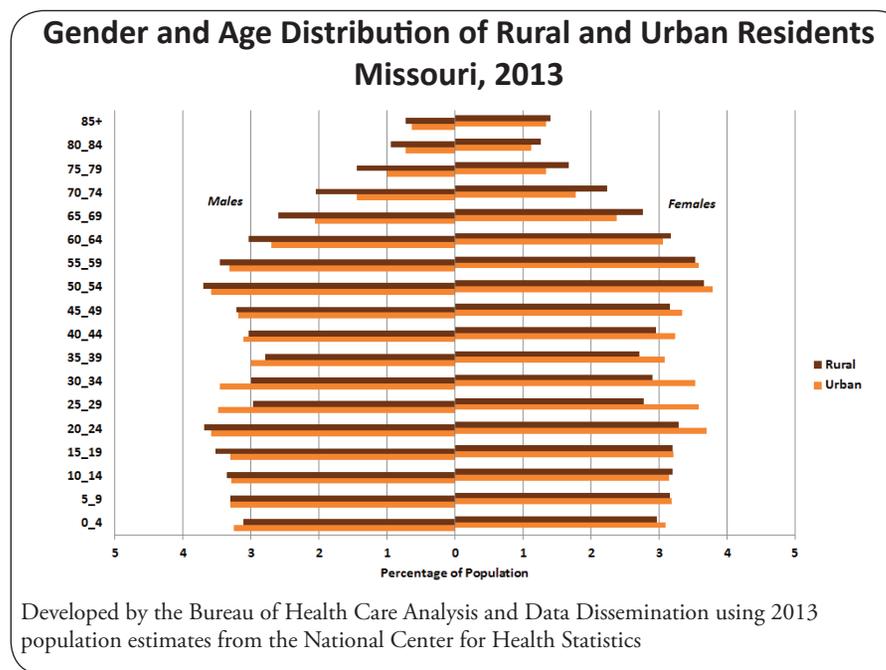
The 2013 population pyramid for Missouri's rural and urban areas illustrates the distribution of residents by gender and age group. The overall Missouri population contains slightly more females than males (51.0 percent versus 49.0 percent, respectively). The rural population is evenly divided between the two genders, but females outnumber males in urban areas, making up 51.5 versus 48.5 percent of residents, respectively. The Missouri population pyramid also reveals that older age groups comprise a larger percentage of the population in rural areas compared to urban areas.

In both rural and urban areas, males tend to outnumber females in the younger age groups. (The male-female ratio in the "Under 15" category is 1.05 for rural residents and 1.04 for urban residents.) In rural areas, male-female ratios are highest among the 15-19 and 20-24 age groups at 1.10 and 1.11, respectively. Research in Missouri's neighboring states of Kansas and Nebraska discovered similar trends in rural areas, finding that "the proportion of young men increased by an average of nearly 40 percent as people went from their teens to their 20s." This was particularly true in extremely rural communities with less than 800 residents. Possible reasons for this gender disparity may involve females leaving rural areas to pursue

higher education in urban centers or fewer job opportunities in rural communities for women.<sup>5</sup> The overall rural male-female ratios for Missouri young adults are not as extreme as those cited in the Kansas and Nebraska study, and after age 25, the Missouri male-female ratio in rural areas narrows considerably.

In rural parts of the state, females outnumber males in all of the oldest age groups, beginning at age 55. In urban areas, females begin to

outnumber males much earlier, beginning at age 20. This earlier gender shift in urban populations may be due to an influx of rural females seeking higher education and job opportunities, as previously discussed. The female-male ratio increases dramatically with age. In urban areas, the female-male ratio for the 85 and over age group is 2.10, meaning that there are more than two females for every one male. The rural ratio of 1.93 is only slightly lower.



<sup>5</sup>Reed, L. (May 15, 2014). Young Men Increasingly Outnumber Young Women in Rural Great Plains. *University of Nebraska – Lincoln News Releases*. Accessed September 1, 2015, from <http://newsroom.unl.edu/releases/2014/05/15/Young+men+increasingly+outnumber+young+women+in+rural+Great+Plains>.

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## *Racial/Ethnic Diversity<sup>6</sup>*

The urban counties of Missouri are more racially and ethnically diverse than the rural counties. One-quarter (25 percent) of urban county residents are members of minority populations; in contrast, less than one out of every ten rural residents (only 8 percent) is a member of a minority population.

Black/Non-Hispanics comprise the largest minority group in both rural and urban areas of Missouri. However, in urban areas Black/Non-Hispanics represent 17 percent of the total population, while only 4 percent of the rural population is Black/Non-Hispanic. The largest rural clusters of Black/Non-Hispanic residents are found in the Bootheel area of southeast Missouri. In three Bootheel counties (Pemiscot, Mississippi and New Madrid), Black/Non-Hispanics make up more than 15 percent of the total population (27.2 percent, 24.8 percent and 16.3 percent, respectively).

The percentage of Missouri's population that is Hispanic is relatively small, especially when compared to the overall U.S., where nearly 17 percent of the population is estimated to be Hispanic. Hispanics compose 3 percent of Missouri's rural population and 4 percent of Missouri's urban population. However, Hispanics are more evenly dispersed across all counties than Black/Non-Hispanics. While 31 of Missouri's 115 counties have fewer than 100 Black/Non-Hispanic residents, only 15 counties have fewer than 100 Hispanic residents. The largest rural Hispanic populations are geographically dispersed. The three counties with the highest Hispanic percentages are spread across the Northeast (Sullivan County, 18.2 percent), Southwest (McDonald County, 11.5 percent) and Central (Pulaski County, 10.4 percent) Behavioral Risk Factor Surveillance System (BRFSS) regions.<sup>7</sup>



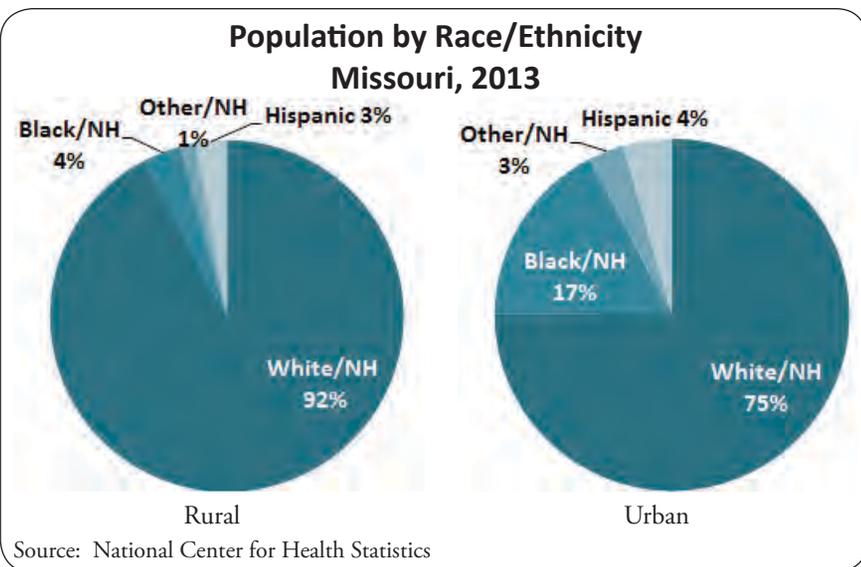
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<sup>6</sup>Throughout this section, the term “Hispanic” is used for brevity, but residents who identify as “Latino” are also included in this ethnic category.

<sup>7</sup>See the Glossary for a description of the BRFSS and a map of the BRFSS regions, which are referenced frequently in this report.

All other Non-Hispanic racial groups (which include American Indians, Asians, Native Alaskans and Native Hawaiians, among others) together represent 1 percent of Missouri’s rural population and 3 percent of Missouri’s urban population.

Some of the challenges related to Missouri’s racial and ethnic diversity are particularly apparent in rural areas of the state. As an example, roughly 1 percent of Missouri residents are estimated to have limited English proficiency. While several of the highest rates are found in metropolitan counties, rural areas of the state are impacted by this issue as well. Fifteen rural counties have limited English proficiency rates that are higher than the state average. In Sullivan County, which has the highest rate of any county in the state, over 6 percent of the population is not proficient in English.<sup>8</sup> Language and other differences may impact the ability of rural communities to provide appropriate health care and other services to all residents.



<sup>8</sup>University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation. (2015). Missouri: % Not Proficient in English. *County Health Rankings and Roadmaps*. Accessed September 1, 2015, from <http://www.countyhealthrankings.org/app/#!/missouri/2015/measure/additional/59/data>.

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## *Income and Poverty*

Socioeconomic factors, such as poverty and unemployment, are directly and indirectly linked to the health of individuals, communities and regions.<sup>9,10,11</sup> Low income and poverty limit a person's ability to pay for a variety of goods and services related to health, such as doctor visits, healthy foods and medications.

Per capita income (or income per person) can be used to measure relative wealth. The 2013 average per capita income of Missouri's rural counties (\$33,936) is 23.8 percent less than that of urban counties (\$44,563).<sup>12</sup> This income disparity has decreased since 2010, when the average per capita income of rural residents was 26.6 percent less than that of their urban counterparts.<sup>13</sup>



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<sup>9</sup>Murray, S. (March 28, 2006). Poverty and Health. *Canadian Medical Association Journal*, 174(7), 923. Accessed September 2, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/>. doi: 10.1503/cmaj.060235

<sup>10</sup>Rice, S. (August 29, 2006). Poverty and Poor Health Are Intertwined, Experts Say. *CNN Health*. Accessed September 2, 2015, from [http://articles.cnn.com/2006-08-29/health/poverty.health\\_1\\_health-insurance-poverty-health-care?s=PM:HEALTH](http://articles.cnn.com/2006-08-29/health/poverty.health_1_health-insurance-poverty-health-care?s=PM:HEALTH).

<sup>11</sup>Strully, K.W. (May 2009). Job Loss and Health in the U.S. Labor Market. *Demography* 46(2), 221-246. Accessed September 2, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2831278/>.

<sup>12</sup>U.S. Department of Commerce, Bureau of Economic Analysis. (Last updated November 20, 2014). CA1 Personal Income Summary: Personal Income, Population, Per Capita Income. *Interactive Data*. Accessed September 2, 2015, from <http://www.bea.gov/itable/>. Per capita personal income was computed using Census Bureau midyear population estimates. Estimates reflect county population estimates available as of March 2014. All dollar estimates are in current dollars (not adjusted for inflation).

<sup>13</sup>Missouri Department of Economic Development, Missouri Economic and Research Information Center (MERIC). *2010 County Per Capita Personal Income*. Accessed September 2, 2015, from <http://www.missourieconomy.org/indicators/wages/pci10county.stm>.

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Poverty rates in rural Missouri are considerably higher than in urban Missouri, and the disparity between the two areas is growing. According to the U.S. Census Bureau, 18.4 percent of rural Missourians lived in poverty in 2013, a slight increase from the 2011 rural poverty rate of 18.0. Missouri's urban rate, on the other hand, decreased slightly, from 14.5 in 2011 to 14.4 in 2013. As a result, the 2013 rural rate is 27.8 percent higher than the 2013 urban rate.<sup>14</sup>

Three counties have 2013 poverty rates that exceed 30 percent. In other words, more than three out of every 10 residents in these counties live below the poverty level. All three of these counties, which are Mississippi (36.3 percent), Shannon (31.5 percent) and Pemiscot (31.4 percent), are rural and are located within the Southeast BRFSS Region. In contrast, only two urban counties have poverty rates exceeding even 20 percent: St. Louis City (27.2 percent) and Greene County (20.2 percent). Many of the counties with high rates are considered to

be persistently poor. The U.S. Department of Agriculture's Economic Research Service defines "counties as being persistently poor if 20 percent or more of their populations were living in poverty over the last 30 years ...". Fourteen Missouri counties are considered to be persistently poor under this definition. Only one of these counties is urban (St. Louis City); 12 of these counties are located in the Southeast BRFSS Region.<sup>15</sup>

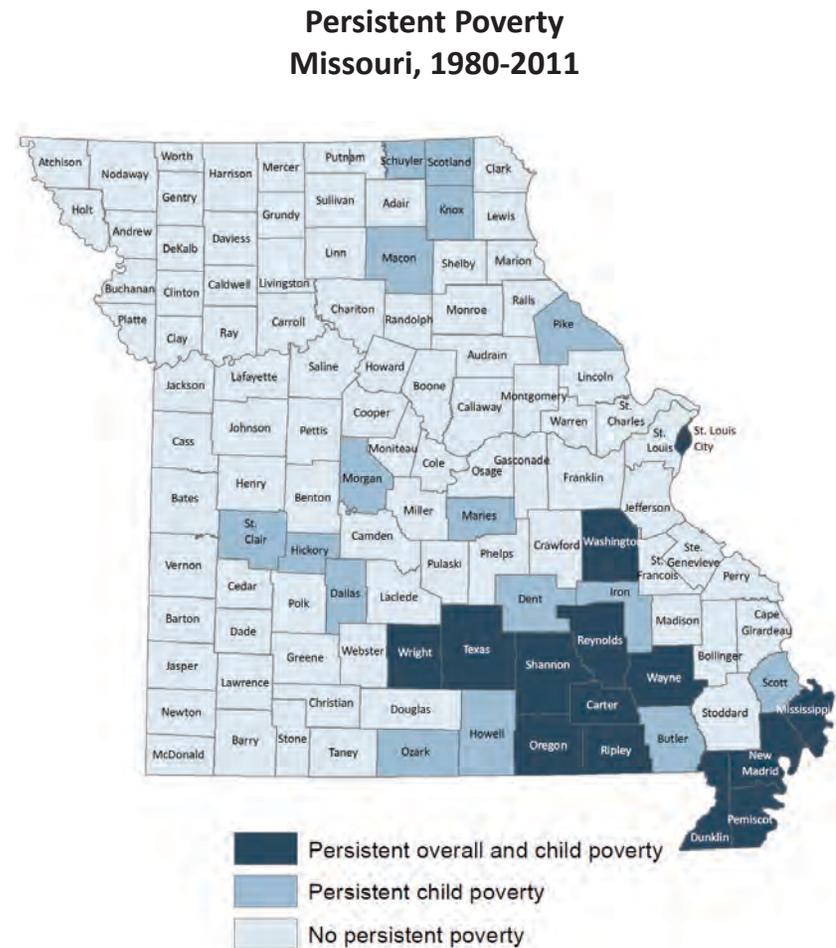
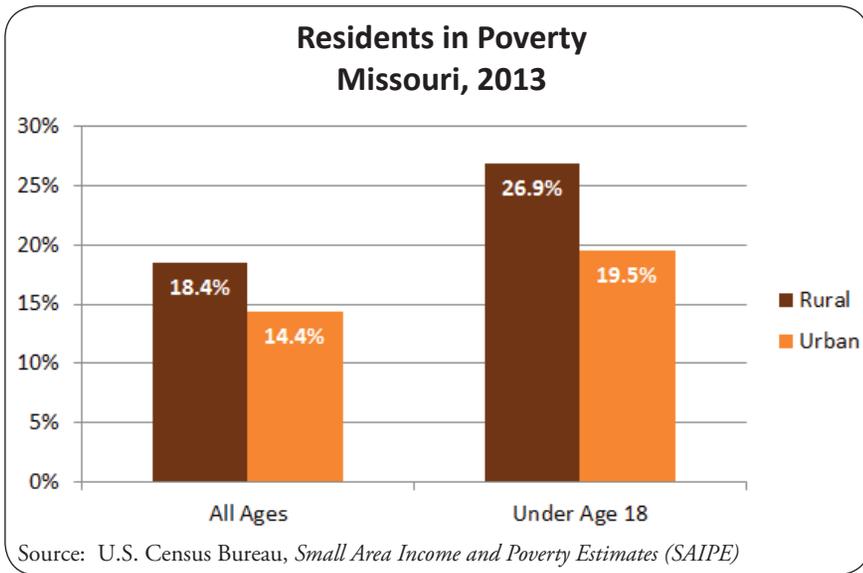
Poverty rates for residents under the age of 18 are even higher than the rates for the general population. Statewide, nearly one-quarter (22.2 percent) of youth live in poverty. The rural-urban disparity is also higher for youth than for the general population. While 2013 general poverty rates are 27.8 percent higher for rural residents than urban residents, the rural youth rate of 26.9 percent is 37.9 percent higher than the urban youth rate of 19.5 percent. (This is an increase from the 32.2 percent disparity between the 2011 rates.)



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<sup>14</sup>U.S. Census Bureau. *Small Area Income and Poverty Estimates (SAIPE)*. Accessed September 3, 2015, from <http://www.census.gov/did/www/saipe/index.html>. All poverty rates in this section were obtained from SAIPE.

<sup>15</sup>U.S. Department of Agriculture, Economic Research Service. (Last updated May 18, 2015). *Geography of Poverty. Rural Poverty & Well-being*. Accessed October 6, 2015, from <http://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty.aspx>.



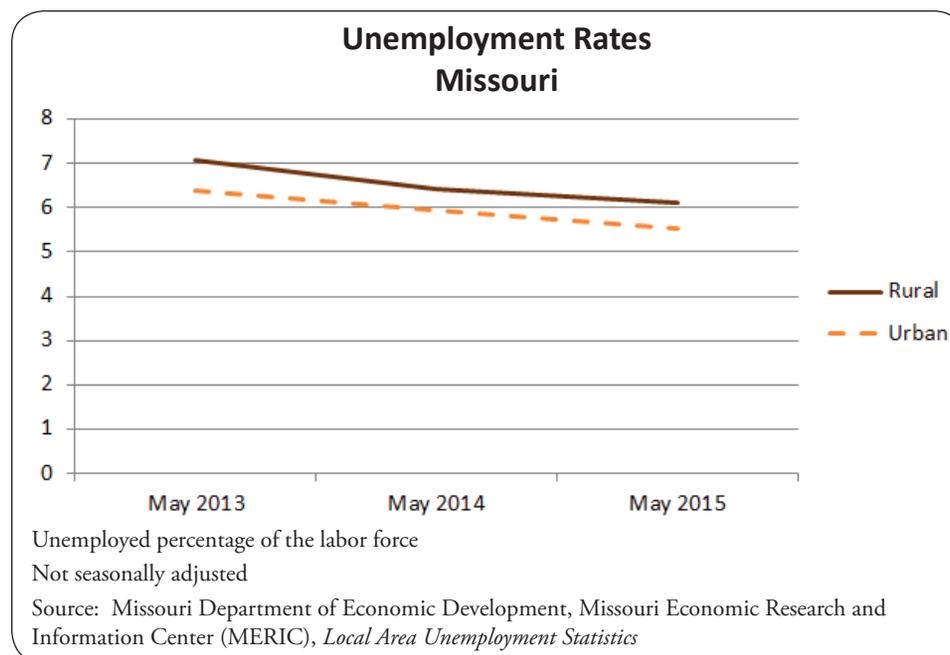
Source: U.S. Department of Agriculture, Economic Research Service

Some individual rural county rates are dramatically higher than the overall rural rate – more than half of the youth living in Mississippi and Shannon counties fall below the poverty level. The 2013 youth poverty rates in those counties are 51.6 percent and 50.1 percent, respectively. St. Louis City has the highest urban youth poverty rate at 43.1 percent. These 3 counties as well as 27 others in Missouri have experienced persistent child poverty over the past 30 years. The list of counties with persistent child poverty includes 18 of the 25 counties in the Southeast BRFSS Region. “Persistent poverty among children is of particular concern as the cumulative effect of being poor may lead to especially negative outcomes and limited opportunities that carry through to adulthood.”<sup>16</sup>

<sup>16</sup>U.S. Department of Agriculture, Economic Research Service. (Last updated May 18, 2015). Child Poverty. *Rural Poverty & Well-being*. Accessed October 6, 2015, from <http://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/child-poverty.aspx#pcpov>.

## Unemployment

Most Americans under the age of 65 obtain health insurance through an employer.<sup>17</sup> Thus, unemployment can severely limit a person's access to preventive care.<sup>18</sup> The Missouri unemployment rate decreased in recent years, from 6.6 percent of the labor force in May 2013 to 5.7 percent in May 2015.<sup>19</sup> This decrease was shared nearly equally by both rural and urban residents. The rural rate dropped from 7.1 percent in May 2013 to 6.1 percent in May 2015; the urban rate dropped from 6.4 percent to 5.5 percent. However, the disparity between rural and urban counties persisted over that time period. In both years, the May unemployment rate for rural residents was 10.9 percent higher than the urban rate.<sup>20</sup>



<sup>17</sup>Smith, J.C., and Medalia, C., U.S. Census Bureau. (September 2014). Health Insurance Coverage in the United States: 2013. *Current Population Reports P60-250*. Washington, D.C.: U.S. Government Printing Office. Accessed September 3, 2015, from <https://www.census.gov/content/dam/Census/library/publications/2014/demo/p60-250.pdf>.

<sup>18</sup>HealthyPeople.gov. (Last updated October 5, 2015). *Access to Health Services Overview*. Accessed October 5, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services>.

<sup>19</sup>Unemployment rates for May 2013 were revised following the publication of the *2012-2013 Health in Rural Missouri Biennial Report*.

<sup>20</sup>Missouri Department of Economic Development, Missouri Economic Research and Information Center (MERIC). *Local Area Unemployment Statistics*. Accessed September 2, 2015, from <https://www.missourieconomy.org/indicators/laus/index.stm>. Unemployment rates are reported per 100 residents in the labor force. The unemployment rates discussed in this section are not seasonally adjusted.

In spite of the decreases in the overall rural and urban rates, some counties continued to experience high unemployment rates in May 2015. The highest urban county rate of 7.1 percent was found in St. Louis City; 23 rural counties had unemployment rates higher than the St. Louis City rate. Of these 23 counties, 14 are located within the Southeast BRFSS Region, three are located in the Southwest Region, and two are found in the Northeast Region. The Central Region and the St. Louis Metro Region each had one rural county with an unemployment rate higher than 7.1 percent. Furthermore, all rural counties did not share in the decreases. In eight rural counties (Lewis, Madison, Mercer, Pemiscot, St. Clair, Shelby, Sullivan and Worth), the unemployment rates either did not change or actually increased between May 2013 and May 2015. In contrast, every urban county experienced at least a slight decrease in unemployment rates during the same time period.<sup>21</sup>

### Unemployment Rates Selected Rural and Urban Missouri Counties, May 2015

	Rank Rural	Rate	Rank Urban	Rate
<b>Highest</b>	1 Pemiscot County	9.9	1 St. Louis City	7.1
	2 Dunklin County	8.8	2 Jackson County	6.7
	3 Iron County	8.6	3 Jefferson County	5.6
	3 Shannon County	8.6	4 St. Louis County	5.5
<b>Lowest</b>	99 Holt County	4.5	12 Platte County	4.5
	100 Osage County	4.4	12 St. Charles County	4.5
	101 Worth County	3.6	14 Boone County	4.1

Unemployed percentage of the labor force

Not seasonally adjusted

Source: Missouri Department of Economic Development, Missouri Economic Research and Information Center (MERIC), *Local Area Unemployment Statistics*

<sup>21</sup>Missouri Department of Economic Development, Missouri Economic Research and Information Center (MERIC). *Local Area Unemployment Statistics*. Accessed September 2, 2015, from <https://www.missourieconomy.org/indicators/laus/index.stm>. Unemployment rates are reported per 100 residents in the labor force. The unemployment rates discussed in this section are not seasonally adjusted.

## Lack of Health Insurance

Health insurance status is strongly influenced by socioeconomic factors, especially employment status. Residents lacking health insurance are less likely to receive preventive health care, such as screenings for certain conditions, and are more likely to delay or go without necessary treatments.<sup>22</sup> They also have higher death rates from many chronic diseases.<sup>23</sup>

In 2013, prior to the implementation of most of the major health insurance coverage provisions of the Affordable Care Act (ACA),

rural Missourians lacked health insurance at a higher rate than urban Missourians. According to the U.S. Census Bureau's Small Area Health Insurance Estimates (SAHIE), 17.1 percent of rural Missourians under age 65 lacked health insurance compared to 14.2 percent of urban Missourians.<sup>24</sup>

Uninsured rates in 24 of the 101 rural counties exceeded 20 percent in 2013; all of the urban rates, on the other hand, fell at least slightly below 20 percent. The highest rural uninsured

rates are scattered across the state. Knox (24.9 percent) and Schuyler (23.2 percent) counties are located in the Northeast BRFSS Region, while Hickory County (23.5 percent) is found in the Southwest BRFSS Region. Ozark County (23.2 percent) is assigned to the Southeast BRFSS Region, but it is positioned in south central Missouri along the southern border of the state. The Knox County rate of 24.9 percent is nearly double the lowest rural uninsured rate of 13.2 percent reported for Andrew and Cape Girardeau counties.<sup>25</sup>

**Uninsured Rates**  
**Selected Rural and Urban Missouri Counties, 2013**

	Rank Rural	Rate	Rank Urban	Rate		
<b>Highest</b>	1	Knox County	24.9	1	Newton County	19.5
	2	Hickory County	23.5	2	St. Louis City	18.4
	3	Ozark County	23.2	3	Jackson County	17.8
	3	Schuyler County	23.2	3	Jasper County	17.8
<b>Lowest</b>	99	Pemiscot County	13.8	12	Clay County	11.8
	100	Andrew County	13.2	13	Platte County	10.3
	100	Cape Girardeau County	13.2	14	St. Charles County	9.7

Percentage of Missouri residents under age 65  
Source: U.S. Census Bureau, *Small Area Health Insurance Estimates (SAHIE)*

<sup>22</sup>HealthyPeople.gov. (Last updated October 5, 2015). *Access to Health Services Overview*. Accessed October 5, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services>.

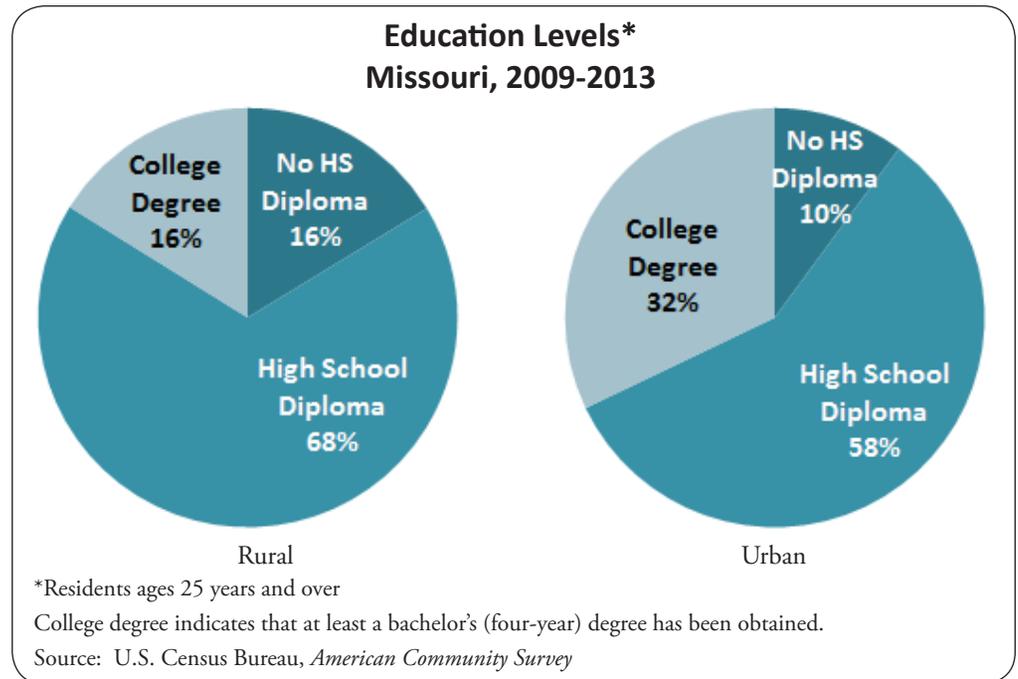
<sup>23</sup>Brooks, E.L., Preis, S.R., Hwang, S., Murabito, J.M., Benjamin, E.J., Kelly-Hayes, M., ... and Levy, D. (August 2010). Health Insurance and Cardiovascular Disease Risk Factors. *American Journal of Medicine* 123(8), 741-747. Accessed September 3, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2913281/>.

<sup>24</sup>U.S. Census Bureau. *Small Area Health Insurance Estimates (SAHIE)*. Accessed September 3, 2015, from <http://www.census.gov/did/www/sahie/index.html>.

<sup>25</sup>U.S. Census Bureau. *Small Area Health Insurance Estimates (SAHIE)*. Accessed September 3, 2015, from <http://www.census.gov/did/www/sahie/index.html>.

## Lack of Education

Lack of education is associated with poorer health status. Research shows that persons with lower levels of education experience higher “mortality, smoking, drug abuse,” accident and certain disease rates, even after controlling for other social and economic factors.<sup>26</sup> Rural Missouri residents ages 25 years and over have lower levels of education, on average, than urban Missourians. According to the U.S. Census Bureau’s *American Community Survey*, the percentage of rural Missourians with at least a bachelor’s (four-year) degree is half that of urban Missourians (16 percent of rural residents versus 32 percent of urban residents). Rural Missourians are also more likely to lack even a high school diploma or equivalent credential than urban Missourians; 16 percent of rural Missourians have not completed high school compared to only 10 percent of urban Missourians.<sup>27</sup>



<sup>26</sup>Baker, D.P., Leon, L., Smith Greenaway, E.G., Collins, J., and Movit, M. (June 2011). The Education Effect on Population Health: A Reassessment. *Population and Development Review* 37(2), 307-332. Accessed September 3, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3188849/>.

<sup>27</sup>U.S. Census Bureau. Table B15002. *2009-2013 American Community Survey 5-Year Estimates*. Accessed September 3, 2015, from American FactFinder at <http://factfinder2.census.gov>.

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## Crime

“Crime victimization is associated with myriad physical and psychological health problems, resulting in widespread treatment needs and substantial costs to both the victim and society.”<sup>28</sup> Research into the economic impact of crime suggests that a single crime costs thousands of dollars to the victim and society, with costs increasing for more violent crimes. For example, each aggravated assault occurring in the U.S. in 2008 was estimated to result in tangible costs (such as victims’ medical expenses and lost wages and criminal justice system expenses) of \$19,472. Such figures also include estimates of costs related to the perpetrators of crimes, which involve opportunity costs for both the criminal and society when crime is pursued rather than more productive activities, as well as service costs for incarcerated prisoners.<sup>29</sup> For example, treating persons with mental disorders within the criminal justice system is expensive. According to a 2013 study of adults with either schizophrenia or bipolar disorder who were receiving services from the Connecticut Department of Mental Health and Addiction Services, individuals who were involved with the criminal justice system had treatment costs that were nearly twice as high as those of individuals without any justice system involvement.<sup>30</sup>



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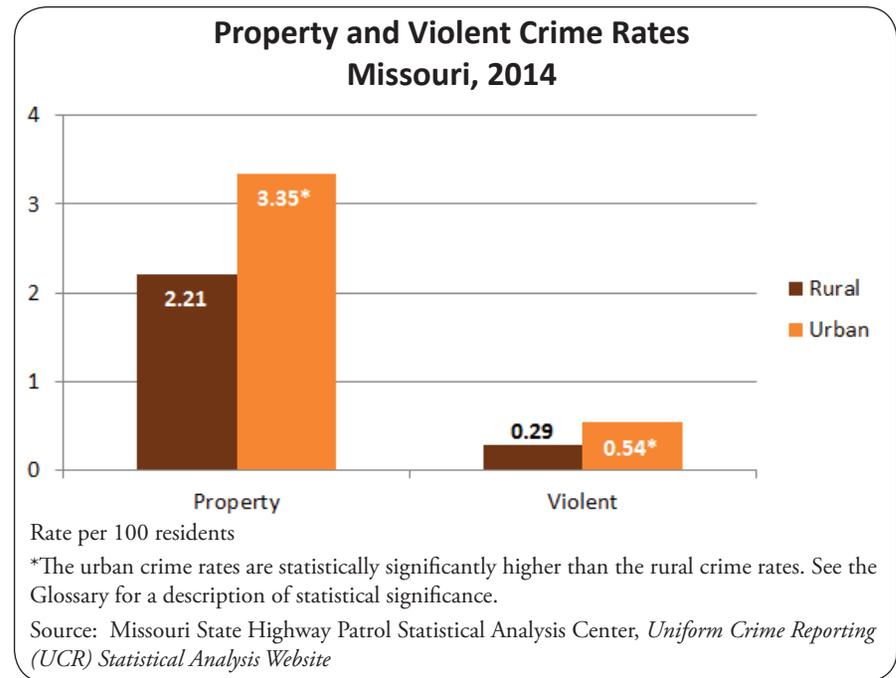
<sup>28</sup>Hanson, R.F., Sawyer, G.K., Begle, A.M., and Hubel, G.S. (April 2010). The Impact of Crime Victimization on Quality of Life. *Journal of Traumatic Stress* 23(2), 189-197. Accessed September 3, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2910433/>.

<sup>29</sup>McCollister, K.E., French, M.T., and Fang, H. (April 2010). The Cost of Crime to Society: New Crime-Specific Estimates for Policy and Program Evaluation. *Drug and Alcohol Dependence* 108(1-2), 98-109. Accessed September 3, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2835847/>.

<sup>30</sup>Swanson, J.W., Frisman, L.K., Robertson, A.G., Lin, H.J., Trestman, R.L., Shelton, D.A., ... and Swartz, M.S. (July 2013). Costs of Criminal Justice Involvement Among Persons with Serious Mental Illness in Connecticut. *Psychiatric Services* 64(7), 630-637. Accessed August 17, 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/23494058>.

Data from the Missouri State Highway Patrol's *Uniform Crime Reporting* system indicate that fewer property and violent crimes are reported in rural areas than in urban areas. Property crimes include burglary, larceny-theft, motor vehicle theft and arson. In 2014, 2.21 property crimes were committed per 100 rural Missouri residents, which is 34.0 percent lower than the 3.35 property crimes committed per 100 urban residents. The disparity is even greater for violent crimes, which include murder/manslaughter, rape, robbery and aggravated assault. In 2014, the rural rate of 0.29 violent crimes per 100 residents was only slightly more than half the urban violent crime rate of 0.54 per 100 residents.<sup>31</sup> In fact, two rural counties, Knox County and Putnam County in northeast Missouri had no reported violent crimes in 2014. For both types of crimes, the rural-urban difference is statistically significant.<sup>32</sup>

In both rural and urban counties, property crime rates were significantly lower in 2014 than in 2012. There was no statistically significant change in the violent crime rates for either rural or urban counties.<sup>33</sup>



<sup>31</sup>Missouri State Highway Patrol Statistical Analysis Center. *Uniform Crime Reporting (UCR) Statistical Analysis Website*. Accessed September 3, 2015, from [http://www.mshp.dps.mo.gov/MSHPWeb/SAC/data\\_and\\_statistics\\_ucr\\_query\\_backup.html](http://www.mshp.dps.mo.gov/MSHPWeb/SAC/data_and_statistics_ucr_query_backup.html).

<sup>32</sup>See the Glossary for a description of statistical significance.

<sup>33</sup>Crime rates for 2012 were revised following the publication of the *2012-2013 Health in Rural Missouri Biennial Report*.



## Deaths and Emergency Room Visits

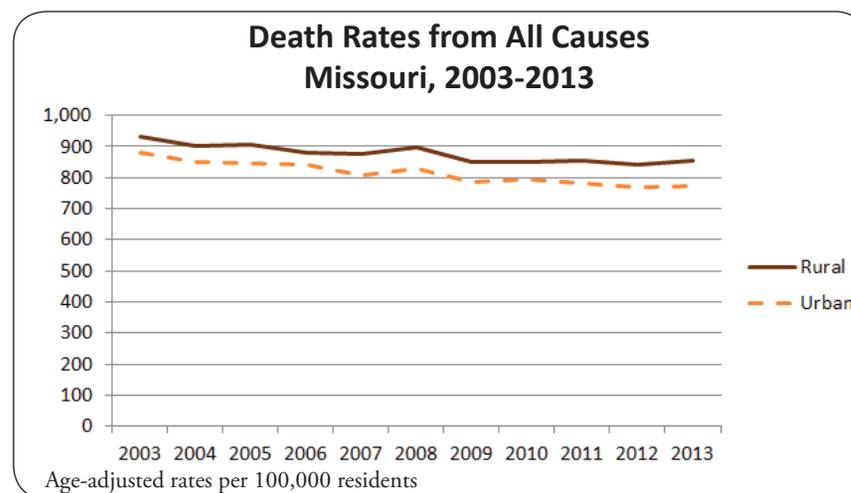
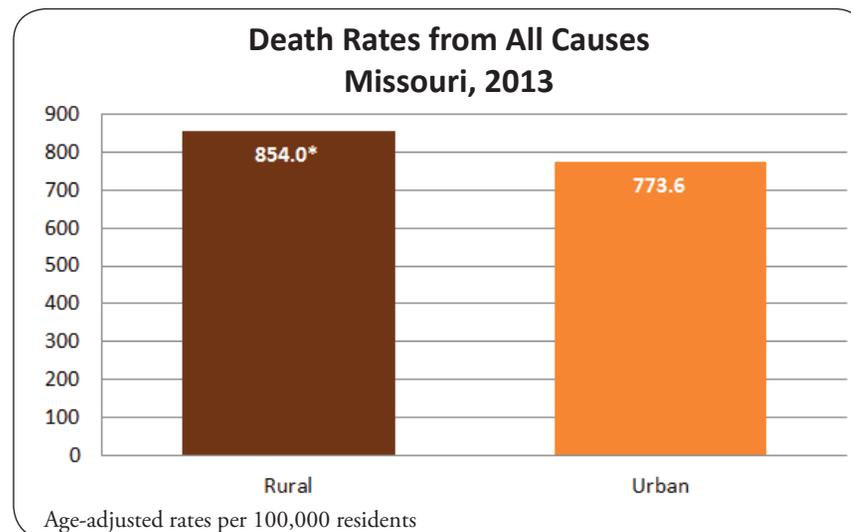
Another way to measure the disparity in health status between rural and urban Missourians is to compare rates for some of the state's leading causes of deaths and emergency room (ER) visits.<sup>35</sup>

### All Causes

A total of 57,256 Missouri residents died during 2013, resulting in an age-adjusted rate of 804.9 deaths per 100,000 residents. The rural death rate of 854.0 is 10.4 percent higher than the urban death rate of 773.6, which is a statistically significant difference.

Annual death rates decreased significantly for both rural and urban areas between 2003 and 2013. However, the urban rate decreased faster than the rural rate, causing the disparity between the two areas to increase over the past decade. The rural rate was significantly higher than the urban rate in each of the years from 2003 to 2013.

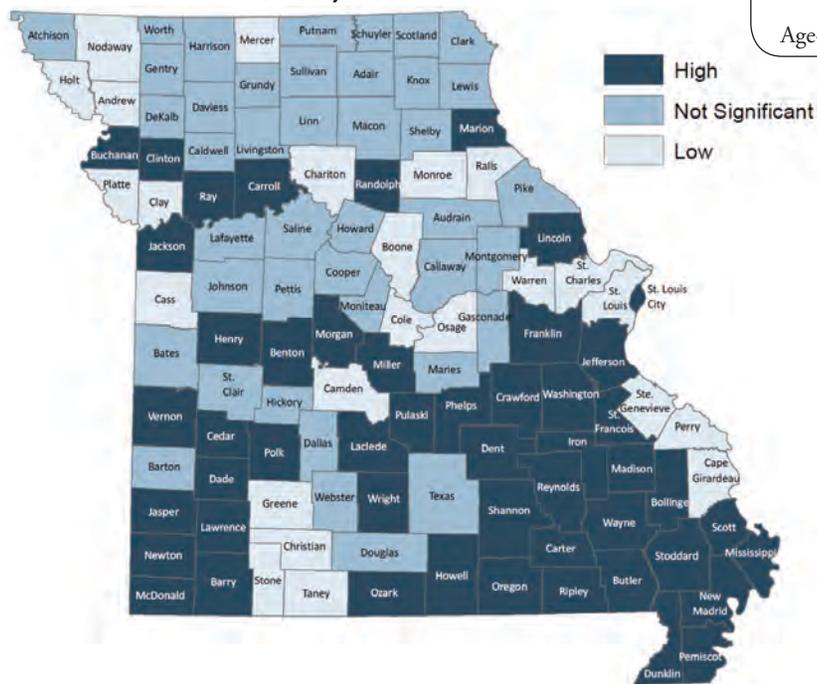
Rural death rates are statistically significantly higher than urban death rates across both genders and for all age groups except Under 15. The rural death rate for residents in the Under 15 age group is slightly higher than the urban rate, but the difference is not statistically significant. (Death counts and rates for the 2003-2013 time period are available in Appendix B.)



