



Health in Rural Missouri

Biennial Report
2016-2017

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

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

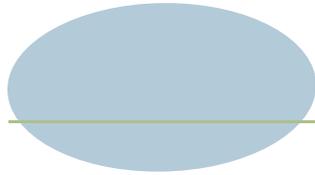
Of the more than 6 million residents in Missouri, 2.2 million, or approximately 37 percent, are considered rural. Since 2005, rural areas overall have experienced a 5.1 percent increase in residents; however, this increase is very uneven. Over this time period, 15 counties (all rural) lost more than five percent of their population. Twelve of these 15 rural counties were located north of the Missouri River.

In terms of socioeconomic factors, rural Missourians are at a significant disadvantage compared to their urban counterparts when considering income and education. Missouri's rural poverty rate (17 percent) is higher than its urban poverty rate (13.6 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 (17 percent for rural versus 33 percent for urban).

When analyzing standard markers of health status, rural Missourians are overall less healthy than their urban counterparts and more likely to die at an earlier age. The rural death rate for all causes during 2013 was 854 deaths per 100,000 residents, while in urban areas this rate was more than 10 percent less, at 773.6

per 100,000. The 2014-2015 urban life expectancy at birth is 77.9 years compared to 76.5 years in rural counties - a difference of 1.4 years. The overall death rate is significantly higher for rural Missourians (866.7) than their urban counterparts (796.8), a relative difference of just over 8 percent. Furthermore, the All Cause death rate for rural residents in 2015 is still higher than the urban rate was 11 years ago. In Missouri, rural rates are higher than their urban counterparts for the All Causes of death category as well as each of the ten leading causes of death.

Missouri's opioid mortality rate for rural areas is 21 percent lower than the national average, but urban areas have a mortality rate that is higher than both the state rate and the national rate, by 18 and 37 percent, respectively. However, in rural areas the non-heroin overdose rates during the 2011-2015 time period are three times higher than heroin overdose rates.



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 164 licensed hospitals in Missouri, 72 (45 percent) are located in rural areas. Of those 72 hospitals, nearly half (36) are Critical Access Hospitals which have 25 beds or less and provide a limited scope of service. In regards to 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, 99 are Primary Medical HPSAs, 97 are Mental Health HPSAs, and 95 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 leads 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

The Missouri Office of Rural Health 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 four specific areas:

- Demographic and Socioeconomic Indicators
- Health Status
- The Opioid Epidemic in Missouri
- Health Care Resources

This report focuses on the dichotomy of urban and rural health and health care access. 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 your geographic location in Missouri has a significant bearing on your health.

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



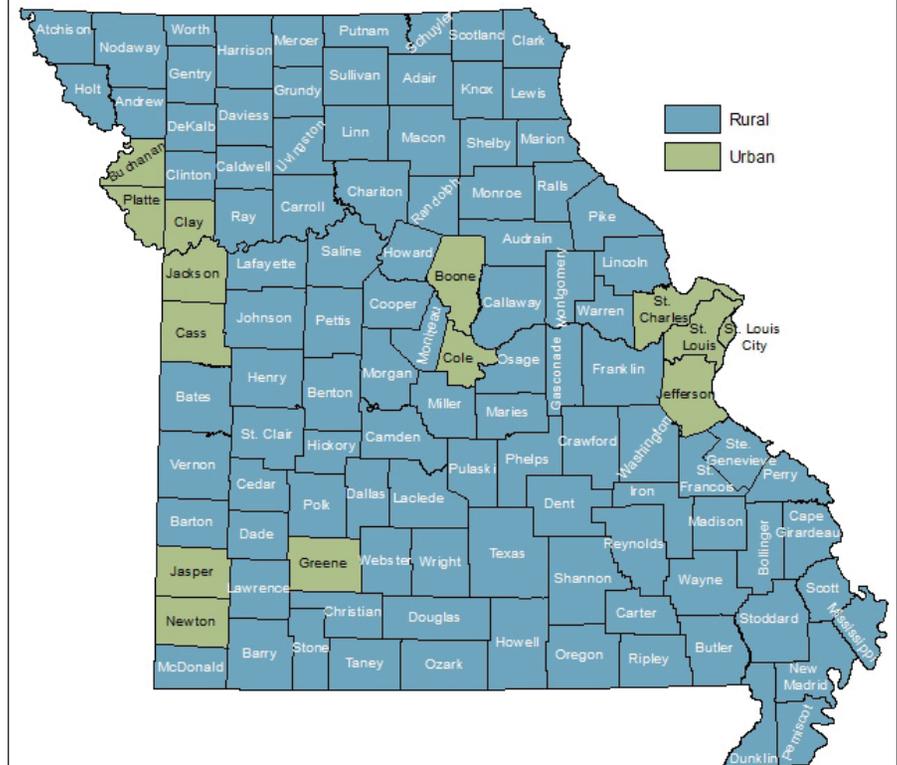
DEFINING RURAL HEALTH

The United States (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 uses the same rural/urban definition as recent editions of Health in Rural Missouri. It defines urban counties as those with a population density of greater than 150 persons per square mile plus any county that contains at least part of the central city of a Metropolitan Statistical Area (MSA) based on 2004 Census guidelines. Using this definition, 14 Missouri counties are urban.¹ The remaining 101 counties in Missouri are rural. The following map illustrates the rural and urban counties in Missouri.



2016-2017 Health in Rural Missouri Biennial Report Rura/Urban County Classification



Developed by the Bureau of Health Care Analysis and Data Dissemination using 2015 population estimates from the National Center for Health Statistics

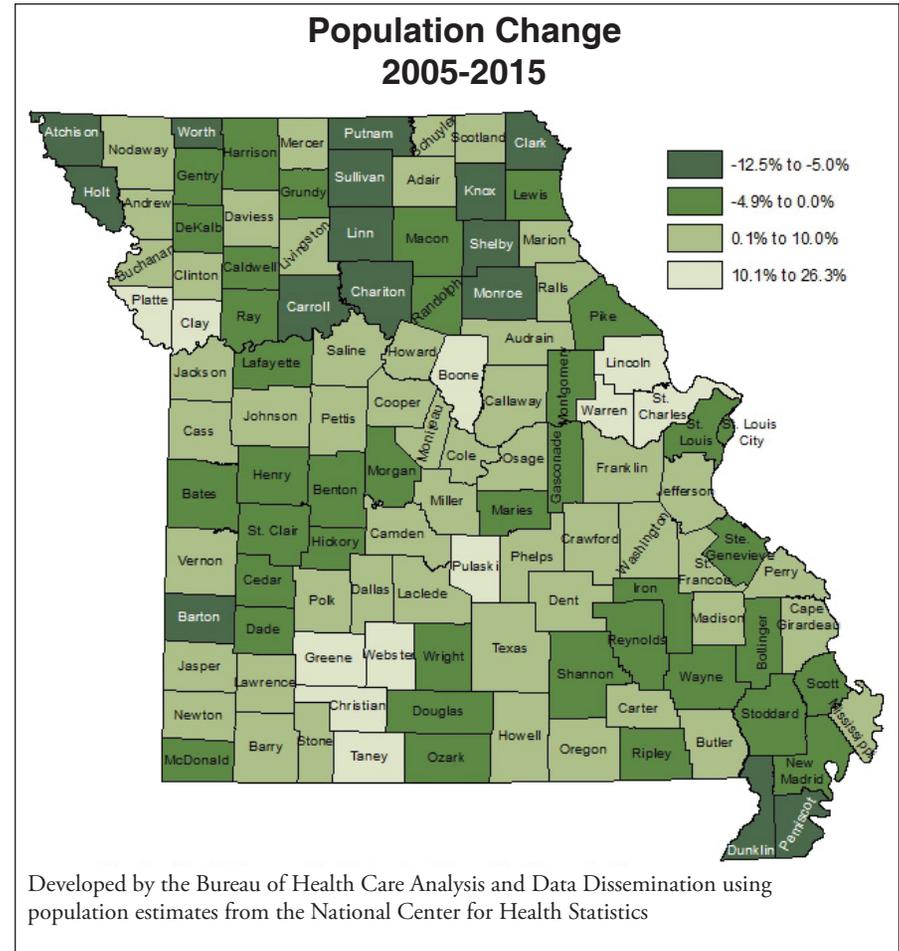
¹St. Louis City is an independent city which functions as its own county. It is therefore included as one of the 14 urban counties.

POPULATION²

The U.S. Census Bureau estimates the 2015 Missouri resident population to be 6,083,672. The majority of Missouri’s population resides in urban counties (3.9 million residents). The remaining 2.2 million Missourians, or 36.6 percent of the state’s population, reside in rural counties. The 2015 Missouri population estimate represents a 5.1 percent increase since the 2005 estimate. Comparatively, the U.S. population increased by 11.0 percent from 2005 to 2015.

In Missouri, from 2005 to 2015, the population increased an estimated 3.3 percent in rural counties, while it increased 6.1 percent in urban counties. The population growth over this time period was not uniformly distributed even within the rural and urban designations. Half of the rural counties (or 51 of the 101 rural counties) experienced population decline, the largest of which was 12 percent (Atchison County in northwest Missouri). Statewide, 15 counties (all rural) lost more than five percent of their population. Twelve of these 15 rural counties were located north of the Missouri River. Atchison and Holt, two very small rural counties in the northwest corner of the state, experienced population loss greater than 10 percent.

The other half of rural counties experienced population increase, although the size of the increase ranged from a minor 0.1 percent (Daviess County in northwest Missouri) to a robust 26.3 percent (Christian County in southwest Missouri). Rural counties which experienced large population growth (10 percent or higher) can easily be categorized by one of the following descriptions: 1) counties in the suburban fringe of St Louis; 2) counties in the Springfield/Branson area of southwest Missouri; or 3) Pulaski County in south central Missouri. (Pulaski County is unique because of the Fort Leonard Wood military base and plays a large role in the county’s population fluctuations.)



²National Center for Health Statistics. Vintage 2015 postcensal estimates of the resident population of the United States (April 1, 2010, July 1, 2010-July 1, 2015), 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., http://www.cdc.gov/nchs/nvss/bridged_race.htm.

NATURAL INCREASE

Natural increase is a commonly used tool for tracking population trends. It is calculated by subtracting the number of deaths within a chosen geography from the number of births. When the geography has more births than deaths, a positive natural increase, or population growth, exists. Alternatively, when the deaths exceed the births, there is a natural decrease or population loss.

From 2013 to 2015, the overall natural increase in Missouri was 50,183. Most of this natural increase occurred in urban areas. Over 87 percent of the total natural increase was found in urban counties compared to only about 13 percent in rural areas.

Another way to look at natural increase is to examine the ratio between births and deaths. A ratio over 1.0

means that more births than deaths occurred in that geography during the given time frame. The Missouri urban birth-death ratio for 2013-2015 was 1.4, compared to 1.1 for rural counties.