<sup>35</sup>The data in the remainder of this chapter were collected from the Missouri Information for Community Assessment (MICA) system unless otherwise specified. All death data were collected from the Death MICA. Cancer incidence data were collected from the Cancer Registry MICA. Unintentional injury and motor vehicle accident ER visit data were collected from the Injury MICA. Alzheimer's disease ER visit data were prepared by the Bureau of Health Care Analysis and Data Dissemination. All other ER visit data were collected from the Emergency Room MICA. See Appendix A for more information on the MICA system.

The three counties with the highest rural death rates are located in the Southeast BRFS Region. The counties with the lowest rates are located in the Central and Northeast BRFS regions.

### Deaths from All Causes Missouri, 2003-2013



Based on age-adjusted rates per 100,000 residents  
Statistical significance compared to the state using 95 percent confidence intervals

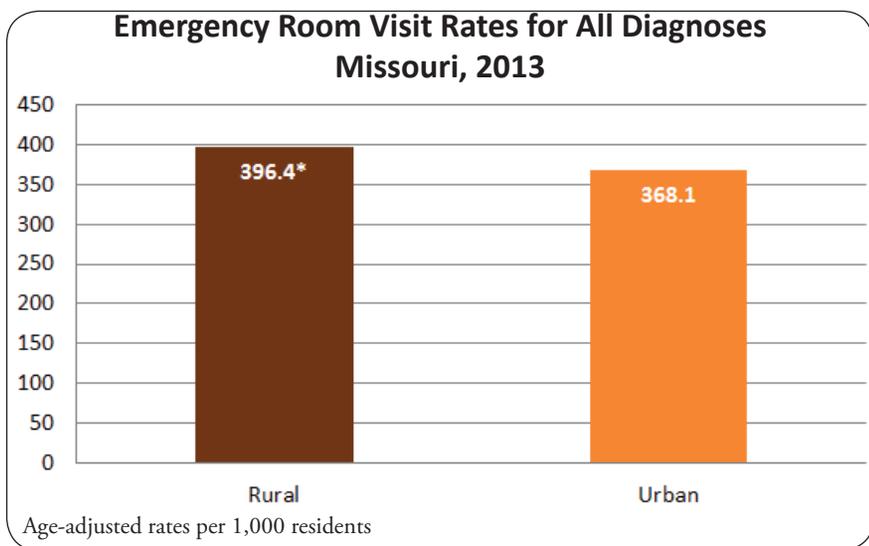
	Rank Rural	Number	Rate	Rank Urban	Number	Rate
<b>Highest</b>	1 Dunklin County	4,894	1,131.2	1 St. Louis City	36,225	1,019.1
	2 Pemiscot County	2,564	1,105.0	2 Jefferson County	18,896	941.0
	3 Mississippi County	2,032	1,098.0	3 Jasper County	12,320	923.5
<b>Lowest</b>	99 Osage County	1,326	734.3	12 Boone County	10,210	726.9
	100 Ralls County	940	726.1	13 St. Charles County	23,268	697.8
	101 Mercer County	443	704.7	14 Platte County	5,967	681.1

Age-adjusted rates per 100,000 residents

Most of the counties with significantly high death rates compared to the state are located in the southern half of Missouri. In fact, 38 rural counties south of the Missouri River have significantly high rates compared to only 6 rural counties north of the Missouri River. Furthermore, in the south there are several large clusters of rural counties with significantly high rates, while the north contains only one small cluster, which is found in a row of three counties north and east of Kansas City.

<sup>36</sup>See the Glossary description of unstable rates for an explanation of the use of multi-year death and ER visit rates.

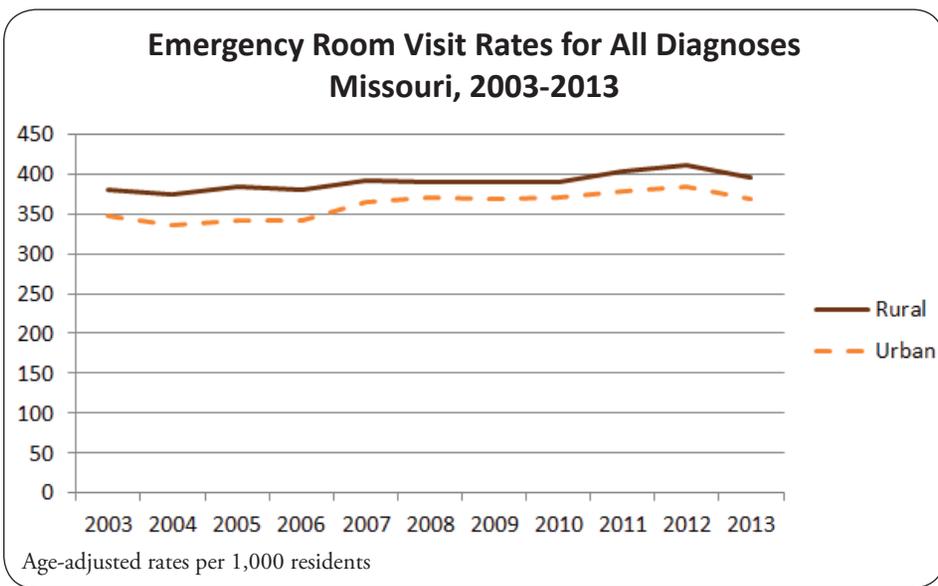
In 2013, ER visit rates were also statistically significantly higher for rural residents than urban residents.<sup>37</sup> The rural ER visit rate is 396.4 per 1,000 residents, which is 7.7 percent higher than the urban rate of 368.1. In contrast, the *2012-2013 Health in Rural Missouri Biennial Report* found that urban residents tend to have significantly higher inpatient hospitalization rates.<sup>38</sup> (ER visit counts and rates for the 2009-2013 time period are available in Appendix C.)



<sup>37</sup>Patients who seek treatment in the ER and are directly admitted into the hospital are counted in inpatient hospitalization statistics, not ER statistics.

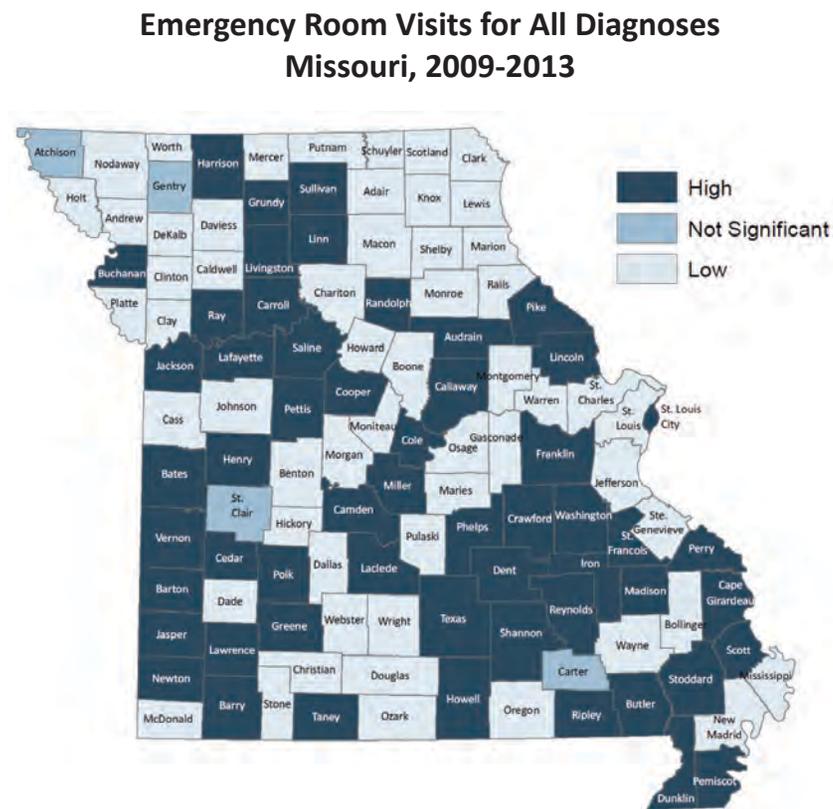
<sup>38</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

Unlike death rates, ER visit rates increased significantly between 2003 and 2013. In the early years of this time period, a gap of roughly 10 percent existed between the rural and urban rates. This disparity shrank between 2007 and 2010 but began to grow again in 2011.



The significance map of ER visit rates for all diagnoses differs somewhat from the significance map of deaths from all causes. On both maps, the majority of the counties with significantly higher rates are located in the southern part of the state, particularly in the southeast and southwest corners. However, the ER visit map reveals a secondary cluster of significantly high rates in the north central and west central parts of the state that does not appear on the death map.

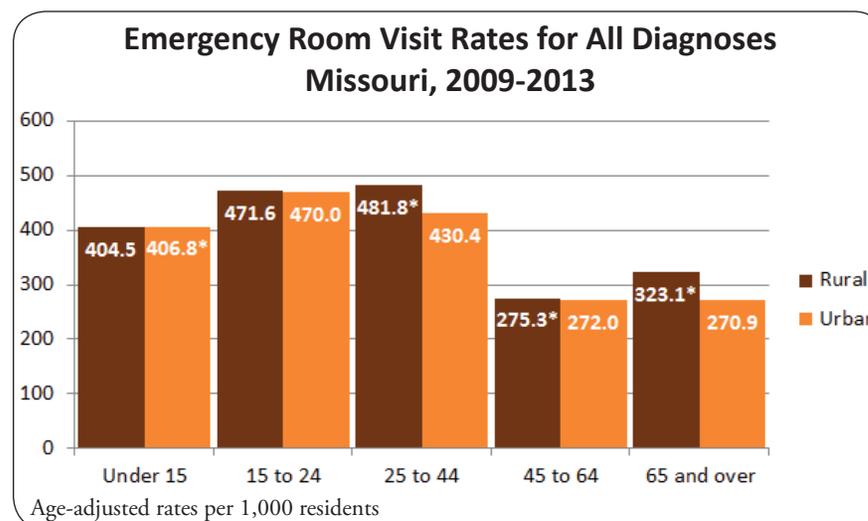
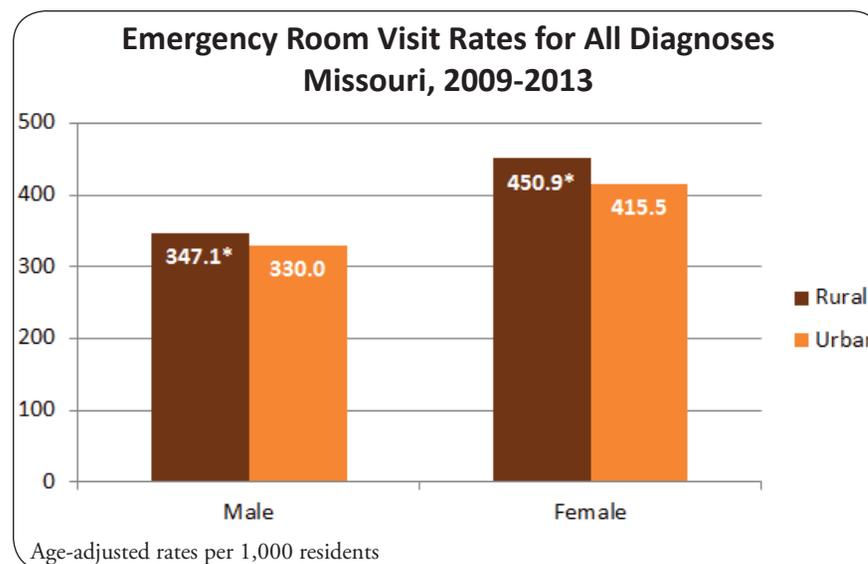
Most of the rural counties in the northeast and northwest corners of the state have significantly low rates compared to the state. Although the majority of counties in the southeast and southwest corners have significantly high rates, there are also pockets of counties in those areas that have significantly low ER visit rates.



Based on age-adjusted rates per 1,000 residents  
 Statistical significance compared to the state using 95 percent confidence intervals

Females seek ER treatment at significantly higher rates than males. This is true for both rural and urban residents, although the gender disparity is slightly higher in rural areas. The female ER visit rate is 29.9 percent higher than the male rate in rural areas compared to a difference of only 25.9 percent in urban areas. Rural rates are significantly higher than urban rates for both genders.

The *2012-2013 Health in Rural Missouri Biennial Report* found that inpatient hospitalization rates increased with age. The report also noted that rural rates were significantly higher than urban rates for the age groups of Under 15 and 15 to 24 but significantly lower for the remaining older age groups.<sup>39</sup> ER visit rates, on the other hand, are higher among younger age groups, and an almost reversed pattern of significance related to rural versus urban rates exists. Rural residents have significantly lower ER visit rates than urban residents only for the Under 15 age group. The rural and urban rates for the 15 to 24 age group are not significantly different from each other, but rural rates are significantly higher for the three remaining older age groups. The largest disparity is found in the 65 and older age group. The ER visit rate for rural residents ages 65 years and older is 19.3 percent higher than the rate for urban residents.



<sup>39</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

## Leading Causes of Deaths and Emergency Room Visits

The 2003-2013 leading causes of death for both rural and urban Missourians are similar, with heart disease and cancer responsible for nearly half of all deaths in each location. Leading causes of death are determined using the number of deaths, not the death rate. In this table and throughout this report, causes of death are listed in order of leading causes for rural residents. There are slight differences in the order of the leading causes for urban residents.

Death data are ranked using a method developed by the National Center for Health Statistics (NCHS). No similar ranking methodology exists for ER visit data, and ER diagnosis categories do not always match death classification categories. However, rural and urban data can be compared for specific ER visit diagnoses. The following sections are arranged in order of the leading causes of rural death and provide both death and ER visit data, when available. Additional sections on ER visits due to affective disorders, acute bronchitis, urinary stones, gastritis and duodenitis, and nontraumatic dental complaints are also included, as these diagnoses cause relatively large numbers of ER visits for both rural and urban Missourians. Furthermore, the rural-urban disparity ratios for affective disorders, urinary stones, and gastritis and duodenitis are increasing. Acute bronchitis rates generally declined between 2003 and 2013, but in recent years the rural rates have been rising, creating a larger disparity. The rural-urban disparity in nontraumatic dental complaint visits has remained fairly steady over the past decade, but the rates in both areas have increased dramatically.

**Leading Causes of Rural and Urban Deaths  
Missouri, 2003-2013**

Rank	Rural			Urban		
	Cause	Number	Rate	Cause	Number	Rate
	<i>All causes</i>	255,086	875.7	<i>All causes</i>	350,652	812.6
1	Heart disease	69,562	234.2	Heart disease	89,409	205.2
2	Cancer	57,539	194.1	Cancer	80,038	185.6
3	Chronic lower respiratory diseases	16,896	56.6	Stroke	19,796	45.7
4	Stroke	15,145	50.8	Chronic lower respiratory diseases	19,571	45.9
5	Unintentional injuries	13,712	54.9	Unintentional injuries	18,150	43.3
6	Alzheimer's disease	8,422	27.9	Alzheimer's disease	10,697	24.4
7	Diabetes	6,739	22.9	Diabetes	9,205	21.3
8	Pneumonia and influenza	6,581	22.1	Pneumonia and influenza	8,348	19.1
9	Kidney disease	5,804	19.5	Kidney disease	7,422	17.2
10	Suicide	3,627	15.0	Suicide	5,393	13.0

Age-adjusted rates per 100,000 residents

Rural rates are statistically significantly higher than urban rates for All causes and for each of the leading causes of death.

## Heart Disease

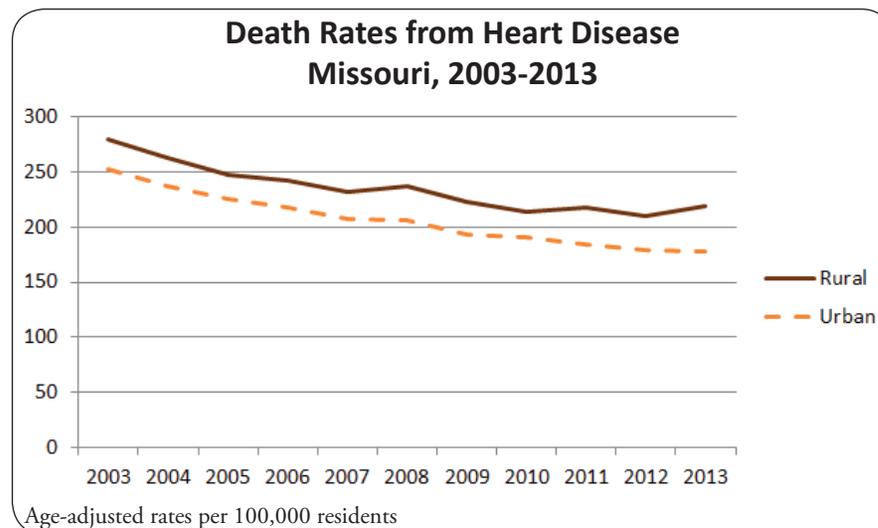
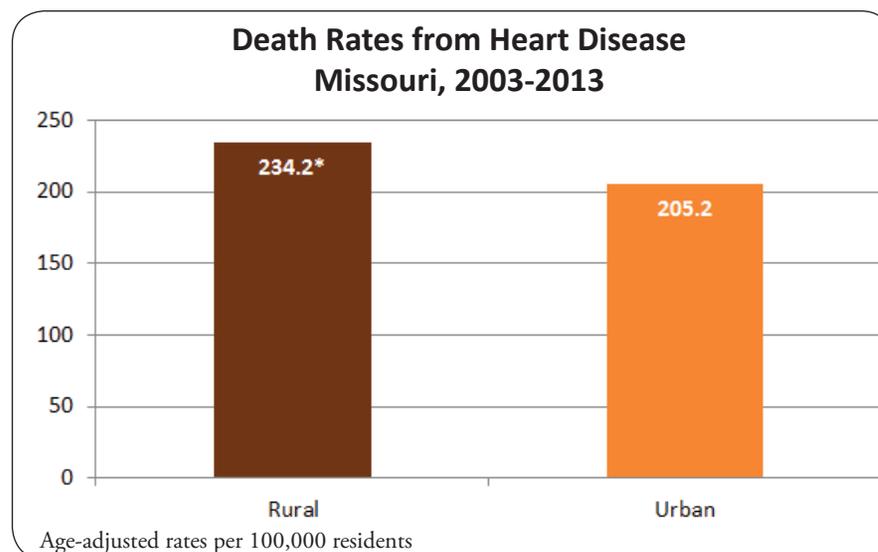
Heart disease includes a large class of conditions affecting the cardiovascular system and is a major cause of death, hospitalization and ER visits. In fact, it is the number one cause of death for both rural and urban Missourians. The 2003-2013 heart disease death rate of 234.2 per 100,000 rural residents is 14.1 percent higher than the 205.2 rate for urban residents, which is a statistically significant difference.

Over the past decade, heart disease death rates significantly decreased for both rural and urban areas, but the gap between the rural and urban rates grew dramatically. Between 2003 and 2007, the rural rate stayed between 10.0 and 12.0 percent higher than the urban rate. The disparity increased between 2008 and 2012, with the rural rate ranging from 12.1 percent to 18.4 percent higher than the urban rate. A large increase in the rural-urban disparity occurred in 2013, when the rural rate was 23.6 percent higher than the urban rate.

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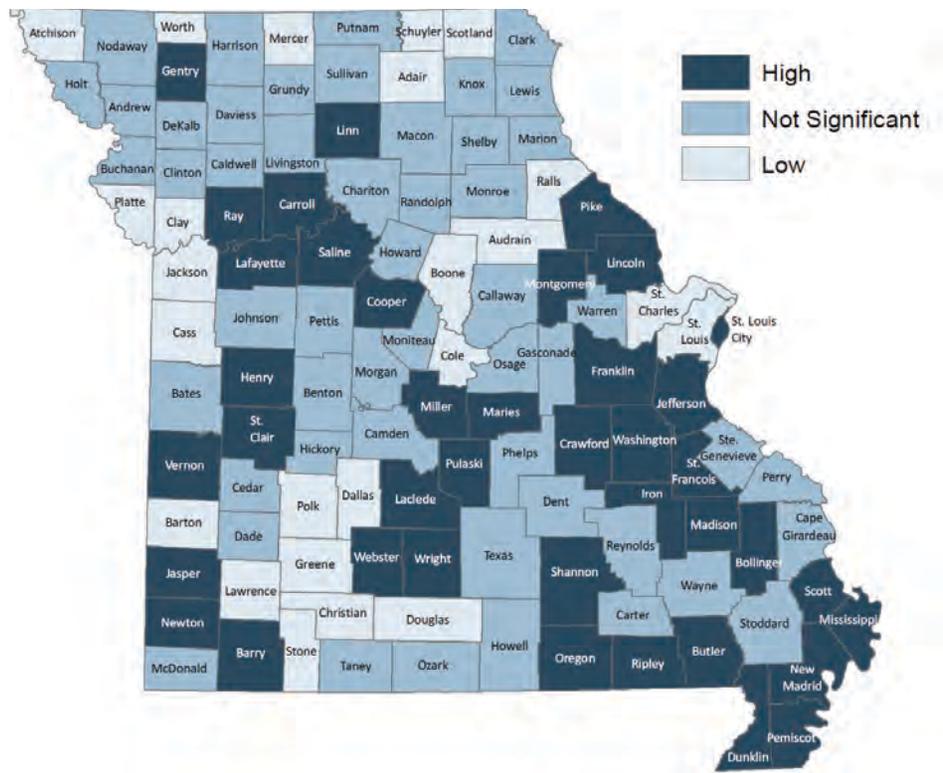
...it is the number one cause of death  
for both rural and urban Missourians.

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Most counties with heart disease death rates that are significantly different from the overall Missouri rate are located in clusters. Five clusters of significantly high rates are located south of the Missouri River; only two clusters of significantly high rates are found along or north of the river. Clusters of significantly low rates tend to be located around urban areas.

### Deaths from Heart Disease Missouri, 2003-2013



### Death Rates from Heart Disease Selected Rural and Urban Missouri Counties, 2003-2013

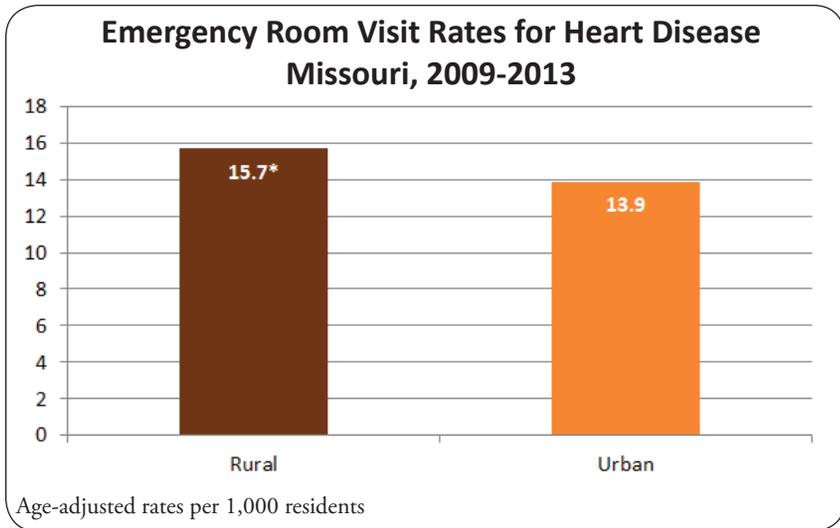
	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
Highest	1	Washington County	998	396.7	1	St. Louis City	9,941	279.1
	2	Mississippi County	724	383.4	2	Jasper County	3,691	274.6
	3	New Madrid County	933	355.9	3	Jefferson County	4,834	248.7
Lowest	99	Worth County	82	165.2	12	Clay County	3,485	163.4
	100	Scotland County	130	161.0	13	Boone County	2,231	160.5
	101	Schuyler County	116	156.8	14	Platte County	1,301	148.9

Age-adjusted rates per 100,000

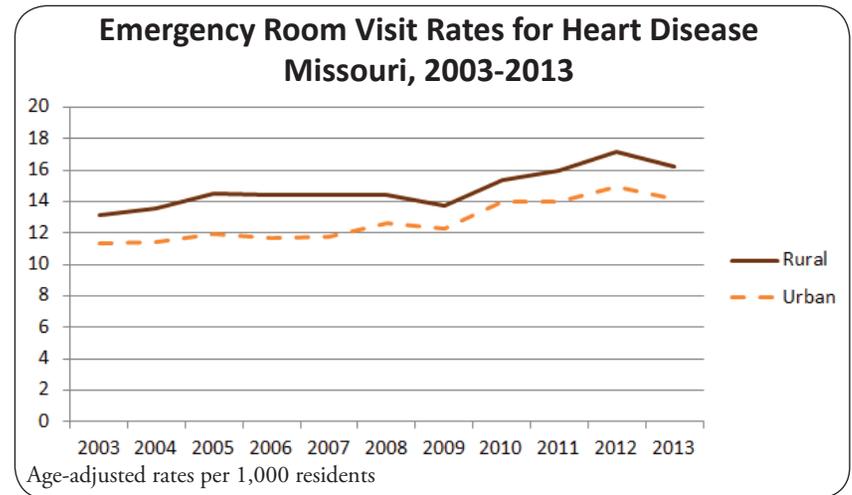
The three highest rural heart disease death rates are found in the Southeast BRFSS Region. The three counties with the lowest rural rates are located in northern counties along the Iowa border.

Based on age-adjusted rates per 100,000 residents  
Statistical significance compared to the state using 95 percent confidence intervals

The 2009-2013 rural ER visit rate for heart disease is 15.7 per 1,000 residents, which is 12.9 percent higher than the urban rate of 13.9. The difference between the rural and urban rates is statistically significant.



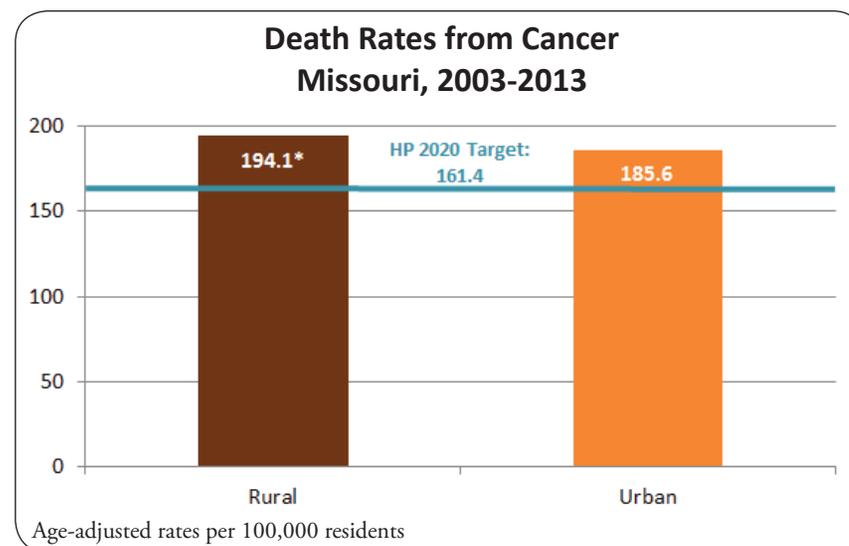
In contrast to the significant declines in heart disease death rates, heart disease ER visit rates significantly increased for both rural and urban residents between 2003 and 2013. The difference between the rural and urban rates remained fairly stable over time. The rural rate was significantly higher than the urban rate in each of these years.



## Cancer

The second leading cause of death for both rural and urban Missourians is cancer, which primarily affects older residents. The rural cancer death rate of 194.1 per 100,000 residents is significantly higher than the urban rate of 185.6. Both the rural and the urban rates exceed the Healthy People 2020 target rate of 161.4.<sup>40,41,42</sup>

The counties with the three highest rural cancer death rates are located in the Southeast BRFSS Region. The three lowest rural rates are found in the Northeast, Central and Northwest BRFSS regions.



**Death Rates from Cancer Selected Rural and Urban Missouri Counties, 2003-2013**

	Rank Rural	County	Number	Rate	Rank Urban	County	Number	Rate
<b>Highest</b>	1	Carter County	214	252.3	1	St. Louis City	7,935	228.0
	2	Mississippi County	468	250.8	2	Jefferson County	4,544	208.9
	3	Wayne County	543	244.9	3	Buchanan County	2,197	198.9
<b>Lowest</b>	99	Monroe County	225	161.6	12	Boone County	2,390	172.7
	100	Osage County	283	159.0	13	St. Charles County	5,923	170.1
	101	DeKalb County	243	153.0	14	Platte County	1,462	161.6

Age-adjusted rates per 100,000 residents

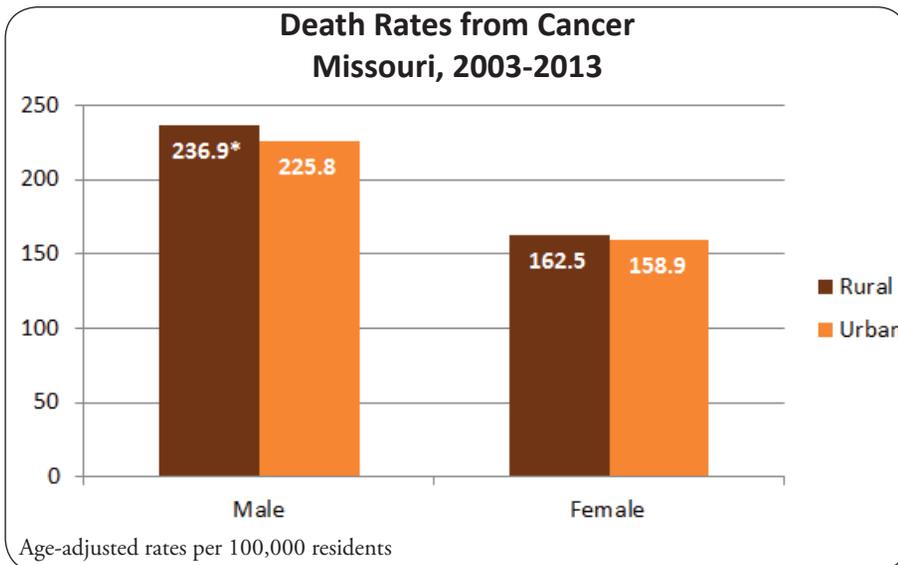
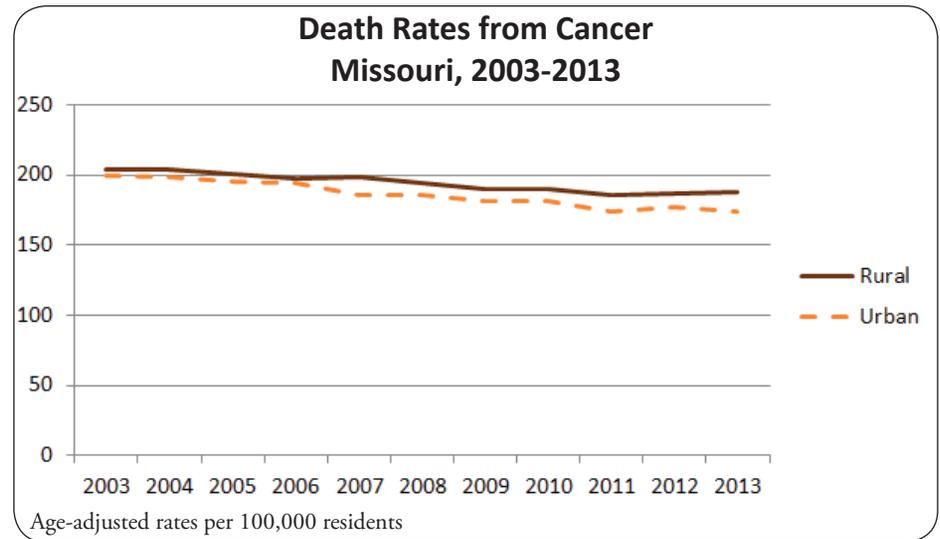
<sup>40</sup>See the Glossary for a description of Healthy People 2020.

<sup>41</sup>HealthyPeople.gov. (Last updated October 9, 2015). *Cancer Objectives*. Accessed October 13, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives>.

<sup>42</sup>Healthy People 2020 revised this target rate after the publication of the *2012-2013 Health in Rural Missouri Biennial Report*.

Cancer death rates in both rural and urban areas of Missouri decreased significantly from 2003 to 2013, by 8.3 and 13.0 percent, respectively. The rural rate remained higher than the urban rate throughout this time period, and the rural-urban disparity increased over these years, with the relatively small gap between the rates more than doubling.

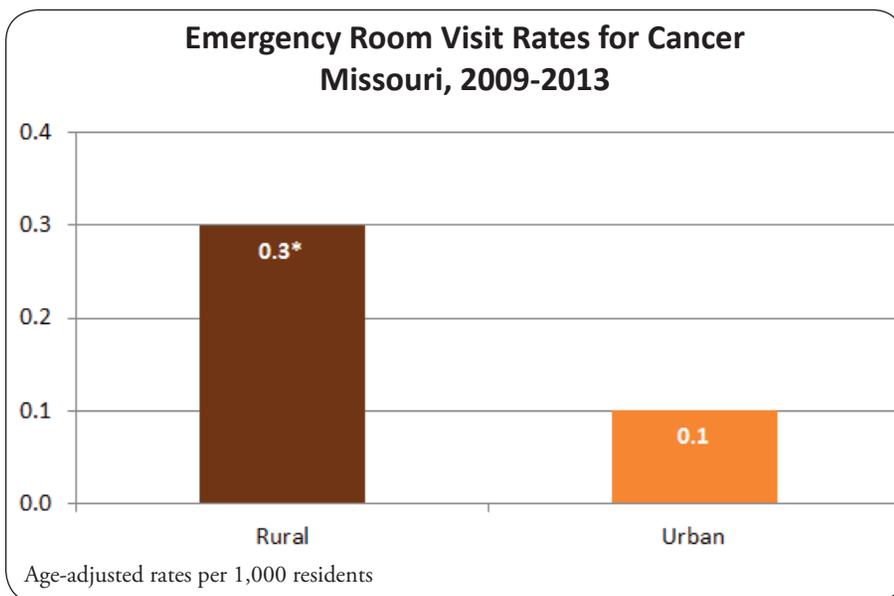
While rural males have a significantly higher death rate than urban males, there is no statistically significant difference between the rural and urban female rates. In both rural and urban counties, male cancer death rates are significantly higher than female rates.



Specific types of cancer deaths can be ranked using the number of deaths, not the death rate. The overall order is the same for both rural and urban Missourians. However, specific types of cancer affect rural and urban residents at different rates. For example, rural death rates are higher for lung/bronchus/trachea, colon/rectum/anus and prostate cancers, while urban death rates are higher for breast and pancreatic cancers.

Leading Causes of Cancer Deaths Missouri, 2003-2013		Rural		Urban	
		Count	Rate	Count	Rate
1	Lung/Bronchus/Trachea	18,726	62.4*	24,173	56.2
2	Colon/Rectum/Anus	5,547	18.8*	7,251	16.8
3	Breast	3,709	23.5†	6,087	24.8†
4	Pancreas	3,182	10.7	4,891	11.3
5	Prostate	2,642	22.2‡*	3,313	20.4‡

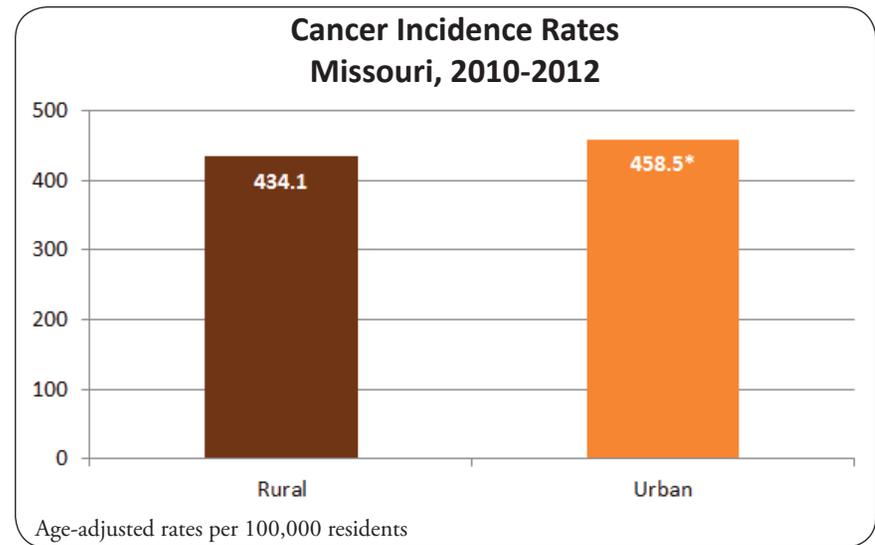
Age-adjusted rates per 100,000 residents  
 †Breast cancer rates reflect only the female population.  
 ‡Prostate cancer rates reflect only the male population.  
 \*Asterisks indicate if either the rural or urban rate is statistically significantly high compared to the other geography.



The cancer ER visit rate for rural Missourians is three times higher than that of urban Missourians (0.3 per 1,000 residents versus 0.1). Between 2003 and 2013, the urban rate decreased significantly. The rural rate also decreased slightly, but the rural change was not significant.

Although males die from cancer at higher rates than females in both rural and urban areas, rural males and females visit the ER at exactly the same rate (0.3 per 1,000 residents), which is significantly higher than the urban rates for both males (0.2) and females (0.1).

The Missouri Cancer Registry provides data on all newly diagnosed cases of cancer throughout the state. (This is sometimes referred to as incidence data.) During the 2010-2012 time period, the urban rate of cancer incidence was 5.6 percent higher than the rural rate (458.5 new cancer cases per 100,000 urban residents versus 434.1 new cases per 100,000 rural residents). Thus, urban residents are diagnosed with cancer at a higher rate, but rural residents die from this disease at a higher rate. A similar trend was observed in the *2012-2013 Health in Rural Missouri Biennial Report*, which noted that urban hospitalization rates for cancer were higher over the 2007-2011 time period, but 2001-2011 mortality rates were higher among rural residents.<sup>43</sup>



The Missouri Cancer Registry also provides incidence statistics for some of the major types of cancer. Breast and prostate cancer rates are statistically significantly higher in urban areas, while the rural lung cancer rate is significantly higher than the urban rate. There is no statistically significant difference in colon cancer rates.

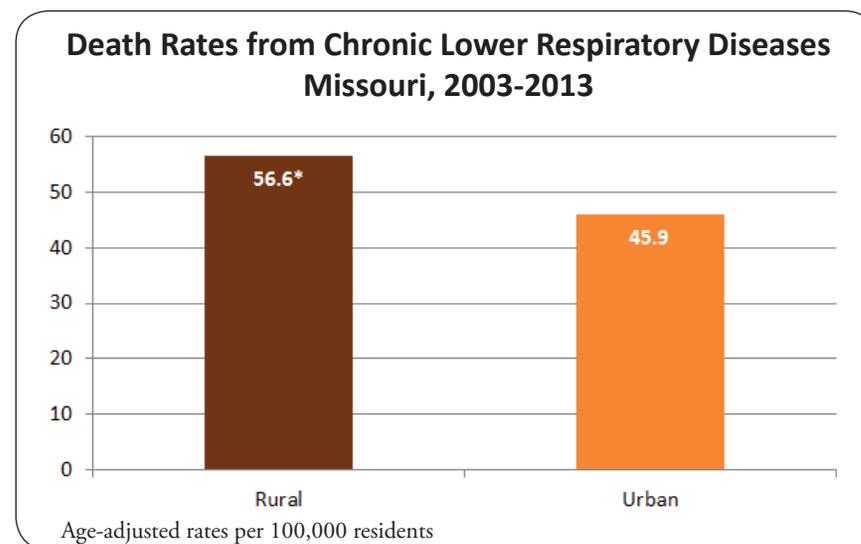
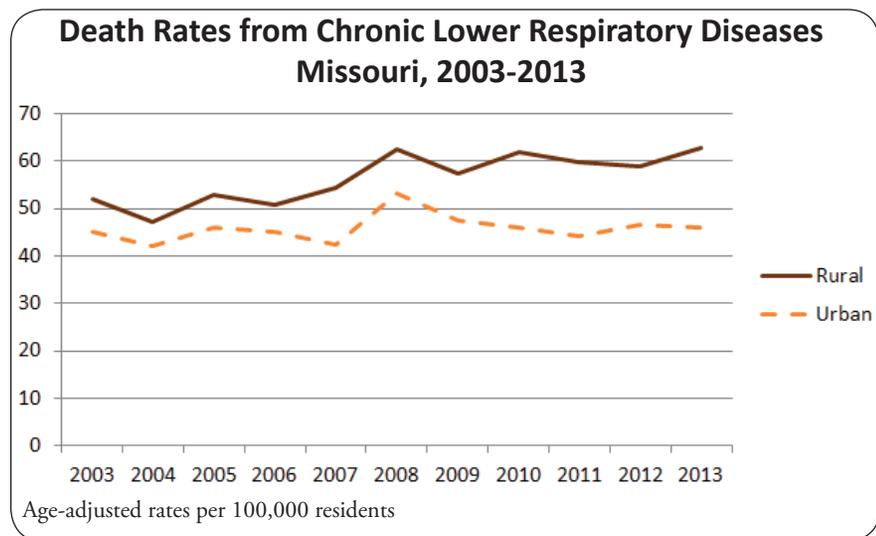
Most Common Sites of New Cancer Cases Missouri, 2010-2012	Rural		Urban	
	Count	Rate	Count	Rate
1 Lung	6,700	78.0*	9,022	73.0
2 Breast	4,703	111.3†	8,838	131.7†*
3 Prostate	4,149	100.0‡	6,572	111.5‡*
4 Colon	3,679	44.3	5,205	42.3
ALL SITES	35,937	434.1	56,850	458.5*

Age-adjusted rates per 100,000 residents  
 †Breast cancer rates represent only the female population.  
 ‡Prostate cancer rates represent only the male population.  
 \*Asterisks indicate if either the rural or urban rate is statistically significantly high compared to the other geography.

<sup>43</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

## Chronic Lower Respiratory Diseases

Chronic lower respiratory diseases (CLRDs) include chronic obstructive pulmonary disease (COPD), emphysema, asthma, bronchiectasis, non-acute bronchitis and other forms of chronic airway obstruction.<sup>44</sup> CLRD is the third leading cause of death in rural Missouri and the fourth leading cause in urban Missouri. The 2003-2013 CLRD death rate for rural Missourians (56.6 per 100,000 residents) is 23.3 percent higher than the urban rate of 45.9, a statistically significant difference.



CLRD death rates fluctuated in both rural and urban areas between 2003 and 2013. Rural areas experienced statistically significant increases between 2004 and 2005 and again between 2007 and 2008. The urban rate also increased significantly between 2007 and 2008, but it declined significantly the following year. The rural rate has not significantly declined from year to year and in fact was significantly higher in 2013 than it was in 2003. As a result, the gap between rural and urban areas widened; by 2013, the rural rate was 36.2 percent higher than the urban rate.

<sup>44</sup>Missouri Department of Health and Senior Services. *Leading Causes of Death Profile – Definitions*. Accessed August 6, 2015, from <http://www.health.mo.gov/data/mica/CDP/MICA/CofDDefinitionofIndicators.html#I6>.

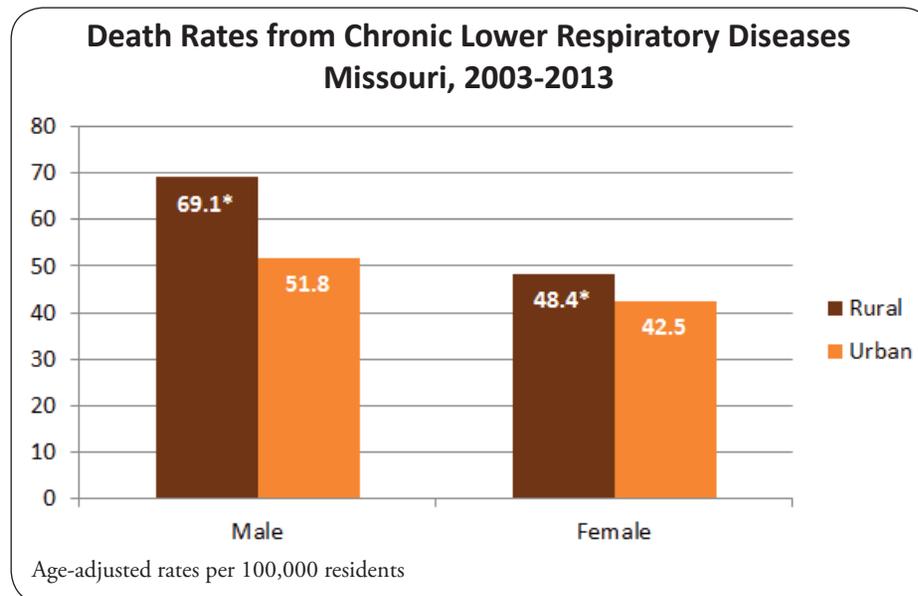
The counties with the three highest rural CLRD death rates are located in the Southeast BRFSS Region of the state.

### Death Rates from Chronic Lower Respiratory Diseases Selected Rural and Urban Missouri Counties, 2003-2013

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Carter County	79	94.6	1	Buchanan County	886	78.9
	2	Iron County	145	93.0	2	Jasper County	884	65.9
	3	Wayne County	200	90.9	3	Clay County	1,300	61.6
<b>Lowest</b>	99	Barton County	71	37.6	12	Boone County	550	41.7
	100	Oregon County	67	36.5	13	St. Charles County	1,290	40.0
	101	Chariton County	48	31.5	14	St Louis County	4,551	33.4

Age-adjusted rates per 100,000 residents

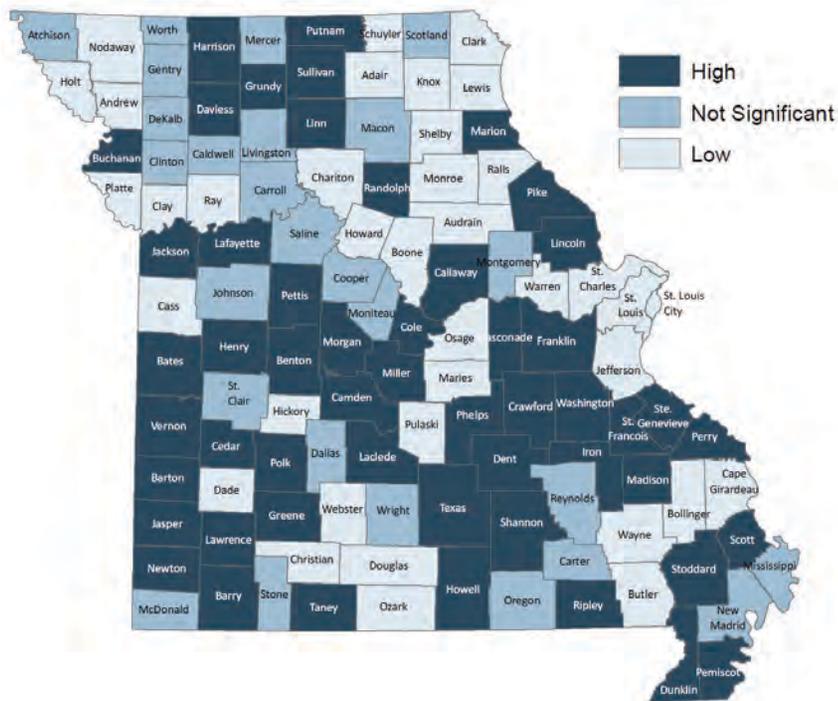
Rural CLRD death rates are significantly higher than urban rates for both males and females. Males have significantly higher CLRD death rates than females in both rural and urban areas. However, the gender disparity in rural areas is much greater than in urban areas, with rural males having a 42.8 percent higher CLRD death rate than rural females. Urban males have only a 21.9 percent higher rate compared to urban females.



The majority of CLRD ER visits are due to COPD/bronchiectasis and asthma. Significance maps of ER visit rates for these two conditions reveal contrasting patterns of distribution.

In Missouri, 46 of the 101 rural counties and 6 of the 14 urban counties have COPD/bronchiectasis ER visit rates that are significantly higher than the overall state rate.

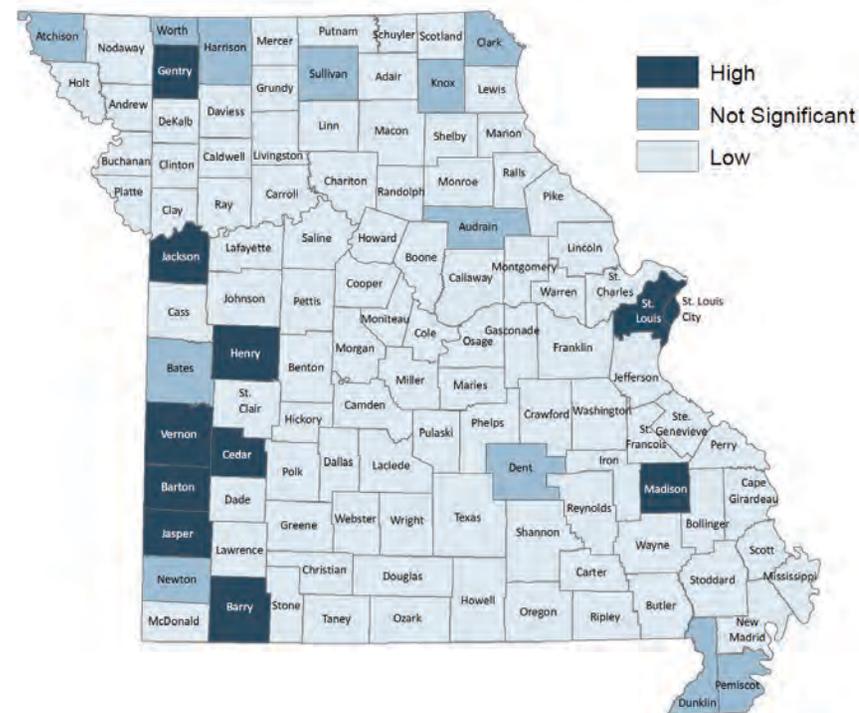
### Emergency Room Visit Rates for COPD/Bronchiectasis Missouri, 2009-2013



Based on age-adjusted rates per 1,000 residents  
Statistical significance compared to the state using 95 percent confidence intervals

In contrast, only 11 counties have asthma ER visit rates that are significantly higher than the state rate, while 91 counties have significantly lower rates. Several of the counties with significantly high rates are metropolitan (St. Louis City, St. Louis County and Jackson County). The largest cluster of significantly high rates is found in southwest Missouri and includes Joplin.

### Emergency Room Visit Rates for Asthma Missouri, 2009-2013

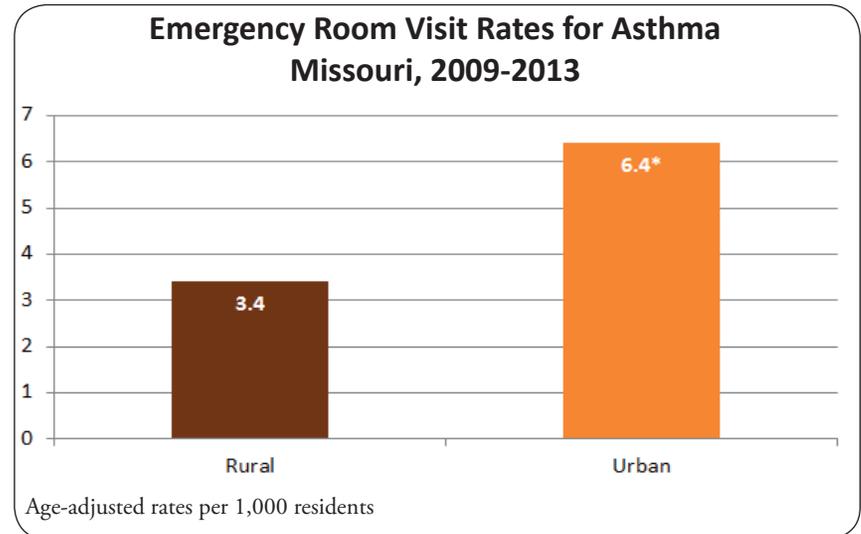
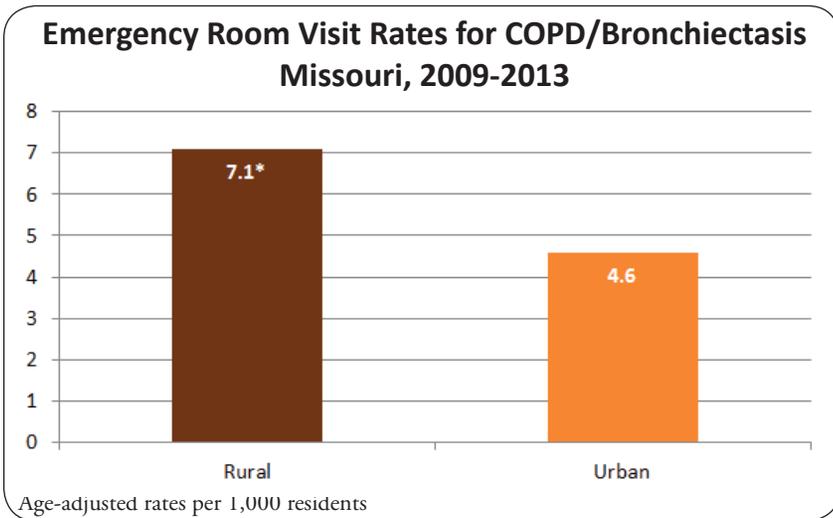


Based on age-adjusted rates per 1,000 residents  
Statistical significance compared to the state using 95 percent confidence intervals

Mirroring the rural-urban disparity in CLRD death rates, the rural COPD/bronchiectasis ER visit rate is higher than the urban rate at 7.1 ER visits per 1,000 rural residents compared to 4.6 per 1,000 urban residents. This 54.3 percent difference in rates is statistically significant.

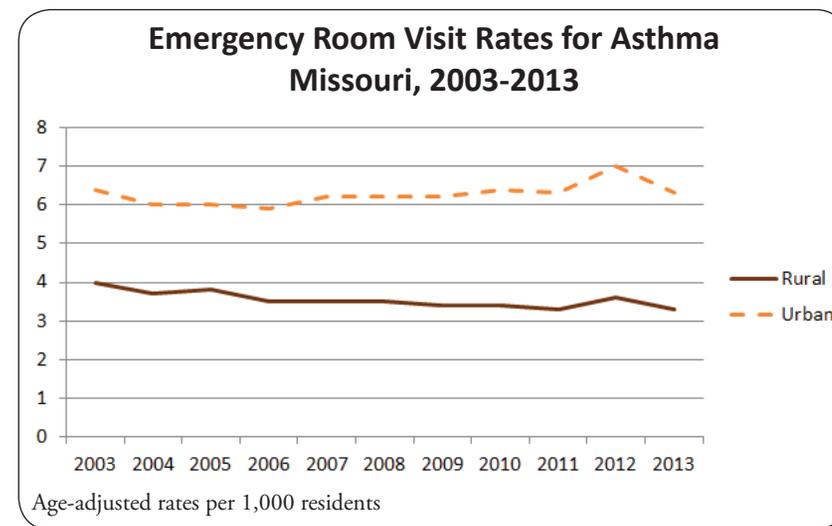
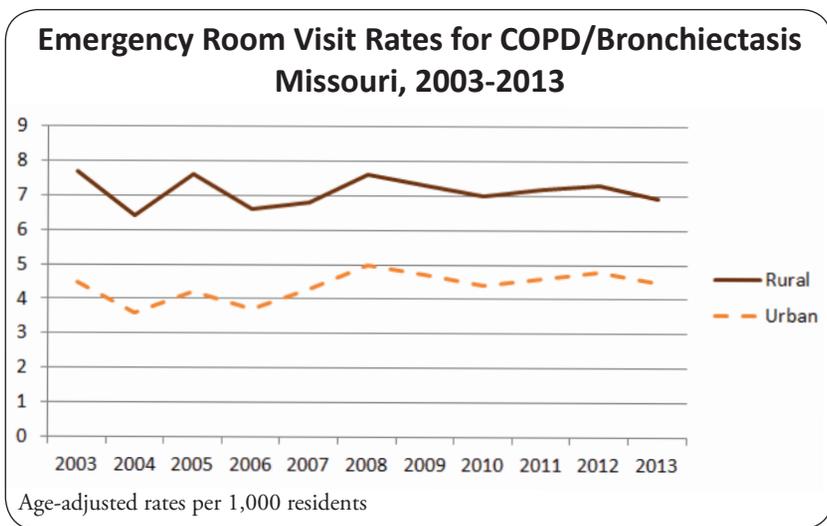


ER visit rates for asthma, on the other hand, are 88.2 percent higher among urban residents, a statistically significant disparity.



COPD/bronchiectasis ER visit rates fluctuated during the years between 2003 and 2013, with both the rural and the urban rates following the same general pattern of increases and decreases over time. However, rates were consistently significantly higher for rural residents during these years. The rural rate was always at least 1.5 times higher than the urban rate.

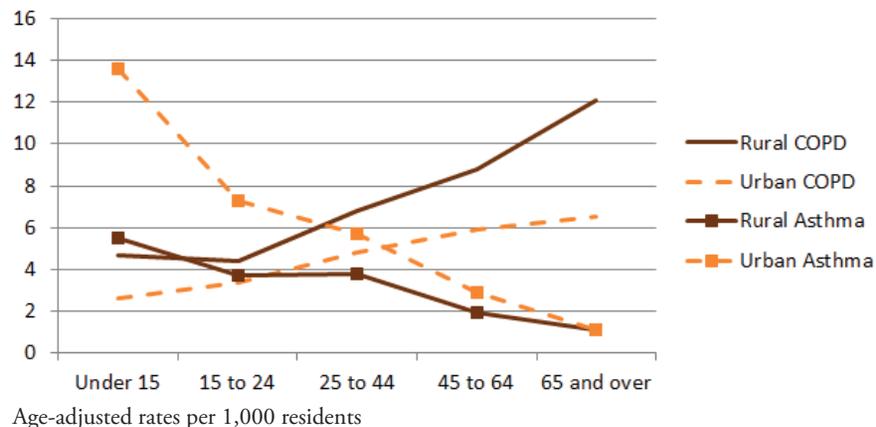
In sharp contrast, asthma ER visit rates were significantly higher for urban residents during the same time period. Between 2003 and 2013, rates slightly increased for urban residents as they significantly decreased for rural residents, causing the urban-rural disparity to grow. In 2003, the urban-rural disparity ratio was 1.6. By 2013, it had risen to 1.9, meaning that the urban rate was nearly twice the rural rate.



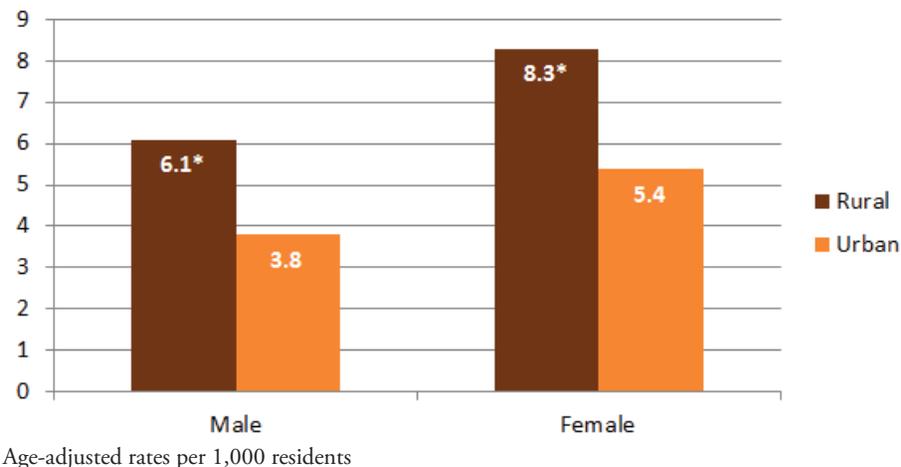
COPD/bronchiectasis ER visit rates increase markedly with age. (The same pattern is observed for CLRD deaths.) Asthma ER visit rates, on the other hand, tend to decrease with age.

Rural COPD/bronchiectasis ER visit rates are significantly higher than urban rates for both males and females. While males in both rural and urban areas have significantly higher CLRD death rates than females, rural and urban female residents visit the ER at significantly higher rates for COPD/bronchiectasis. The Centers for Disease Control and Prevention (CDC) reports that COPD prevalence is higher among women than men. “Increased COPD morbidity among women is believed to reflect increased smoking rates among women beginning in the 1940s... Although death rates from COPD remained lower among women overall, death rates did not change for women from 1999 through 2007, while they decreased for men. The narrowing gap in death rates represents a continuing shift in the relative burden of COPD to women.”<sup>45</sup>

**Emergency Room Visit Rates for COPD/Bronchiectasis and Asthma Missouri, 2009-2013**

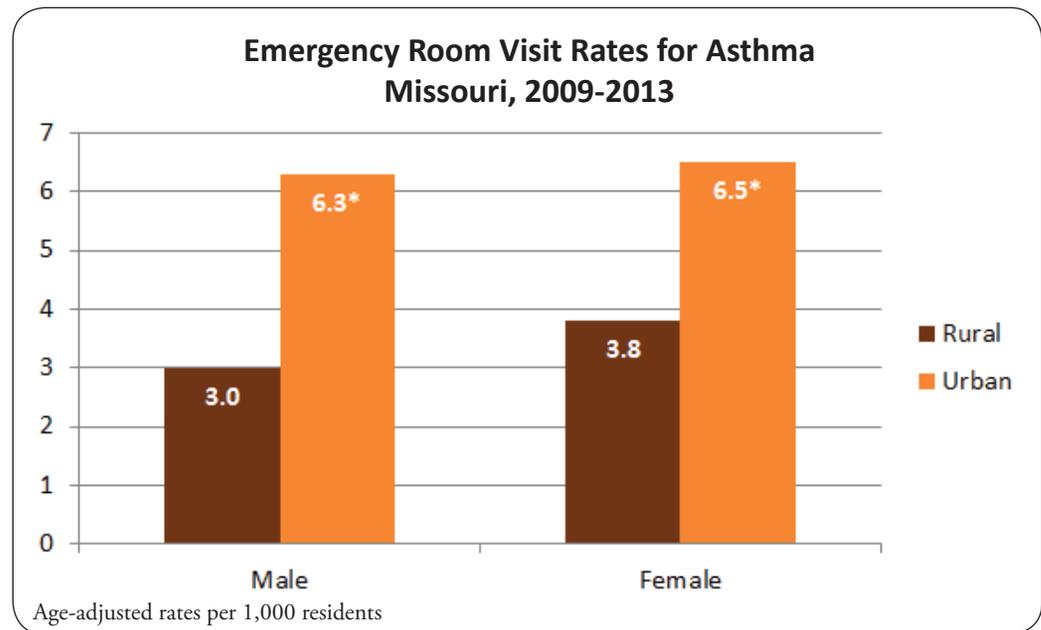


**Emergency Room Visit Rates for COPD/Bronchiectasis Missouri, 2009-2013**



<sup>45</sup>Akinbami, L.J., and Liu, X. (June 2011). Chronic Obstructive Pulmonary Disease Among Adults Aged 18 and Over in the United States, 1998–2009. *NCHS Data Brief*, 63. Hyattsville, MD: National Center for Health Statistics. Accessed August 18, 2015, from <http://www.cdc.gov/nchs/data/databriefs/db63.pdf>.

Female residents also have significantly higher ER visit rates for asthma in both rural and urban areas. “Because of the complexity of the disease, no single straightforward mechanism can explain the gender differences found in asthma.”<sup>46</sup> Possible contributory factors for females include hormonal changes during and after puberty, greater susceptibility to the effects of cigarette smoking, sociocultural influences, different environmental exposures, and lung development and immune system differences.<sup>47,48,49</sup> Urban rates are significantly higher than rural rates for both genders.



<sup>46</sup>Postma, D.S. (2007). Gender Differences in Asthma Development and Progression [Abstract]. *Gender Medicine* 4(Suppl B), S133-S146. Accessed August 18, 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/18156099>.

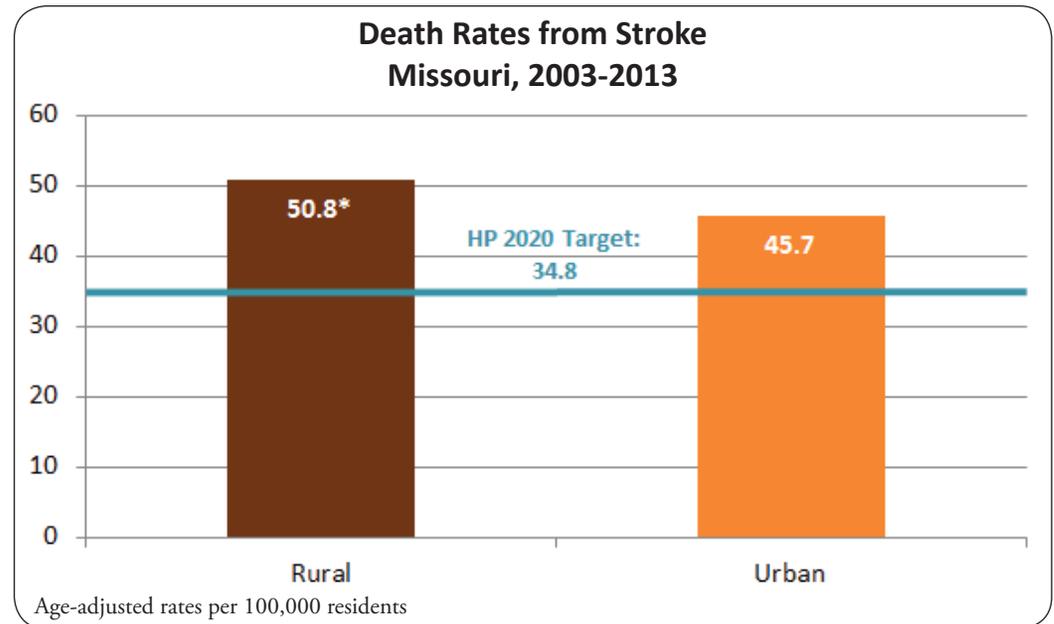
<sup>47</sup>Ibid.

<sup>48</sup>Almqvist, C., Worm, M., Leynaert, B., and the Working Group of GA2LEN WP 2.5 ‘Gender.’ (2008). Impact of Gender on Asthma in Childhood and Adolescence: A GA2LEN Review. *Allergy* 63, 47-57. Accessed August 18, 2015, from <http://onlinelibrary.wiley.com/doi/10.1111/j.1398-9995.2007.01524.x/pdf>.

<sup>49</sup>Osman, M. (2003). Therapeutic Implications of Sex Differences in Asthma and Atopy. *Archives of Disease in Childhood* 88, 587-590. Accessed August 18, 2015, from <http://adc.bmj.com/content/88/7/587.full.pdf>.

## Stroke

While stroke death rates have fallen since 2003, stroke remains the fourth leading cause of death for Missouri overall and for rural residents. (Stroke is the third leading cause of death for Missouri's urban residents.) "The burden of cardiovascular disease is disproportionately distributed across the population. There are significant disparities ... based on ... geographic area" as well as other social, economic and demographic factors.<sup>50</sup> In Missouri, the death rate from stroke is higher in rural counties (50.8 per 100,000 rural residents compared to 45.7 for urban residents during the 2003-2013 time period). This rural-urban rate difference is statistically significant. Both the rural and the urban rates exceed the Healthy People 2020 target rate of 34.8.<sup>51,52</sup>

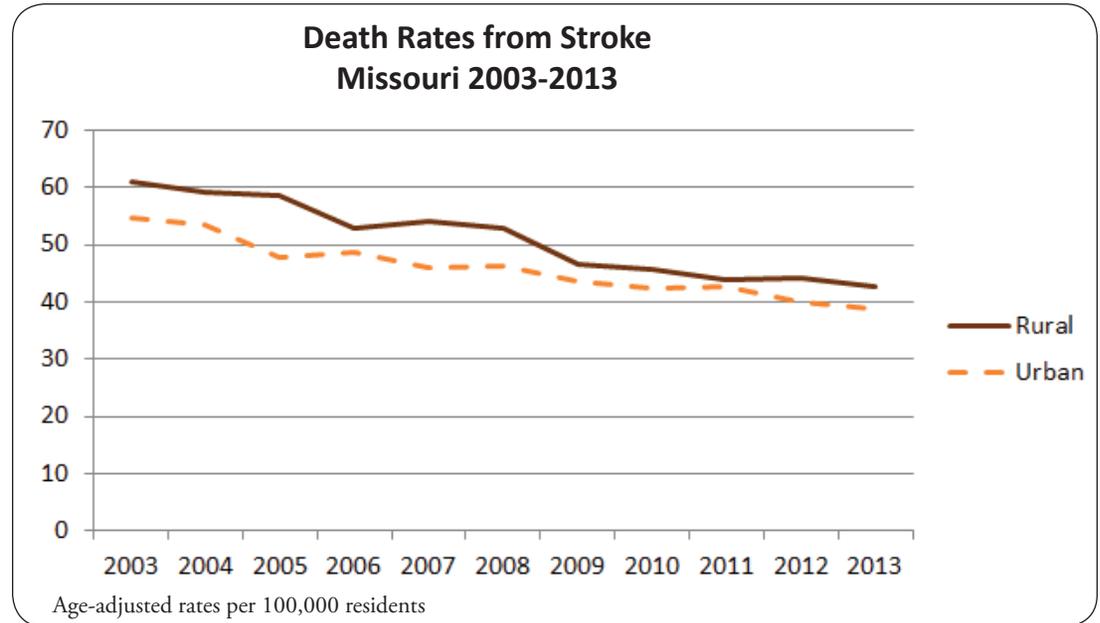


<sup>50</sup>HealthyPeople.gov. (Last updated August 17, 2015). *Heart Disease and Stroke Overview*. Accessed August 18, 2015, from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=21>.

<sup>51</sup>HealthyPeople.gov. (Last updated October 9, 2015). *Heart Disease and Stroke Objectives*. Accessed October 13, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-stroke/objectives>.

<sup>52</sup>Healthy People 2020 revised this target rate after the publication of the *2012-2013 Health in Rural Missouri Biennial Report*.

Stroke death rates significantly declined between 2003 and 2013 in both rural and urban areas. Although the rural rate remained higher than the urban rate throughout this time period, the disparity between the rural and urban rates varied quite a bit from year to year. The largest disparity occurred in 2005, when the rural rate was 22.5 percent higher than the urban rate. However, by 2011 the rural rate was only 3.0 percent higher.

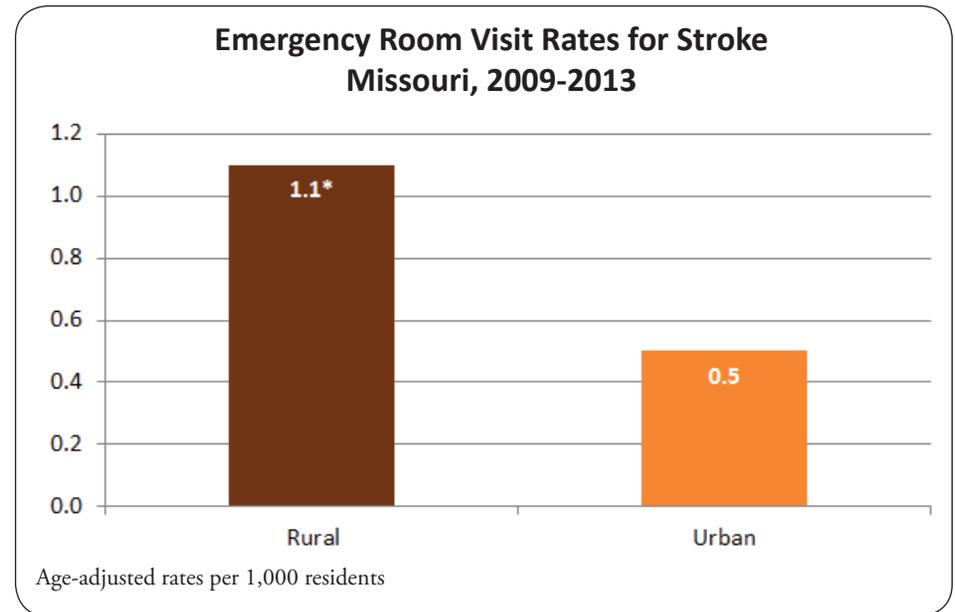


The counties with the three highest rural stroke death rates are found in the Northeast, Southeast and Southwest BRFSS regions. The counties with the three lowest rural rates are located in the Northeast (Monroe and Putnam counties) and Central (Osage County) BRFSS regions.

	Rank Rural	County	Number	Rate	Rank Urban	County	Number	Rate
<b>Highest</b>	1	Lewis County	124	83.0	1	Buchanan County	778	64.3
	2	Dunklin County	358	80.4	2	Jefferson County	1,042	56.0
	3	Henry County	267	70.8	3	St. Louis City	1,920	53.8
<b>Lowest</b>	99	Monroe County	50	32.6	12	Clay County	817	39.2
	100	Osage County	61	32.3	13	St. Charles County	1,133	35.7
	101	Putnam County	26	27.6	14	Platte County	297	35.1

The *2012-2013 Health in Rural Missouri Biennial Report* noted that although the rural stroke death rate is significantly higher than the urban stroke death rate, urban residents are hospitalized for stroke at a significantly higher rate than rural residents (30.3 versus 28.4 per 10,000 residents for 2007-2011).<sup>53</sup> ER visit rates, on the other hand, are significantly higher for rural residents. The rural rate of 1.1 per 1,000 residents is more than double the urban rate of 0.5.

Between 2003 and 2013, rural stroke ER visit rates ranged from a low of 1.0 to a high of 1.2, while urban rates ranged from a low of 0.5 to a high of 0.6. Although the changes over time were not significant, the rural rates trended slightly upward while the urban rates trended slightly downward. As a result, the rural-urban disparity ratio increased.



<sup>53</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

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## *Unintentional Injuries/Motor Vehicle Accidents*

The fifth leading cause of death for both rural and urban Missourians is unintentional injuries, a category that includes motor vehicle accidents (MVAs), falls, drug overdoses, fires and drownings.<sup>54</sup> The rural rate of unintentional injury deaths (54.9 per 100,000 residents for 2003-2013) is statistically significantly higher than the urban rate (43.3). Rural residents have significantly higher unintentional injury death rates for both genders and all age groups except 65 and over; the urban rate is significantly higher than the rural rate for this age group.

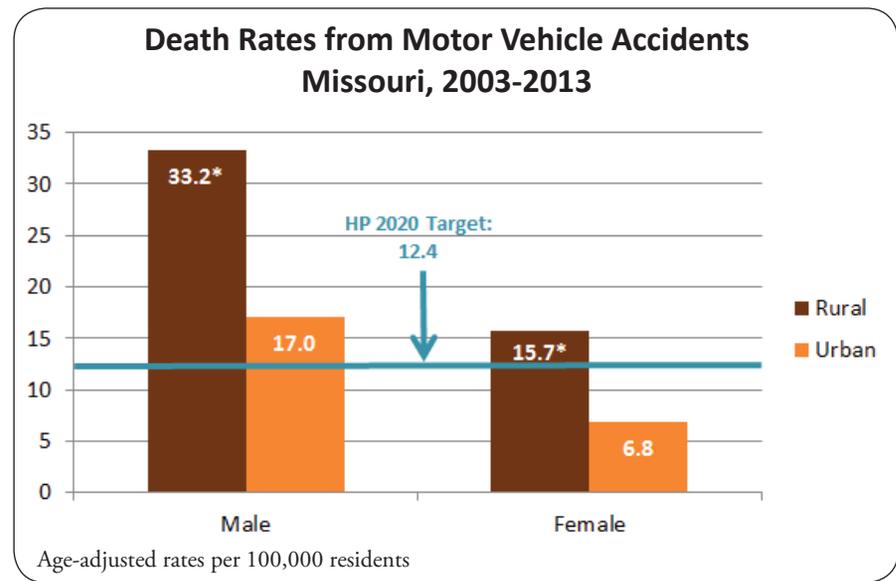
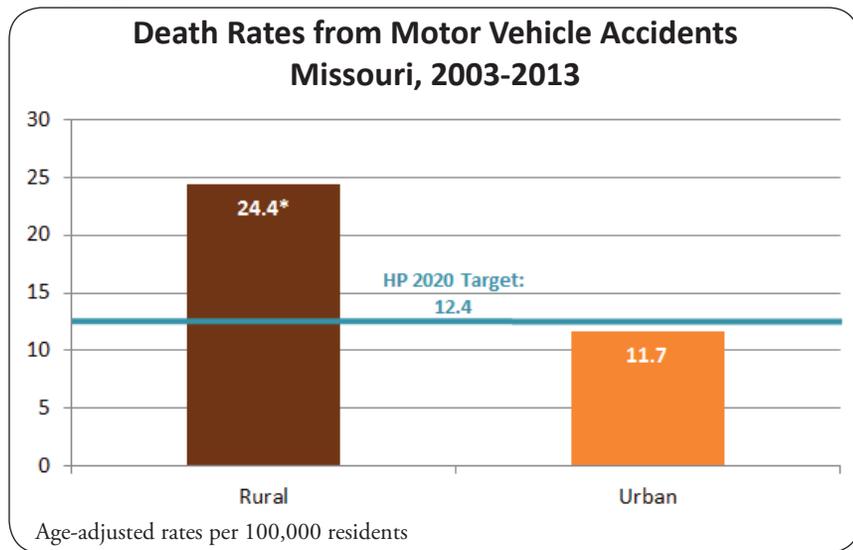
Likewise, rural residents visit the ER for unintentional injuries at a significantly higher rate (89.9 versus 77.2 per 1,000 residents). Rural residents have higher unintentional injury ER visit rates for both genders and for all age groups.



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<sup>54</sup>Missouri Department of Health and Senior Services. *Leading Causes of Death Profile – Definitions*. Accessed July 28, 2015, from [http://www.health.mo.gov/data/mica/CDP\\_MICA/CofDDefinitionofIndicators.html#17](http://www.health.mo.gov/data/mica/CDP_MICA/CofDDefinitionofIndicators.html#17).