	Births	Deaths	Natural Increase	Number of Births for Every 1 Death
Missouri	225,390	175,207	50,183	1.3
Rural Missouri	80,196	73,860	6,336	1.1
Urban Missouri	145,194	101,344	43,850	1.4

Source: Missouri Vital Statistics



RACIAL/ETHNIC DIVERSITY³

Missouri's urban counties are more racially and ethnically diverse than its rural counties. In 2015, over one-fifth (21 percent) of urban county residents were members of minority populations. In contrast, only 6 percent of rural residents were members of a minority population. Fifty-seven out of the 101 rural counties had a minority population of less than five percent.

The Black/Non-Hispanic population comprised the largest minority group in both rural and urban areas of Missouri, but the share was much larger in urban areas. Black/Non-Hispanics represented 17 percent of the total population within urban areas while accounting for only 4 percent of the rural population. The largest rural clustering of Black/Non-Hispanic residents was in the Bootheel area of southeast Missouri. Pemiscot, Mississippi and New Madrid Counties had Black/Non-Hispanic populations that made up more than 15 percent of the total county population (28.1 percent, 25.5 percent and 17.0 percent, respectively).

Missouri's Hispanic population of 247,592 (4.1 percent of the state total) was relatively small—especially when compared to the overall U.S., where nearly 18 percent of the 2015 population was estimated to be Hispanic.³ Hispanics made up 3 percent of Missouri's rural population and 5 percent of its urban population. Unlike Black/Non-Hispanics, Hispanics were more evenly dispersed across all counties. The three rural counties with the largest Hispanic population are scattered across the state in the counties of Sullivan (Northeast BRFSS Region, 17.6 percent), McDonald (Southwest BRFSS Region, 11.7 percent) and Pulaski (Central BRFSS Region, 11.0 percent). These regions are defined by the Behavioral Risk Factor Surveillance System (BRFSS).⁴

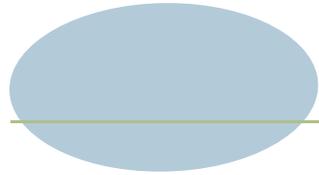
All other Non-Hispanic racial groups (including American Indians, Asians, Native Alaskans and Native Hawaiians, among others) collectively represented 1.8 percent of Missouri's rural population and 3.8 percent of its urban population. While still a small percentage of the overall population, this collection of race groups has increased substantially in both rural and urban areas over the last 10 years (50 percent increase in rural and 31 percent increase in urban from 2005).



Language, culture and other differences may affect the ability of rural communities to provide appropriate healthcare, information and other services to all of their residents.

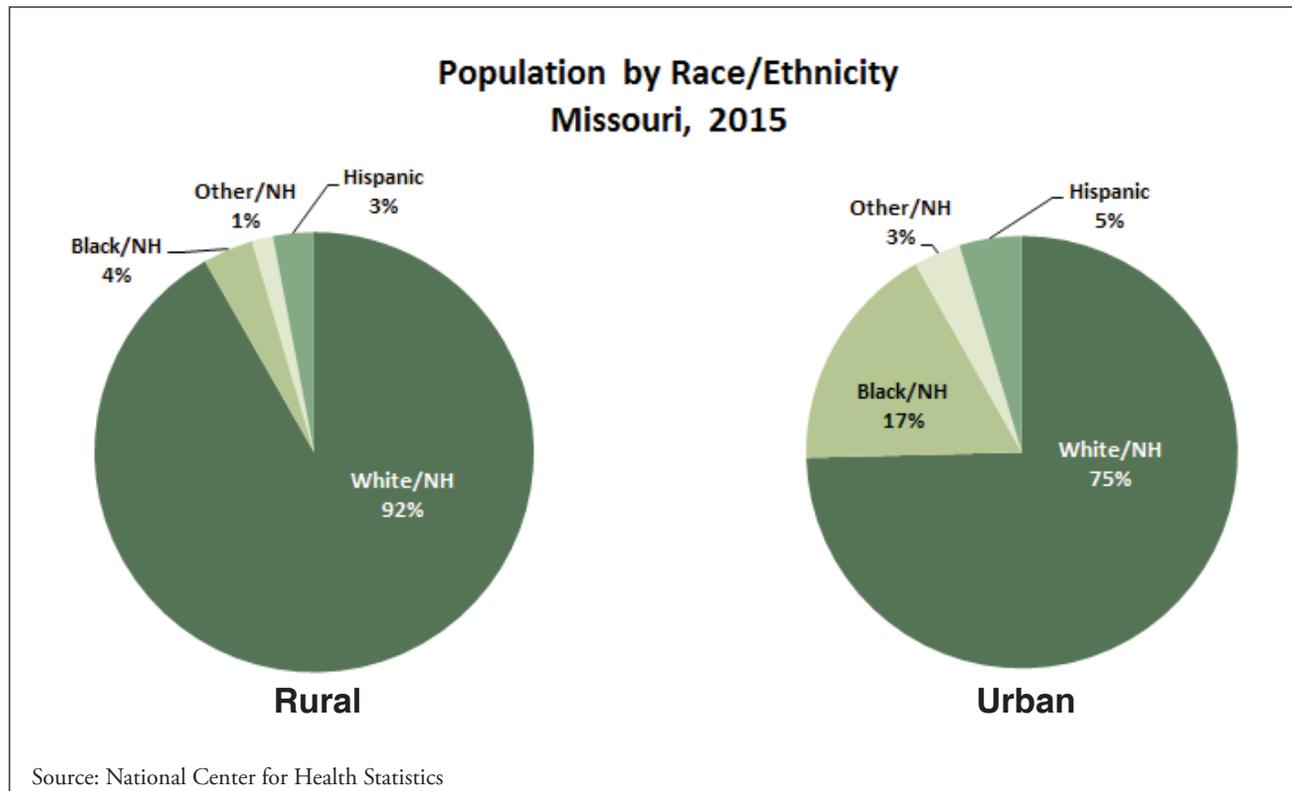
³Throughout this section, the term “Hispanic” is used for brevity, but residents who identify as “Latino” are also included in this ethnic category.

⁴See the Glossary for a description of the BRFSS and a map of the BRFSS regions, which are referenced frequently in this report.

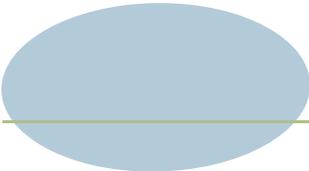


Challenges related to racial and ethnic diversity are especially prevalent in rural areas of Missouri. A popular metric used to quantify these challenges is level of English proficiency. Approximately 1 percent of Missouri residents have limited English proficiency. With larger immigrant populations, it may be expected that several urban counties have relatively high rates, but rural areas also encounter this problem. Fifteen of the 23 counties that have rates equal to or greater than

Missouri's average of 1 percent are rural. Sullivan County, which had the largest percentage Hispanic population statewide, also topped this list with a rate of 5.6 percent.⁵ Language, culture and other differences may affect the ability of rural communities to provide appropriate health care, information and other services to all of their residents.



⁵University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation. Missouri: % Not Proficient in English. County Health Rankings & Roadmaps. <http://www.countyhealthrankings.org/app/missouri/2017/measure/factors/59/data?sort=desc-3>. Accessed June 12, 2017.



INCOME AND POVERTY

Social and economic factors exert the greatest influence on health in terms of chronic illness, disability, injury and complications resulting in poor health outcomes including premature death.^{6,7} Recent studies have indicated that large gaps in income inequality can adversely impact health⁸ and have linked poverty and low levels of social integration to increased risks of mortality.⁹ While social impacts are more difficult to quantify, low income and poverty reduce the ability of citizens to access the basic requirements for good health: healthy food, medicine, and both preventive and ongoing health care services.

A common measure of relative wealth is per capita income, or income per person. In 2015, residents of rural counties had an average per capita income of \$33,333 which was 22.3 percent lower than the average per capita income of Missouri urbanites (\$42,912).^{10,11} In addition, from 2014 to 2015, urban areas saw an annual growth rate of 3.8 percent, while rural Missourians' average growth in income per capita was zero which indicates the disparity in the rate of urban and rural growth is growing.¹²

Between 2005 and 2013, increases in poverty rates were observed across Missouri for residents of all ages, peaking in 2012 and 2013 before beginning to decline. However, rural Missouri residents experience much higher rates of poverty compared to urban residents. According to the U.S. Census Bureau, 17 out of every 100 rural Missouri residents lived in poverty in 2015, a slight decline from 18.4 percent reported in 2013. Urban poverty rates also declined from 14.4 percent in 2013 to 13.6 percent in 2015. Despite the decline in poverty for both areas, income disparity has increased in the last few years. The rate of poverty for rural Missouri residents is 30.9 percent greater than urban areas for 2015 compared to a difference of 27.8 percent between rural and urban Missouri in 2013.¹³

⁶Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008.

⁷Murray S. Poverty and health. *CMAJ*. 2006; 174(7):923-923. Accessed September 2, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/>. doi: 10.1503/cmaj.060235

⁸Pickett KE, Wilkinson RG. Income inequality and health: A causal review. *Soc Sci Med*. 2015; 128:316-326.

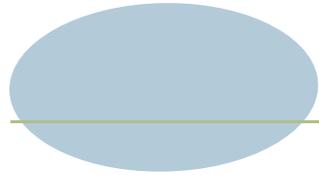
⁹Marcus AF, Echeverria SE, Holland BK, Abraido-Lanza AF, Passannante MR. The joint contribution of neighborhood poverty and social integration to mortality risk in the United States. *Ann Epidemiol*. 2016; 26(4):261-266.

¹⁰U.S. Department of Commerce. CA1 Personal Income Summary: Personal Income, Population, Per Capita Income. Bureau of Economic Analysis. <http://www.bea.gov/itable>. Published 2014. Accessed June 2, 2017.

¹¹Per 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).