The disparity between rural and urban injury deaths is especially pronounced for deaths from MVAs, a subcategory of unintentional injuries. The rural death rate of 24.4 per 100,000 residents is more than double the urban rate of 11.7. In fact, Missouri’s urban MVA death rate is already lower than the Healthy People 2020 target rate of 12.4.<sup>55</sup> Missouri’s rural MVA death rate would have to be reduced by nearly half in order to meet this target. Accidents along the rural roadways of Missouri result in more deaths due to curvier roads, higher driving speeds, lower seatbelt use among certain demographic groups and lack of health system infrastructure to meet emergency needs.<sup>56</sup>



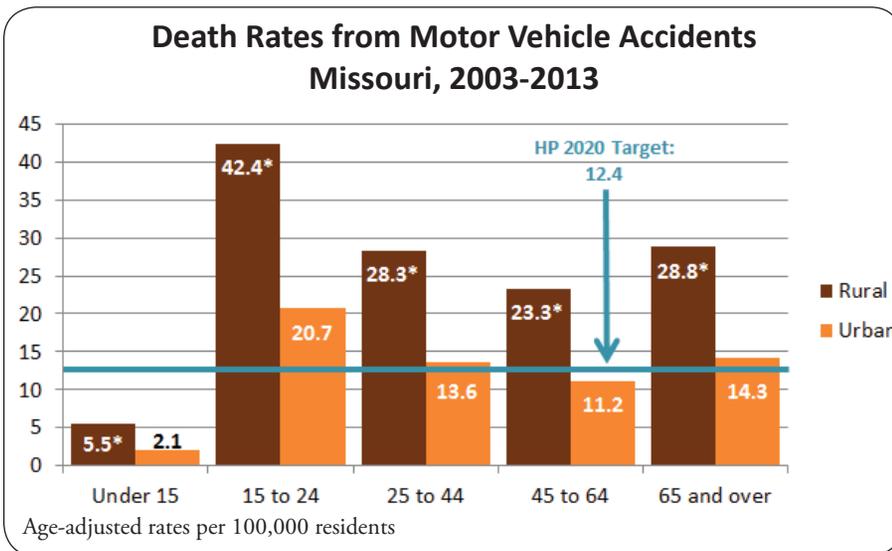
Rural MVA death rates are approximately twice the urban rates for both males and females. Male MVA death rates are significantly higher than female rates in both rural and urban areas; in fact, the male rates are double the female rates for both rural and urban Missourians. “Men typically drive more miles than women and more often engage in risky driving practices including not using safety belts, driving while impaired by alcohol, and speeding. Crashes involving male drivers often are more severe than those involving female drivers. However, females are more likely than males to be killed or injured in crashes of equal severity...”<sup>57</sup> Only urban females fall below the Healthy People 2020 target rate.

<sup>55</sup>HealthyPeople.gov. (Last updated October 9, 2015). *Injury and Violence Prevention Objectives*. Accessed October 13, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/injury-and-violence-prevention/objectives>.

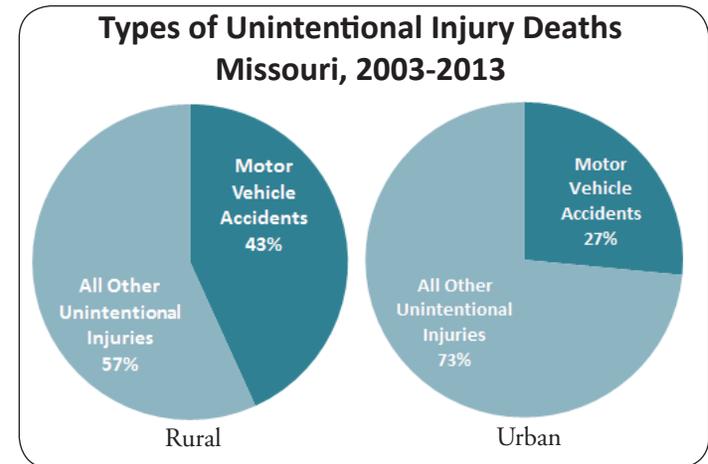
<sup>56</sup>National Highway Traffic Safety Administration (NHTSA). (December 2006). *Traffic Crashes Take Their Toll on America’s Rural Roads: The Need to Establish Rural Safety Belt Programs*. Accessed July 30, 2015, from [www.nhtsa.gov/people/injury/airbags/RuralCrashes.pdf](http://www.nhtsa.gov/people/injury/airbags/RuralCrashes.pdf).

<sup>57</sup>Insurance Institute for Highway Safety, Highway Loss Data Institute. (2013). *Fatality Facts: Gender. General Statistics*. Accessed August 19, 2015, from <http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/gender>.

Rural MVA death rates are also significantly higher – again, more than double the urban rates – across all age groups. The highest rates occur among the 15 to 24 age group in both rural and urban areas. The rural death rate in this age group is more than three times the Healthy People 2020 target rate.



Although MVA death rates declined between 2003 and 2013, MVAs still account for 43 percent of all rural unintentional injury deaths. In contrast, MVA deaths are responsible for less than one-third of all urban unintentional injury deaths.



In fact, MVA death rates are significantly higher than the state rate in nearly 65 percent of Missouri's rural counties. Only one rural county, Cape Girardeau, has a significantly low MVA death rate compared to the state overall.

The three highest MVA death rates by county are clustered in the south central part of the state. The rates for these three counties are more than double the overall rural rate of 24.4 and are over four times higher than the overall urban rate of 11.7. The lowest rural MVA death rates are dispersed throughout the state.

### Death Rates from Motor Vehicle Accidents Selected Rural and Urban Missouri Counties, 2003-2013

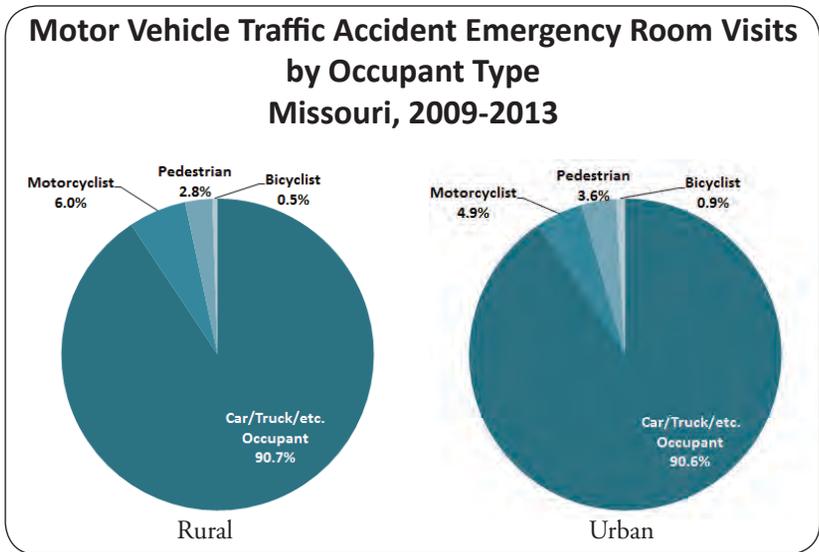
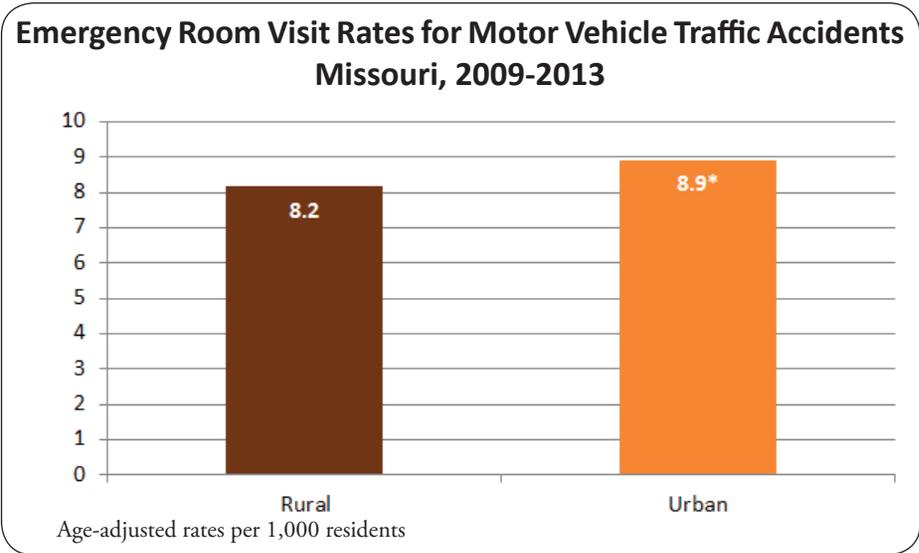
	Rank Rural	Number	Rate	Rank Urban	Number	Rate
<b>Highest</b>	1 Reynolds County	38	56.4	1 Newton County	153	24.7
	2 Carter County	31	49.3	2 Jasper County	241	19.3
	3 Shannon County	42	47.9	3 Jefferson County	436	19.0
<b>Lowest</b>	99 Adair County	35	13.2	12 Platte County	100	10.7
	100 DeKalb County	19	12.6†	13 St. Louis County	942	8.5
	101 Cape Girardeau County	91	10.5	14 St. Charles County	316	8.4

Age-adjusted rates per 100,000 residents

†Unstable rate based on fewer than 20 events



MVA ER visits are reported in two categories: those that occurred on a trafficway, such as a highway or street, and those that occurred on a non-trafficway, such as a parking lot or driveway. Both categories include persons injured in a motor vehicle accident, regardless of whether they were in a motor vehicle at the time of injury. For the time period from 2009 through 2013, 73.2 percent of rural MVA ER visits and 83.9 percent of urban MVA ER visits were due to injuries that occurred on a trafficway. The remainder of this section focuses only on motor vehicle traffic accidents since they are responsible for the majority of MVA ER visits. The urban ER visit rate of 8.9 per 1,000 residents is significantly higher than the rural ER visit rate of 8.2. This starkly contrasts with the pattern of inpatient hospitalization rates, which are significantly higher for rural residents.<sup>58</sup>



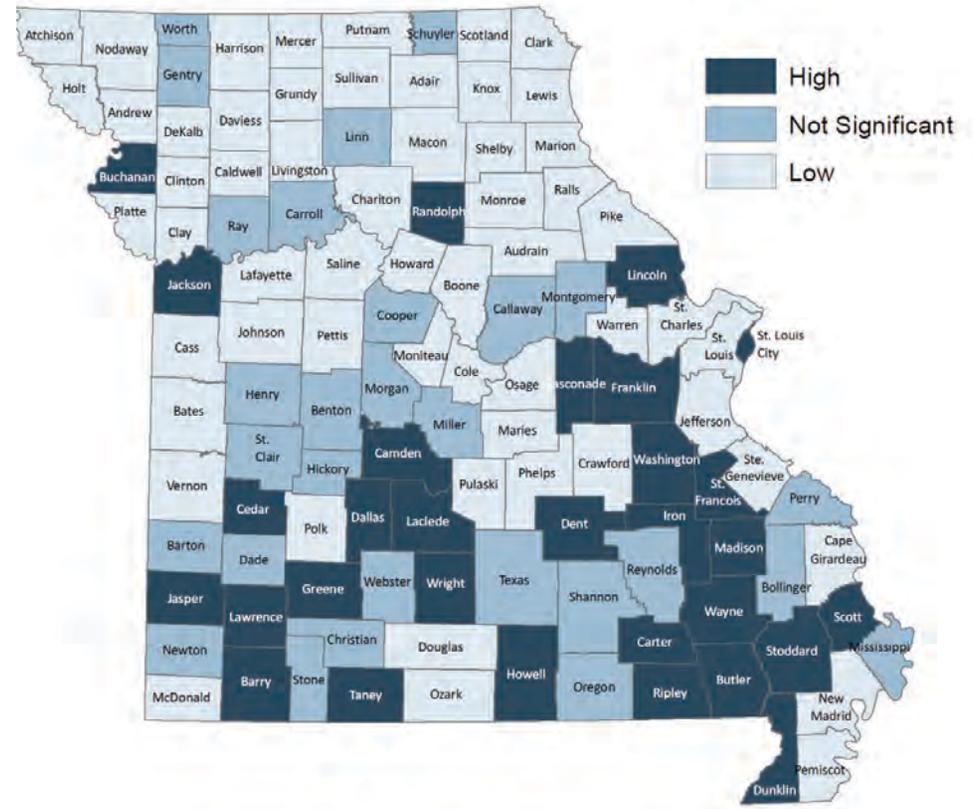
In both rural and urban areas, over 90 percent of motor vehicle traffic accident ER patients are classified as car/truck occupants. Motorcyclists are the next largest category, followed by pedestrians and then bicyclists. The pattern is similar for inpatient hospitalizations.<sup>59</sup>

<sup>58</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 24, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

<sup>59</sup>Ibid.

The vast majority of counties with significantly high MVA ER visit rates compared to the state are located south of the Missouri River. One large cluster extends from Gasconade and Franklin counties, which border the river, down to Dunklin County in the Bootheel. A second cluster stretches from Camden County in central Missouri toward the southwest corner of the state. Only two rural counties north of the Missouri River, Randolph and Lincoln, have significantly high rates.

### Emergency Room Visit Rates for Motor Vehicle Traffic Accidents Missouri, 2009-2013



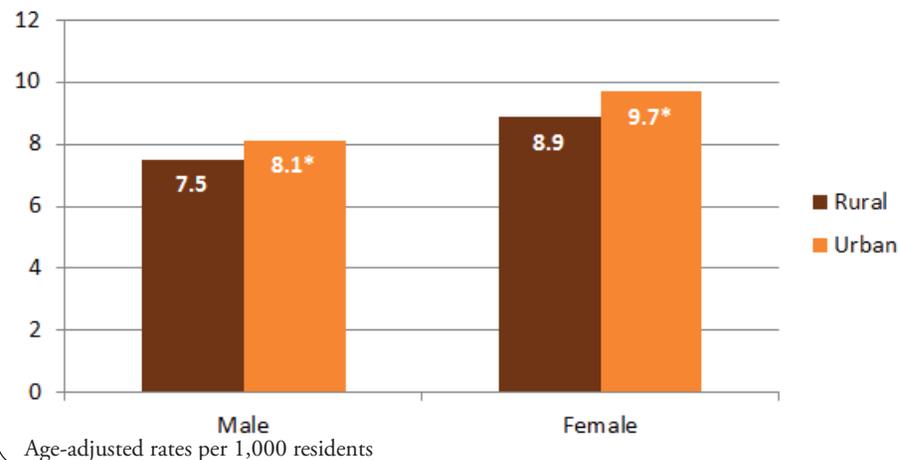
Based on age-adjusted rates per 1,000 residents  
Statistical significance compared to the state using 95 percent confidence intervals



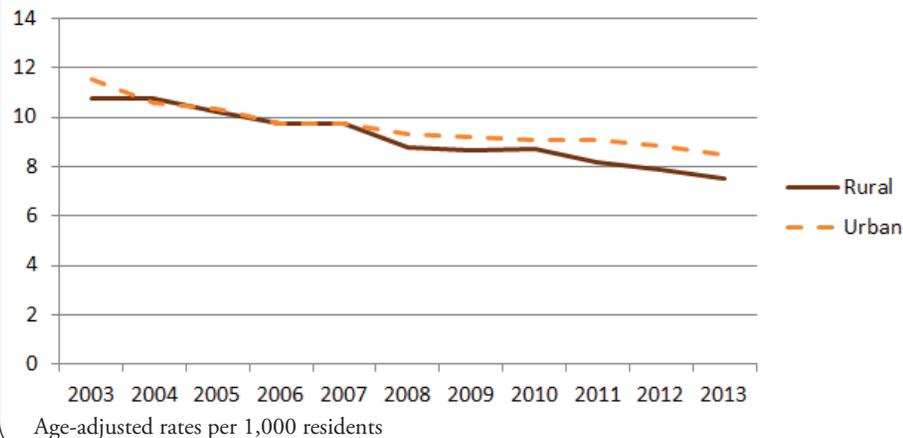
Urban ER visit rates are significantly higher than rural rates for both genders. Although males have significantly higher MVA death rates, females have significantly higher MVA ER visit rates.

ER visit rates for motor vehicle traffic accidents decreased for both rural and urban Missourians between 2003 and 2013. The rates for both areas remained similar from 2004 through 2007. However, in more recent years rural rates decreased more than urban rates. The 2013 rate of 7.5 for rural counties is 30.0 percent less than the 2003 rate of 10.7. Urban counties experienced a decline of 26.3 percent (from 11.5 to 8.5) over the same time period. Although the decreases in both areas are significant, the urban-rural disparity appears to be growing.

**Emergency Room Visit Rates for Motor Vehicle Traffic Accidents  
Missouri, 2009-2013**



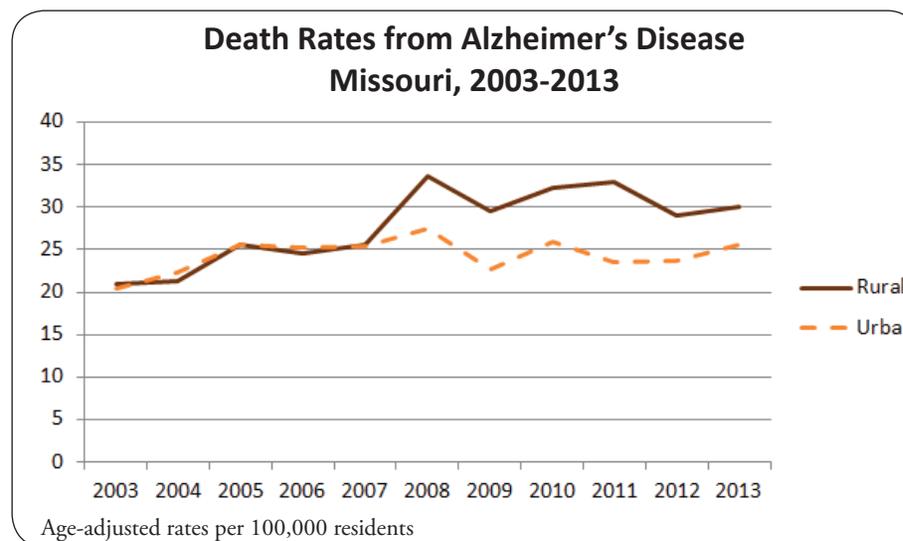
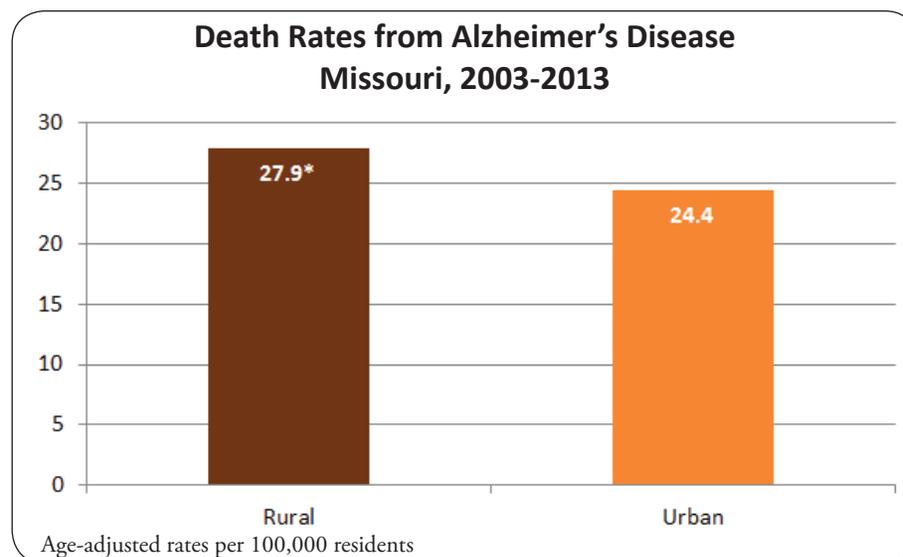
**Emergency Room Visit Rates for Motor Vehicle Traffic Accidents  
Missouri, 2003-2013**



## Alzheimer's Disease

“Alzheimer’s disease is an irreversible, progressive brain disorder that slowly destroys memory and thinking skills and, eventually, the ability to carry out the simplest tasks. In most people with Alzheimer’s, symptoms first appear in their mid-60s. Alzheimer’s disease is the most common cause of dementia among older adults... The time from diagnosis to death varies—as little as 3 or 4 years if the person is older than 80 when diagnosed to as long as 10 or more years if the person is younger.”<sup>60</sup> The rural Alzheimer’s disease death rate of 27.9 per 100,000 residents is 14.3 percent higher than the urban rate of 24.4, which is a statistically significant difference.

Although rural and urban death rates from Alzheimer’s disease were similar from 2003 through 2007, the rural rates diverged from the urban rates between 2007 and 2008. The 2013 rural Alzheimer’s disease death rate is 18.0 percent higher than the 2007 rural rate, while the 2013 urban rate is only 0.8 percent higher than the 2007 urban rate.



<sup>60</sup>National Institute on Aging, Alzheimer’s Disease Education and Referral Center. *About Alzheimer’s Disease: Alzheimer’s Basics*. Accessed October 5, 2015, from <https://www.nia.nih.gov/alzheimers/topics/alzheimers-basics>.

The counties with the three highest rural Alzheimer’s disease death rates are all found in the Southeast BRFSS Region. The counties with the lowest rates are not displayed because the rural rates are based on small numbers of deaths and are considered to be unstable.<sup>61</sup>

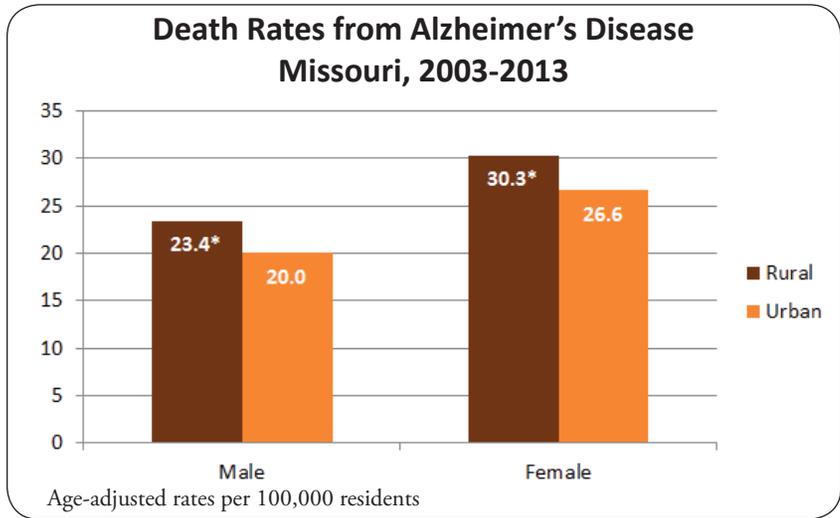
**Death Rates from Alzheimer’s Disease  
Selected Rural and Urban Missouri Counties, 2003-2013**

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Iron County	83	54.3	1	Platte County	298	36.4
	2	Butler County	310	52.8	2	Cass County	387	35.1
	3	Madison County	99	50.3	3	Boone County	455	33.2

Age-adjusted rates per 100,000 residents  
Lowest rates not shown due to small rural numbers

Rural death rates from Alzheimer’s disease are significantly higher than urban rates for both males and females. Female death rates are significantly higher than male death rates in both rural and urban areas. The rural female death rate is significantly higher than the rates for both rural and urban males as well as urban females.

The ER visit rate for Alzheimer’s disease is extremely low (less than 0.1 per 1,000 residents) for the overall population. However, the rates rise considerably among older age groups. For Missourians ages 75 years and over, the rates for the rural and urban populations are not statistically significantly different (0.4 per 1,000 rural residents versus 0.3 per 1,000 urban residents). While the Alzheimer’s disease ER visit rates for residents ages 85 years and over are even higher (1.0 per 1,000 rural residents and 0.8 per 1,000 urban residents), this rural-urban difference is also not statistically significant.<sup>62</sup>

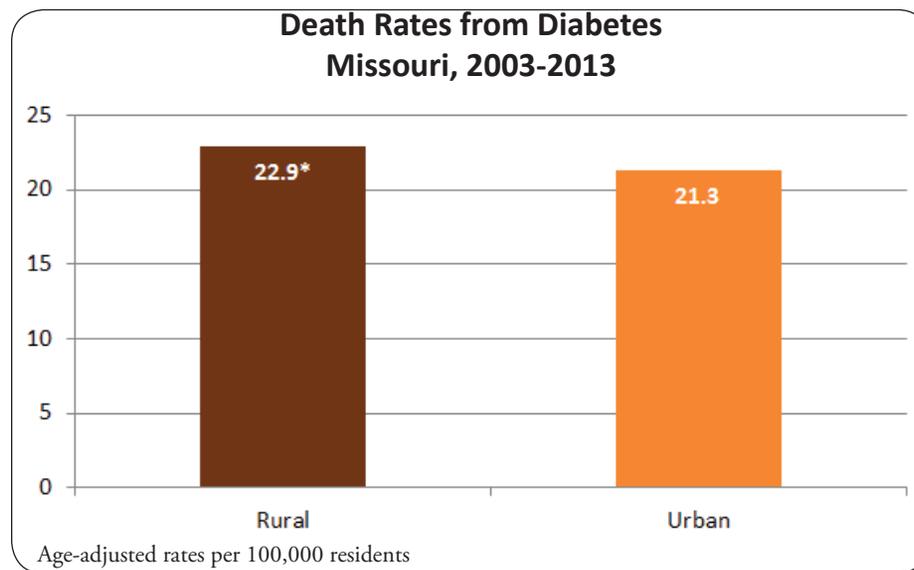


<sup>61</sup>See the Glossary for a discussion of unstable rates.

<sup>62</sup>Alzheimer’s disease ER visit data were obtained from Patient Abstract System files with the assistance of David Litchfield in the Bureau of Health Care Analysis and Data Dissemination.

## Diabetes

The 2014 BRFSS estimates that 11.1 percent of Missouri adults have diabetes.<sup>63,64</sup> Diabetes “occurs when the body cannot produce or respond appropriately to insulin.”<sup>65</sup> According to the Centers for Disease Control and Prevention (CDC), complications from diabetes are “debilitating, costly and sometimes deadly. Diabetes is a major cause of health complications, such as heart disease, stroke, kidney damage (chronic kidney disease and kidney failure), blindness, amputations of the legs and feet, and gum disease (periodontitis).”<sup>66</sup> Research has found that rural diabetics are less likely to receive certain types of care, such as eye and foot examinations and diabetes education.<sup>67</sup> This lack of preventive care may be leading to higher death rates among rural Missourians. For the 2003–2013 time period, the rural diabetes death rate of 22.9 per 100,000 residents is significantly higher than the urban rate of 21.3.



<sup>63</sup>The age-adjusted prevalence estimate is provided in this report. See the Glossary for a discussion of the BRFSS.

<sup>64</sup>Missouri Department of Health and Senior Services, Office of Epidemiology. (August 2015). *2014 Missouri Behavioral Risk Factor Surveillance System Key Findings*. Jefferson City, MO: Missouri Department of Health and Senior Services. Accessed August 24, 2015, from [http://www.health.mo.gov/data/brfss/2014\\_BRFSS\\_Key\\_Findings\\_Report.pdf](http://www.health.mo.gov/data/brfss/2014_BRFSS_Key_Findings_Report.pdf).

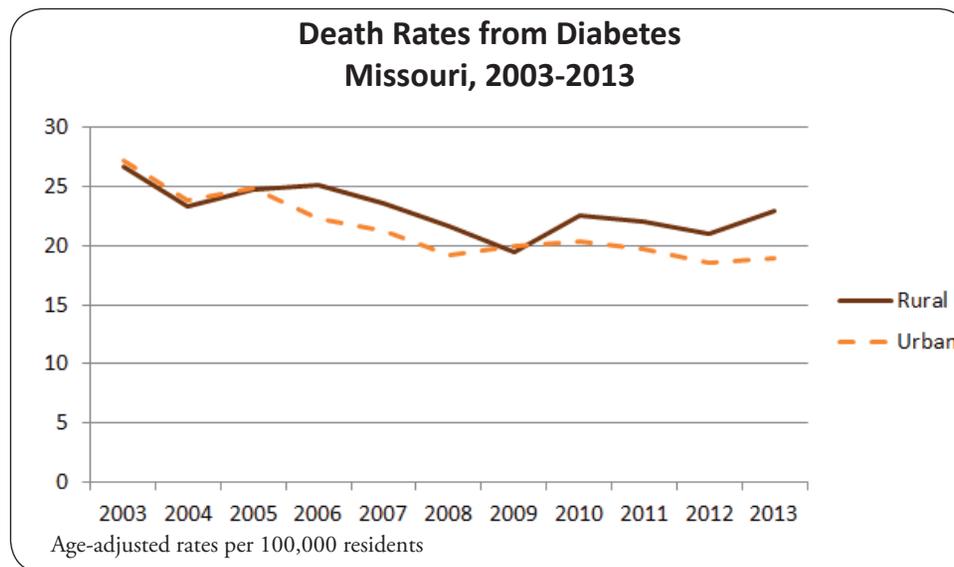
<sup>65</sup>HealthyPeople.gov. (Last updated April 10, 2013). *Diabetes Overview*. Accessed July 27, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/diabetes>.

<sup>66</sup>Centers for Disease Control and Prevention (CDC). (2015). *Diabetes Report Card 2014*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Accessed July 27, 2015, from <http://www.cdc.gov/diabetes/pdfs/library/diabetesreportcard2014.pdf>.

<sup>67</sup>Krishna, S., Gillespie, K.N., and McBride, T.M. (2010). Diabetes Burden and Access to Preventive Care in the Rural United States. *Journal of Rural Health* 26(1), 3-11. Accessed July 27, 2015, from <http://onlinelibrary.wiley.com/doi/10.1111/j.1748-0361.2009.00259.x/abstract;jsessionid=D99AD3AB6618092D6190FE85B5D63290.d03t04>. doi: 10.1111/j.1748-0361.2009.00259.x.

In general, urban diabetes death rates gradually declined from 2003 through 2013. As a result, the 2013 urban rate is statistically significantly lower than the 2003 urban rate. The rural diabetes death rate, however, fluctuated throughout the same time period. It significantly declined between 2003 and 2009 but then significantly increased between 2009 and 2013. Because of these fluctuations, the 2013 rural rate is not significantly different from the 2003 rate. At several points during the early part of the decade, the rural and urban rates were nearly identical. In more recent years, the rural rate has almost always been higher than the urban rate, and the gap between the two appears to be increasing.

The county with the highest rural diabetes death rate is located in the Northeast BRFSS Region. The rural counties ranked second and third are found in the Central and Southeast BRFSS regions, respectively. The counties with the lowest rates are not displayed because the rural rates are based on small numbers of deaths and are considered to be unstable.<sup>68</sup>

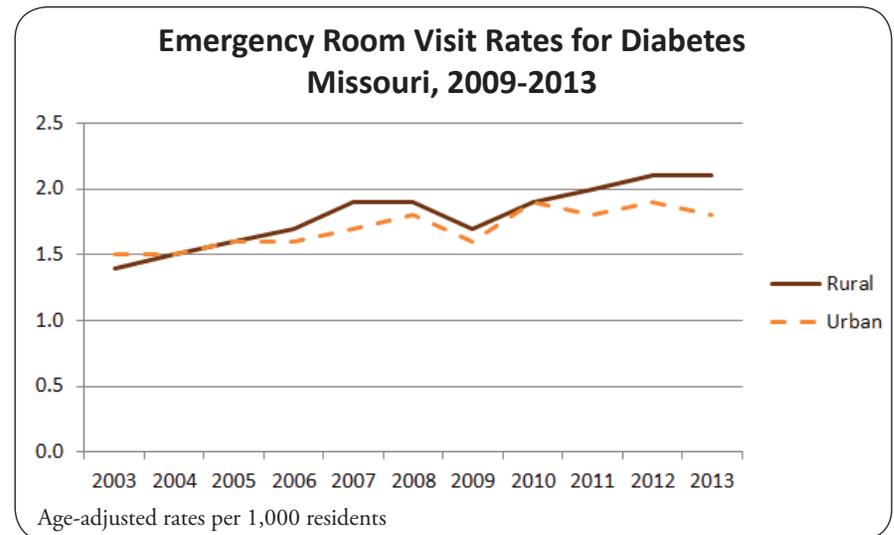
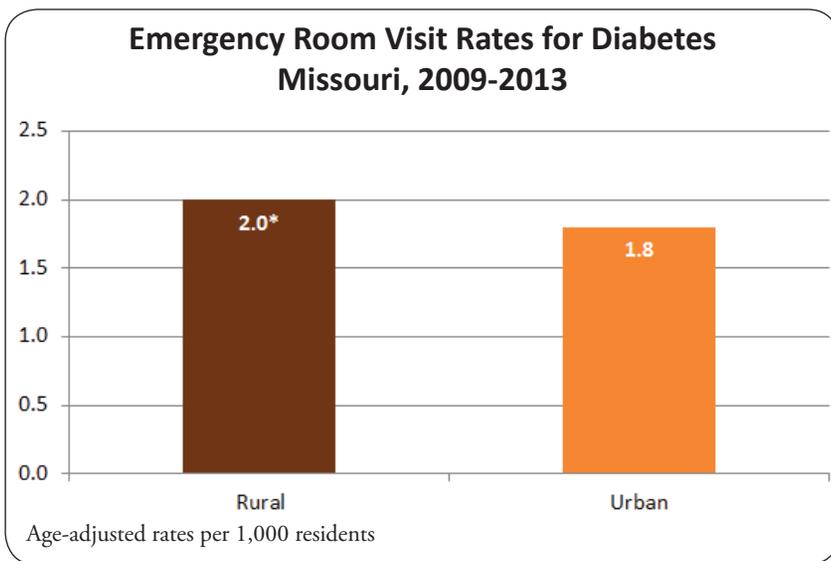


	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Lewis County	72	47.6	1	Buchanan County	471	41.9
	2	Moniteau County	91	46.4	2	St. Louis City	1,199	34.5
	3	Iron County	66	43.7	3	Cole County	206	24.5

Age-adjusted rates per 100,000 residents  
 Lowest rates not shown due to small rural numbers

<sup>68</sup>See the Glossary for a discussion of unstable rates.

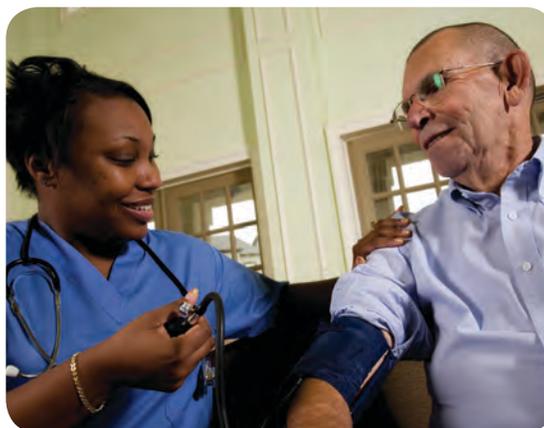
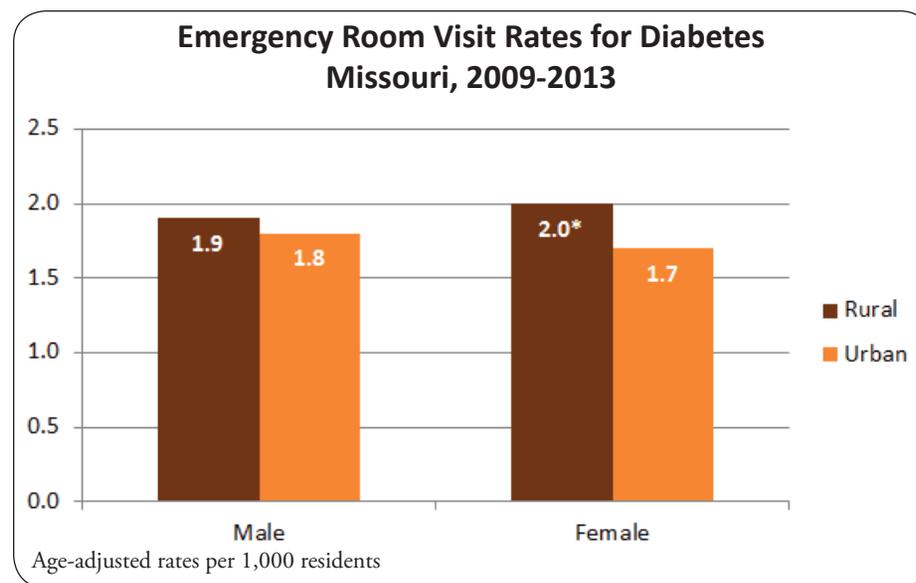
Rural residents also visit the ER for diabetes at a higher rate than urban residents (2.0 visits per 1,000 rural residents versus 1.8 visits per 1,000 urban residents). Although these rates are relatively low, the rural rate is significantly higher than the urban rate.



Between 2003 and 2013, diabetes ER visit rates for both rural and urban residents increased significantly. However, in the most recent three years, the rural rate continued to steadily increase while the urban rate appeared to reach a plateau. If this trend continues, the disparity between the rural and urban rates will grow even larger.

The rural diabetes ER visit rate for females is significantly higher than the urban female rate; however, there is no significant difference between the rural and urban male rates. Analysis performed for the *2012-2013 Health in Rural Missouri Biennial Report* noted that male hospitalization rates for diabetes were significantly higher than female rates in both rural and urban areas.<sup>69</sup> However, data for the 2009-2013 time period reveal that rural females have significantly higher ER visit rates than rural males, urban males and urban females.

Diabetes ER visit rates increase with age in both rural and urban areas. Rural ER visit rates are significantly higher than urban rates among residents in the 15 to 24, 25 to 44, and 65 and over age groups. There is no significant difference between the rural and urban rates for residents in the Under 15 and 45 to 64 age groups.

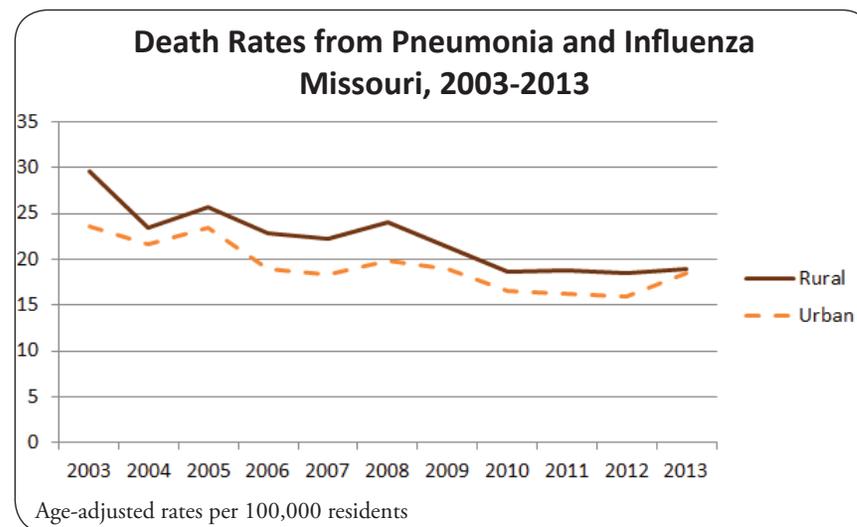
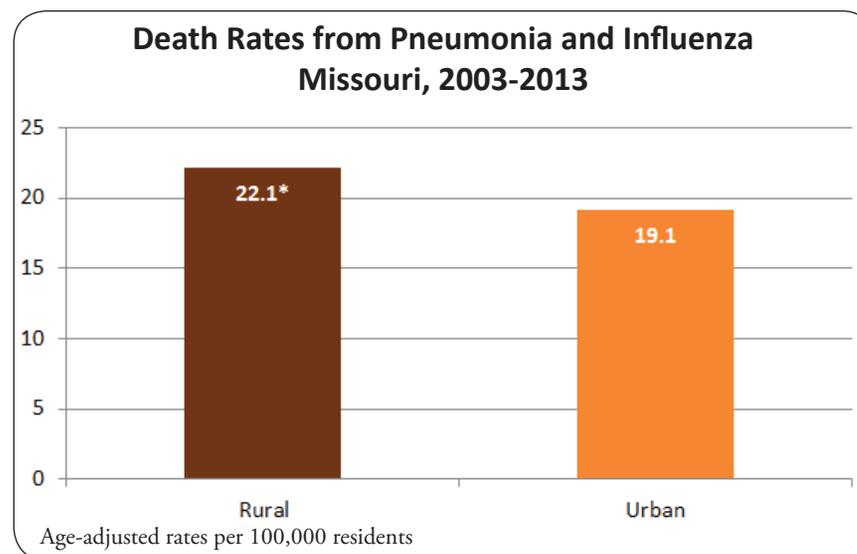


<sup>69</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

## Pneumonia and Influenza

Rural residents die of pneumonia and influenza at a significantly higher rate than urban residents. The rates are 22.1 per 100,000 rural residents versus 19.1 per 100,000 urban residents for the 2003-2013 time period. Rural residents may not be as likely to receive the recommended vaccinations that prevent these infectious diseases due to limited access to health care services. For instance, one study found that rural residents are more dependent upon traditional clinic visits in order to receive influenza shots, while urban residents have more opportunities to receive flu shots through other venues.<sup>70</sup>

Between 2003 and 2013, pneumonia and influenza death rates steadily declined, by 36.1 percent among rural Missourians and 21.6 percent among urbanites. These decreases are statistically significant for both rural and urban residents. However, most of the rate declines occurred prior to 2010. Since then, both the rural and the urban death rates have remained fairly stable except for a slight increase among urban residents between 2012 and 2013 that nearly equalized the rural and urban rates, which were 18.9 and 18.5, respectively.



<sup>70</sup>Bennett, K.J., Pumkam, C., and Probst, J.C. (August 11, 2011). Rural-Urban Differences in the Location of Influenza Vaccine Administration. *Vaccine* 29(35), 5970-5977. Accessed July 27, 2015, from <http://www.sciencedirect.com/science/article/pii/S0264410X11009029>. doi: 10.1016/j.vaccine.2011.06.038

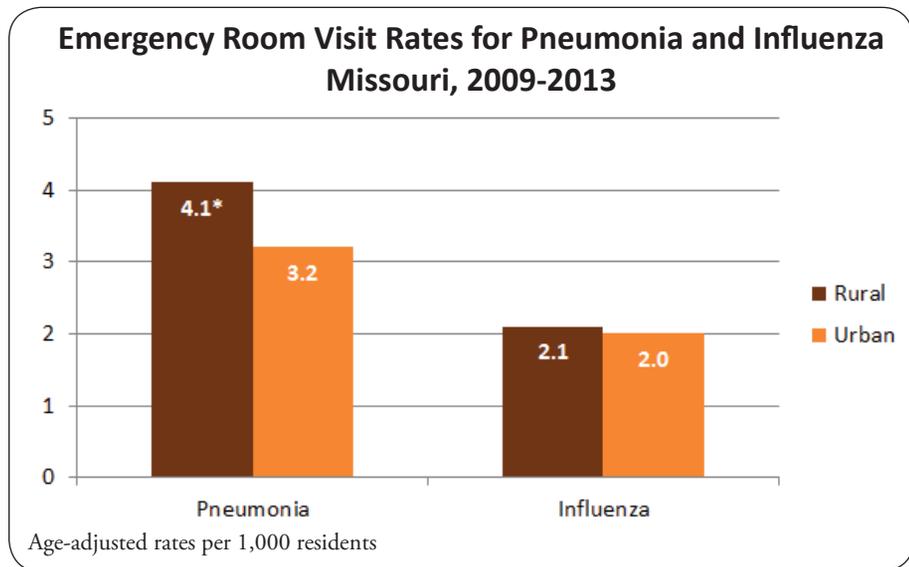
The counties with the three highest rural pneumonia and influenza death rates are Cedar, Ripley and Texas counties. Cedar County is found in the Southwest BRFSS Region, while Ripley and Texas counties are located in the Southeast BRFSS Region. The counties with the two highest urban death rates from pneumonia and influenza are also located in the Southwest BRFSS Region (Jasper and Newton counties). The three lowest rural rates are found in three different BRFSS regions (the Northwest, Southwest and Southeast regions, respectively).

Rural Missourians visit the ER for pneumonia at a higher rate than urban Missourians (4.1 visits per 1,000 rural residents versus 3.2 visits per 1,000 urban residents). The same is true for influenza (2.1 rural versus 2.0 urban). The rural-urban difference in pneumonia ER visit rates is statistically significant, while the small difference in influenza ER visit rates is not.

### Death Rates from Pneumonia and Influenza Selected Rural and Urban Missouri Counties, 2003-2013

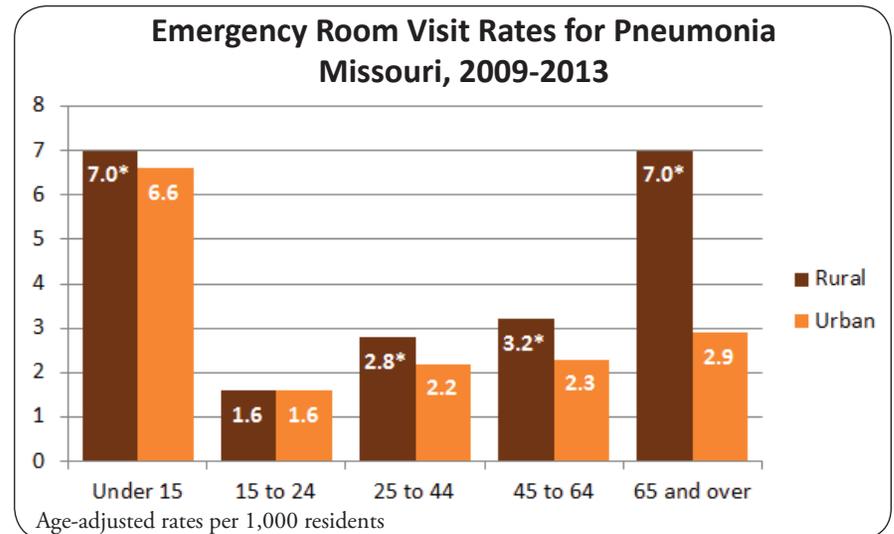
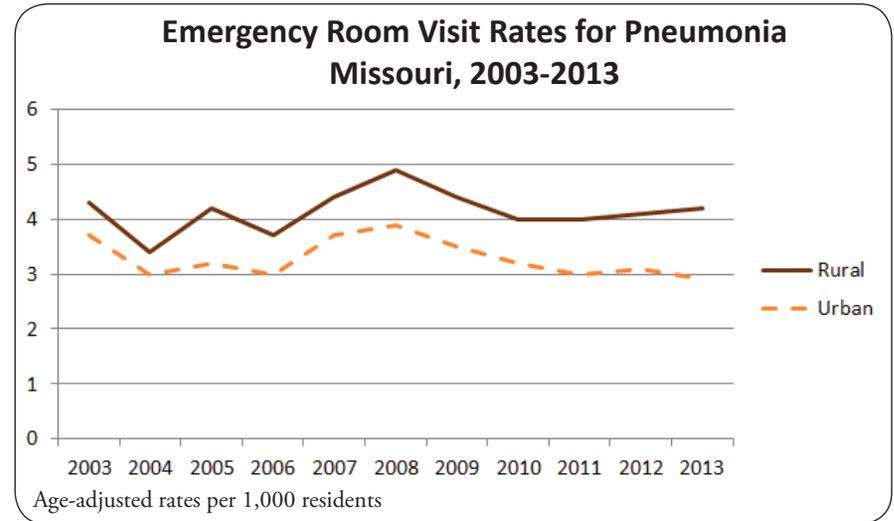
	Rank Rural	Number	Rate	Rank Urban	Number	Rate
<b>Highest</b>	1 Cedar County	103	41.0	1 Jasper County	461	34.2
	1 Ripley County	78	41.0	2 Newton County	218	30.5
	3 Texas County	156	40.2	3 St. Louis City	860	24.0
<b>Lowest</b>	99 Andrew County	29	11.6	12 Clay County	310	14.9
	100 Stone County	50	10.0	13 Buchanan County	170	14.2
	101 Ste. Genevieve County	24	9.9	14 Platte County	98	11.3

Age-adjusted rates per 100,000 residents



Influenza hospitalization and ER visit rates tend to fluctuate due to the different types of influenza that are present from year to year. Pneumonia rates, however, have a more stable trend. The pneumonia ER visit rates for both rural and urban residents have been fairly consistent over the past decade, with rates peaking for both areas in 2008 and then subsequently declining until 2011. At that point, rural rates began to rise slightly. As a result, the disparity between the rural and urban rates has increased. The average annual rural-urban disparity ratio was 1.2 for the 2003-2010 time period. The average annual ratio rose to 1.4 for the 2011-2013 time period.

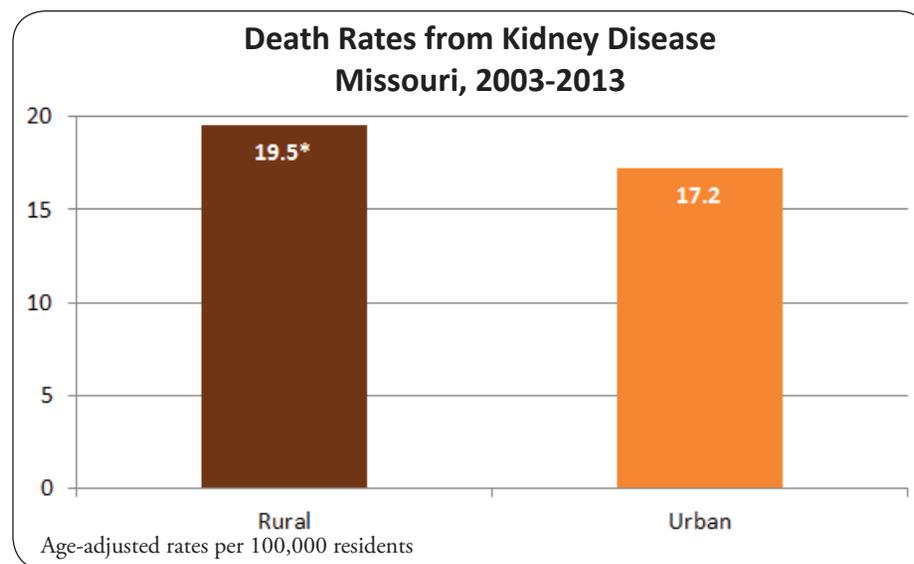
Rural pneumonia ER visit rates are significantly higher than urban rates for all age groups except 15 to 24. The rural-urban disparity increases dramatically across the three oldest age groups, with rural residents in the 65 and over age category seeking ER treatment for pneumonia at a rate that is 141.4 percent higher than the rate for their urban counterparts.



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## Kidney Disease

Kidney disease, which includes nephritis, nephrosis and nephrotic syndrome, renders the kidneys unable to filter waste from the bloodstream.<sup>71,72</sup> Nationally, chronic kidney diseases (CKDs) afflict approximately 11 percent of adults over the age of 20.<sup>73</sup> Most kidney disease deaths in Missouri are “attributed to chronic renal failure.”<sup>74</sup> During the 2003-2013 time period, the Missouri rural kidney disease death rate was 19.5 per 100,000 residents, which is 13.4 percent higher than the 17.2 rate for urban Missourians. This difference is statistically significant.



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<sup>71</sup>Missouri Department of Health and Senior Services. *Leading Causes of Death Profile – Definitions*. Accessed August 24, 2015, from <http://www.health.mo.gov/data/mica/CDP/MICA/CofDDefinitionofIndicators.html#I11>.

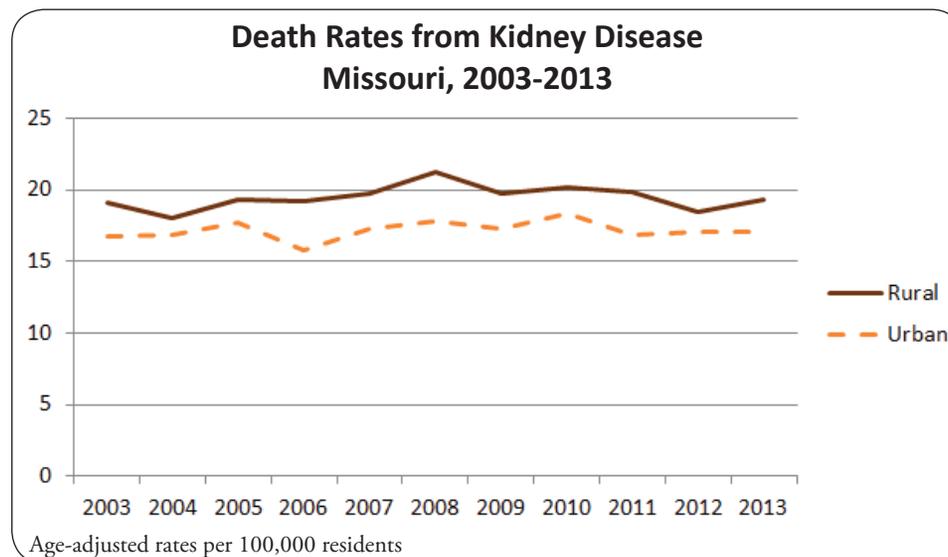
<sup>72</sup>U.S. National Library of Medicine. (Last updated August 12, 2015). Kidney Diseases. *MedlinePlus*. Accessed August 24, 2015, from <https://www.nlm.nih.gov/medlineplus/kidneydiseases.html>.

<sup>73</sup>Fink, H.A., Ishani, A., Taylor, B.C., Greer, N.L., MacDonald, R., Rossini, D., ... and Wilt, T.J. (August 2012). *Final Evidence Summary: Chronic Kidney Disease (CKD): Screening*. U.S. Preventive Services Task Force. Accessed August 24, 2015, from <http://www.uspreventiveservicestaskforce.org/Page/Document/final-evidence-summary15/chronic-kidney-disease-ckd-screening>.

<sup>74</sup>Missouri Department of Health and Senior Services. *Leading Causes of Death Profile – Definitions*. Accessed August 24, 2015, from <http://www.health.mo.gov/data/mica/CDP/MICA/CofDDefinitionofIndicators.html#I11>.

Kidney disease death rates for both rural and urban Missourians remained relatively stable during the 2003-2013 time period. The 2003 and 2013 rates are not significantly different from each other. However, the aging of the Missouri population and the rising prevalence of several conditions associated with kidney disease, which include obesity, diabetes and hypertension, may lead to higher kidney disease death rates in coming years.<sup>75</sup>

The counties with the three highest rural kidney disease death rates are distributed throughout the state. Pemiscot County, which has the highest rate, is located in the Southeast BRFSS Region. Linn County is situated in the Northeast BRFSS Region, while Daviess County falls within the Northwest Region. The counties with the lowest rates are not displayed because the rural rates are based on small numbers of deaths and are considered to be unstable.<sup>76</sup>



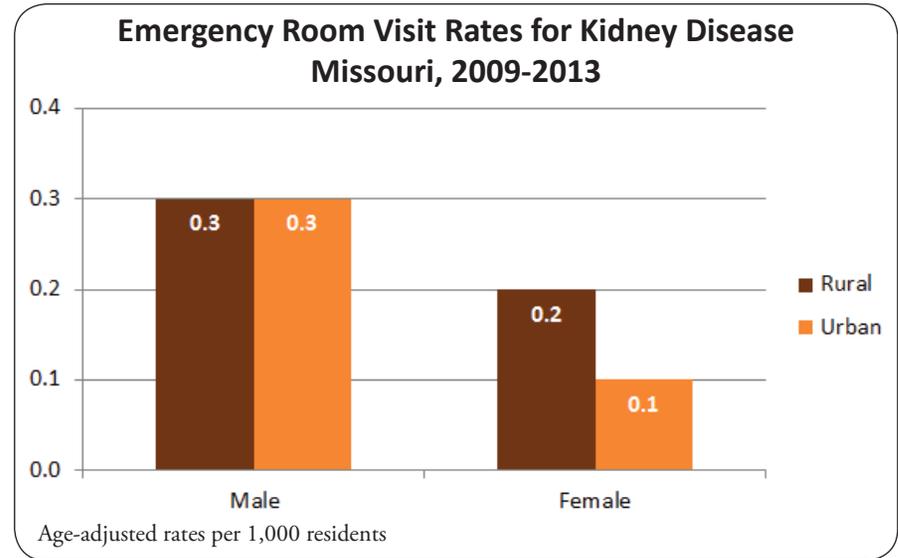
	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Pemiscot County	93	38.5	1	Cass County	297	26.7
	2	Linn County	81	33.7	2	Jackson County	1,702	22.4
	3	Daviess County	37	32.4	3	St. Louis City	755	21.4

Age-adjusted rates per 100,000 residents  
 Lowest rates not shown due to small rural numbers

<sup>75</sup>Coresh, J., Selvin, E., Stevens, L.A., Manzi, J., Kusek, J.W., Eggers, P., ... and Levey, A.S. Prevalence of Chronic Kidney Disease in the United States. *Journal of the American Medical Association* 298(17), 2038-2047. Accessed August 25, 2015, from <http://jama.jamanetwork.com/article.aspx?articleid=209357>. doi:10.1001/jama.298.17.2038.

<sup>76</sup>See the Glossary for a discussion of unstable rates.

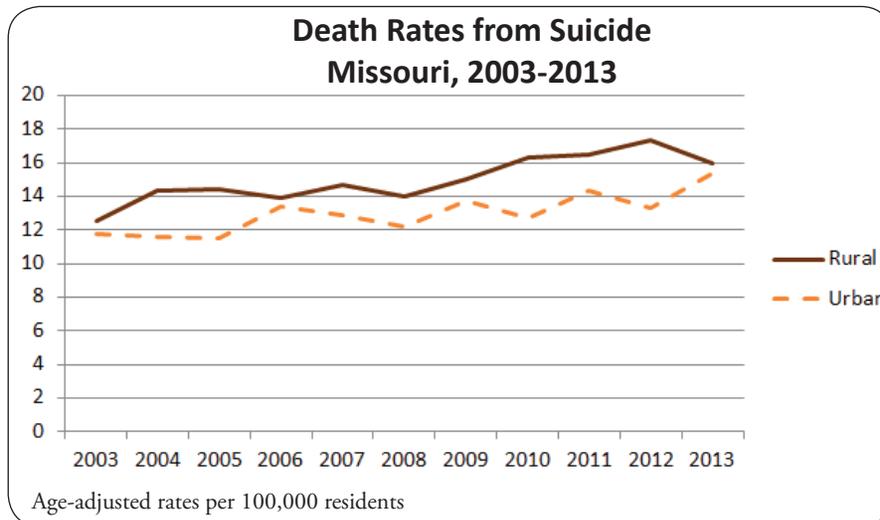
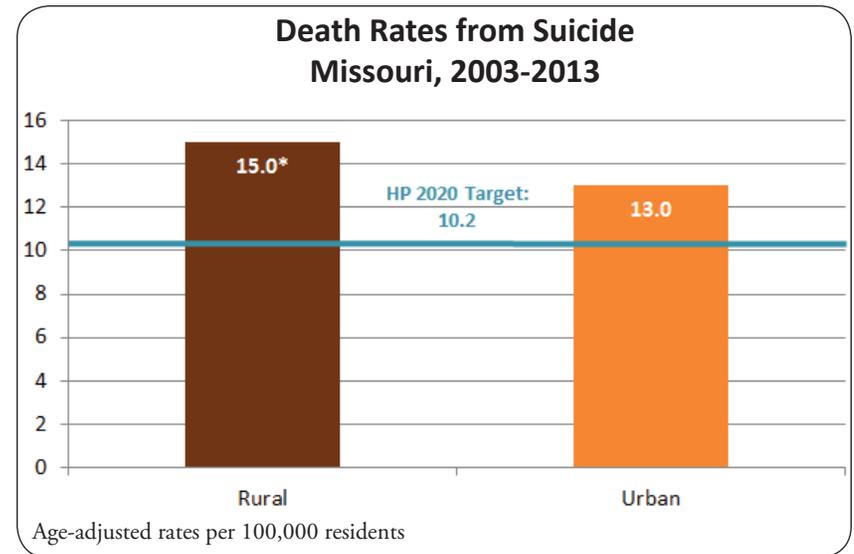
The rural and urban ER visit rates for kidney disease are not statistically significantly different, either overall or by gender. However, male rates are significantly higher than female rates for both rural and urban Missourians, mirroring the pattern seen for kidney disease death rates.



## Suicide

During the 2003-2013 time period, 9,020 Missouri residents committed suicide. The rural suicide rate of 15.0 per 100,000 residents is 15.4 percent higher than the urban rate of 13.0. This difference is statistically significant. Both rates exceed the Healthy People 2020 target of 10.2.<sup>77</sup>

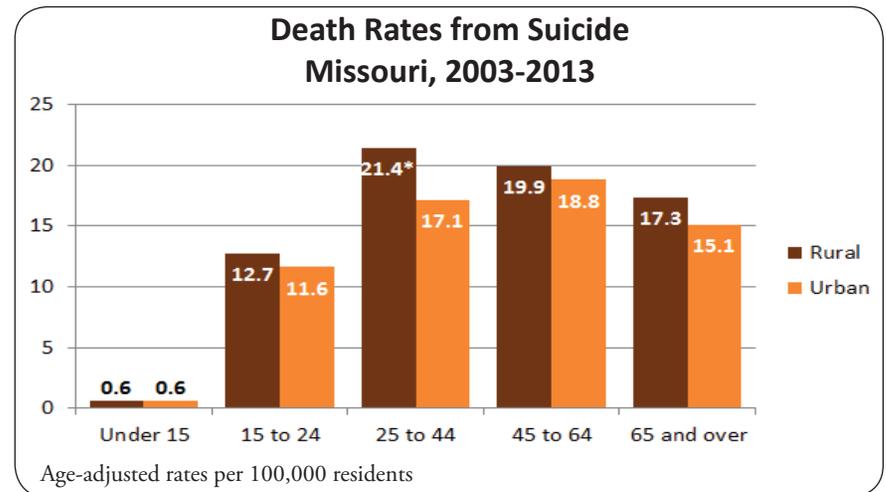
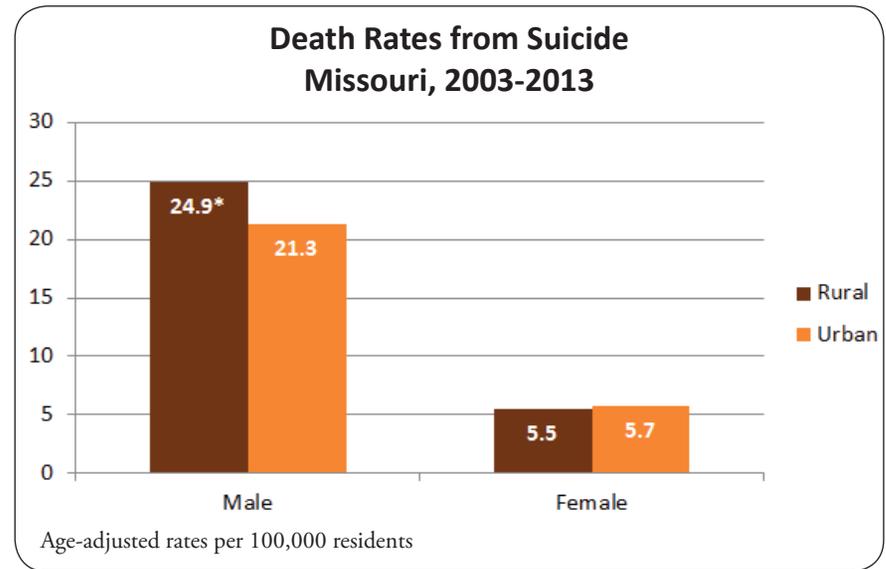
Suicide rates in both rural and urban areas trended upward between 2003 and 2013. The rural rate increased by 28.0 percent during this time; the urban rate increase was slightly larger at 30.5 percent. In spite of the larger increase, urban rates remained lower than rural rates throughout this time period. The increases for both rural and urban residents are statistically significant.



<sup>77</sup>HealthyPeople.gov. (Last updated October 9, 2015). *Mental Health and Mental Disorders Objectives*. Accessed October 13, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/mental-health-and-mental-disorders/objectives>.

Male suicide rates are significantly higher than female rates in both rural and urban areas of Missouri. Rural males have a significantly higher suicide rate than urban males. There is no statistically significant difference between rural and urban female suicide rates.

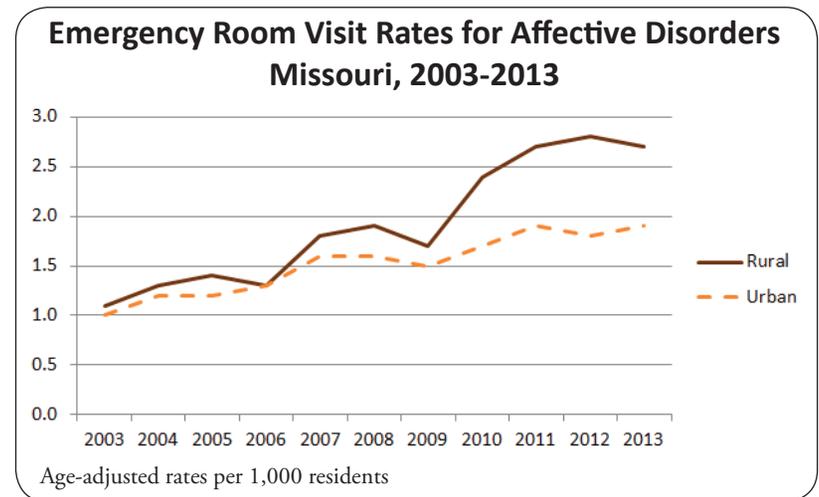
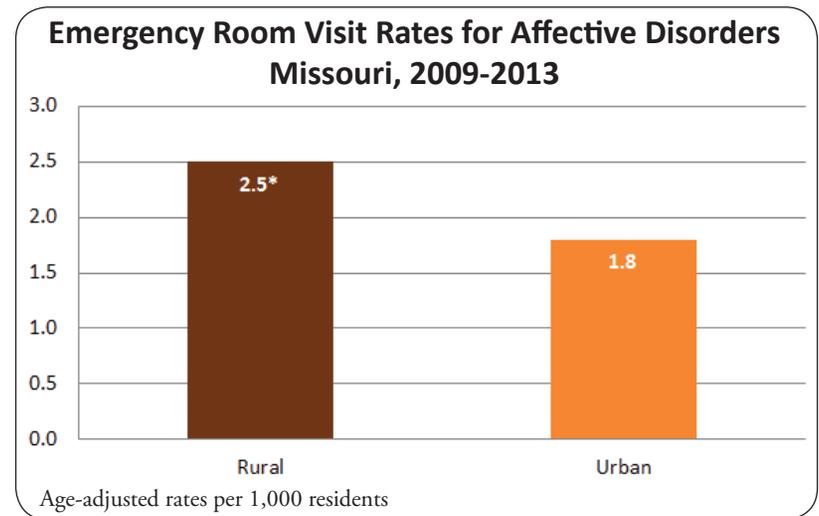
Rural suicide rates are higher than urban rates for all age groups except Under 15. Suicide rates for rural and urban residents under the age of 15 are equal. The highest rural suicide rate occurs among residents in the 25 to 44 age group, and this is the only age group for which the rural rate is significantly higher than the urban rate. The highest urban suicide rate occurs among residents ages 45 to 64.



## Affective Disorders

The affective, or mood, category of disorders includes a variety of mental illnesses, such as depressive, bipolar and schizoaffective disorders, as well as manic episodes.<sup>78</sup> The rural Missouri ER visit rate for affective disorders is 2.5 per 1,000 residents compared to 1.8 for urban residents. This 38.9 percent difference is statistically significant. In contrast, the *2012-2013 Health in Rural Missouri Biennial Report* found that affective disorder hospitalization rates were statistically significantly higher in urban areas.<sup>79</sup>

ER visit rates for affective disorders increased for both rural and urban residents in recent years. While the urban rate nearly doubled between 2003 and 2013, the rural rate grew at an even faster pace, increasing nearly 2.5 times, with much of the fastest growth occurring during more recent years. During the earlier part of the time period, from 2003 through 2009, the rural-urban disparity fluctuated greatly, but the rural rate was never more than 20 percent higher than the urban rate. (In 2006, the rates were equal, meaning there was no disparity. The greatest disparity for those years occurred in 2008, when the rural rate was 18.8 percent higher than the urban rate.) From 2010 through 2013, however, the annual rural rates were consistently at least 40 percent higher than the annual urban rates.



<sup>78</sup>Centers for Medicare and Medicaid Services (CMS). (2014). Affective Disorders. *Road to 10: The Small Physician Practice's Route to ICD-10*. Accessed August 27, 2015, from <http://www.roadto10.org/category/health-condition-categories/behavioral-health/affective-disorders/>.

<sup>79</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012-2013 Health in Rural Missouri Biennial Report*. Accessed August 18, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

The counties with the four highest rural ER visit rates for affective disorders are all located in the Southeast BRFSS Region. The counties with the lowest rates are not displayed because the rural rates are based on small numbers of ER visits and are considered to be unstable.

### Emergency Room Visit Rates for Affective Disorders Selected Rural and Urban Missouri Counties, 2009-2013

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
Highest	1	Dunklin County	1,122	8.0	1	St. Louis City	4,841	3.0
	2	Ripley County	389	6.4	2	Jasper County	1,328	2.4
	3	Butler County	1,163	6.1	3	Buchanan County	910	2.1
	4	Wayne County	238	4.4	3	Clay County	2,295	2.1

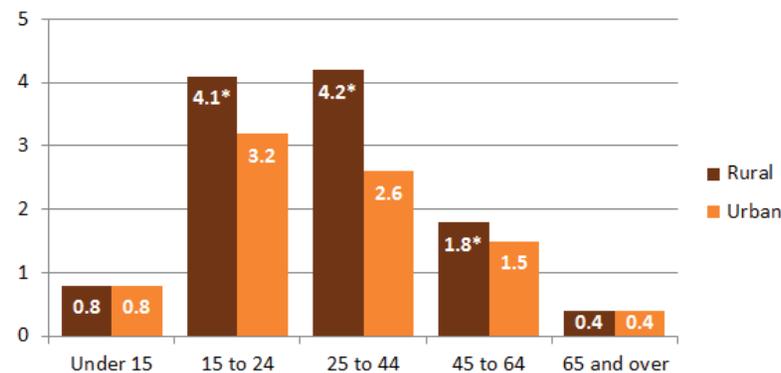
Age-adjusted rates per 1,000 residents

Lowest rates not shown due to small rural numbers

Multiple studies over decades indicate that persons suffering from affective disorders have much higher suicide rates than the general population.<sup>80,81,82</sup> “An important feature of suicidal behavior among patients with major affective disorders is the high lethality of the suicide attempts (presumably reflecting both the intent and the method of suicide)...”<sup>83</sup> As discussed earlier in the Health Status section of this report, suicide is the tenth leading cause of death in Missouri, with significantly higher rates among rural Missourians compared to urban Missourians.

Rural affective disorder ER visit rates are significantly higher than urban rates for both genders. However, rural females have significantly higher rates than rural males, while there is no significant difference between the urban male and urban female rates. Rural and urban rates are equal for residents under 15 and 65 and over, but rural rates are significantly higher than urban rates for residents between the ages of 15 and 64.

### Emergency Room Visit Rates for Affective Disorders Missouri, 2009-2013



Age-adjusted rates per 1,000 residents

<sup>80</sup>Bostwick, J.M., and Pankratz, V.S. (December 2000). Affective Disorders and Suicide Risk: A Reexamination [Abstract]. *American Journal of Psychiatry* 157(12), 1925-1932. Accessed August 28, 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/11097952>.

<sup>81</sup>Rihmer, Z. (2007). Suicide Risk in Mood Disorders. *Current Opinion in Psychiatry* 20(1), 17-22. Accessed August 28, 2015, from [http://www.medscape.com/viewarticle/550672\\_2](http://www.medscape.com/viewarticle/550672_2).

<sup>82</sup>Angst, F., Stassen, H.H., Clayton, P.J., and Angst, J. (April 2002). Mortality of Patients with Mood Disorders: Follow-up over 34-38 Years [Abstract]. *Journal of Affective Disorders* 68(2-3), 167-181. Accessed August 28, 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/12063145>.

<sup>83</sup>Pompilo, M., Innamorati, M., Mosticoni, S., Lester, D., Del Casale, A., Ardenghi, G., ... and Grispini, A. (2007). Suicide Attempts in Major Affective Disorders. *Clinical Neuropsychiatry* 4(3), 106-110. Accessed August 28, 2015, from <http://www.clinicalneuropsychiatry.org/pdf/pompili2.pdf>.

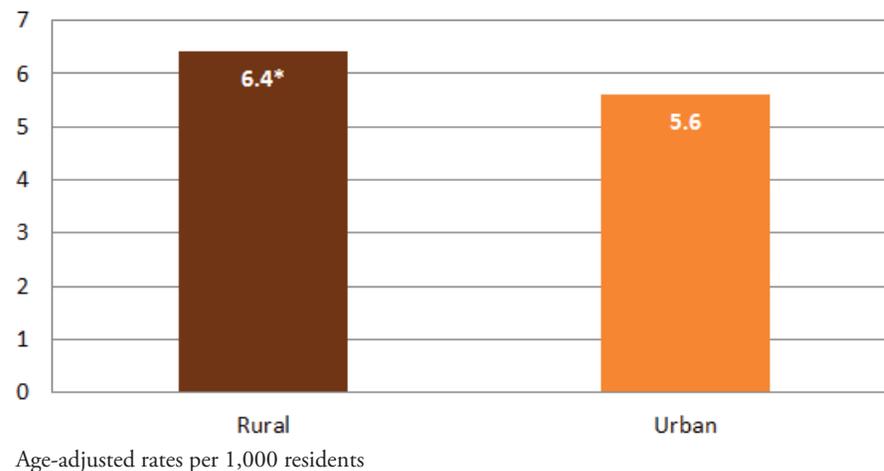
## Acute Bronchitis

Acute bronchitis involves severe inflammation of the bronchial tubes, which carry oxygen to the lungs. It is often caused by a viral infection or by inhaling smoke or other irritants. The symptoms of this illness can last two to three weeks, and complications can include pneumonia. Acute bronchitis may be very serious for persons with lung disease.<sup>84</sup> However, the death rate for acute bronchitis is very low. Only four Missouri residents died of acute bronchitis in 2013.

The rural ER visit rate for acute bronchitis is 6.4 per 1,000 residents, which is 14.3 percent higher than the urban rate of 5.6. This difference is statistically significant.

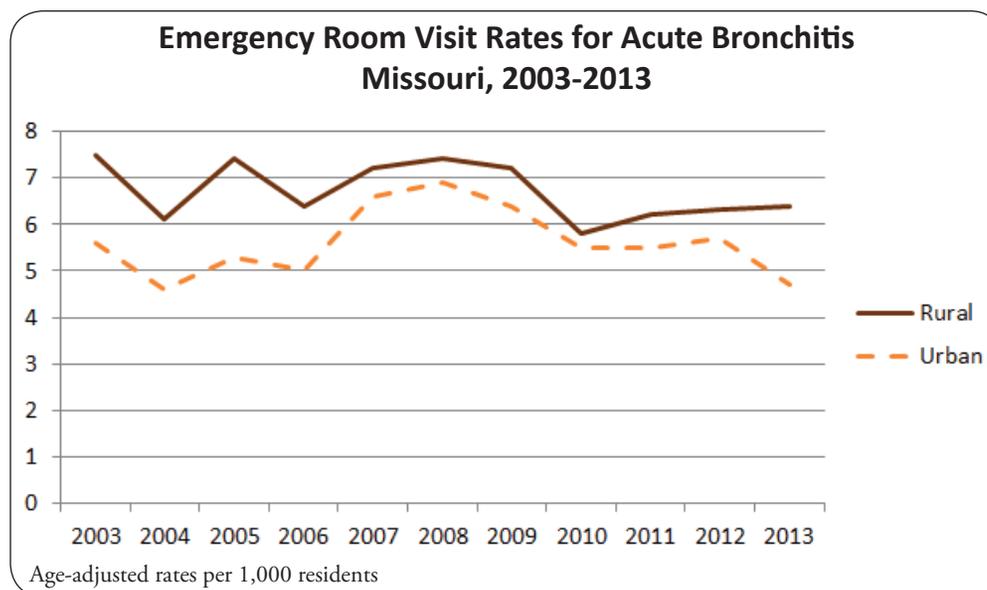


**Emergency Room Visit Rates for Acute Bronchitis  
Missouri, 2009-2013**



<sup>84</sup>National Cancer Institute. (Last reviewed September 9, 2014). Acute Bronchitis. *WebMD*. Accessed August 28, 2015, from <http://www.webmd.com/lung/tc/acute-bronchitis-topic-overview>.

The BRFSS estimates that statewide smoking rates declined each year between 2011 and 2013.<sup>85</sup> (BRFSS trend data for earlier years are no longer comparable due to methodology changes that were implemented beginning with the 2011 survey.<sup>86</sup>) Although these declines are not statistically significant, they may be partially responsible for the drop in acute bronchitis ER visit rates over the past several years. The rural and urban ER visit rates for acute bronchitis fluctuated between 2003 and 2013, but the 2013 rates are roughly 15 percent lower than the 2003 rates in both areas. However, the rural rate remained higher than the urban rate throughout the 2003–2013 time period. The *2012–2013 Health in Rural Missouri Biennial Report* found that rural residents smoke at higher rates than their urban counterparts, which may be one contributing factor to the higher rural ER visit rates for acute bronchitis.<sup>87</sup> Furthermore, the downward trend in acute bronchitis ER visit rates may be reversing for rural residents. Rural rates reached a low of 5.8 in 2010 but since that time have increased significantly to 6.4 in 2013. Urban rates remained fairly stable between 2010 and 2012 but then decreased significantly between 2012 and 2013. As a result, the rural rate, which had been only 5.5 percent higher than the urban rate in 2010, is now 36.2 percent higher.



<sup>85</sup>Centers for Disease Control and Prevention (CDC). (Last updated June 23, 2015). *BRFSS Prevalence and Trends Data*. Accessed September 9, 2015, from <http://www.cdc.gov/brfss/brfssprevalence/index.html>.

<sup>86</sup>Centers for Disease Control and Prevention (CDC). (Last updated February 3, 2015). *BRFSS Frequently Asked Questions (FAQs)*. Accessed September 9, 2015, from [http://www.cdc.gov/brfss/about/brfss\\_faq.htm](http://www.cdc.gov/brfss/about/brfss_faq.htm).

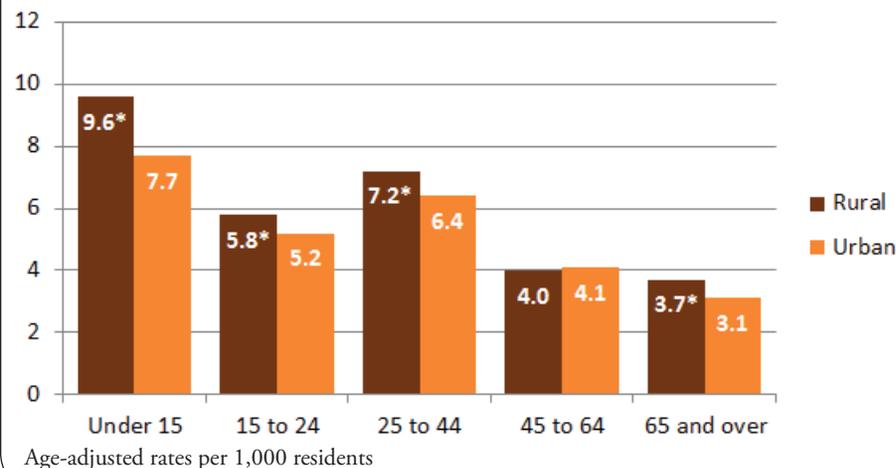
<sup>87</sup>Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health. (2013). *2012–2013 Health in Rural Missouri Biennial Report*. Accessed September 9, 2015, from <http://health.mo.gov/living/families/ruralhealth/pdf/biennial2013.pdf>.

Rural acute bronchitis ER visit rates are significantly higher than urban rates for both males and females. As with COPD/bronchiectasis, asthma and influenza ER visit rates, female rates for acute bronchitis are higher than male rates in both rural and urban areas. (Rural males have significantly higher ER visit rates for pneumonia than rural females, but there is no statistically significant difference between urban males and females.)

ER visit rates for acute bronchitis tend to decrease with age in both rural and urban areas. The rate for rural residents under the age of 15 is statistically significantly higher than the rate for any other age group in either rural or urban areas.