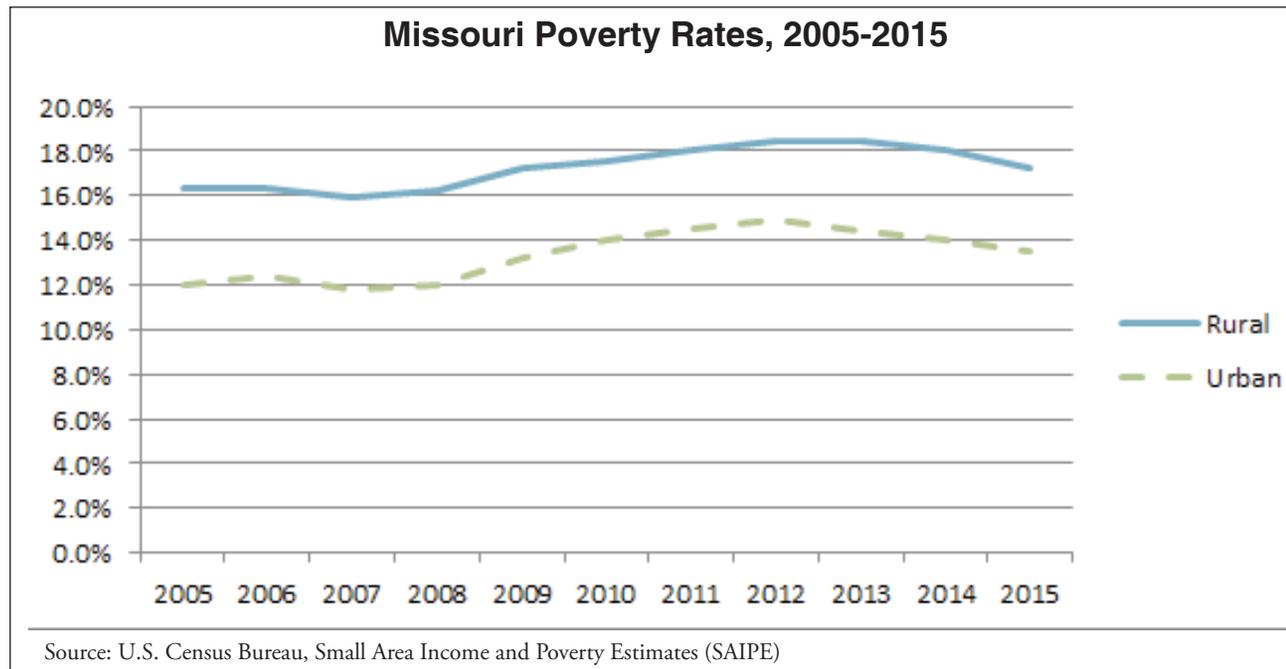
¹²Missouri Department of Economic Development. 2015 County Per Capita Personal Income. Missouri Economic and Research Information Center (MERIC). https://www.missourieconomy.org/indicators/income/per_capita_county.stm. Published 2017. Accessed June 2, 2017.

¹³U.S. Census Bureau. Small Area Income and Poverty Estimates (SAIPE). <http://www.census.gov/did/www/saipe/index.html>. Accessed June 2, 2017.



Analysis of poverty rates at the county level further highlight the disparity between rural and urban areas in the state. For urban areas, only St. Louis City had a poverty rate over 20 percent (25.5 percent). The income disparity between rural and urban areas can be illustrated by the fact that 27 rural counties had poverty rates of 20 percent or greater. Despite decreases in rural poverty rates, the three highest rates of poverty were still found in rural areas, all three in the Southeast BRFSS region. The three highest rates of poverty in 2015 were for Dunklin County (27.6 percent), Ozark County (27.7 percent), and Pemiscot County (28 percent).

The U.S. Department of Agriculture's Economic Research Service defines a county as persistently poor if 20 percent or more of their population experiences poverty for a duration of at least 30 years.¹⁴ Fourteen Missouri counties meet the criteria to be designated as persistently poor. Of the persistently poor counties, 13 are rural (12 in the Southeast BRFSS region, one on the eastern side of the Central BRFSS region). Only one urban county, St. Louis City, is classified as persistently poor in Missouri.

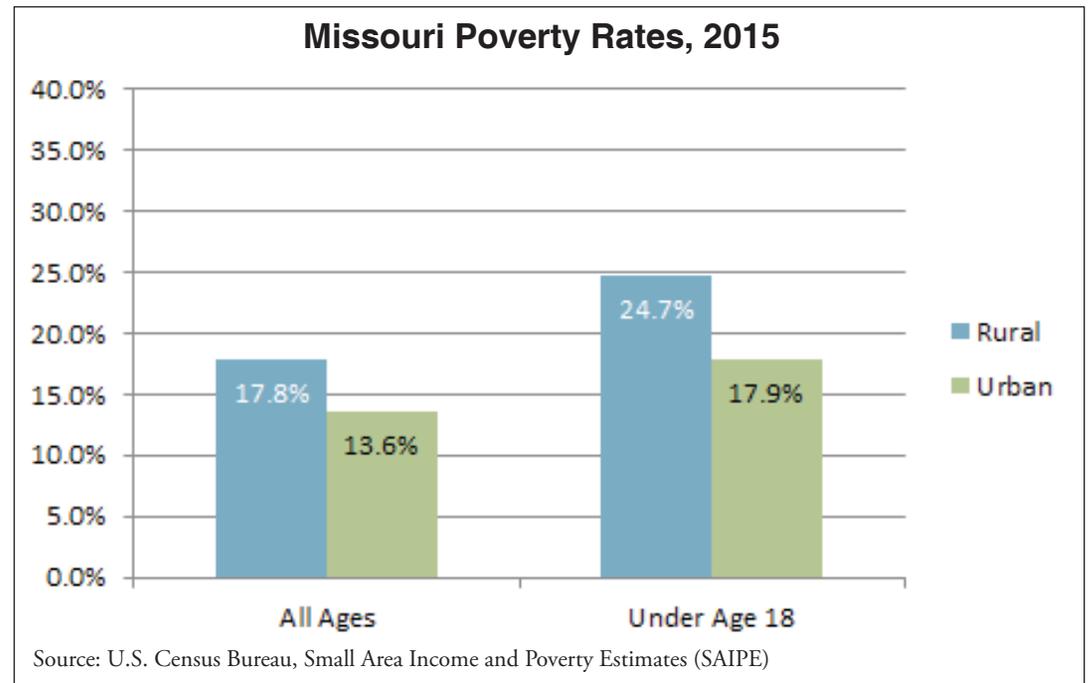


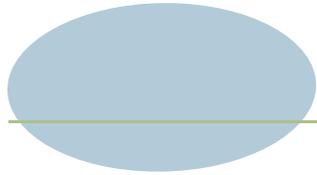
¹⁴U.S. Department of Agriculture. Geography of Poverty. Rural Poverty & Well-being. Economic Research Service. <http://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty.aspx>. Updated May 18, 2015. Accessed October 6, 2015.

POVERTY AND AGE

In 2015, children aged 18 years and younger made up 24.1 percent of Missouri's population in both rural and urban communities. From 2005 to 2015, there was a 3.5 percent decrease in the rural child population; in urban areas, the decrease was only 1.9 percent. The decline may be attributed to changing demographics, lower fertility rates and people of childbearing age waiting until later to have children. The three rural counties that experienced the greatest decrease in youth population were Barton, Carroll and Atchison counties, with 17.5 percent, 17.7 percent and 24.2 percent, respectively. Of the urban counties, St. Louis City saw the greatest decline with 18.1 percent. In contrast, the rural counties of Christian, Taney and Schuyler experienced child population growth of over 10 percent (19.8 percent, 17.6 percent and 10.0 percent, respectively). The urban counties of Clay, Boone and Platte all experienced child population increases between 10-15 percent.

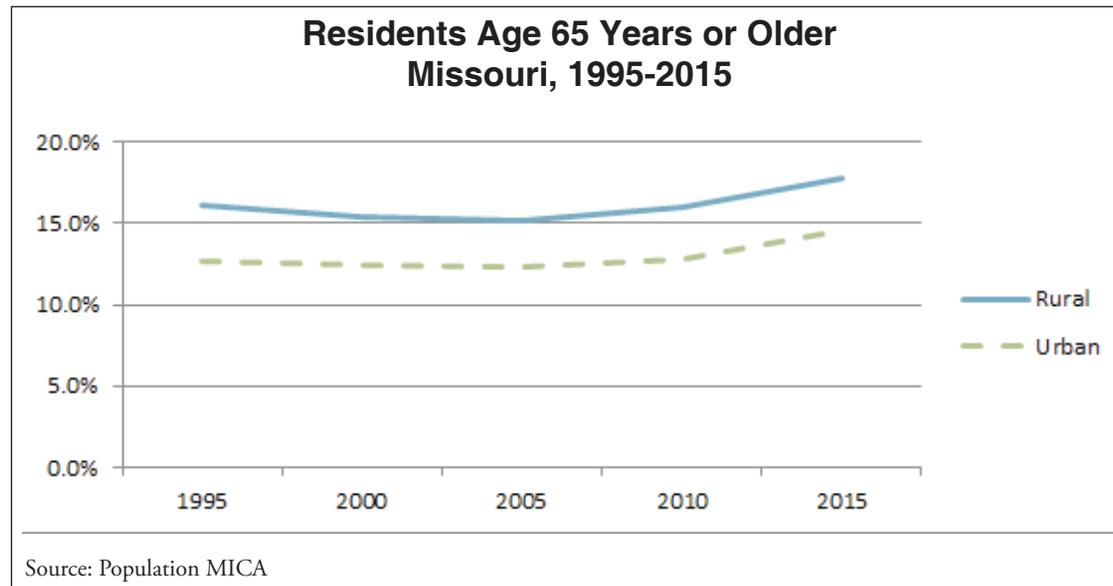
Children in or near poverty can face a multitude of serious health problems such as low birth weight, asthma, obesity, high blood pressure, increased accidental injuries, violence and overall poor physical and mental health. Childhood poverty rates are higher than the general poverty rates for both urban and rural Missouri children. Statewide, 22 percent of children under the age of 18 live in poverty, compared to 15.6 percent of the total population in poverty. In rural areas nearly 25 out of every 100 children experience poverty compared to 18 out of 100 for their urban counterparts. Rural childhood poverty is 28.9 percent greater than that experienced by urban Missouri youth.



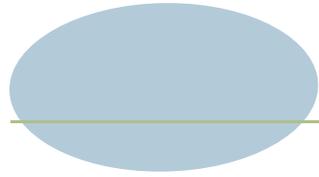


As the Baby Boomers population continues to age into retirement and as medical technology advances, the number of older Missourians will continue to quickly rise. This means the older population (defined in this report as 65 years and older) will require more resources to continue living at a comfortable level. Job loss or retirement, health care costs, raised cost of living for items such as food, heating and cooling, housing, and insufficient savings all contribute to the increasing percentage of elderly in poverty.¹⁵ The Social Security Administration estimates that in 2014, 43 percent of unmarried recipients relied on Social Security for at least 90 percent of their income.¹⁶

In 2015, elderly residents (considered here as those age 65 years and older) accounted for 15.7 percent of the total Missouri population. Elderly residents accounted for 17.7 percent of the rural population, whereas the elderly urban population consisted of 14.5 percent. From 1995 to 2015, there was a 14.0 percent increase in rural residents 65 years and older and a 12.6 percent increase in urban counties, likely due, in part, to some of the factors noted above. Over time, the differences in the percentage of elderly residents for rural and urban counties have remained similar.



¹⁵Walter, J. Poverty Among Seniors Getting Harder to Ignore. Governing, Health and Human Services. <http://www.governing.com/topics/health-human-services/gov-poverty-among-elderly-harder-to-ignore.html>. Published January 2013. Accessed June 26, 2017.
¹⁶Social Security Administration. Income of the Aged Population: Relative Importance of Social Security, 2014. https://www.ssa.gov/policy/docs/chartbooks/fast_facts/2016/fast_facts16.html#page5. Published April 2016. Accessed June 26, 2017.