Two of the three highest rural ER visit rates for acute bronchitis are found in the Southeast BRFSS Region, in Dunklin and Cape Girardeau counties. The third, Dent County, is located in the Central Region but borders the Southeast Region. The counties with the three highest urban rates are all located in the Southwest Region. The counties with the three lowest rural rates are all part of the Northeast Region, while the counties with the three lowest urban rates are all part of the St. Louis Metro Region.

**Emergency Room Visit Rates for Acute Bronchitis  
Missouri, 2009-2013**



**Emergency Room Visit Rates for Acute Bronchitis  
Selected Rural and Urban Missouri Counties, 2009-2013**

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Dunklin County	2,396	15.5	1	Jasper County	14,966	26.0
	2	Dent County	1,067	14.4	2	Newton County	4,217	15.0
	3	Cape Girardeau County	4,917	13.7	3	Greene County	17,248	12.8
<b>Lowest</b>	99	Putnam County	37	1.5	12	St. Louis County	14,229	3.1
	100	Mercer County	28	1.4	13	St. Charles County	3,783	2.2
	101	Lewis County	35	0.7	14	Jefferson County	1,857	1.8

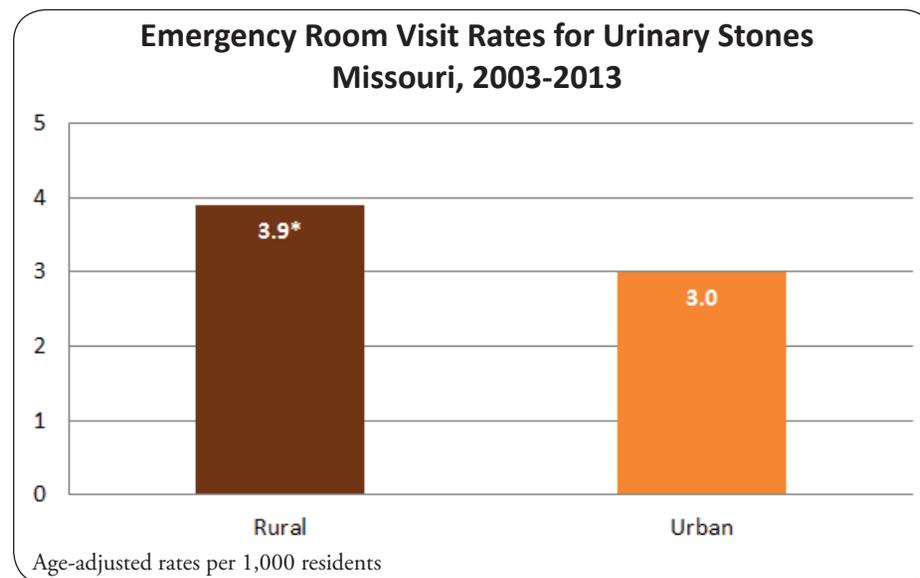
Age-adjusted rates per 1,000 residents

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## Urinary Stones

Urinary stones are also referred to as calculi of the urinary tract. They may form anywhere in the urinary tract when a person's urine contains certain substances in greater amounts than the body is able to dilute. Most stones form in the kidneys and are therefore referred to as kidney stones. The substance that most commonly creates urinary stones is calcium. Although urinary stones often cause extreme and sudden pain, they typically cause no lasting damage.<sup>88,89</sup> However, "kidney stones increase the risk of developing chronic kidney disease."<sup>90</sup> Kidney disease is the ninth leading cause of death for both rural and urban Missourians.

In Missouri, rural residents visit the ER for urinary stones at significantly higher rates than urban residents (3.9 visits per 1,000 rural residents versus 3.0 visits per 1,000 urban residents, a 30.0 percent difference).



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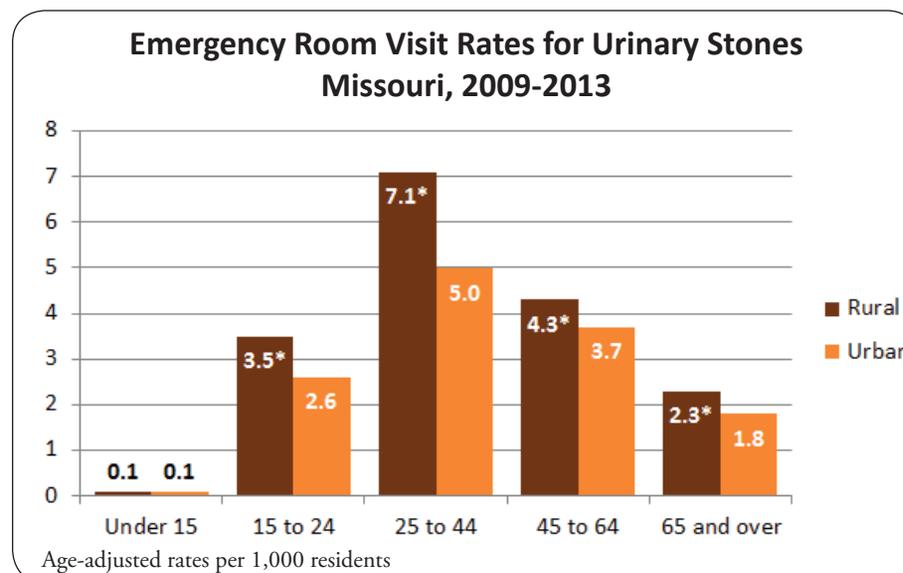
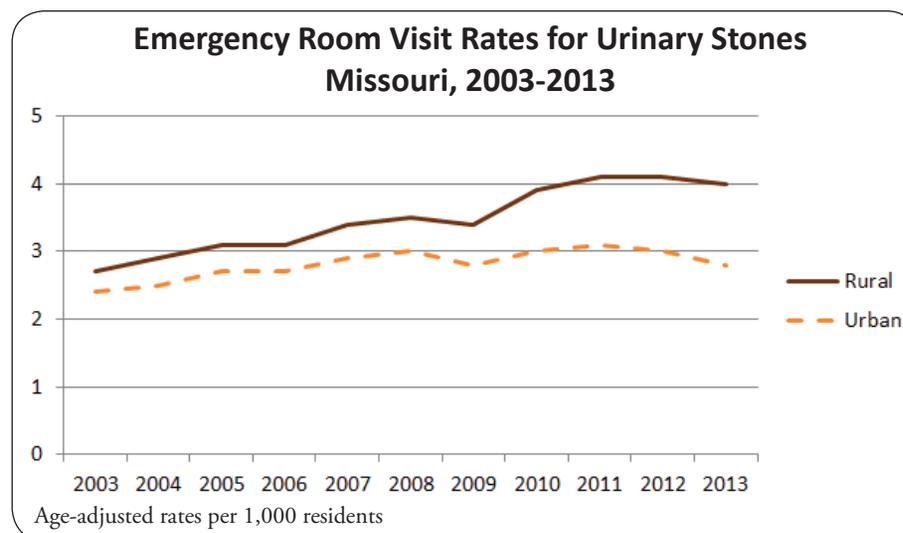
<sup>88</sup>Preminger, Glenn M. Stones in the Urinary Tract (Urolithiasis). *Merck Manuals Consumer Version*. Accessed August 28, 2015, from <http://www.merckmanuals.com/home/kidney-and-urinary-tract-disorders/stones-in-the-urinary-tract/stones-in-the-urinary-tract>.

<sup>89</sup>Mayo Clinic Staff. (February 26, 2015). Kidney Stones. *Mayo Clinic*. Accessed August 28, 2015, from <http://www.mayoclinic.org/diseases-conditions/kidney-stones/basics/definition/con-20024829>.

<sup>90</sup>National Kidney Foundation. Kidney Stones. *National Kidney Foundation*. Accessed August 28, 2015, from <https://www.kidney.org/atoz/content/kidneystones>.

Urinary stone ER visit rates are increasing in both rural and urban areas of Missouri. The disparity between the two areas is also growing. Rural rates increased by 48.1 percent between 2003 and 2013, while urban rates increased by only 16.7 percent. Potential risk factors for kidney stones “include drinking too little water, exercise (too much or too little), obesity, weight loss surgery or eating food with too much salt or sugar. Infections and family history might be important in some people. Eating too much fructose correlates with increasing risk of developing a kidney stone. Fructose can be found in table sugar and high fructose corn syrup... Other diseases such as high blood pressure, diabetes and obesity may increase the risk for kidney stones.”<sup>91</sup> As rates for several of these risk factors continue to increase, ER visit rates for urinary stones are likely to increase as well.

Rural urinary stone ER visit rates are significantly higher than urban rates for both genders and all age groups except under 15. (The under 15 rural and urban rates are equal.) Male rates for ER visits related to urinary stones are higher than female rates. Rates peak among residents in the 25 to 44 age group in both rural and urban areas.



<sup>91</sup>National Kidney Foundation. Kidney Stones. *National Kidney Foundation*. Accessed August 28, 2015, from <https://www.kidney.org/atoz/content/kidneystones>.

The counties with the three highest rural urinary stone ER visit rates are all found in the Southeast BRFSS Region. The counties with the three lowest rural rates are all located in the Northeast BRFSS Region.

### Emergency Room Visit Rates for Urinary Stones Selected Rural and Urban Missouri Counties, 2009-2013

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Madison County	377	6.4	1	Jasper County	3,116	5.6
	2	Dent County	430	6.0	2	Cass County	2,042	4.2
	3	Iron County	283	5.9	3	Buchanan County	1,836	4.1
<b>Lowest</b>	99	Mercer County	29	1.3	12	Platte County	1,343	2.9
	100	Clark County	34	0.9	13	St. Louis County	11,077	2.2
	101	Lewis County	36	0.7	14	St. Louis City	2,616	1.6

Age-adjusted rates per 1,000 residents

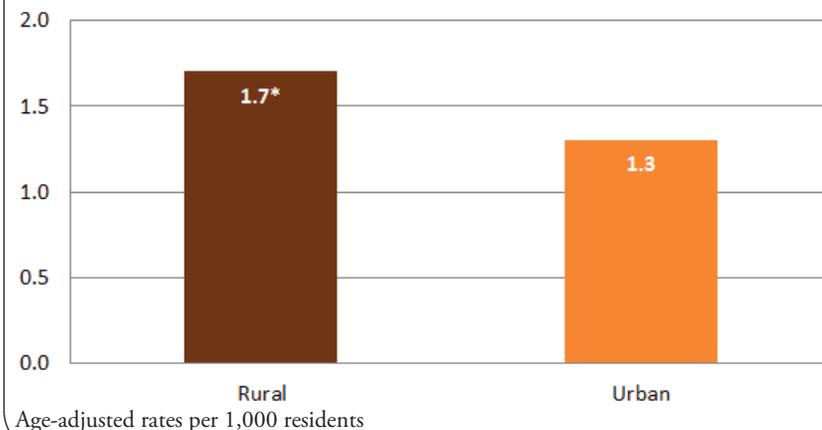


## Gastritis and Duodenitis

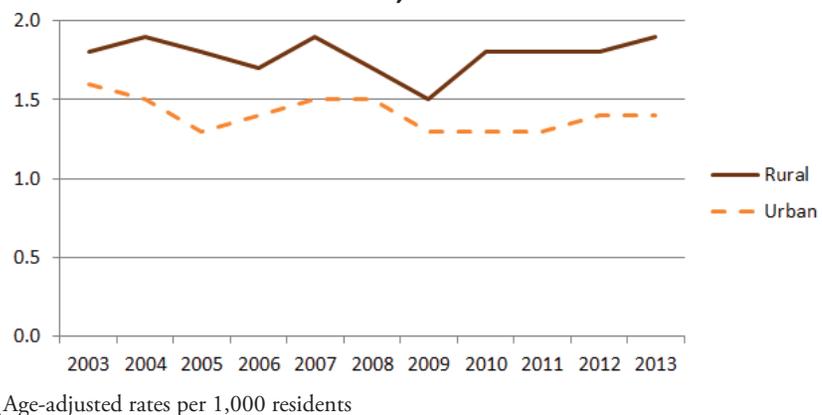
Gastritis and duodenitis are diseases of the upper gastrointestinal tract. Gastritis involves irritation of the lining of the stomach, while duodenitis involves inflammation of the first part of the small intestine, which is just beneath the stomach. “Both gastritis and duodenitis have the same causes ...,” which include bacteria, alcohol use, stress and use of certain medications, among other reasons, and both may be acute or chronic conditions.<sup>92</sup> The rural gastritis and duodenitis ER visit rate is 30.8 percent higher than the urban rate (1.7 per 1,000 rural residents versus 1.3 per 1,000 urban residents), a significant disparity.

The rural rate remained significantly higher than the urban rate throughout the 2003-2013 time period. The 2013 urban rate is significantly lower than the 2003 urban rate, but the 2003 and 2013 rural rates are not significantly different from each other. As a result, the disparity between the rural and urban rates increased over these years. In 2003, the rural rate was 1.2 times higher than the urban rate; by 2013, it was 1.4 times higher.

**Emergency Room Visit Rates for Gastritis and Duodenitis  
Missouri, 2009-2013**

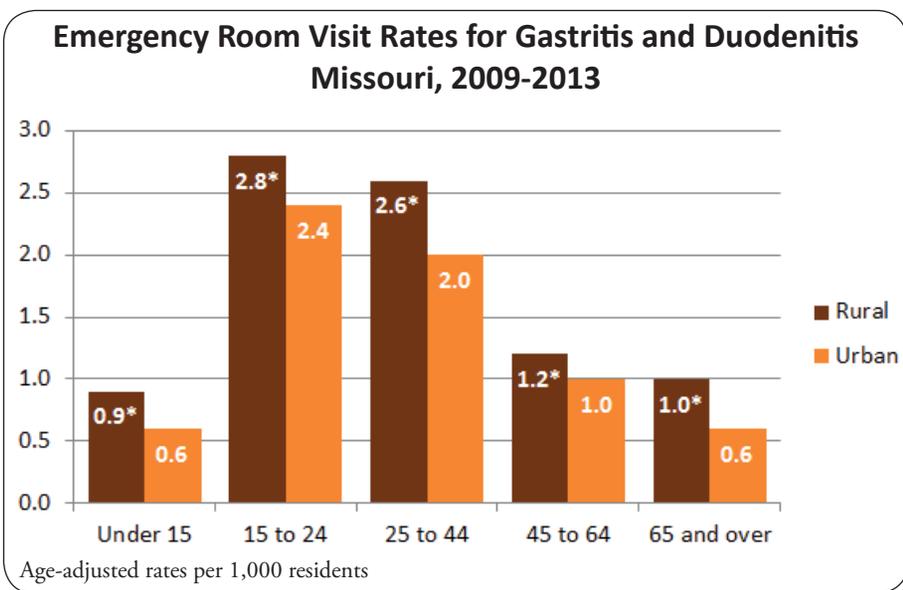


**Emergency Room Visit Rates for Gastritis and Duodenitis  
Missouri, 2003-2013**



<sup>92</sup>Kivi, R. (July 20, 2012). Gastritis/Duodenitis. *Healthline*. Accessed August 28, 2015, from <http://www.healthline.com/health/gastritis-duodenitis#Overview1>.

Rural gastritis and duodenitis ER visit rates are significantly higher than urban rates for both gender and all age groups. Rates are higher among females than males in both rural and urban areas. Rates peak for the 15 to 24 age group in both settings. Rural and urban rates decrease substantially for ages 45 and older.

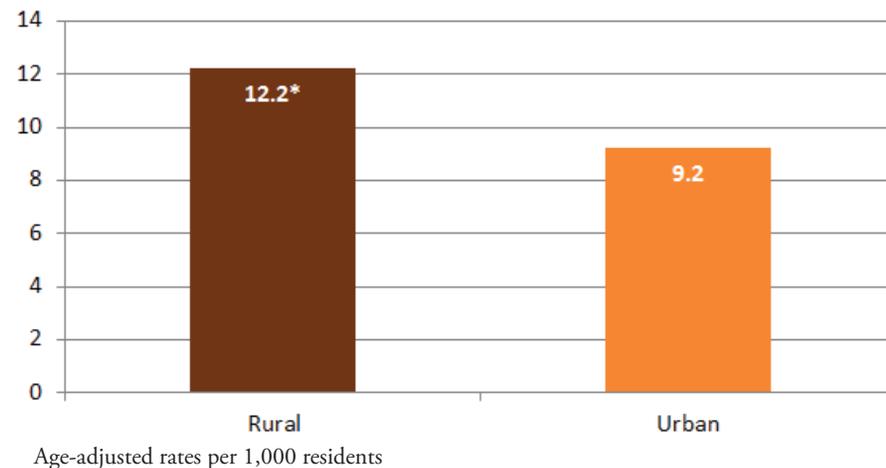


## Nontraumatic Dental Complaints

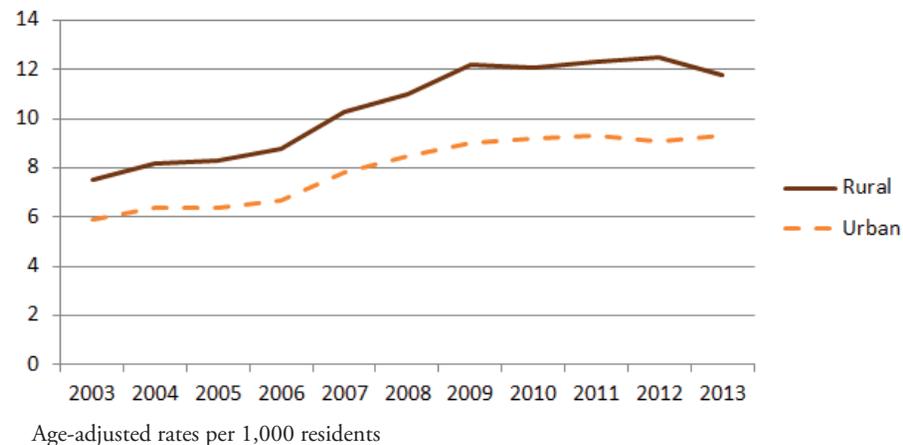
ER visits for disorders of the teeth and jaws include complaints such as dental abscesses and toothaches rather than injuries to the mouth and teeth. Therefore, these ER visits are often described as nontraumatic and preventable; dental experts assert that the majority of these complaints could be best addressed in a dental office rather than in a hospital setting. Medical professionals may provide pain relievers and antibiotics but are not generally able to perform necessary extractions or restorations needed to solve underlying dental problems. The rural Missouri ER visit rate for nontraumatic dental complaints is 12.2 per 1,000 residents compared to 9.2 for urban residents. This 32.6% difference is statistically significant.

ER visit rates for nontraumatic dental complaints significantly increased for both rural and urban residents in recent years. In both areas, the 2013 rate was approximately 57 percent higher than the 2003 rate.

**Emergency Room Visit Rates for Nontraumatic Dental Complaints  
Missouri, 2009-2013**



**Emergency Room Visit Rates for Nontraumatic Dental Complaints  
Missouri, 2003-2013**



The counties with the highest rural ER visit rates for nontraumatic dental complaints are Washington, St. Francois and Iron, which are all located between the St. Louis area and the Bootheel. The counties with the lowest rural rates are all found in the Northeast BRFSS Region. The counties with the highest urban rates are all located in the Southwest BRFSS Region. Three of the counties with the lowest urban rates fall into the St. Louis Metro BRFSS Region, while one (Platte County) is included in the Kansas City Metro BRFSS Region.

Nontraumatic dental ER visit rates are significantly higher for rural residents in the 15 to 24 and 25 to 44 age groups than they are for urban residents in those age groups. Rural rates are significantly lower than urban rates for the 45 to 64 and 65 and over age groups. However, visits by residents in the 45 and over age groups make up only 14 percent of total nontraumatic dental ER visits; visits by residents ages 15 to 44 make up 81 percent of these visits. Visits by residents under the age of 15 make up only 4 percent of total nontraumatic dental ER visits. The rural and urban rates for these youngest residents are not significantly different.

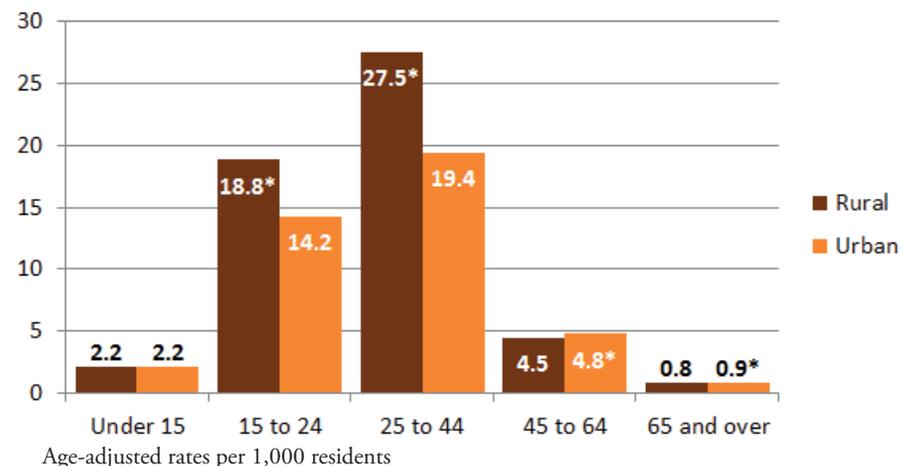
The use of ER visits for nontraumatic dental complaints has been a topic of discussion nationally and within Missouri for some time. According to national estimates, an ER visit for a dental complaint costs about \$300. When the 289,633 ER visits for nontraumatic dental complaints that occurred between 2009 and 2013 are considered in total, the estimated costs are over \$86.9 million, or about \$17.4 million per year.

### Emergency Room Visit Rates for Nontraumatic Dental Complaints Selected Rural and Urban Missouri Counties, 2009-2013

	Rank Rural	Number	Rate	Rank Urban	Number	Rate		
<b>Highest</b>	1	Washington County	3,211	28.4	1	Jasper County	13,923	24.8
	2	St. Francois County	8,806	27.7	2	Greene County	23,914	17.4
	3	Iron County	1,076	24.9	3	Newton County	3,916	15.3
<b>Lowest</b>	98	Mercer County	39	2.6	11	St. Louis County	30,081	6.6
	98	Schuyler County	45	2.6	12	Jefferson County	5,824	5.6
	100	Clark County	61	2.1	13	St. Charles County	8,239	4.7
	101	Lewis County	61	1.5	14	Platte County	1,648	3.8

Age-adjusted rates per 1,000 residents

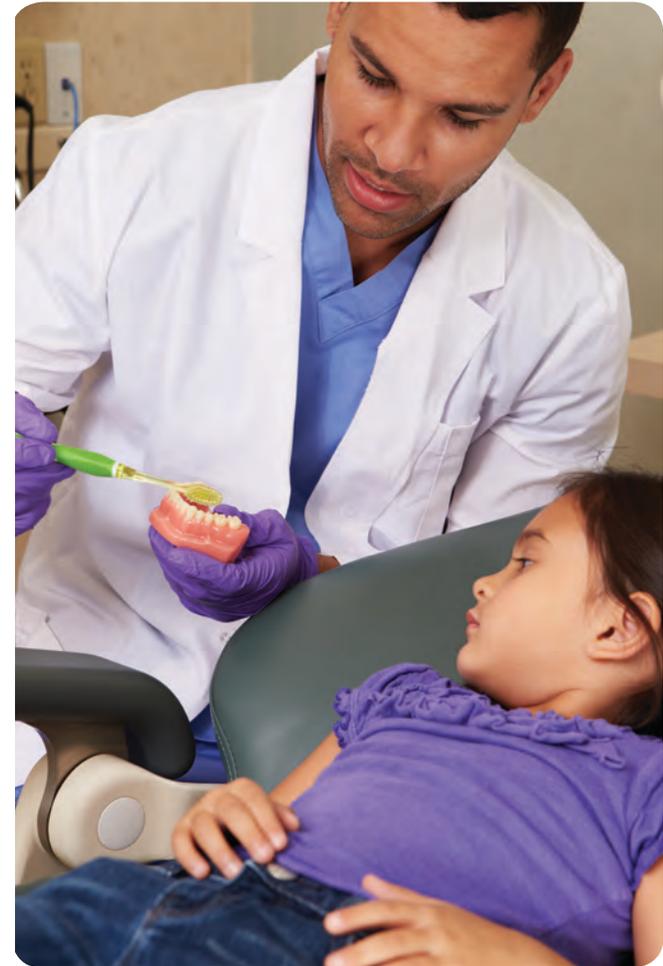
### Emergency Room Visit Rates for Nontraumatic Dental Complaints Missouri, 2009-2013



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There are many possible explanations for why ER visits for nontraumatic dental complaints are higher among residents of rural areas. Access to a dental office or clinic is an important factor in preventing poor oral health and adequately addressing urgent dental problems. In Missouri, 99 counties plus areas within the City of St. Louis and Kansas City have been designated as Dental Health Professional Shortage Areas (DHPSAs). Only nine rural counties in Missouri are not DHPSAs.<sup>93</sup>

It is recommended that most individuals should visit a dentist at least once per year. However, only about 62% of Missouri's adults visited a dentist in the last year, according to the 2012 BRFSS. Annual dental visit rates are lower among adults in the lowest annual income category of less than \$15,000 than any other income category; only 37 percent of adults in this income bracket report visiting a dentist within the past year. As stated previously in this report, poverty rates are higher among rural Missourians. Therefore, it is expected that dental visit rates would be lower in rural counties, and this is confirmed by examining trends in annual dental visit rates among adults by geography.<sup>94</sup>



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<sup>93</sup>Missouri Department of Health and Senior Services, Missouri Oral Health Program. (2014). *Oral Health in Missouri 2014: A Burden Report by the Missouri Department of Health and Senior Services*. Accessed December 21, 2015, from <http://health.mo.gov/living/families/oralhealth/pdf/2014OralHealthReport.pdf>.

<sup>94</sup>Missouri Department of Health and Senior Services, Office of Epidemiology. (2011). *Missouri County-Level Study*. Dental visit data were provided by special request.

# MATERNAL, INFANT AND CHILD HEALTH

Maternal, infant and child health indicators can also be used to measure the health status of a community. The health of mothers, infants and children is important because “their well-being determines the health of the next generation and can help predict future public health challenges for families, communities, and the health care system.”<sup>95</sup>

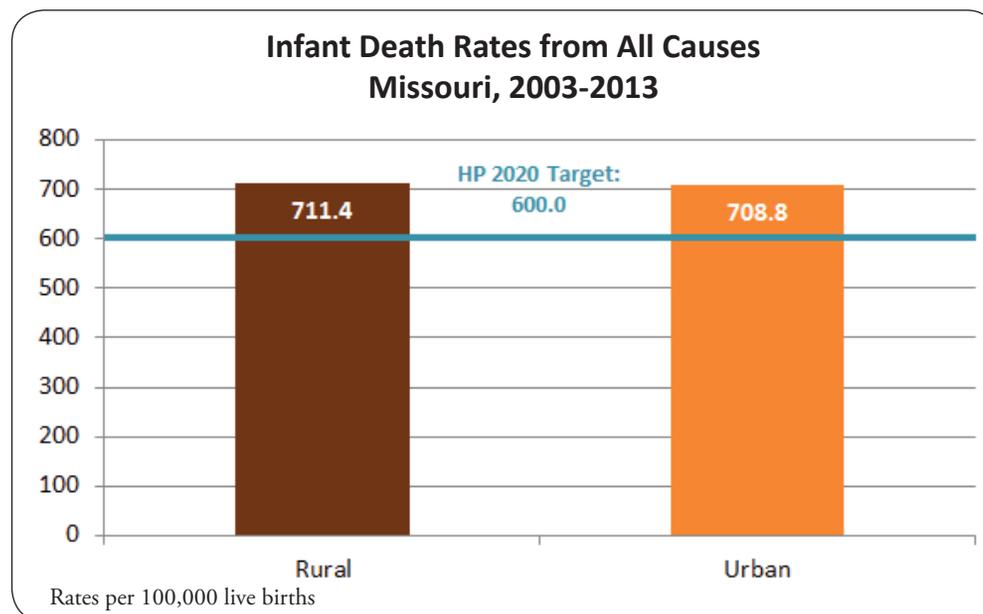


*Note: On the bar charts in this chapter, asterisks indicate if either the rural or urban rate is statistically significantly high compared to the other geography. See the Glossary for a description of statistical significance.*

<sup>95</sup>HealthyPeople.gov. (Last updated September 1, 2015). *Maternal, Infant, and Child Health Overview*. Accessed September 3, 2015, from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>.

## Infant Deaths

Healthy People 2020 considers the infant death rate a Leading Health Indicator for the Maternal, Infant and Child Health topic area. Leading Health Indicators can be used to communicate health status and emphasize a need for action. In Missouri, the 2003-2013 rural infant death rate of 711.4 per 100,000 live births is slightly higher than the urban rate of 708.8, although the difference is not statistically significant. However, both of these rates are higher than the Healthy People 2020 U.S. baseline rate of 670.0 and the U.S. 2020 target rate of 600.0.<sup>96</sup> In specific years, the Missouri rural and urban infant death rates have fallen below the Healthy People 2020 baseline. However, in order to provide more stable rates, Missouri typically reports an 11-year combined death rate. None of the Missouri rates fell below the Healthy People 2020 target rate of 600.0 during the 2003-2013 time period.<sup>97</sup>



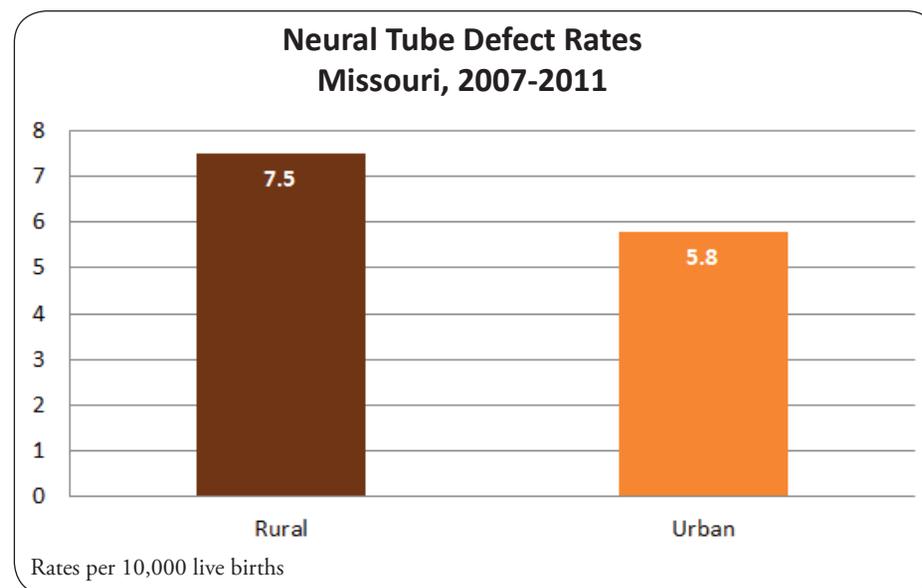
<sup>96</sup>HealthyPeople.gov. (Last updated October 9, 2015). *Maternal, Infant, and Child Health Objectives*. Accessed October 13, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>.

<sup>97</sup>Infant death data are available from the Death MICA.

## Neural Tube Defects

Neural tube defects (NTDs) are birth defects affecting the brain and spinal column. NTDs range widely in severity from mild forms of spina bifida that are not disabling to rare forms like anencephaly, in which a portion of the brain and/or skull fails to develop and the infant is either stillborn or dies within a few hours of birth.<sup>98</sup> The risk of NTDs can be greatly reduced through the use of folic acid prior to pregnancy. The CDC, the March of Dimes and the American Pregnancy Association recommend that all women of childbearing age consume at least 0.4 micrograms of folic acid daily. Women with a previous NTD pregnancy are at much higher risk and require a higher dosage of folic acid (4.0 micrograms).<sup>99,100,101</sup>

Statewide, NTDs occurred in 253 births during the 2007-2011 time period.<sup>102</sup> The rural NTD rate was 7.5 per 10,000 live births. This rate is 29.3 percent higher than the urban rate of 5.8; however, this difference is not statistically significant.



<sup>98</sup>National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development. (Last updated November 30, 2012). *Neural Tube Defects (NTDs): Condition Information*. Accessed September 14, 2015, from <http://www.nichd.nih.gov/health/topics/ntds/conditioninfo/Pages/default.aspx>.

<sup>99</sup>March of Dimes. (Last reviewed November 2012). *Birth Defects: Neural Tube Defects Overview*. Accessed September 14, 2015, from <http://www.marchofdimes.org/baby/neural-tube-defects.aspx>.

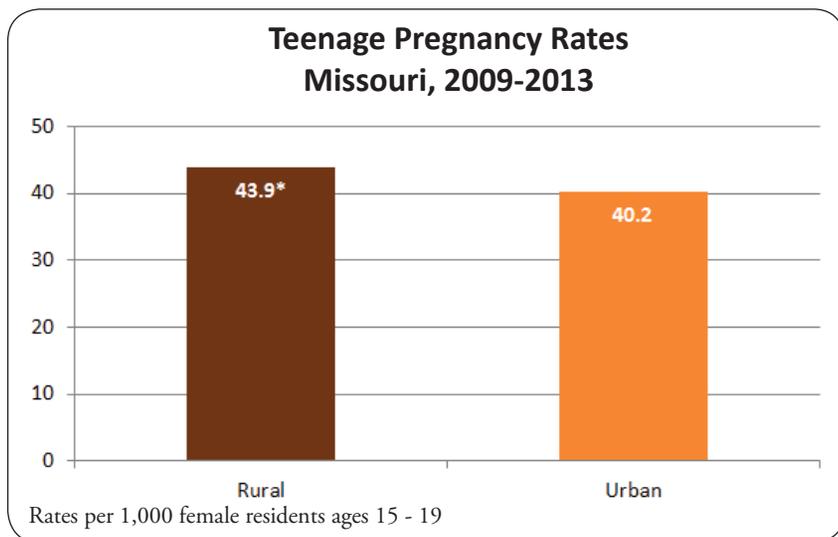
<sup>100</sup>Centers for Disease Control and Prevention (CDC). (Last updated January 5, 2015). Folic Acid and Birth Defects. *CDC Features*. Accessed September 14, 2015, from <http://www.cdc.gov/features/folicacidbenefits/>.

<sup>101</sup>American Pregnancy Association. (Last updated July 2015). *Folic Acid*. Accessed September 14, 2015, from <http://americanpregnancy.org/pregnancy-health/folic-acid/>.

<sup>102</sup>Missouri state and county neural tube defect rates are available from the Infant Health Profile.

## Teenage Pregnancy

“Teenage pregnancy including birth is a serious public concern in the U.S. and Missouri. Teenage pregnancies are associated with an increased risk of poor social, economic and health outcomes for both the mother and the child.”<sup>103</sup> In Missouri, 11.5 percent of rural pregnancies and 9.0 percent of urban pregnancies during the 2009-2013 time period occurred among females less than 20 years of age. The rural teenage pregnancy rate of 43.9 per 1,000 female residents ages 15-19 is statistically significantly higher than the urban teenage pregnancy rate of 40.2.<sup>104</sup>

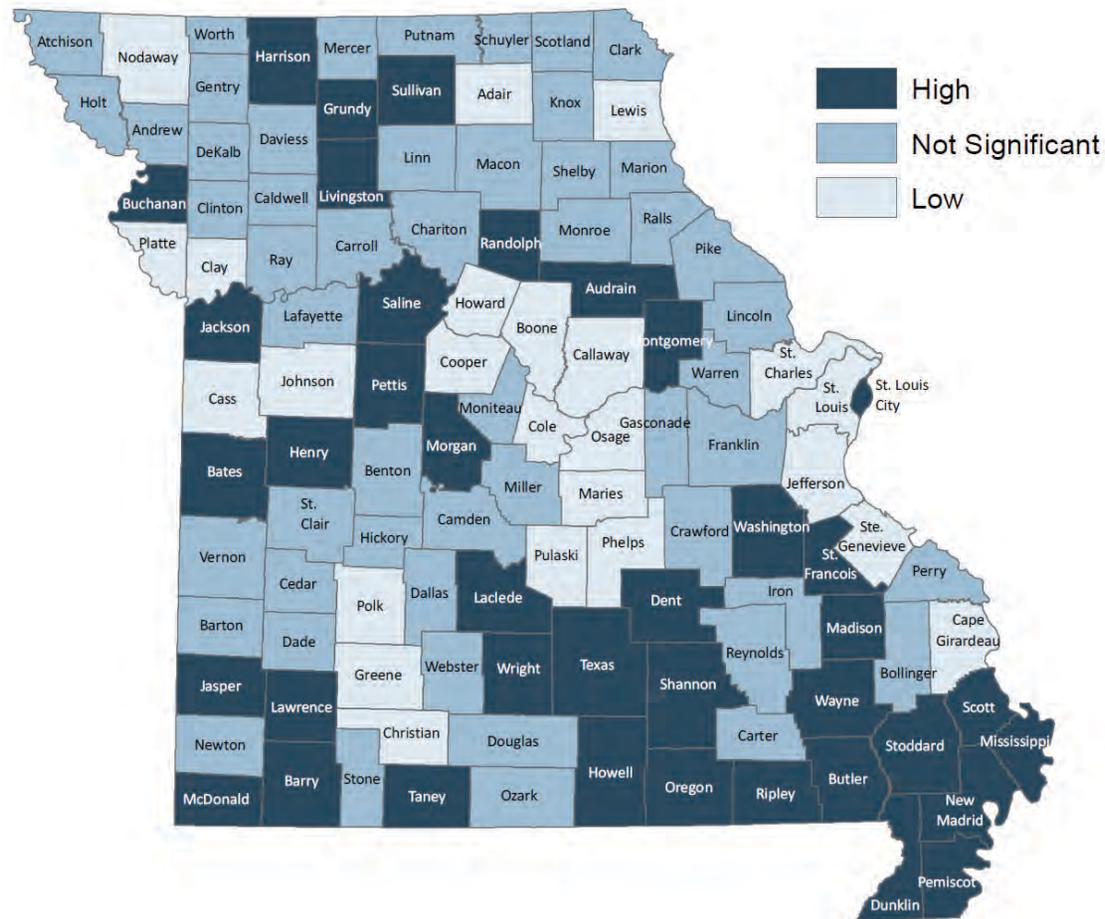


<sup>103</sup>Missouri Department of Health and Senior Services. *Affordable Care Act Maternal, Infant and Early Childhood Home Visiting Program Needs Assessment*. Accessed September 14, 2015, from <http://health.mo.gov/atoz/pdf/hvneedsassessment.pdf>.

<sup>104</sup>Pregnancy and live birth (fertility) rates are available from the Fertility Rate MICA.

Many of the highest county teenage pregnancy rates are clustered in the southeast portion of the state. Mississippi County has the highest teenage pregnancy rate at 94.2, meaning that over 9 percent of females between the ages of 15 and 19 become pregnant. Smaller clusters of significantly high rural rates are found in central Missouri, southwest Missouri, north central Missouri and south of the Kansas City area. Most counties, both rural and urban, with significantly low rates are located near urban areas. The largest cluster of significantly low rates is found in central Missouri around Columbia and Jefferson City.

### Teenage Pregnancy Rates Missouri, 2009-2013



Based on rates per 1,000 female residents ages 15-19  
Statistical significance compared to the state using 95 percent confidence intervals

## Smoking During Pregnancy

Smoking during pregnancy is associated with major health risks for both mother and child. Women who smoke during pregnancy experience higher rates of miscarriage and low birth weight and preterm deliveries. Their infants experience higher rates of stillbirth and death during the first 27 days of life. Multiple studies over the past several decades indicate that smoking during pregnancy is also associated with a variety of birth defects, including gastrointestinal system deformities, eye defects, oral clefts and clubfoot.<sup>105</sup>

The risks associated with smoking during pregnancy can be reduced if the mother quits smoking, particularly in the early stages of pregnancy. A 1990 report by the U.S. Surgeon General found that “women who quit smoking during the first 3-4 months of pregnancy and remain abstinent throughout pregnancy reduce their risk of having a low birth weight baby to that of women who never smoked.”<sup>106</sup> More recent research continues to highlight the importance of smoking cessation during pregnancy. For example, a 2007-2008 study of mothers in San Bernardino County, CA, found that, relative to mothers smoking during pregnancy, women who quit smoking during pregnancy reduced their risk of having a low birth weight or preterm birth to nearly the same amount as women who had never smoked at all.<sup>107</sup>

During the 2009-2013 time period, rural Missouri mothers reported that they smoked during pregnancy in nearly one-quarter (24.5 percent) of rural live births.<sup>108</sup> This rural rate is statistically significantly higher than the 14.1 percent rate reported for urban live births over the same timeframe. Between 2003 and 2013, neither the rural nor the urban rate of smoking during pregnancy exhibited any statistically significant change; both rates were remarkably stable during this period.