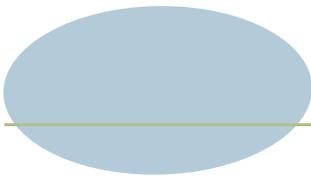
Using 2015 estimates, the three rural counties with the lowest percentage of people 65 years and older were Pulaski (due to the military installation), Johnson and Lincoln Counties, with 7.8 percent, 12.1 percent and 12.7 percent, respectively. The six rural counties where the elderly accounted for at least a quarter of the population were all located in the southwestern portion of the state. They were Camden, St. Clair, Ozark, Stone, Benton and Hickory Counties.

As people age and parts of their lives change, the risk of poverty increases and so do the chances of not being able to pay for necessary health care. Every county in Missouri has some level of poverty within its elderly population. Using estimates from the U.S. Census Bureau's American Community Survey covering the 2011-2015 time period, the poverty rate for the 65 and over population statewide

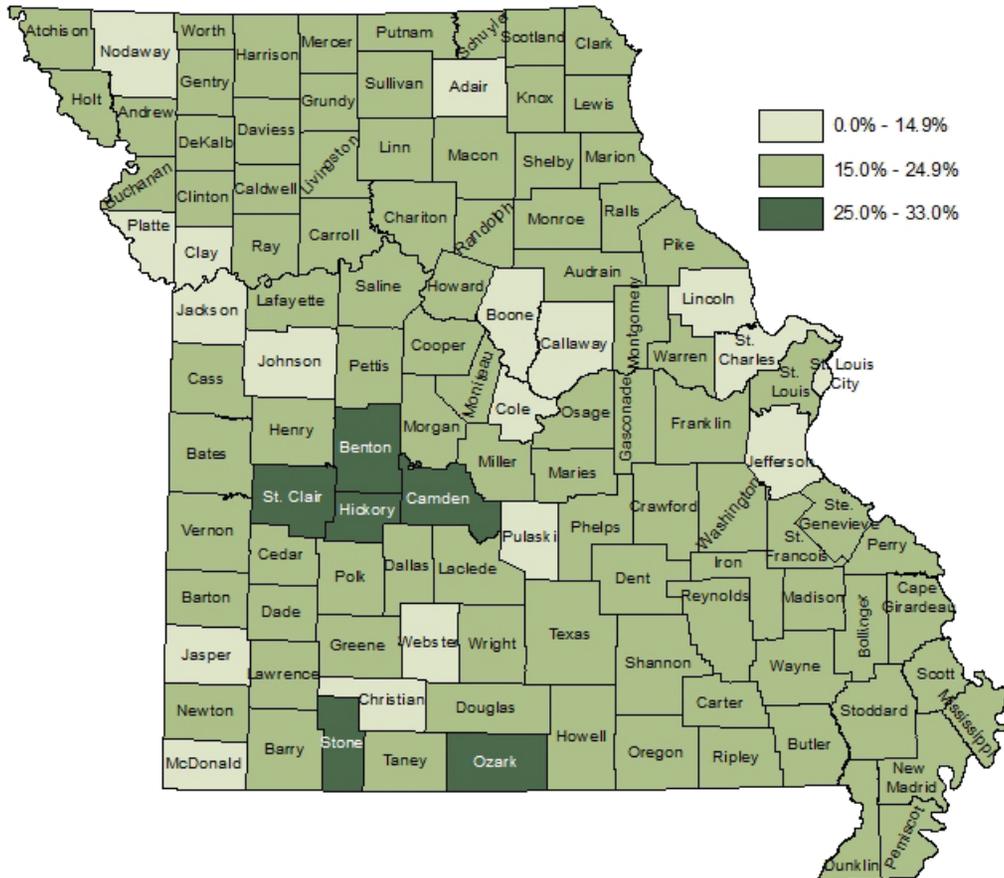
was 8.9 percent, with a rural rate of 10.8 percent compared to 7.5 percent for urbanites.¹⁷ County level poverty estimates for this sub-population range from 3.0 percent to 21.7 percent. Among the 50 counties with the highest age 65+ poverty rates, only St. Louis City is urban. Rural counties with the highest poverty percentages in the elder population can primarily be found in three areas: 1) Southeast Missouri, including the Bootheel; 2) a block of counties just south of the Kansas City metro area; and 3) scattered counties north of the Missouri River. The rural counties with the lowest percentages of elderly poverty are Ralls, Clinton and Lafayette (3.0 percent, 4.9 percent and 5.4 percent, respectively). Conversely, Mississippi, Cedar and Oregon counties have the highest percentages of elderly poverty of all the rural counties and of the state (20.3 percent, 21.3 percent and 21.7 percent, respectively).

Mississippi, Cedar, and Oregon counties have the highest percentages of elderly poverty of all the rural counties and of the state (20.3 percent, 21.3 percent and 21.7 percent, respectively).

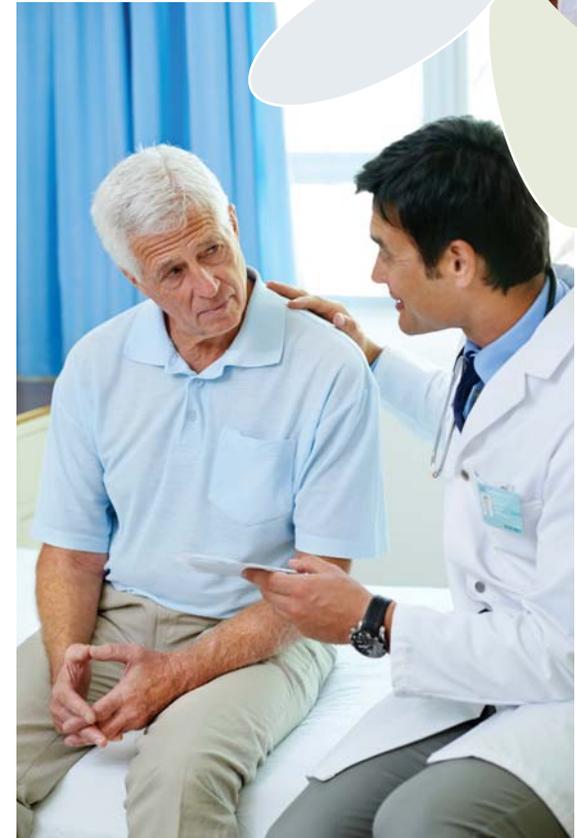
¹⁷US Census Bureau. 2011-2015 American Community Survey 5-Year Estimates. Poverty Status in the past 12 months by sex by age. American FactFinder. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_15_5YR_B17001&prodType=table. Accessed June 26, 2017.



Percent of Elderly Residents (65 Years and Older) 2015



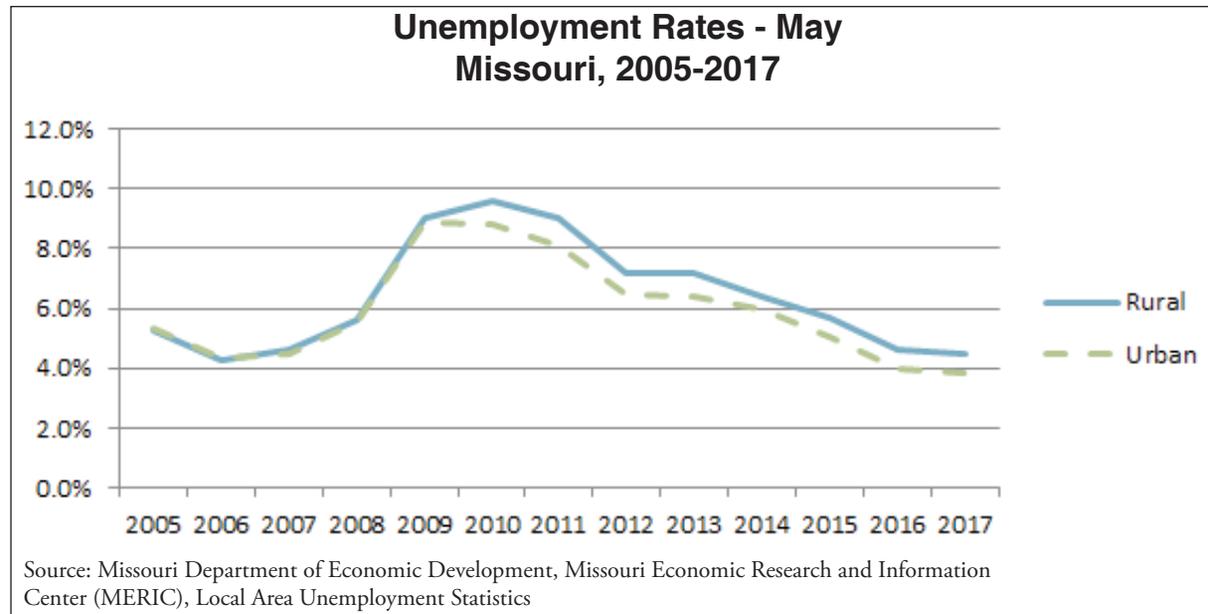
Source: MOPHIMS - Population MICA, Missouri Department of Health and Senior Services



UNEMPLOYMENT

Job loss can create large social stressors and economic uncertainties that impact both mental and physical health.^{18,19} In 2015, 55.7 percent of insured Americans had employer-based health insurance, particularly those Americans under the age of 65.²⁰ Subsequently, unemployment can be a barrier to health care access and, consequently, have large impacts on health.²¹ While urban and rural disparities in employment persist, Missouri's non-seasonally adjusted unemployment rates have been declining over the last several years.

Unemployment figures for the last 13 years were greatly affected by the Great Recession (2008-2010). Small disparities between urban and rural Missouri unemployment rates appear in 2010 with lower unemployment rates and a slightly steeper decline in unemployment for urban areas. By 2016, unemployment rates fell to 4.0 percent for urban Missouri and 4.6 percent for rural areas.

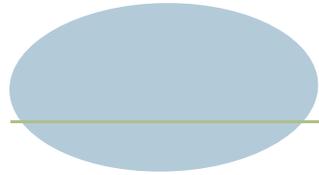


¹⁸Strully KW. Job loss and health in the U.S. labor market. *Demography*. 2009; 46(2):221-246. doi: 10.1353/dem.0.0050

¹⁹Pearlman J. The consequences of job displacement for health: moderating Influences of economic conditions and educational attainment. *Soc Sci Res*. 2015; 52:570-587. doi: 10.1016/j.ssresearch.2015.04.006

²⁰Barnett, JC, Vornovitsky, MS. Health Insurance Coverage in the United States: 2015. Current Population Reports P60-257 *. <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-257.pdf>. Published September 2016. Accessed May 24, 2017.