<sup>105</sup>Hackshaw, A., Rodeck, C., and Boniface, S. (September-October 2011). Maternal Smoking in Pregnancy and Birth Defects: A Systematic Review Based on 173 687 Malformed Cases and 11.7 Million Controls [Abstract]. *Human Reproduction Update* 17(5), 589-604. Accessed September 15, 2015, from <http://humupd.oxfordjournals.org/content/early/2011/07/09/humupd.dmr022.full>.

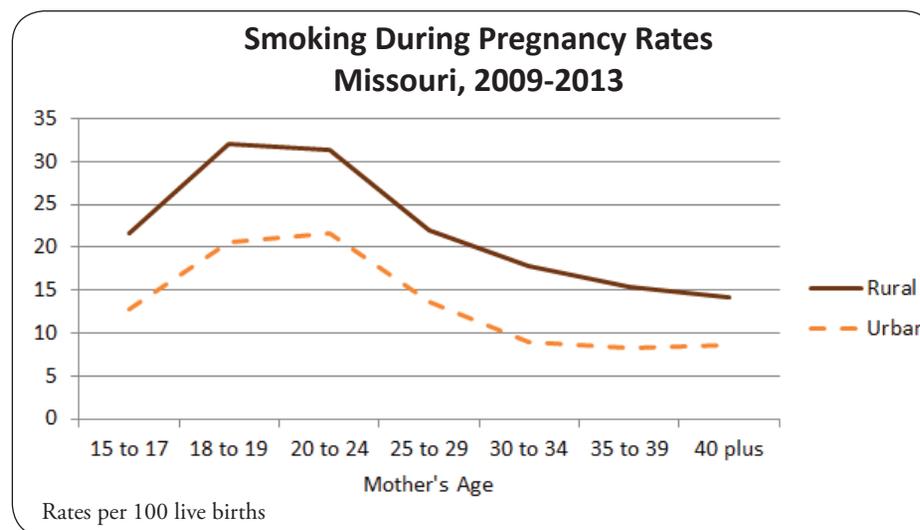
<sup>106</sup>Centers for Disease Control and Prevention (CDC). (Last updated March 8, 2011). PNSS Health Indicators. *Pediatric and Pregnancy Nutrition Surveillance System*. Accessed September 15, 2015, from [http://www.cdc.gov/pednss/what\\_is/pnss\\_health\\_indicators.htm#Smoking/Drinking](http://www.cdc.gov/pednss/what_is/pnss_health_indicators.htm#Smoking/Drinking).

<sup>107</sup>Batech, M., Tonstad, S., Job, J.S., Chinnock, R., Oshiro, B., Allen Merritt, T., ... and Singh, P.N. Estimating the Impact of Smoking Cessation During Pregnancy: The San Bernardino County Experience [Abstract]. *Journal of Community Health* 38(5), 838-846. Accessed September 15, 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/23553684>.

<sup>108</sup>Smoking during pregnancy rates are available from the Birth MICA.

Rural rates of smoking during pregnancy remained significantly higher than urban rates across all age groups. The highest 2009-2013 rate was reported among live births to rural mothers ages 18 to 19; pregnancy smoking was reported in 32.0 percent, or nearly one-third, of live births to mothers in this age group. The highest urban rate of 21.7 percent was reported for live births to mothers in the 20 to 21 age group. In both rural and urban areas, smoking rates decline among live births to mothers ages 25 and older. Rates for live births to mothers ages 15 to 17 years are more similar to those of older mothers than to the older teenage group.

In 55 rural counties – more than half of the counties designated as rural in this report – pregnancy smoking was reported for more than 25 percent of live births during the 2009-2013 time period; 17 of these counties had rates of 30 percent or higher. No urban county experienced a rate this high. The three highest rural rates were found in the adjacent counties of Iron (37.0 percent), Wayne (36.1 percent) and Madison (33.5 percent). Several of the other rural counties with extremely high rates are also located in a contiguous block with these counties. They include Butler and Crawford (tied for the 5th highest rural rate), St. Francois (8th highest) and Dent and Washington (tied for 10th). St. Louis County, with pregnancy smoking reported for only 9.0 percent of live births, has the lowest county rate in Missouri and is the only county with a rate below 10.0 percent.



### Rates of Smoking During Pregnancy Selected Rural and Urban Missouri Counties, 2009-2013

	Rank Rural	County	Number	Rate	Rank Urban	County	Number	Rate
<b>Highest</b>	1	Iron County	201	37.0	1	Buchanan County	1,540	24.9
	2	Wayne County	269	36.1	2	Jefferson County	2,953	21.7
	3	Madison County	244	33.5	3	Newton County	759	20.4
<b>Lowest</b>	99	Webster County	376	14.4	12	Platte County	629	11.1
	100	Scotland County	54	14.1	13	St. Charles County	2,407	10.6
	101	Christian County	693	13.6	14	St. Louis County	5,258	9.0

Rates per 100 live births

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## Breastfeeding

One of the goals of Healthy People 2020 is to increase the proportion of infants who are ever breastfed from the U.S. 2007-2009 baseline of 74.0 percent to 81.9 percent, citing breast milk as “the most complete form of nutrition for most infants, with a range of benefits for their health, growth, immunity and development.”<sup>109,110</sup> “The American Academy of Pediatrics (AAP) recommends that breastfeeding continue for at least 12 months, and thereafter for as long as mother and baby desire. The World Health Organization recommends continued breastfeeding up to 2 years of age or beyond.”<sup>111</sup> Breastfeeding offers benefits to both mother and child even when breastfeeding is not

continued for the recommended length of time. Breastfeeding promotes more rapid recovery for the mother following delivery and may reduce postpartum depression. Breastfeeding also reduces the risk of multiple diseases and health conditions for both mother and infant.<sup>112</sup> Early breastfeeding is particularly important because it exposes infants to colostrum, which is the first milk produced by the mother. Colostrum contains nutrients and antibodies that protect the newborn from infections.<sup>113</sup>

Breastfeeding rates are typically measured using surveys of mothers. For example, the Missouri Pregnancy Risk Assessment

Monitoring System (PRAMS) surveys a random sample of new mothers regarding their health status and behaviors before, during and after pregnancy. Several questions ask mothers about breastfeeding practices. The Missouri Child Health Assessment Survey (MoCHAPS) is a two-year follow-up to the PRAMS survey. It assesses the health status of mothers and their two-year-old toddlers and provides another source of Missouri breastfeeding rates. Both PRAMS and MoCHAPS data are weighted for statewide, rather than local, comparison.<sup>114,115</sup>

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<sup>109</sup>HealthyPeople.gov. (Last updated September 4, 2015). *Maternal, Infant, and Child Health Objectives*. Accessed September 4, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>.

<sup>110</sup>HealthyPeople.gov. (Last updated September 4, 2015). *Maternal, Infant, and Child Health Overview*. Accessed September 4, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health>.

<sup>111</sup>Centers for Disease Control and Prevention (CDC). (Last updated June 16, 2015). *Breastfeeding Frequently Asked Questions (FAQs)*. Accessed September 4, 2015, from <http://www.cdc.gov/breastfeeding/faq/index.htm>.

<sup>112</sup>American Academy of Pediatrics. (March 1, 2012). Policy Statement: Breastfeeding and the Use of Human Milk. *Pediatrics* 129(3), e827-e841. Accessed September 4, 2015, from <http://pediatrics.aappublications.org/content/129/3/e827.full>.

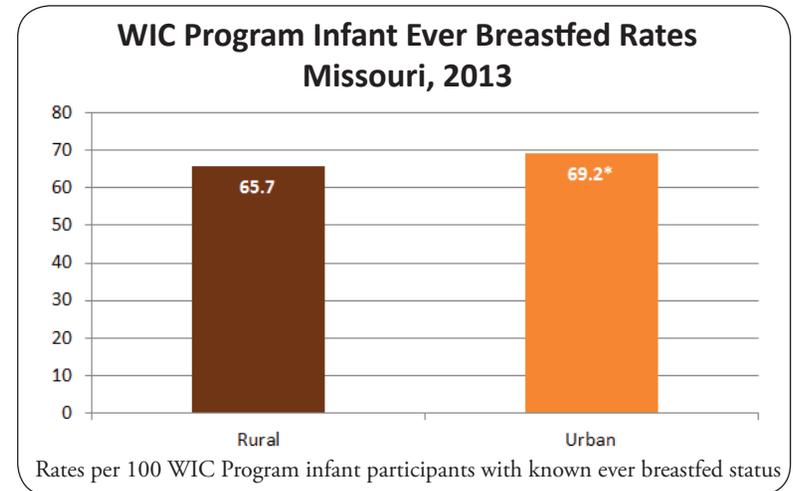
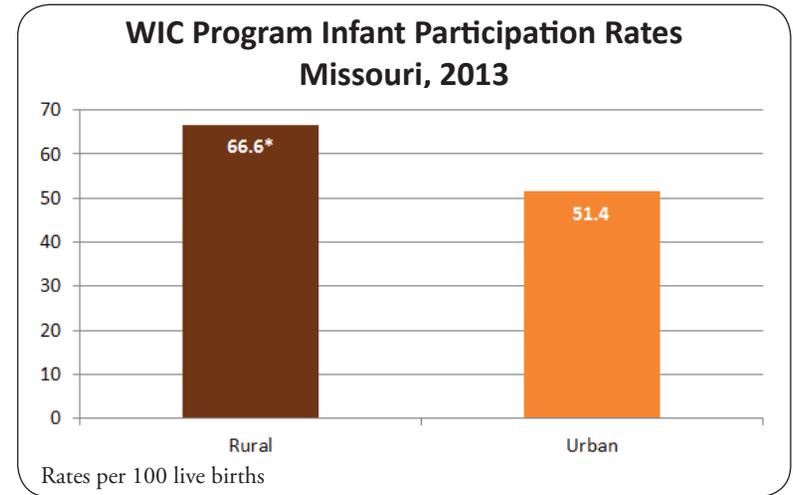
<sup>113</sup>Office on Women’s Health. (Last updated July 21, 2014). *Breastfeeding: Why Breastfeeding Is Important*. Accessed September 4, 2015, from <http://www.womenshealth.gov/breastfeeding/breastfeeding-benefits.html>.

<sup>114</sup>Missouri Department of Health and Senior Services, Division of Community and Public Health. *Missouri Pregnancy Risk Assessment Monitoring System*. Accessed September 4, 2015, from <http://www.health.mo.gov/data/prams/>. PRAMS data for Missouri are available through the PRAMStat tool at <http://www.cdc.gov/prams/pramstat/index.html>.

<sup>115</sup>Missouri Department of Health and Senior Services, Division of Community and Public Health. *Missouri Child Health Assessment Program Survey (MoCHAPS)*. Accessed September 4, 2015, from <http://health.mo.gov/data/mochaps/>.

In Missouri, the most robust source of local breastfeeding data is usually the Women, Infants and Children (WIC) Program, “a special supplemental nutrition program which provides services to pregnant women, new mothers, infants and children up to their 5th birthday based on nutritional risk and income eligibility.” One of the primary services provided by WIC is breastfeeding promotion and support.<sup>116</sup> More than half of all infants residing in Missouri in 2013 (56.8 percent) received services through WIC. Rural infants participate in WIC at significantly higher rates than urban infants (66.6 percent versus 51.4 percent).<sup>117</sup>

The breastfeeding data available through the WIC Program do not represent all infants, only those who are both eligible for and participating in the program. At an infant’s initial WIC certification visit, which may occur at any point after birth but prior to the infant’s first birthday, the mother or other caregiver is asked if the infant has ever been breastfed. According to these reports, urban infants enrolled in the WIC Program are breastfed at significantly higher rates than rural infants (69.2 percent of WIC urban infants versus 65.7 percent of rural WIC infants).

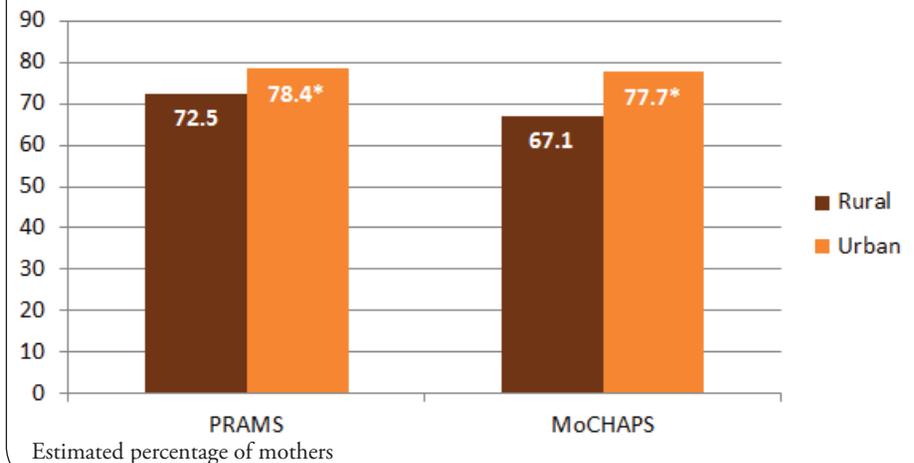


<sup>116</sup>Missouri Department of Health and Senior Services, WIC and Nutrition Services. *Welcome to WIC*. Accessed September 4, 2015, from <http://www.health.mo.gov/living/families/wic/index.php>.

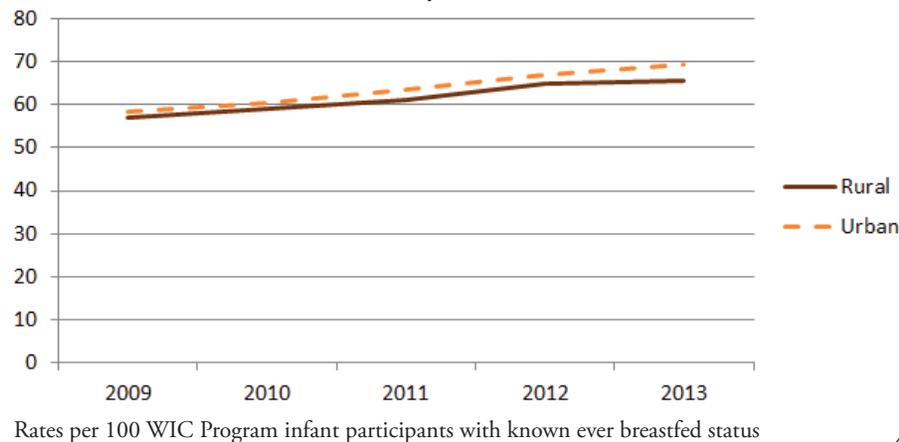
<sup>117</sup>WIC data for years 2009 and later are not currently posted on the MICA website but will be added at a later date. However, WIC infant participation and ever breastfed rates for Missouri and its 115 counties are available through the Infant Health Profile at <http://www.health.mo.gov/data/CommunityDataProfiles/index.html>.

Both PRAMS and MoCHAPS also report higher prevalence of breastfeeding initiation by mothers in urban counties, which is consistent with the WIC Program ever breastfed rates.<sup>118</sup> However, the breastfeeding initiation percentages from PRAMS and MoCHAPS are slightly higher than the ever breastfed percentages from the WIC Program, possibly due to the different populations included in each dataset. (PRAMS and MoCHAPS randomly sample the entire population of new Missouri mothers, which includes mothers of WIC Program infant participants as well as mothers of infants not enrolled in the WIC Program.)

**Prevalence of Breastfeeding Initiation by Mothers  
Missouri, 2007-2012**



**WIC Program Infant Ever Breastfed Rates  
Missouri, 2009-2013**



In Missouri, both the rural and urban WIC Program infant ever breastfed rates rose significantly each year between 2009 and 2012. Between 2012 and 2013, the urban rate continued to rise significantly. The rural rate also rose slightly but not significantly so.

<sup>118</sup>PRAMS and MoCHAPS breastfeeding rates were calculated for the rural and urban categories used in this report by David McBride and Rebecca Chitima-Matsiga in the Office of Epidemiology.

# HEALTH BEHAVIORS AND RISK FACTORS

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Several common health behaviors and risk factors affect many of the health conditions discussed in the Health Status section of this report. The Missouri Department of Health and Senior Services, with assistance and support from the CDC, conducts the BRFSS survey to produce estimates of the prevalence of many health behaviors and risk factors related to chronic diseases.<sup>119</sup> Annual estimates are prepared for Missouri and for seven regions within Missouri. The Office of Epidemiology within the Missouri Department of Health and Senior Services completed a special analysis in order to provide rates using the rural and urban categories designated in this report.<sup>120</sup>

*Note: On the bar charts in this chapter, asterisks indicate if either the rural or urban rate is statistically significantly high compared to the other geography. See the Glossary for a description of statistical significance.*



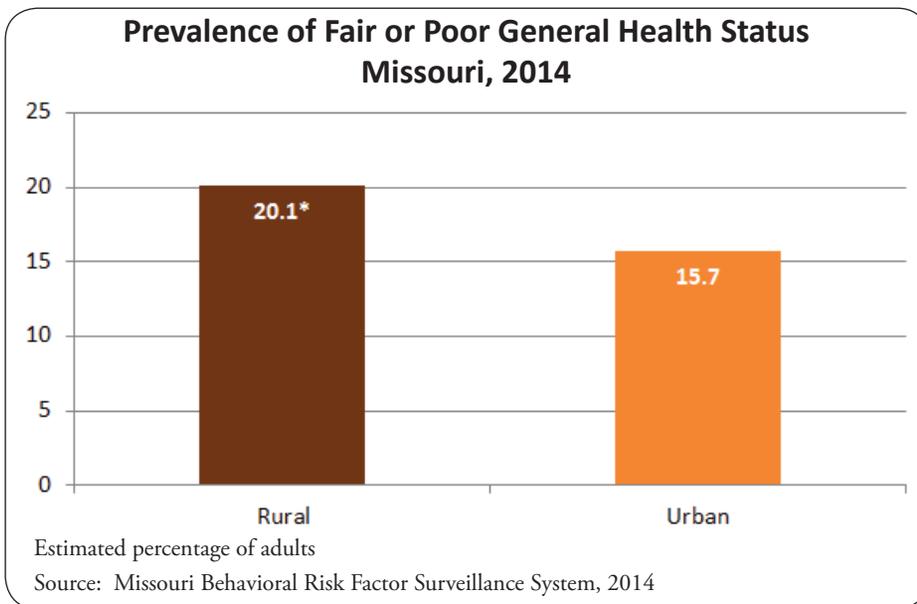
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<sup>119</sup>See the Glossary for a description of the BRFSS.

<sup>120</sup>Rural and urban estimates were prepared by Shumei Yun and Arthur Pashi in the Office of Epidemiology.

## Fair or Poor General Health Status

BRFSS respondents are asked to evaluate their own health status and rate it as “excellent, very good, good, fair or poor.”<sup>121</sup> “Self-assessed health status has been validated as a useful indicator of health for a variety of populations and allows for broad comparisons across different conditions and populations.”<sup>122</sup> It is also “a good predictor of future disability, hospitalization and mortality.”<sup>123</sup> Based on data collected by the BRFSS, 20.1 percent of rural Missouri adults are estimated to have fair or poor general health status compared to 15.7 percent of urban Missouri adults. This difference is statistically significant.



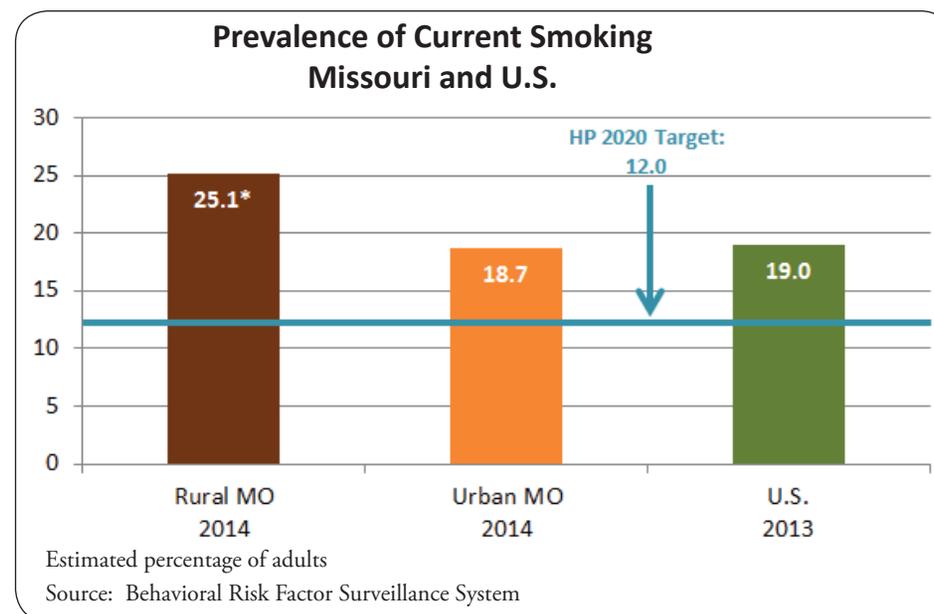
<sup>121</sup>Pashi, A., Wilson, J.S., and Yun, S. (March 2015). *Missouri Behavioral Risk Factor Surveillance System Annual Data Report*. Jefferson City, MO: Missouri Department of Health and Senior Services, Office of Epidemiology. Accessed September 16, 2015, from <http://www.health.mo.gov/data/brfss/2013datareport.pdf>.

<sup>122</sup>HealthyPeople.gov. (Last updated September 16, 2015). *General Health Status*. Accessed September 16, 2015, from <http://www.healthypeople.gov/2020/about/foundation-health-measures/General-Health-Status>.

<sup>123</sup>Boardman, M., and Hoff, S. (Last updated June 1, 2012). Self-reported Health Status. In Washington State Department of Health, *Health of Washington State*. Accessed September 16, 2015, from <http://www.doh.wa.gov/Portals/1/Documents/5500/GHS-SRHS2012.pdf>.

## Tobacco Use

The CDC classifies a reduction in tobacco use as a Winnable Battle. “Winnable Battles are public health priorities with large-scale impact on health and known effective strategies to address them.”<sup>124</sup> Tobacco use was selected because it “is a major preventable cause of premature death and disease.”<sup>125</sup> The CDC estimates that half of all U.S. adults who continue to smoke will ultimately die from a smoking-related cause.<sup>126</sup> Healthy People 2020 has set a goal of reducing the smoking rate to 12.0 percent by the end of the decade.<sup>127</sup> The BRFSS survey estimates that 19.0 percent of U.S. adults were currently smoking as of 2013.<sup>128</sup> The 2014 Missouri rate is even higher at 20.6 percent; however, smoking rates within Missouri vary across the state. The rural rate of 25.1 percent is significantly higher than the urban rate of 18.7.



<sup>124</sup>Centers for Disease Control and Prevention (CDC). (Last updated April 16, 2015). *Winnable Battles*. Accessed September 18, 2015, from <http://www.cdc.gov/winnablebattles/index.html>.

<sup>125</sup>Centers for Disease Control and Prevention (CDC). (Last updated June 9, 2015). *Winnable Battles: Tobacco Use*. Accessed September 18, 2015, from <http://www.cdc.gov/winnablebattles/tobacco/index.html>.

<sup>126</sup>Centers for Disease Control and Prevention (CDC). (Last updated September 6, 2011). *Adult Smoking in the U.S. CDC Vital Signs*. Accessed September 18, 2015, from <http://www.cdc.gov/vitalsigns/AdultSmoking/index.html>.

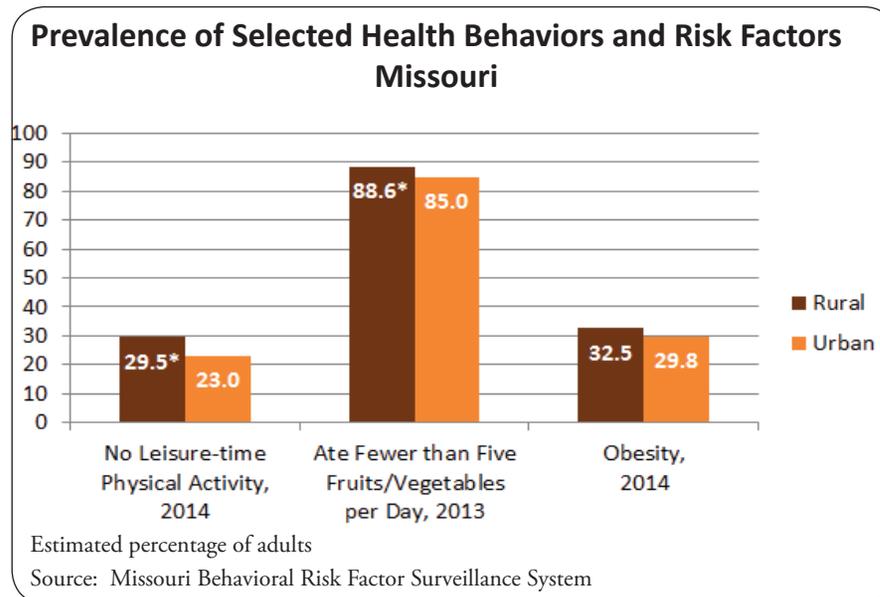
<sup>127</sup>HealthyPeople.gov. (Last updated September 18, 2015). *Tobacco Use Objectives*. Accessed September 18, 2015, from <http://www.healthypeople.gov/2020/topics-objectives/topic/tobacco-use/objectives>.

<sup>128</sup>Centers for Disease Control and Prevention (CDC). (Last updated July 16, 2014). *Prevalence Data & Data Analysis Tools*. Accessed September 18, 2015, from [http://www.cdc.gov/brfss/data\\_tools.htm](http://www.cdc.gov/brfss/data_tools.htm). The 2014 U.S. estimate is not currently available.

## Physical Activity, Nutrition and Obesity

Healthy People 2020 states that “good nutrition, physical activity and a healthy body weight are essential parts of a person’s overall health and well-being.”<sup>129</sup> According to the BRFSS, rural Missouri residents lag behind their urban counterparts on these three aspects of health. In 2014, 29.5 percent of rural Missourians reported no leisure-time physical activity in the past month. This compares to only 23.0 percent of urban Missourians, a statistically significant difference. As of 2013, a significantly higher percentage of rural Missourians reported eating fewer than five fruits and vegetables per day compared to urban Missourians (88.6 percent of rural residents versus 85.0 of urban residents).<sup>130</sup>

Physical activity and nutrition as well as genetics, certain medications and other factors play a role in obesity, which is defined as a body mass index (BMI) of 30.0 or greater.<sup>131</sup> Obesity is related to an increased risk of heart disease, stroke, diabetes, osteoarthritis, certain types of cancer, some mental illnesses and several other health conditions.<sup>132</sup> The 2014 BRFSS obesity estimate for rural Missouri residents is 32.5 percent compared to 29.8 percent for urban residents. This difference is not statistically significant.



<sup>129</sup>HealthyPeople.gov. (Last updated September 16, 2015). *Nutrition, Physical Activity, and Obesity Overview & Impact*. Accessed September 16, 2015, from <http://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Nutrition-Physical-Activity-and-Obesity>.

<sup>130</sup>The BRFSS survey questions regarding consumption of fruits and vegetables were not included in the 2014 survey.

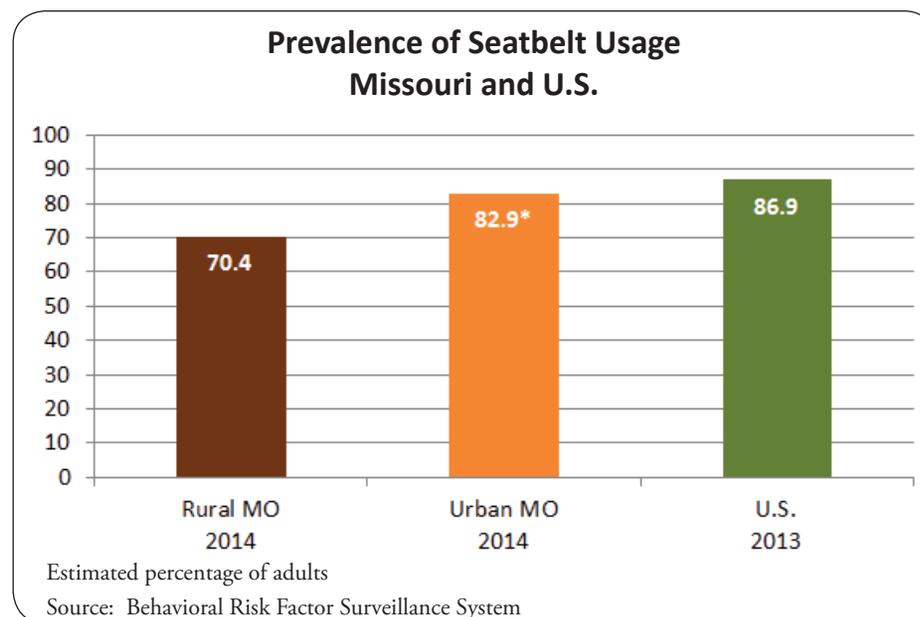
<sup>131</sup>See the Glossary for a more detailed description of body mass index and the survey questions used to derive the physical activity, nutrition and obesity indicators.

<sup>132</sup>Centers for Disease Control and Prevention (CDC). (Last updated June 16, 2015). *Adult Obesity Causes and Consequences*. Accessed September 16, 2015, from <http://www.cdc.gov/obesity/adult/causes.html>.

## Seatbelt Usage

Lack of seatbelt usage is strongly correlated with roadway deaths and serious injuries. The World Health Organization estimates that wearing a seatbelt can reduce the risk of fatality or serious injury for front seat passengers by up to 50 percent and for back seat passengers by nearly 75 percent.<sup>133</sup> Although Missouri does have seatbelt laws, the state does not have a primary enforcement law, which means that drivers cannot be pulled over or ticketed solely for failure to wear a seatbelt.<sup>134</sup> Studies have shown that primary seatbelt enforcement laws increase seatbelt usage, especially among high-risk drivers.<sup>135</sup> BRFSS survey results for 2013 estimated that the prevalence of seatbelt usage among Missouri adults is nearly 9 percentage points lower than the national average, with 78.1 percent of Missouri adults estimated to always wear a seatbelt versus 86.9 percent of U.S. adults.<sup>136</sup>

Seatbelt usage is even less common among rural Missouri adults. In 2014, only 70.4 percent of rural Missouri adults were estimated to always use a seatbelt when driving or riding in a vehicle. This figure is statistically significantly lower than the urban prevalence estimate of 82.9 percent. Lack of seatbelt usage is likely a contributing factor to the higher rural motor vehicle accident death rates observed in the Health Status section of this report.



<sup>133</sup>World Health Organization (WHO). (2013). *Global Status Report on Road Safety 2013: Supporting a Decade of Action*. Accessed September 16, 2015, from [http://www.who.int/violence\\_injury\\_prevention/road\\_safety\\_status/2013/report/en/](http://www.who.int/violence_injury_prevention/road_safety_status/2013/report/en/).

<sup>134</sup>Centers for Disease Control and Prevention (CDC). (2014). *Prevention Status Reports 2013: Motor Vehicle Injuries – Missouri*. Atlanta, GA: U.S. Department of Health and Human Services. Accessed September 16, 2015, from <http://www.cdc.gov/psr/motorvehicle/2013/mo-mvi.pdf>.

<sup>135</sup>Dinh-Zarr, T.B., Sleet, D.A., Shults, R.A., Zaza, S., Elder, R.W., Nichols, J.L., ... and the Task Force on Community Preventive Services. (2001). Reviews of Evidence Regarding Interventions to Increase the Use of Safety Belts. *American Journal of Preventive Medicine* 21(4S), 48-65. Accessed September 16, 2015, from <http://www.thecommunityguide.org/mvoi/mvoi-AJPM-evrev-seat-belts.pdf>.

<sup>136</sup>Centers for Disease Control and Prevention (CDC). (Last updated June 23, 2015). *BRFSS Prevalence and Trends Data*. Accessed September 16, 2015, from <http://www.cdc.gov/brfss/brfssprevalence/>. The 2014 U.S. estimate is not currently available.

# HEALTH CARE RESOURCES

Health care resources are key elements in the maintenance of health and the prevention and treatment of disease. Basic access to primary care physicians and dentists, hospital services and specialty care services improve overall health and contribute significantly to an area's economic vitality.

Unfortunately, in rural Missouri these resources are limited, even for those who have health insurance, have no financial difficulty and have access to transportation. In terms of Hospital and Specialty Services and Primary Care services, differences between rural and urban are stark.

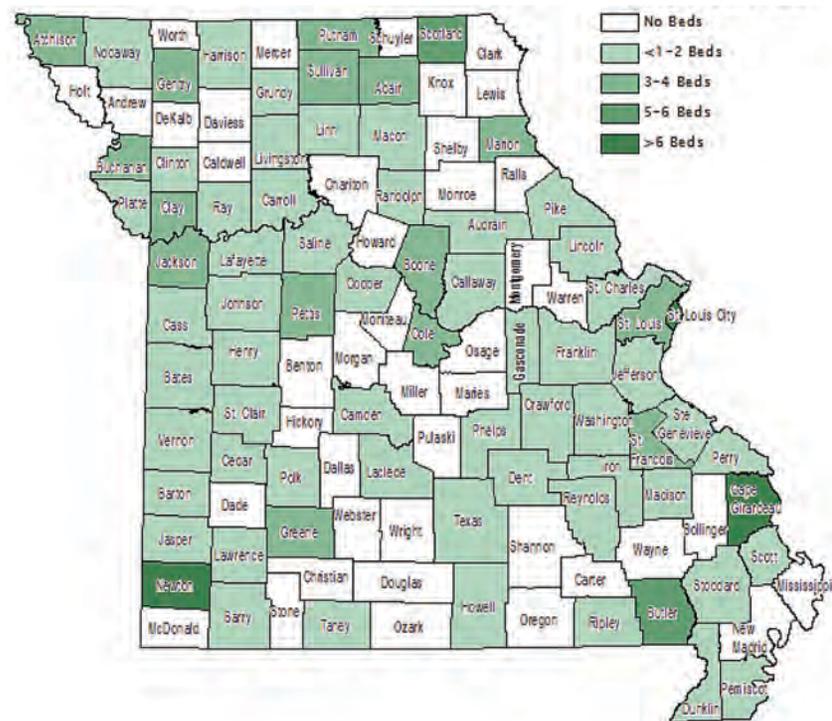
## *Hospital and Specialty Services*

At the time of this report there are 167 licensed hospitals in Missouri. Of those, only 45 percent (76 total) are located in rural counties, leaving 41 rural counties without a hospital. Of the 76 rural hospitals, 37 are Critical Access Hospitals (CAHs), with 25 or less critical access beds. In total, urban areas have 4.8 beds per 1,000 residents and rural areas have 2.5 beds per 1,000 residents.

Additionally, of the 109 licensed Ambulatory Surgical Centers in Missouri, only 23 are located in rural counties.

The lack of hospital and specialty services in rural Missouri greatly contributes to health disparities between Missouri's rural and urban residents. As mentioned in the Health Status section of this report, rural Missourians have a significantly lower overall rate of hospitalization but a significantly higher overall rate of death compared to urban Missourians. Rural Missourians also have a significantly higher ER visit rate, which may be reflective of a lack of primary and specialty care that would prevent health issues from reaching emergency status. Rural Missourians generally have to travel excessive distances to obtain specialty care, such as cardiology, oncology and nephrology. Given the lower incomes and increased age of rural residents, the lack of local services can mean no access to or less consistent care for vulnerable populations.

**Number of Staffed Hospital Beds Per 1,000 Residents**



Source: Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination, 2014 Hospital Utilization Survey

## Primary Medical Care

Primary Medical Care is crucial to the overall health of a population. The regular availability of primary care physicians improves health outcomes and decreases health costs.<sup>137</sup>

The best way to holistically view access to primary health care services is through federally designated Health Professional Shortage Areas (HPSAs). Through state-collected data and state-created services areas, HPSAs utilize a ratio between a given population and health care providers, set against a standard measure, to determine access to health providers in a given service area.

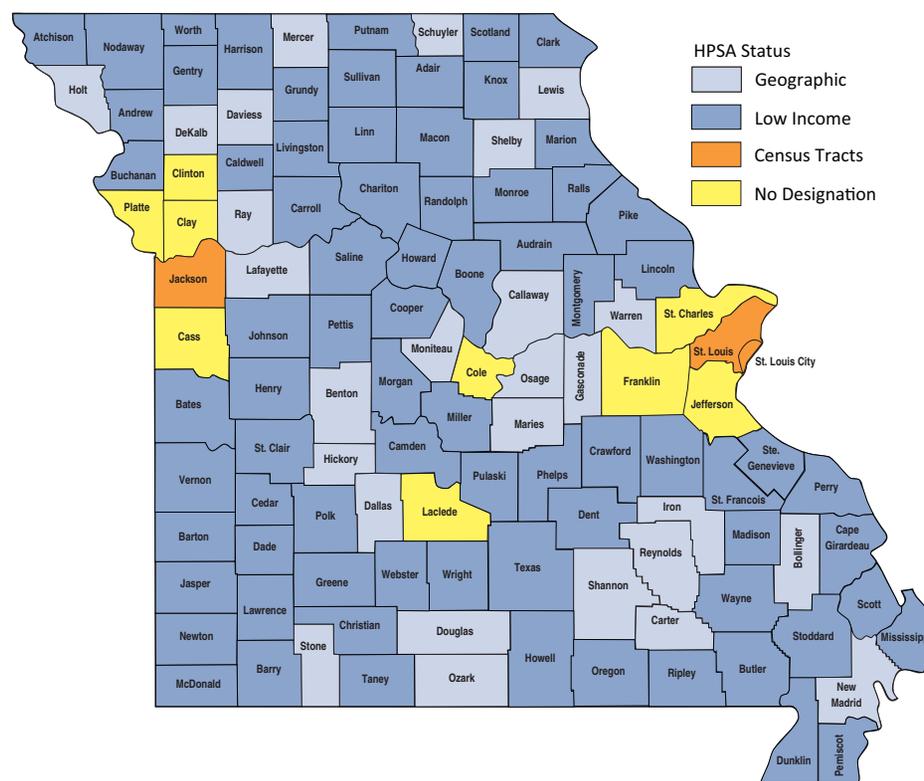
HPSA designations consider a wide range of factors and include a diverse set of data sources such as Missouri Professional Registration data, Census Bureau data and Geographic Information System data.

There are predominately two types of HPSAs in Missouri: Geographic and Low Income. Geographic HPSAs represent limited access for a whole population in a given area, while Low-Income HPSAs represent limited access for the part of the population below 200% of the Federal Poverty Level in a given area.

Primary Medical HPSAs are defined using a ratio between the general population and the number, in Full-Time Equivalents (FTEs), of licensed primary care physicians (allopathic and osteopathic doctors who specialize in family practice, general practice, pediatrics, internal medicine and obstetrics/gynecology). Generally for a Geographic HPSA there is a ratio of least 3,500:1 and for a Low-Income HPSA there is a ratio of at least 3,000:1.

Of the 101 rural counties in Missouri, 98 are considered Primary Medical HPSAs.

Primary Medical Care Health Professional Shortage Areas - 2013



Source: Health Resources and Services Administration's Shortage Designation Branch

<sup>137</sup>Council on Graduate Medical Education, *Twentieth Report, Advancing Primary Care*, 2010.