²¹[HealthyPeople.gov](http://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services). Access to Health Services Overview. Healthy People 2020. <http://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services>. Accessed May 24, 2017.



From 2015 to 2017, the highest rates of unemployment were found in the rural counties of Pemiscot (8.7 percent), New Madrid (7.9 percent), Dunklin (7.7 percent), Iron (7.4 percent), and Shannon (7.3 percent). All of these counties are located in the Southeast BRFSS region. In fact, 17 out of 25 Southeast BRFSS counties have higher unemployment rates than observed in any urban Missouri county. The highest rates of urban area unemployment were found in the counties of St. Louis City (5.4 percent), Jackson (5.2 percent), Jefferson and Newton (both 4.3 percent), and St. Louis County (4.2 percent). Despite the high unemployment rates observed in several rural Missouri areas, 34 rural counties saw unemployment rates decrease 25 percent or more between 2015 and 2017.



**Unemployment Rates (not seasonally adjusted)
Selected Rural and Urban Missouri Counties, 2015-2017**

Rank	Rural	Rate	Urban	Rate
1	Pemiscot	8.7%	St. Louis City	5.4%
2	New Madrid	7.9%	Jackson	5.2%
3	Dunklin	7.7%	Jefferson	4.3%
4	Iron	7.4%	Newton	4.3%
5	Shannon	7.3%	St. Louis County	4.2%

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

HEALTH INSURANCE

Socioeconomic factors, such as employment, are essential in determining the ability of people to obtain health insurance. Health insurance often provides access to health care that is otherwise financially out of reach. Uninsured residents are more likely to delay health care screenings and forgo medical treatments and preventive health care. For many chronic disease sufferers, this lack of health insurance increases health risks and can result in higher death rates.²²

Small Area Health Insurance Estimates (SAHIE) from 2015 showed a decline in the number of uninsured Missourians from previous years.²³ Urban Missouri residents had an uninsured rate that was 26.8 percent less than 2013, while the rural Missouri uninsured rate declined by 20.5 percent. The rates of uninsured residents improved for both urban and rural areas, but the disparity in health coverage actually increased, with rural rates nearly 31 percent higher than their urban counterparts in 2015 (13.6 percent versus 10.4 percent).

The rural counties of McDonald, Scotland and Morgan had the highest rate of uninsured residents (under the age of 65) with 21.1 percent, 19.0 percent and 18.4 percent, respectively. In 2013, 24 of 101 rural counties exceeded a rate of 20 percent uninsured. However, in 2015, only McDonald County residents experienced an uninsured rate greater than 20 percent. In comparison, all urban counties had less than 20 percent uninsured rates. The highest rates of uninsured residents for urban areas were found in the Joplin area (Jasper County and Newton County).

**Uninsured Rates
Selected Rural and Urban Missouri, Counties, 2015**

Rank	Rural	Rate	Urban	Rate
1	McDonald	21.1%	Jasper	14.5%
2	Scotland	19.0%	Newton	14.4%
3	Morgan	18.4%	St. Louis City	13.7%
4	Taney	18.1%	Greene	13.3%
5	Wright	18.0%	Jackson	12.6%



²²Brooks EL, Preis SR, Hwang S et al. Health insurance and cardiovascular disease risk factors. *Am J Med.* 2010; 123(8):741-747.

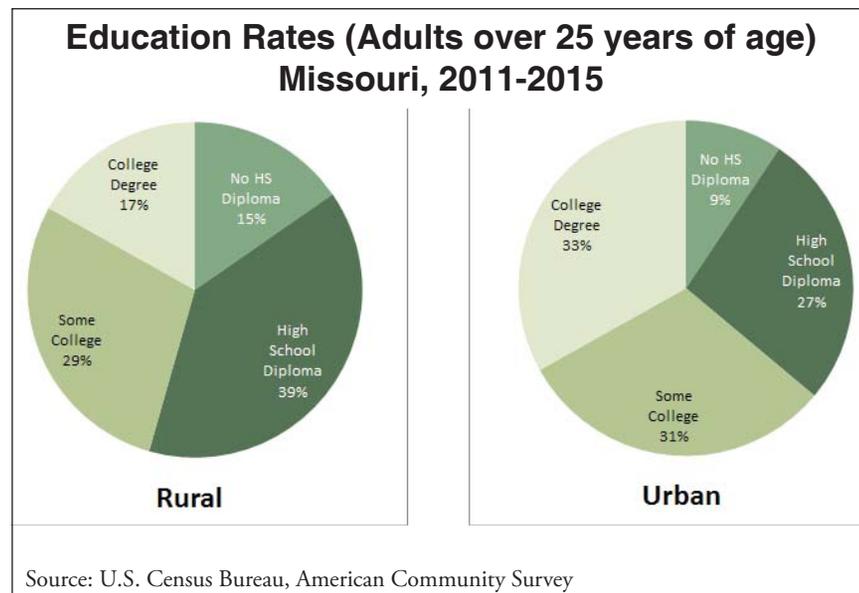
²³US Census Bureau. Small Area Health Insurance Estimates (SAHIE). <http://www.census.gov/did/www/sahie/index.html>. Accessed June 15, 2017.

EDUCATION

Additional levels of education have been associated with health benefits. Research has shown that education protects against the onset of certain diseases, promoting better health outcomes, and reducing risky health behaviors while increasing healthy behaviors.²⁴ Education helps individuals find work, understand how to access health care resources, and fosters the ability of individuals to implement those resources for themselves and their families. Persons with lower levels of education have higher rates of accidents, smoking and drug abuse in addition to greater risks of mortality and certain diseases, even when controlling for other social and economic factors.²⁵

According to the U.S. Census Bureau's American Community Survey²⁶, rural

Missourians fail to obtain a high school diploma or equivalency at a higher rate (15 percent) compared to urban Missourians (9 percent). For residents over the age of 25, urban Missourians have a smaller proportion of residents who did not obtain a high school diploma or equivalency, but also a smaller proportion of residents with only a high school diploma. This means that higher proportions of Missourians who live in urban areas have obtained additional levels of education beyond high school; in fact, urban areas have nearly double the rate of residents with at least a 4-year college degree (33 percent) compared to rural Missouri (17 percent). In contrast, both urban and rural residents appear to have similar proportions of residents who have taken some college courses or are working towards a 2- or 4-year degree (29 percent rural vs 31 percent urban).



²⁴Goldman D, Smith JP. The increasing value of education to health. *Soc Sci Med*. 2011; 72(10):1728-1737. doi: 10.1016/j.socscimed.2011.02.047

²⁵Baker DP, Leon J, Smith Greenaway EG, Collins J, Movit M. The education effect on population health: a reassessment. *Popul Dev Rev*. 2011; 37(2):307-332.

²⁶US Census Bureau. 2011-2015 American Community Survey 5-Year Estimates. Table B15002. American FactFinder. <http://factfinder2.census.gov>. Accessed May 30, 2017.

CRIME

“Crime victimization is associated with a myriad of physical and psychological health problems, resulting in widespread treatment needs and substantial costs to both the victim and society.”²⁷ Research has shown that crime can have substantial economic impacts including thousands of dollars in costs and lost revenue for victims, communities and the criminal justice systems, with costs increasing as the crime increases in severity or violence.²⁸ The costs of crime are not just tangible losses such as those attributed to lost property, victim medical bills or the price of investigating and prosecuting crimes. There are also costs that are less easily quantified such as the loss of productivity from the criminals themselves who could be contributing to society in ways that not only do not harm the community, but contribute to it economically.²⁸

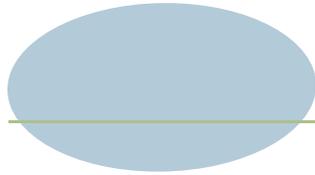
Crime and associated activities can have unexpected consequences on health. For example, higher rates of asthma hospitalizations and emergency department visits have been linked to exposure to community violence.²⁹ This may be related to fewer outdoor activities for residents who feel their communities are not safe.²⁹ Crime can also have additional costs when it is linked to mental illness. A 2013 study of adults with either schizophrenia or bipolar disorder illustrated that mentally ill individuals who were involved in the criminal justice system incurred treatment costs that were nearly double the costs of those mentally ill individuals who were not in the criminal justice system.



²⁷Hanson RE, Sawyer GK, Begle AM, Hubel GS. The impact of crime victimization on quality of life. *J Trau. Stress.* 2010;23(2): 189-197. doi: 10.1002/jts.20508

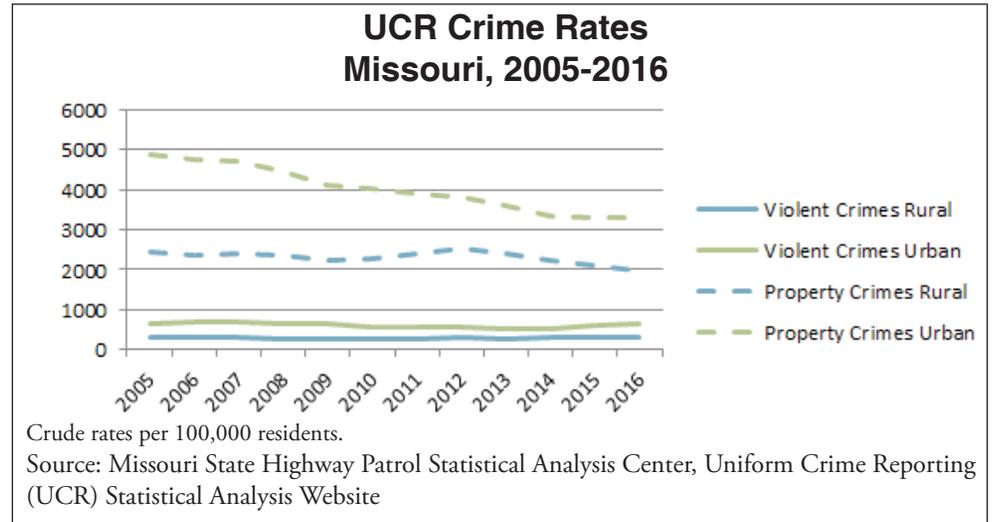
²⁸McCullister KE, French MT, Fang H. The cost of crime to society: New crime-specific estimates for policy and program evaluation. *Drug Alcohol Depend.* 2010; 108(1-2):98-109. doi: 10.1016/j.drugalcdep.2009.12.002.

²⁹Apter AJ, Garcia LA, Boyd RC, Wang X, Bogen DK, Ten Have T. Exposure to community violence is associated with asthma hospitalizations and emergency department visits. *J Allergy Clin Immunol.* 2010; 126(3):552-557. doi: 10.1097/ACI.0b013e32835090c9.



Data from the Missouri State Highway Patrol's Uniform Crime Reporting system indicates that property crimes occurred at a higher frequency than violent crime for both rural and urban Missouri areas.³⁰ From 2005 to 2016, the rates of violent crime in urban areas remained steady while property crimes declined. Still, urban Missourians experience statistically significant higher property and violent crime rates than rural Missouri residents.