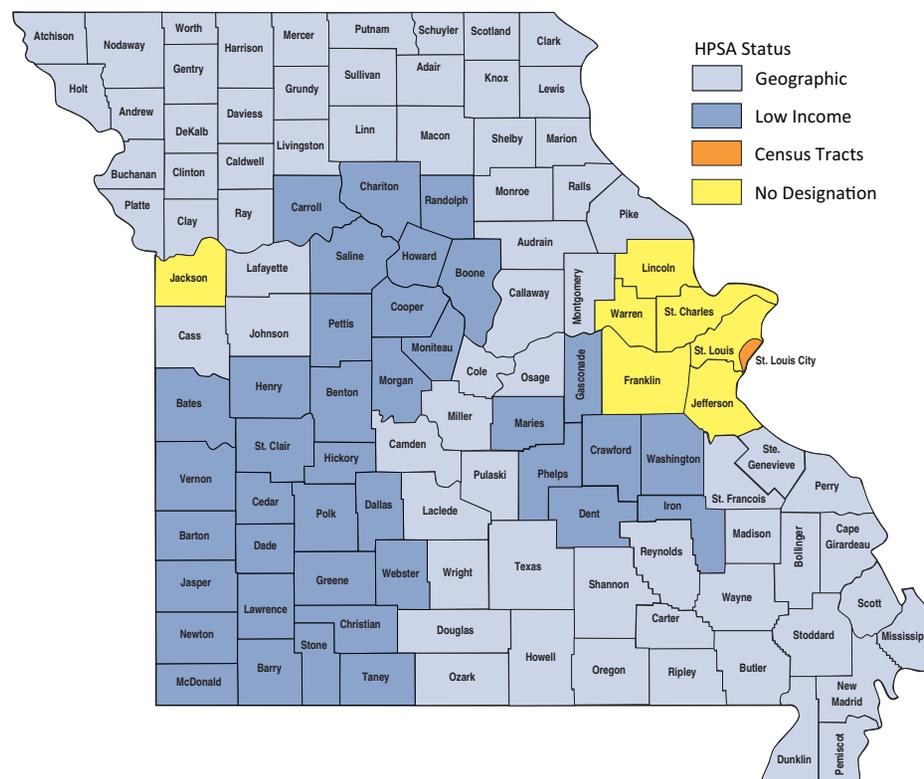
## Primary Care Mental Health

Mental and substance-use illnesses are the leading cause of combined death and disability for women of all ages and the second leading cause for men.<sup>138</sup> Access to appropriate resources is critical to the proper recovery and treatment of mental health problems and disorders.

In Missouri, Primary Care Mental HPSAs are defined using a ratio between the general population and the number (FTE) of licensed psychiatrists (allopathic and osteopathic). Generally for a Geographic HPSA there is a ratio of at least 30,000:1 and for a Low-Income HPSA there is a ratio of at least 20,000:1.

Nearly all rural counties, 98 in total are considered Mental HPSAs. The majority of these HPSAs are geographic.

Primary Care Mental Health Professional Shortage Areas - 2013



Source: Health Resources and Services Administration's Shortage Designation Branch

<sup>138</sup>Institute of Medicine, *Improving the Quality of Health Care for Mental and Substance-Use Conditions: Quality Chasm Series* (2006).



# RECOMMENDATIONS

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As demonstrated throughout this report, rural Missourians face many challenges related to their health. Overcoming the long standing inequality in health between rural and urban Missourians will require a holistic approach; there is no “silver bullet.” In light of this, the Office makes the following recommendations.

State regulations and policies need to continue to consider the varying degrees of difference between rural and urban areas/residents. Differences on the surface are easy to ascertain (rural residents having to drive farther for services, for instance), but some may need serious deliberation and research. In terms of economics, education, natural resources, social services and technology, rural areas present a unique set of challenges. This is especially true as it relates to rural health. Regulations and policies that may be good for hospitals and health care providers in large urban areas, who face many unique challenges of their own, may not be good for small rural hospitals or providers that may have severely limited resources combined

with payer reimbursement issues and serve a small population that is characterized by lack of insurance, lower levels of income and transportation needs.

Access to health care services needs to continue to improve, and at the very least be sustained, throughout rural Missouri. As described in the Health Care Resources section of this report, access to health care services is limited for rural Missourians, even if an individual has health insurance, adequate transportation and other financial resources. Nearly all rural counties are considered Primary Care Health Professional Shortage Areas, with the only non-designated rural counties being adjacent to urban counties. The cost of this lack of care is apparent in the Health Status section of this report. Rural hospitals are especially prone to financial distress due to policies and reimbursement rates, coupled with the high rates of patients that are Medicare/Medicaid dependent and uninsured, which makes it harder for their doors to remain open.

Addressing the access to care problem will require activities at many levels, including educating youth in health professional careers, supporting schools that offer health professional career training, recruiting and retaining practicing health professionals, actively forecasting and projecting the level of professionals required to support rural Missourians, supporting and encouraging professionals to work in defined areas of need, refining care models to allow for access, utilizing technology such as telehealth to bridge the large geographic spread of rural Missouri and improving rural residents’ ability to pay for health care services.

# STATE OFFICE OF RURAL HEALTH ACTIVITIES

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The program and activity areas of the Office are designed to support the health of rural communities. Although health care providers and health systems are often the primary recipients of the technical assistance or services provided by the Office, all members of the rural community are necessary partners and participants in the overall efforts.

The specific programs and functions are described in detail in this chapter.

A primary function within the Office is to facilitate the collection and dissemination of information to rural areas. The Office completes this function through the following mechanisms:

- The Rural Spotlight is a quarterly Office publication containing health information as it relates to rural Missourians and includes dietary, safety or other focused topics. Electronic copies are available at <http://health.mo.gov/living/families/ruralhealth/spotlight.php>.

- The Health in Missouri Briefs highlight specific health disparities within the rural areas of Missouri and provide more detailed information on those issues. Those are available at <http://health.mo.gov/living/families/ruralhealth/publications.php>.
- In coordination with the National Organization of State Offices of Rural Health (NOSORH), the Office utilizes TruServe, a web-based tracking tool created by the University of South Dakota, to track technical assistance and information dissemination activities. During State Fiscal Year 15 (July 1, 2014 - June 30, 2015), the Office assisted with a total of 1,108 technical assistance inquiries, in-depth telephone and email interactions, webinars, teleconferences, face-to-face and other types of technical assistance through mail, website and presentations.

- The Office continues to maintain a web-based healthcare resource directory, <https://ogi.oa.mo.gov/DHSS/medicalFacility/index.html>, which allows searches to find health resources including rural hospitals, rural health clinics and federally qualified health centers. This website provides a one-stop place to search for health care providers in any area of the state of Missouri.

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## *Medicare Rural Hospital Flexibility Grant Program*

The Health Resources and Services Administration (HRSA), Federal Office of Rural Health Policy (FORHP) funds the state for the Medicare Rural Hospital Flexibility Grant (FLEX) Program. The purpose is to assist Critical Access Hospitals by providing funding to encourage quality and performance improvement activities including stabilizing rural hospital finance, integrating emergency medical services into their health care systems, incorporating population health and fostering innovative models of health care.

Part of the FLEX Program is the Medicare Beneficiary Quality Improvement Project (MBQIP). The goal of MBQIP is to support Critical Access Hospitals (CAHs) in enhancing quality improvement; the 37 CAHs in Missouri are hospitals that have 25 or fewer beds and are located in rural areas. CAHs are supported in implementing hospital-specific quality improvement initiatives (such as increasing the number of patients who receive treatment for heart attacks within a standard time period), improving and integrating emergency management systems, supporting health system development and community engagement, and in developing and implementing rural health networks.

Specifically through MBQIP, the Office 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 Centers for Medicare and Medicaid Services, is a consumer-oriented website that provides information on how well hospitals provide recommended care to their patients. Participating CAHs report on a specific set of annual measures and engage in quality improvement projects to benefit patient care.

The Office also supports CAHs with technical assistance to improve their financial and operational outcomes. Technical assistance is provided by conducting a financial analysis of Missouri CAHs and performing comprehensive financial assessments for CAHs considered to be “distressed” under the analysis, identifying revenue cycle performance improvement initiatives and monitoring improvement efforts.

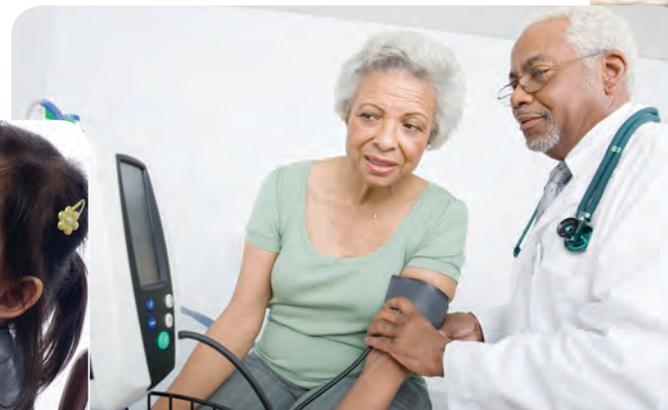


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## *Small Rural Hospital Improvement Program*

The Small Rural Hospital Improvement Program (SHIP) is a federally funded program in which the Office provides funding to small rural hospitals for a variety of operational improvement projects. To be eligible for funding, a hospital must have 49 staffed beds or less and be located outside a Metropolitan Statistical Area (i.e., in a rural area).

During SHIP Year 2014, \$365,040 was distributed among 38 hospitals to pay for costs related to 1) implementation of the Payment Bundling/Prospective Payment System (PPS), 2) Accountable Care Organization (ACO) modeling or Shared Savings, 3) Care Transitions and 4) Value-Based Purchasing (VBP) for financial improvement. The majority of funds were used for purchases under the PB/PPS implementation (43 percent), Care Transitions (27 percent), VBP (17 percent) and ACO category (9 percent). The majority of these purchases consist of software, hardware, education and training within those categories.



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## *The Office of Primary Care and Rural Health*

The Office is located within the Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health, which includes the State Office of Rural Health, the Primary Care Office and the Missouri Oral Health Program. This organizational structure presents a unique environment in which to engage in close collaboration on a multitude of projects; the efforts of these two partner Offices will be briefly outlined here.

### *Primary Care Office*

The Primary Care Office (PCO) promotes federal, state, local and private collaboration in expanding comprehensive, community-based primary health care services for medically underserved populations. The PCO monitors and evaluates access to health care services, including designation of Health Professional Shortage Areas. The PCO is also the primary state contact for the National Health Service Corps, J-1 Visa Waiver Program, National Interest Waiver Program and works with local, state and federal partners in the development and expansion of safety-net health care delivery sites.

The PCO implements programs that directly address the shortage of primary health care providers statewide. The Primary Care Resource Initiative for Missouri (PRIMO), the Missouri Professional and Practical Nursing Student

Loan (NSL) and State Loan Repayment Program (SLRP) provide either scholarship or loan repayment to primary health care providers in return for the provision of health care services in a defined area of need. Funding is also provided to community organizations to develop healthcare services in areas where services are currently unavailable, to expand existing health care services for disparaged populations and to provide support to Area Health Education Centers for the development of health professional students, especially those individuals from rural, inner city and underserved communities in Missouri.

### *Oral Health*

The Missouri Oral Health Program's (MOHP) mission is to improve the oral health of Missourians through education, prevention and leadership. One main function within MOHP is the operation of the Preventive Services Program (PSP). The PSP is a community-driven oral health program for children and involves the participation of a variety of community partners such as schools, day care centers, Head Starts and State Schools for the Severely Disabled.

In the 2014-2015 school year, over 83,000 children were served. Each child received oral health education, age-appropriate oral health supplies (which may include toothbrush, toothpaste and floss), a screening by a dental

professional and a referral for additional dental care if issues are identified. The MOHP also provides information for the public about community water fluoridation and collaborates with other programs and organizations that address access to oral health care in women, children and other at-risk populations.

### *Other Internal/External Partners*

Internal and External Partners and Networks are critical to the efforts of the Office; without these partners success would be severely compromised. Critical internal DHSS partners include the Bureau of Outpatient Healthcare, Bureau of Health Care Analysis and Data Dissemination, Bureau of Emergency Medical Services, Bureau of Cancer and Chronic Disease Control, Office of Minority Health, Office on Women's Health and Bureau of Hospital Standards.

Critical external partners include the Missouri Hospital Association, the Missouri Primary Care Association, the Missouri Dental Association, the Missouri Association of Rural Health Clinics, the Missouri Rural Health Association, the Department of Social Services, the Health Resources and Services Administration Office of Rural Health Policy, the Missouri Area Health Education Centers, the University of Missouri and the Rural Recruitment and Retention Network.

# GLOSSARY

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## *Age-Adjusted Rates*

Age-adjusted rates allow fairer comparisons to be made between groups with different age distributions. For example, a county with a higher percentage of elderly residents may have a higher rate of death or ER visits than a county with a younger population, merely because the elderly are more likely to die or visit the ER. (The same distortion can occur when races, genders or time periods with different age structures are compared.) Age adjustment controls for different age structures and makes the rates for different groups more comparable.

A standard population distribution is used to adjust death, hospitalization, ER visit and other types of rates that typically vary with age. Age-adjusted rates are the rates that would have existed if the population under study had the same age distribution as the standard population. Therefore, they are summary measures adjusted for differences in age distributions.

The National Center for Health Statistics recommends that the U.S. 2000 standard population be used to calculate age-adjusted rates. All age-adjusted rates in this report were adjusted using the U.S. 2000 standard population. Users of Missouri Information for Community Assessment (MICA) have the option of selecting age-adjusted rates based on the U.S. 1940, 1970 or 2000 standard populations when generating tables utilizing age adjustment. Age-adjusted rates in the Community Data Profiles use the U.S. 2000 standard population.

**If rates from different sources are compared, the same standard population must be used on both sides of the comparison. It is not legitimate to compare adjusted rates which use different standard populations.** The use of different standard populations can affect general trends in total mortality and cause of death and differences in mortality by race and gender.

For more information on this topic see: “Effects of Changing from the 1940 to the Year 2000 Standard Population for Age-Adjusted Death Rates in Missouri”: *Missouri Monthly Vital Statistics*, 33.12 (Feb. 2000).

Age-adjusted rates published elsewhere (e.g., in the annual *Missouri Vital Statistics*) may be slightly different from those found in the MICAs or Community Data Profiles due to updating of population estimates for years between decennial Censuses.

The constant or “per population” number used for age-adjusted rates may vary depending on the type of event. For example, age-adjusted rates for deaths are reported per 100,000 population. However, age-adjusted rates for hospitalizations and procedures are reported per 10,000 population, while age-adjusted rates for ER visits are reported per 1,000 population.

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## *Statistical Significance*

Statistical significance tests are performed to determine whether the difference between two rates is probably the result of chance factors or if it is meaningful. All tests of statistical significance performed for this report were computed using 95 percent confidence intervals. In this report, the terms “statistically significant” or simply “significant” indicate that a significance test was performed.

## *Ranks*

Rural and urban county ranks are reported in some sections of this report. This report is structured so that a rank of 1 always indicates the worst rate, regardless of whether the worst rate is the highest or lowest value. Tied counties were all assigned the higher, or worse, rank.

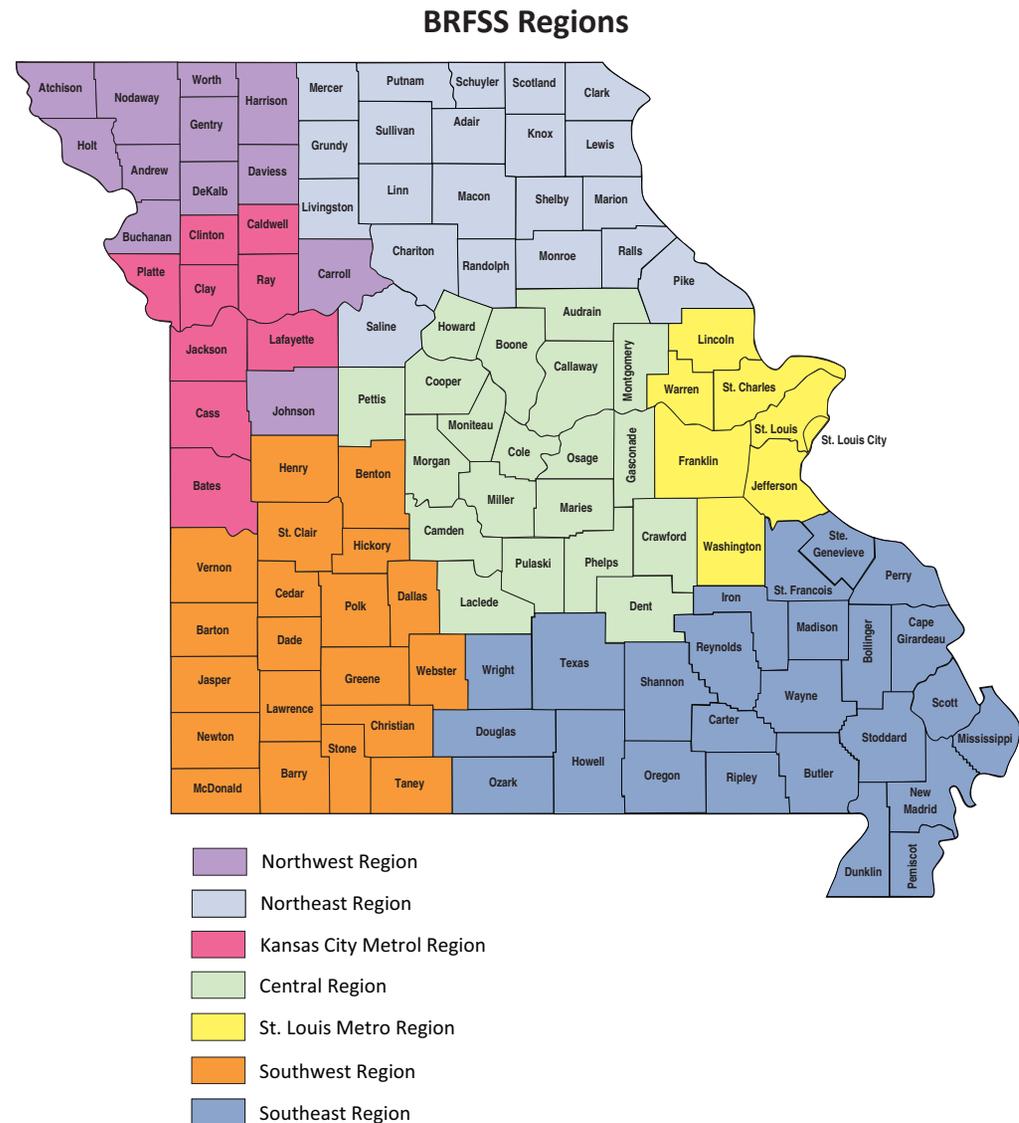
## *Unstable Rates*

Unstable rates are rates based on fewer than 20 events. They can be common for small population areas, such as certain counties, and for low-frequency events, such as cause-specific deaths or birth defects. If the use of data from one specified year is not required, data from several years can be combined to generate a stable multi-year rate. Similarly, data from several counties can be combined to create a stable regional rate. In this report, 11 years of data were combined to calculate cause-specific death rates and death rates by gender and age group. Five years of data were combined to calculate ER visit rates for specific diagnoses and subpopulations.



## Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual landline and cell telephone survey that collects information on health risk behaviors, preventive health practices and health care access from non-institutionalized adults ages 18 and older. The annual BRFSS sample size of approximately 7,000 produces prevalence estimates at the state and regional levels.



Source: <http://www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf>

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Several questions from the BRFSS survey are used to derive prevalence estimates for the indicators included in the Health Behaviors and Risk Factors chapter of this report.

- Fair or poor general health status estimates are derived from “Fair” or “Poor” responses to the question: “Would you say that in general your health is excellent, very good, good, fair or poor?”
- Tobacco use estimates are derived from:
  - o “Yes” responses to “Have you smoked at least 100 cigarettes in your entire life?” and
  - o “Every day” OR “Some days” responses to “Do you now smoke cigarettes every day, some days or not at all?”
- No leisure-time physical activity estimates are derived from “No” responses to the question: “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening or walking for exercise?”
- Ate fewer than five fruits and vegetables per day estimates are derived from responses to the following questions:
  - o “During the past month, how many times per day, week or month did you drink 100 percent PURE fruit juices? Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Only include 100 percent juice.” and
  - o “During the past month, not counting juice, how many times per day, week or month did you eat fruit? Count fresh, frozen or canned fruit.” and
  - o “During the past month, how many times per day, week or month did you eat cooked or canned beans, such as refried, baked, black, garbanzo beans, beans in soup, soybeans, edamame, tofu or lentils. Do not include long green beans.” and
  - o “During the past month, how many times per day, week or month did you eat dark green vegetables for example broccoli or dark leafy greens including romaine, chard, collard greens or spinach?” and
  - o “During the past month, how many times per day, week or month did you eat orange-colored vegetables such as sweet potatoes, pumpkin, winter squash or carrots?” and
  - o “Not counting what you just told me about, during the past month, about how many times per day, week or month did you eat OTHER vegetables? Examples of other vegetables include tomatoes, tomato juice or V-8 juice, corn, eggplant, peas, lettuce, cabbage and white potatoes that are not fried such as baked or mashed potatoes.”
- Seatbelt usage estimates are derived from “Always” responses to: “How often do you use seatbelts when you drive or ride in a car?”

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## Healthy People 2020

Healthy People 2020 objectives are health status targets for the entire U.S. Targets are set using baseline U.S. data. Objectives are organized into 42 topic areas, with Leading Health Indicators identified in 12 of these topic areas. Additional information about Healthy People 2020 is available at <http://www.healthypeople.gov/2020/default.aspx>.

## Body Mass Index

Body mass index (BMI) is a measure of body fat. Persons with BMI values of 30.0 or higher are considered obese.

The Behavioral Risk Factor Surveillance System derives Overweight (25.0 – 29.9 BMI) and Obese ( $\geq 30$  BMI) indicators by calculating BMI using responses to the following questions:

“About how much do you weigh without shoes?”

“About how tall are you without shoes?”

## Resident

This report provides data only for Missouri residents. Missouri residents are persons who resided in Missouri at the time of the event in question (birth, death, hospitalization, ER visit, etc.). Missouri receives vital records and hospital/ER data from most of its border states, and these records are included in the Missouri resident data. For example, a record for a Missouri resident treated in a Kansas hospital would be reported as a Missouri resident hospitalization.

Data in the Missouri Information for Community Assessment (MICA) system and in this report are categorized by resident status. For instance, the record for an Adair County resident who visited the ER in Boone County would be included in the Adair County data.



# APPENDIX A – USING THE DHSS COMMUNITY DATA PROFILES AND MISSOURI INFORMATION FOR COMMUNITY ASSESSMENT (MICA) WEBSITES

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Many of the health data included in this report may be accessed on the Missouri Department of Health and Senior Services (DHSS) Community Data Profiles and MICA websites. Users can easily create different types of tables, graphs, charts and maps pertaining to health indicators.

The following step-by-step guide offers detailed instructions on accessing health data on the DHSS Community Data Profiles website.

1. Go to the DHSS Community Data Profiles website <http://health.mo.gov/data/CommunityDataProfiles/index.html>.
2. From the topic list, select a Profile. Then use the pull-down menu to choose whether to view data for the state, a county or a city. (Note: The rural and urban categories used in this report are not available for the Community Data Profiles. Data for the state, counties and selected cities can be viewed. Data for BRFSS regions are available for some topics.) Click the Submit button.
3. The requested data table will appear.

4. The Trend Lines and Comparison Bar Graphs columns provide links to available charts and graphs. Users can create a graph showing a three-year moving average trend line. In addition, users can create a bar chart showing the rates for a specific indicator in selected geographies or compare indicators within a single geography.

The following step-by-step guide offers detailed instructions on accessing health data on the DHSS MICA website.

1. Go to the DHSS MICA website at <http://health.mo.gov/data/mica/MICA/>.
2. Choose a topic from the list of MICA datasets.
3. Select a viewing option. Options may include county/city tables, maps or ZIP code tables. Each option provides a query screen that allows users to customize the data output.
4. Data for the rural and urban categories used in this report were viewed by selecting

the appropriate counties in Step 5 of the query screen. If County/City is selected as the row or column variable in Step 1 or Step 2, the “Total for Selection” row or column represents the overall rural or urban data. The table on the next page lists the rural and urban counties as categorized in this report.

For more information on using the Community Data Profiles and MICAs please refer to the User Handbook at <http://health.mo.gov/data/mica/MICA/CHAIPTraining.html> or contact the DHSS Bureau of Health Care Analysis and Data Dissemination at 573-751-6272.

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## *Rural Counties*

Adair	Daviess	McDonald
Andrew	DeKalb	Macon
Atchison	Dent	Madison
Audrain	Douglas	Maries
Barry	Dunklin	Marion
Barton	Franklin	Mercer
Bates	Gasconade	Miller
Benton	Gentry	Mississippi
Bollinger	Grundy	Moniteau
Butler	Harrison	Monroe
Caldwell	Henry	Montgomery
Callaway	Hickory	Morgan
Camden	Holt	New Madrid
Cape Girardeau	Howard	Nodaway
Carroll	Howell	Oregon
Carter	Iron	Osage
Cedar	Johnson	Ozark
Chariton	Knox	Pemiscot
Christian	Laclede	Perry
Clark	Lafayette	Pettis
Clinton	Lawrence	Phelps
Cooper	Lewis	Pike
Crawford	Lincoln	Polk
Dade	Linn	Pulaski
Dallas	Livingston	Putnam

Ralls
Randolph
Ray
Reynolds
Ripley
St. Clair
St. Francois
Ste. Genevieve
Saline
Schuyler
Scotland
Scott
Shannon
Shelby
Stoddard
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

## *Urban Counties*

Boone
Buchanan
Cass
Clay
Cole
Green
Jackson
Jasper
Jefferson
Newton
Platte
St. Charles
St. Louis
St. Louis City

*Community Data Profiles and MICAs*

For more information on using the Community Data Profiles and MICA, please refer to the User Handbook at <http://health.mo.gov/data/mica/MICA/CHAIPTraining.html> or contact the DHSS Bureau of Health Care Analysis and Data Dissemination at 573.751.6272.

# APPENDIX B – DEATH NUMBERS AND RATES BY CAUSE, GENDER AND AGE GROUP

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2003-2013 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>All causes</i>	255,086	875.7	350,652	812.6
Males	128,389	1,034.3	169,269	968.0
Females	126,697	743.5	181,383	693.5
Under 15	3,261	68.8	5,318	65.4
15 to 24	3,189	94.4	4,900	84.1
25 to 44	10,969	188.4	17,437	156.9
45 to 64	47,590	747.0	68,246	647.4
65 and Over	190,070	4,984.7	254,717	4,904.6
<i>Heart disease</i>	69,562	234.2	89,409	205.2
Males	35,131	284.5	43,780	256.1
Females	34,431	191.4	45,629	167.4
Under 15	66	1.4	106	1.3
15 to 24	91	2.7	143	2.5
25 to 44	1,573	27.0	2,236	20.1
45 to 64	11,835	185.8	15,624	148.2
65 and Over	55,997	1,468.5	71,293	1,372.8
<i>Cancer</i>	57,539	194.1	80,038	185.6
Males	31,215	236.9	40,661	225.8
Females	26,324	162.5	39,377	158.9
Under 15	119	2.5	177	2.2
15 to 24	121	3.6	217	3.7
25 to 44	1,497	25.7	2,308	20.8
45 to 64	15,477	242.9	22,234	210.9
65 and Over	40,323	1,057.5	55,099	1,060.9

## APPENDIX B – DEATH NUMBERS AND RATES BY CAUSE, GENDER AND AGE GROUP

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2003-2013 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Chronic lower respiratory diseases (CLRD)</i>	16,896	56.6	19,571	45.9
Males	8,722	69.1	8,728	51.8
Females	8,174	48.4	10,843	42.5
Under 15	13	0.3 @	37	0.5
15 to 24	5	0.1 @	28	0.5
25 to 44	156	2.7	179	1.6
45 to 64	2,660	41.8	2,674	25.4
65 and Over	14,062	368.8	16,651	320.6
<i>Stroke</i>	15,145	50.8	19,796	45.7
Males	5,953	49.6	7,564	45.6
Females	9,192	50.8	12,232	44.9
Under 15	23	0.5	42	0.5
15 to 24	20	0.6	21	0.4
25 to 44	225	3.9	343	3.1
45 to 64	1,520	23.9	2,341	22.2
65 and Over	13,357	350.3	17,049	328.3

## APPENDIX B – DEATH NUMBERS AND RATES BY CAUSE, GENDER AND AGE GROUP

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2003-2013 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Unintentional injuries</i>	13,712	54.9	18,150	43.3
Males	8,697	73.1	11,100	58.6
Females	5,015	37.4	7,050	29.7
Under 15	700	14.8	774	9.5
15 to 24	1,957	57.9	1,974	33.9
25 to 44	3,464	59.5	4,495	40.4
45 to 64	3,351	52.6	4,602	43.7
65 and Over	4,239	111.2	6,300	121.3
<i>Motor vehicle accidents (subset of Unintentional injuries)</i>	5,925	24.4	4,817	11.7
Males	3,994	33.2	3,355	17.0
Females	1,931	15.7	1,462	6.8
Under 15	262	5.5	173	2.1
15 to 24	1,434	42.4	1,205	20.7
25 to 44	1,646	28.3	1,512	13.6
45 to 64	1,483	23.3	1,183	11.2
65 and Over	1,099	28.8	744	14.3

# APPENDIX B – DEATH NUMBERS AND RATES BY CAUSE, GENDER AND AGE GROUP

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2003-2013 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Alzheimer's disease</i>	8,422	27.9	10,697	24.4
Males	2,594	23.4	3,005	20.0
Females	5,828	30.3	7,692	26.6
Under 15	0	0.0 @	0	0.0 @
15 to 24	0	0.0 @	0	0.0 @
25 to 44	1	0.0 @	2	0.0 @
45 to 64	85	1.3	104	1.0
65 and Over	8,335	218.6	10,591	203.9
<i>Diabetes</i>	6,739	22.9	9,205	21.3
Males	3,325	26.0	4,581	25.4
Females	3,414	20.4	4,624	18.2
Under 15	4	0.1 @	7	0.1 @
15 to 24	12	0.4 @	36	0.6
25 to 44	237	4.1	368	3.3
45 to 64	1,476	23.2	2,369	22.5
65 and Over	5,010	131.4	6,424	123.7
<i>Pneumonia and influenza</i>	6,581	22.1	8,348	19.1
Males	2,944	25.4	3,684	23.0
Females	3,637	20.0	4,664	16.7
Under 15	44	0.9	51	0.6
15 to 24	19	0.6 @	23	0.4
25 to 44	123	2.1	189	1.7
45 to 64	662	10.4	784	7.4
65 and Over	5,733	150.4	7,299	140.5

## APPENDIX B – DEATH NUMBERS AND RATES BY CAUSE, GENDER AND AGE GROUP

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2003-2013 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Kidney disease</i>	5,804	19.5	7,422	17.2
Males	2,783	23.4	3,524	21.2
Females	3,021	17.0	3,898	14.6
Under 15	11	0.2 @	15	0.2 @
15 to 24	8	0.2 @	19	0.3 @
25 to 44	80	1.4	143	1.3
45 to 64	661	10.4	1,086	10.3
65 and Over	5,044	132.3	6,159	118.6
<i>Suicide</i>	3,627	15.0	5,393	13.0
Males	2,976	24.9	4,184	21.3
Females	651	5.5	1,209	5.7
Under 15	28	0.6	51	0.6
15 to 24	430	12.7	677	11.6
25 to 44	1,245	21.4	1,905	17.1
45 to 64	1,266	19.9	1,978	18.8
65 and Over	658	17.3	782	15.1

Source: Death MICA

An @ following a rate indicates that the rate is based on fewer than 20 cases and is considered to be unstable.

This table is arranged in order of the leading causes of death for rural residents. There are slight differences in the order of the leading causes of death for urban residents.

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

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2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>All diagnoses</i>	4,268,363	397.8	6,954,290	373.7
Males	1,869,763	347.1	2,993,149	330.0
Females	2,398,570	450.9	3,961,113	415.5
Under 15	872,979	404.5	1,502,388	406.8
15 to 24	720,228	471.6	1,244,284	470.0
25 to 44	1,254,005	481.8	2,162,479	430.4
45 to 64	832,385	275.3	1,371,431	272.0
65 and Over	588,727	323.1	673,637	270.9
<i>Heart disease</i>	185,334	15.7	266,316	13.9
Males	88,400	15.3	118,341	12.9
Females	96,933	16.2	147,974	14.8
Under 15	3,481	1.6	7,388	2.0
15 to 24	13,462	8.8	26,560	10.0
25 to 44	45,846	17.6	88,781	17.7
45 to 64	64,454	21.3	94,358	18.7
65 and Over	58,091	31.9	49,222	19.8
<i>Cancer</i>	3,794	0.3	3,020	0.1
Males	1,982	0.3	1,521	0.2
Females	1,812	0.3	1,499	0.1
Under 15	107	0.0	110	0.0
15 to 24	67	0.0	68	0.0
25 to 44	394	0.2	331	0.1
45 to 64	1,448	0.5	1,396	0.3
65 and Over	1,778	1.0	1,115	0.4

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Chronic obstructive pulmonary disease (COPD) and bronchiectasis</i>	83,163	7.1	88,392	4.6
Males	35,116	6.1	35,071	3.8
Females	48,047	8.3	53,321	5.4
Under 15	10,115	4.7	9,435	2.6
15 to 24	6,716	4.4	8,981	3.4
25 to 44	17,586	6.8	23,908	4.8
45 to 64	26,695	8.8	29,798	5.9
65 and Over	22,051	12.1	16,270	6.5
<i>Asthma</i>	35,160	3.4	115,825	6.4
Males	15,615	3.0	56,219	6.3
Females	19,545	3.8	59,606	6.5
Under 15	11,773	5.5	50,293	13.6
15 to 24	5,694	3.7	19,322	7.3
25 to 44	9,911	3.8	28,747	5.7
45 to 64	5,749	1.9	14,673	2.9
65 and Over	2,033	1.1	2,789	1.1
<i>Stroke</i>	15,305	1.1	10,741	0.5
Males	7,307	1.2	5,038	0.6
Females	7,998	1.1	5,703	0.5
Under 15	43	0.0	56	0.0
15 to 24	125	0.1	99	0.0
25 to 44	1,006	0.4	962	0.2
45 to 64	4,712	1.6	3,852	0.8
65 and Over	9,419	5.2	5,772	2.3

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Unintentional injuries†</i>	962,288	89.9	1,433,626	77.2
Males	497,351	93.0	727,387	80.5
Females	464,924	86.1	706,231	73.5
Under 15	237,615	110.1	363,863	98.5
15 to 24	176,231	115.4	259,245	97.9
25 to 44	254,276	97.7	388,955	77.4
45 to 64	172,202	57.0	265,828	52.7
65 and Over	121,951	66.9	155,713	62.6
<i>Motor vehicle traffic accidents†</i>	86,622	8.2	167,146	8.9
Males	40,531	7.5	74,719	8.1
Females	46,089	8.9	92,424	9.7
Under 15	7,264	3.4	12,450	3.4
15 to 24	27,824	18.2	49,044	18.5
25 to 44	28,691	11.0	62,710	12.5
45 to 64	17,163	5.7	34,382	6.8
65 and Over	5,679	3.1	8,559	3.4
<i>Alzheimer's disease‡</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
Males	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
Females	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
Under 15	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
15 to 24	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
25 to 44	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
45 to 64	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>
65 and Over	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>	<i>Not available</i>

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

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2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Diabetes</i>	22,913	2.0	34,775	1.8
Males	10,750	1.9	16,933	1.8
Females	12,163	2.0	17,842	1.7
Under 15	789	0.4	1,022	0.3
15 to 24	1,860	1.2	2,869	1.1
25 to 44	5,869	2.3	10,161	2.0
45 to 64	8,322	2.8	13,850	2.7
65 and Over	6,072	3.3	6,872	2.8
<i>Pneumonia</i>	47,034	4.1	58,333	3.2
Males	23,599	4.3	28,685	3.2
Females	23,435	4.1	29,648	3.1
Under 15	15,023	7.0	24,448	6.6
15 to 24	2,382	1.6	4,166	1.6
25 to 44	7,284	2.8	11,165	2.2
45 to 64	9,525	3.2	11,405	2.3
65 and Over	12,820	7.0	7,149	2.9
<i>Kidney disease±</i>	3,203	0.2	4,603	0.2
Males	1,771	0.3	3,021	0.3
Females	1,432	0.2	1,582	0.1
Under 15	53	0.0	90	0.0
15 to 24	97	0.1	189	0.1
25 to 44	428	0.2	998	0.2
45 to 64	1,143	0.4	2,471	0.5
65 and Over	1,482	0.8	855	0.3

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

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2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Affective disorders</i>	25,017	2.5	32,700	1.8
Males	11,951	2.3	16,453	1.8
Females	13,066	2.6	16,247	1.7
Under 15	1,643	0.8	2,813	0.8
15 to 24	6,216	4.1	8,403	3.2
25 to 44	11,045	4.2	12,979	2.6
45 to 64	5,463	1.8	7,574	1.5
65 and Over	650	0.4	931	0.4
<i>Acute bronchitis</i>	67,093	6.4	102,682	5.6
Males	28,817	5.4	42,472	4.7
Females	38,275	7.3	60,210	6.4
Under 15	20,717	9.6	28,341	7.7
15 to 24	8,794	5.8	13,704	5.2
25 to 44	18,702	7.2	32,347	6.4
45 to 64	12,130	4.0	20,474	4.1
65 and Over	6,750	3.7	7,816	3.1
<i>Urinary stones</i>	41,399	3.9	55,678	3.0
Males	24,628	4.5	33,084	3.6
Females	16,771	3.3	22,594	2.4
Under 15	276	0.1	423	0.1
15 to 24	5,326	3.5	6,945	2.6
25 to 44	18,523	7.1	25,296	5.0
45 to 64	13,038	4.3	18,557	3.7
65 and Over	4,236	2.3	4,457	1.8

# APPENDIX C – EMERGENCY ROOM (ER) VISIT NUMBERS AND RATES BY DIAGNOSIS, GENDER AND AGE GROUP

2009-2013 Age-Adjusted ER Visit Rates per 1,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Gastritis and duodenitis</i>	18,464	1.7	24,587	1.3
Males	7,424	1.4	10,189	1.1
Females	11,040	2.1	14,398	1.5
Under 15	1,889	0.9	2,256	0.6
15 to 24	4,351	2.8	6,244	2.4
25 to 44	6,714	2.6	9,851	2.0
45 to 64	3,769	1.2	4,831	1.0
65 and Over	1,741	1.0	1,405	0.6
<i>Nontraumatic dental complaints</i>	120,117	12.2	169,516	9.2
Males	53,557	10.6	73,294	8.1
Females	66,560	13.9	96,222	10.3
Under 15	4,680	2.2	8,101	2.2
15 to 24	28,668	18.8	37,532	14.2
25 to 44	71,688	27.5	97,467	19.4
45 to 64	13,663	4.5	24,199	4.8
65 and Over	1,416	0.8	2,216	0.9

Sources:

†Unintentional injury and Motor vehicle traffic accident ER visit data were obtained from the Injury MICA.

‡Alzheimer’s disease ER visit data were obtained from Patient Abstract System files with the assistance of David Litchfield in the Bureau of Health Care Analysis and Data Dissemination, but the numbers were too small to include in this report.

±Kidney disease numbers were calculated by summing the Nephritis - nephrosis - renal sclerosis, Acute and unspecified renal failure and Chronic renal failure diagnosis categories in the Emergency Room MICA. Rates were calculated by the Bureau of Health Care Analysis and Data Dissemination using these sums and population data from the Population MICA. Data for all other indicators were obtained directly from the Emergency Room MICA.

An @ following a rate indicates that the rate is based on fewer than 20 cases and is considered to be unstable.

This table is primarily arranged in order of the leading causes of death for rural residents. There are slight differences in the order of the leading causes of death for urban residents. The last five diagnoses are listed in the same order used in the body of the report.



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