Between 2015 and 2016, the highest rates of violent crimes were found in St. Louis City (1,879 violent crimes per 100,000 residents). Urban Jackson County had the second highest rate (1,231 per 100,000) while the third highest rate was found in rural Scott County (993 per 100,000). Property crime rates were highest in urban St. Louis City, with 6,272 property crimes per 100,000 residents, followed by Greene County. In rural Missouri, Marion County recorded the highest property crime rate a rate that was more than double the median property crime rate for rural Missouri (5,533 versus 1,578 per 100,000 residents).



UCR Crime Rates Selected Rural and Urban Missouri Counties, 2015-2016

	Rural	Count	Rate	Urban	Count	Rate
Highest Violent Crime	Scott	772	992.9	St. Louis City	11,782	1,878.8
	Pemiscot	337	975.3	Jackson	16,981	1,231.0
	Vernon	292	702.8	Greene	4,779	828.6
Highest Property Crime	Marion	2,088	5,532.9	St. Louis City	39,329	6,271.7
	Vernon	1,784	4,293.7	Greene	31,673	5,491.5
	Butler	3,378	3,942.1	Buchanan	9,558	5,368.5

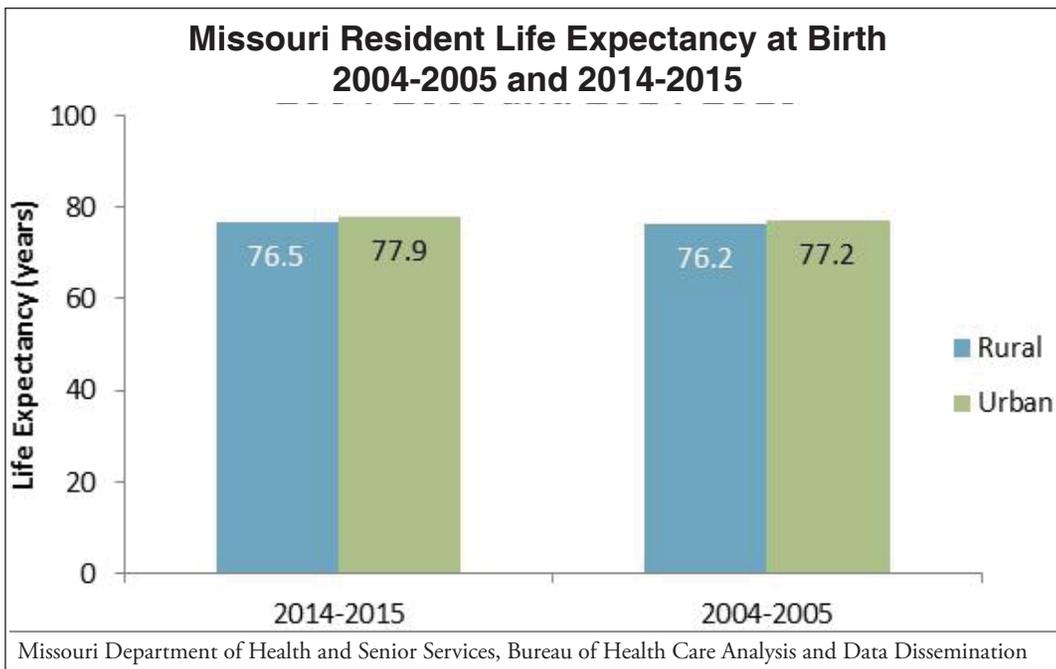
Crude rates per 100,000 residents.
Source: Missouri State Highway Patrol Statistical Analysis Center, Uniform Crime Reporting (UCR) Statistical Analysis Website

³⁰Missouri State Highway Patrol Statistical Analysis Center. Uniform Crime Reporting (UCR) Statistical Query. Missouri State Highway Patrol. http://www.mshp.dps.mo.gov/MSHPWeb/SAC/data_and_statistics_ucr_query_backup.html. Accessed May 30, 2017.

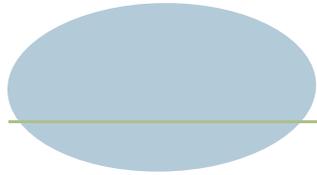
HEALTH STATUS

LIFE EXPECTANCY

Life expectancy at birth is one of the most common public health indicators because it provides a good overall gauge of health for a given geography. In 2014-2015, urban life expectancy at birth is 77.9 years compared to 76.5 years in rural counties – a difference of 1.4 years. When compared to the last decade, life expectancy at birth has increased for both urban and rural populations. However, the gains are not equal, rural life expectancy only increased by a modest 0.3 years while urban life expectancy grew by 0.7 years; thus, the gap or disparity between urban and rural communities has expanded over the last decade.

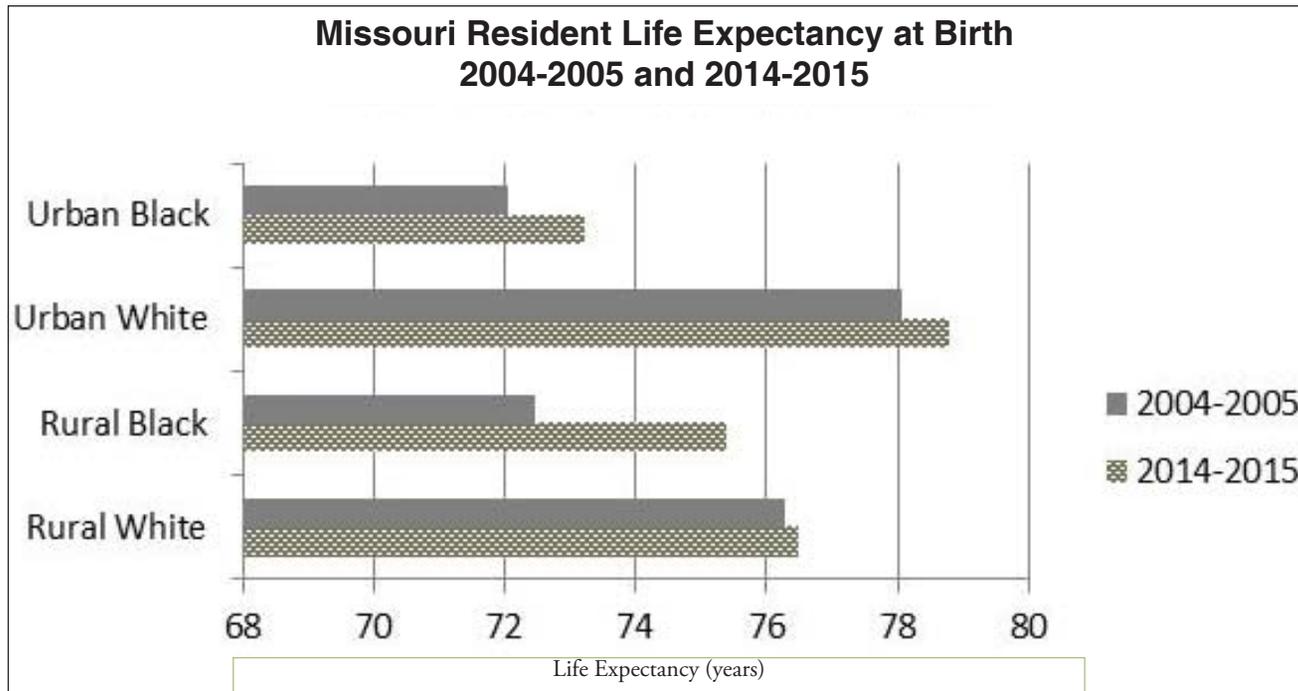


Life expectancy at birth is one of the most common public health indicators because it provides a good overall gauge of health for a given geography.



When examining rural/urban life expectancy differences by race, a few trends stand out. The urban white population has the longest life expectancy at 78.8 years. Rural whites rank second with a life expectancy of 76.5, followed by the rural black population (75.4) and the urban black population (73.2). When

compared to data from 10 years ago, rural blacks have actually made the largest gains, increasing life expectancy at birth by 2.9 years. This increase was more than double the second highest gain of 1.2 years observed in urban black populations. Rural white populations saw the smallest increase of only 0.2 years.



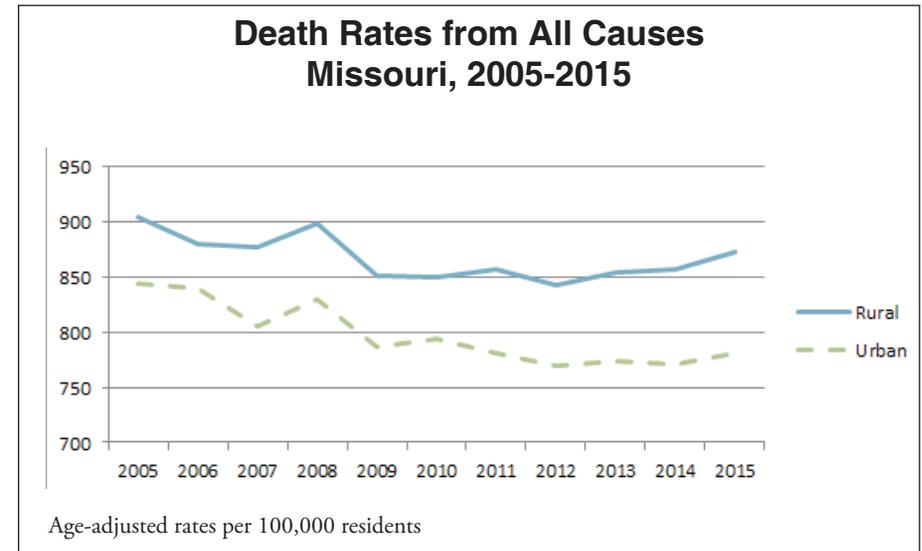
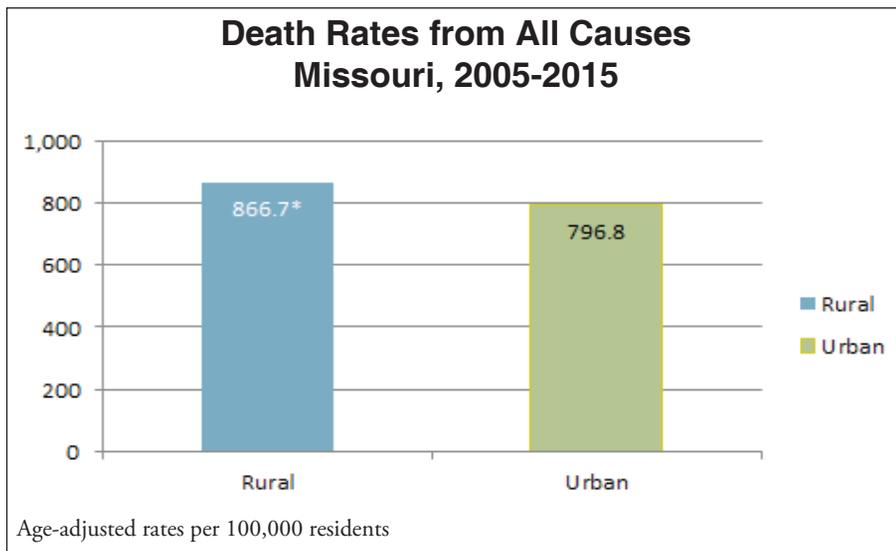
For the remainder of the Health Status Section, unless otherwise noted, rates are age-adjusted to the 2000 U.S. Standard Population and reported using a constant of per 100,000 residents, which is the standard for mortality statistics. When a statistically significant difference is noted (either in text or by the use of asterisks in graphs), a statistical test (performed using 95% confidence intervals) determined a meaningful difference between population groups. The Missouri Information for Community Assessment (MICA) health data query tool is the source for the statistics in this section. The Death MICA, housed in the Missouri Public Health Information Management System (MOPHIMS) platform, is the specific source, unless otherwise noted.

DEATHS BY ALL CAUSES

The overall death rate is significantly higher for rural Missourians (866.7) than their urban counterparts (796.8), a relative difference of just over 8 percent. Furthermore, the All Cause death rate for rural residents in 2015 was still higher than the urban rate was 11 years ago.

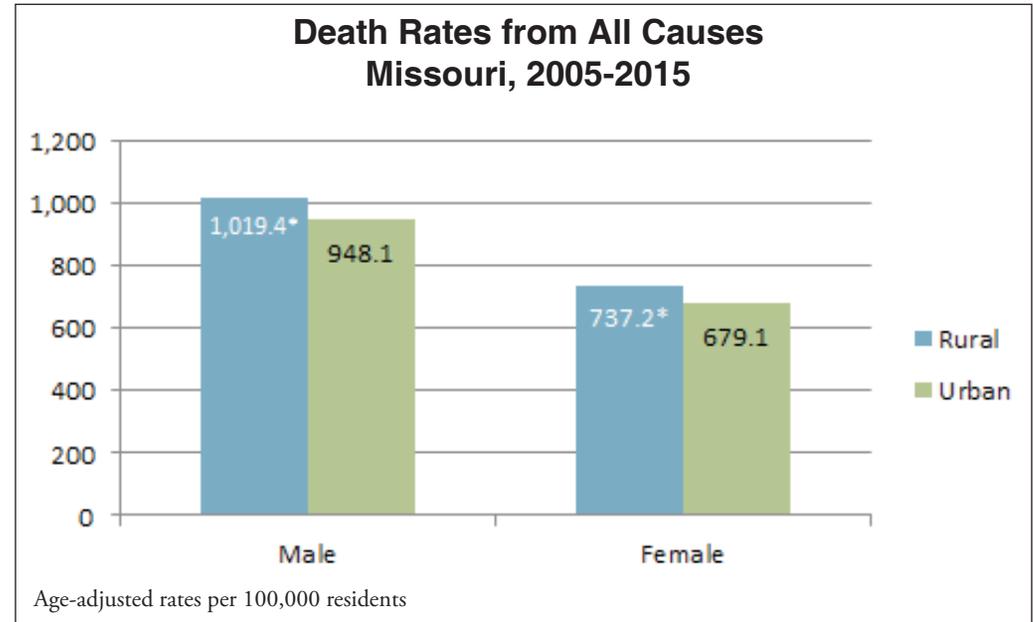
Looking at rates from 2005 and 2015, both urban and rural death rates have declined although the urban rate has declined by a more substantial 7.5 percent compared to the rural decline of 3.5 percent. Thus not only are the rural All Cause death rates meaningfully higher than the urban rates, the disparity is widening,

illustrated by a 60 percent increase in disparity over the past eleven years. (The 2005 relative difference was 7 percent compared to 11 percent in 2015.) The slower decrease of rural death rates in Missouri mirrors trends nationwide, which has led to calls for targeted prevention of excess deaths from the five leading causes of death.³¹ Perhaps even more troubling, after mostly registering declines from 2005-2009, the rural All Causes death rate has gradually been increasing from 2012-2015. The 2015 rural death rate was the highest value observed since 2008. The urban death rate mostly saw declines from 2005-2009. Since then rates have been fairly steady with a small uptick seen in 2015.



³¹ Garcia MC, Faul M, Massetti G, et al. Reducing potentially excess deaths from the five leading causes of death in the rural United States. *MMWR Surveill Summ.* 2017; 66(SS-2):1-7. <https://www.cdc.gov/mmwr/volumes/66/ss/ss6602a1.htm>. Published January 13, 2017. Accessed July 18, 2017.

As seen in overall mortality, there is a gender gap between rural and urban dwellers in All Cause mortality rates. Males have higher rates of mortality compared to females and rural rates are always significantly higher than urban rates. However, it should be noted that the gender disparity within rural and urban areas is roughly equal (32 percent and 33 percent relative difference, respectively).

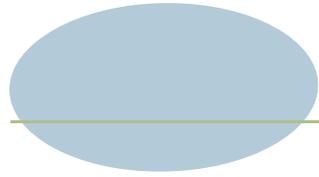


LEADING CAUSES OF DEATH

The rank order for the 2005-2015 ten leading causes of death for Missouri rural and urban areas are identical. In addition, the rankings for both rural and urban areas of the state remain consistent with the rankings reported in earlier years. The most notable changes during the past decade include Chronic Lower Respiratory Diseases (CLRD) death rates overtaking stroke rates in both rural and urban areas of the state and the continued decline in mortality due to heart disease and cancer, though they remain the two most common causes of death statewide by large margins. The rank order for Missouri also reflects the nation's ten leading causes of death in 2015 with the exception of stroke and unintentional accidents.³² For the nation, stroke ranks fifth and unintentional accidents are ranked fourth, whereas in Missouri these are reversed.

Rank	Rural			Urban		
	Cause	Count	Rate	Cause	Count	Rate
	<i>All Causes</i>	258,934	866.7	<i>All Causes</i>	355,774	796.8
1	Heart disease	68,698	225.4	Heart disease	87,520	193.5
2	Cancer	58,130	190.3	Cancer	80,671	180.3
3	Chronic lower respiratory diseases	18,017	58.6	Chronic lower respiratory diseases	20,437	46.3
4	Stroke	14,629	47.9	Stroke	19,304	42.9
5	Unintentional injuries	13,853	54.7	Unintentional injuries	19,132	44.8
6	Alzheimer's disease	9,130	29.5	Alzheimer's disease	11,528	25.3
7	Diabetes	6,765	22.4	Diabetes	8,937	20.0
8	Influenza and pneumonia	6,369	20.9	Influenza and pneumonia	8,180	18.1
9	Kidney disease	6,142	20.1	Kidney disease	7,839	17.5
10	Suicide	3,879	15.8	Suicide	5,769	13.7

³²National Vital Statistics System, National Center for Health Statistics, CDC. 10 Leading Causes of Death by Age Group, United States- 2015. Centers for Disease Control and Prevention. <https://www.cdc.gov/injury/images/lc-charts/leading-causes-of-death-age-group-2015-1050w740h.gif>. Updated May 2, 2017. Accessed June 28, 2017.



Leading causes of death are identified from rankable causes of death, which are determined by the National Center for Health Statistics (NCHS). They are based on clearly defined categories in the ICD-10 coding manual which are considered to be “most useful from a public health perspective.”³³ Leading causes of death are determined using the number of deaths, not the death rate. This is done to illustrate more accurately the burden of cause-specific mortality and represents a departure from how many mortality statistics are displayed (age-adjusted per 100,000 residents). Note that the data presented here is based on the underlying cause of death, not any contributing causes.

In Missouri, rural rates are higher than their urban counterparts for the All Causes category as well as each of the ten leading causes of death. For each of the ten leading causes (and All Causes), the rural/urban rate difference was considered statistically significant, suggesting a meaningful difference in the rates. The ten leading causes of death will be explored in more detail throughout this report.



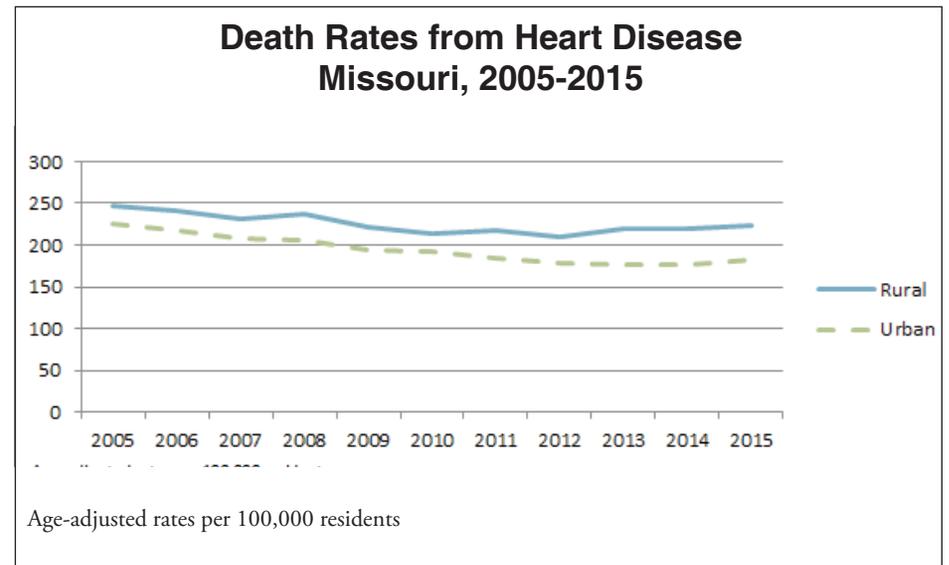
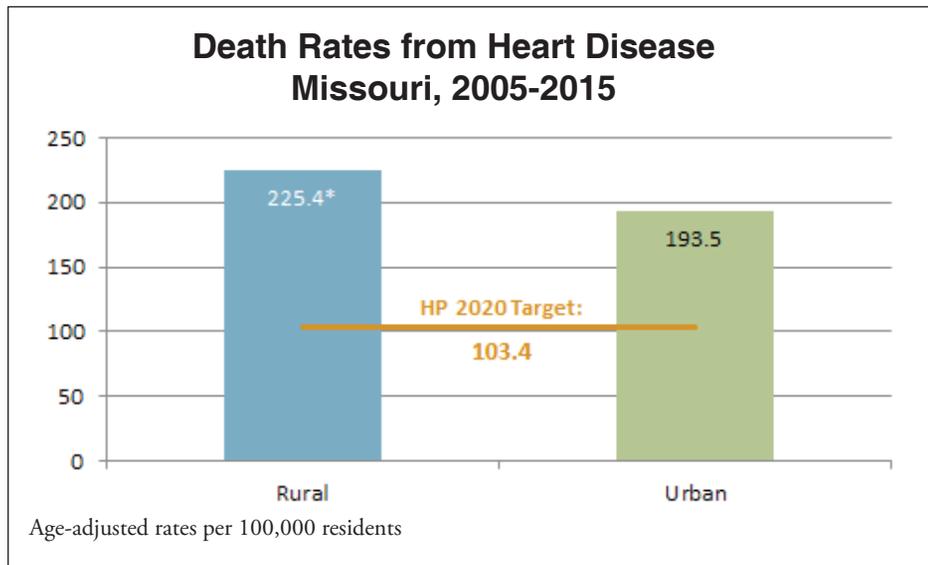
In Missouri, rural rates are higher than their urban counterparts for the All Causes category as well as each of the ten leading causes of death.

³³Heron M. Deaths: leading causes for 2014. National Violent Statistics Reports. 2016; 65(5). https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_05.pdf. Published June 30, 2016. Accessed June 28, 2017.

HEART DISEASE

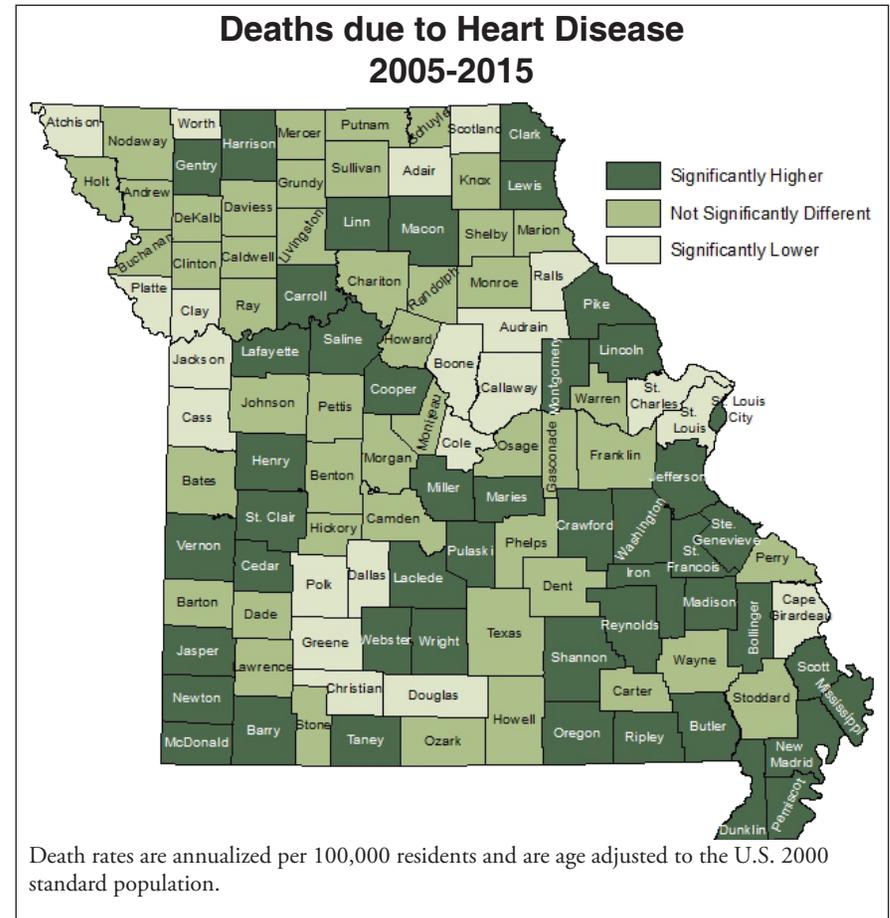
Heart disease includes a host of specific conditions affecting the cardiovascular system and continues to be the leading cause of death in both rural and urban Missouri. The 2005-2015 heart disease mortality rate for rural residents was 225.4, while the rate was 193.5 for urban residents. The rural rate is statistically significantly higher than the urban rate and is more than double the Healthy People 2020 target rate.³⁴

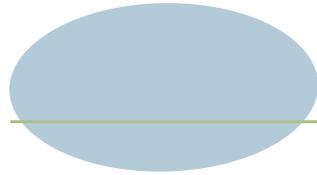
The death rates due to heart disease have decreased for both rural and urban counties between 2005 and 2015. It is notable, however, that the urban decrease was nearly double that of the rural decrease (19.4 percent vs 10.1 percent). Also, after two decades of consistent declines, the rural heart disease death rate has shown small increases each year since 2012. The only year-to-year increase in urban areas in the last decade was between 2014 and 2015.



³⁴HealthyPeople.gov. Heart Disease and Stroke Objectives HDS-2. Healthy People 2020. <https://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-stroke/objectives>. Accessed May 30, 2017.

In the 2005-2015 time period, 44 rural counties have heart disease death rates that are statistically significantly higher than the state rate. The largest cluster of counties with high rates is found in the southeast with several smaller pockets dispersed across the state. In contrast, 9 of the 14 urban counties had rates that were significantly lower than the state.





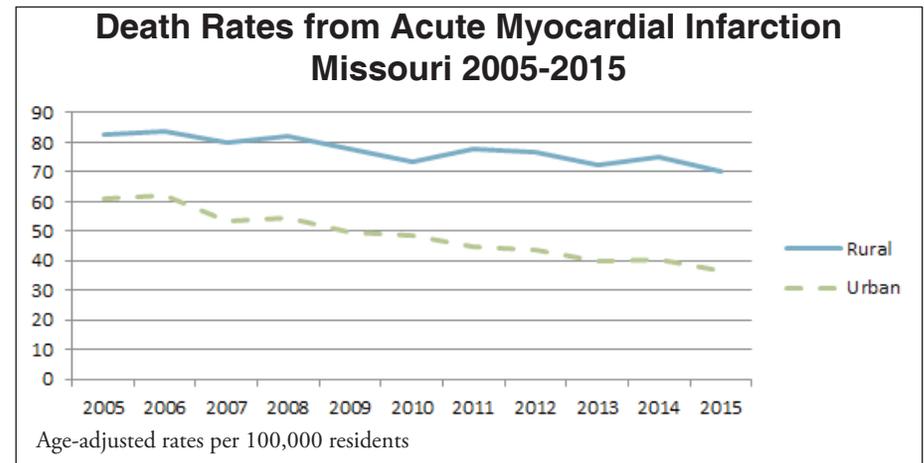
The seven counties with the highest heart disease death rates are all classified as rural. Washington County (Central BRFSS region) had the highest mortality rate but the counties with the next three highest rates are all located in the Bootheel region in southeast Missouri.

**Highest Death Rates from Heart Disease
Selected Rural and Urban Missouri, Counties 2005-2015**

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Washington	1,040	391.0	Jasper	3,632	263.6
2	Mississippi	684	361.1	St. Louis City	9,116	260.5
3	Pemiscot	818	347.8	Jefferson	4,863	232.4
4	New Madrid	863	331.0	Newton	1,726	228.9
5	Oregon	550	312.0	Buchanan	2,469	210.5

Age-adjusted rates per 100,000 residents

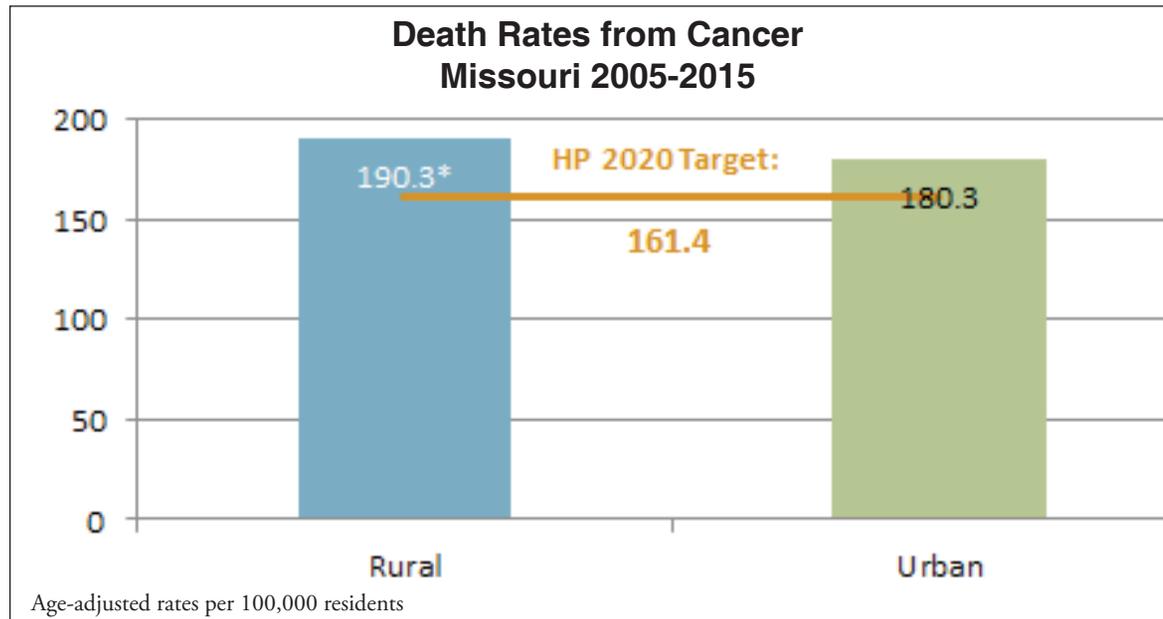
Deaths due to Acute Myocardial Infarction (AMI), commonly known as heart attack, account for nearly 30 percent of heart disease deaths. From 2005 to 2015, in both rural and urban counties, the rates for AMI death have decreased. However, the disparity between rural and urban AMI rates has substantially increased. The death rate for AMI in rural counties is now 60.5 percent higher than in urban counties.



CANCER

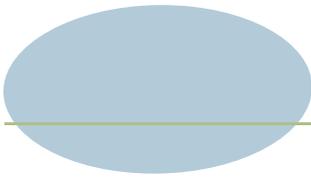
Cancer is the second leading cause of death for both rural and urban Missourians. Rural residents have significantly higher rates of cancer death (190.3) compared to urban Missourians (180.3). Neither group meet the Healthy People 2020 target which is a cancer death rate of 161.4.³⁵ In addition, males in both urban and rural areas have significantly higher rates of cancer deaths when compared to females. Death rates from cancer have significantly decreased between 2005 and 2015, dropping 13.9 percent in urban communities and 9.7 percent in rural areas.

Cancer deaths can also be ranked by subtype. As with the Leading Causes of Death, the ranks are based on the number of deaths instead of the age-adjusted rate. Rural and urban Missourians experience death from specific types of cancer at different rates. For example, lung cancer is the leading cause of cancer death for both urban and rural Missourians, but deaths from lung cancer in rural Missouri are significantly higher (61.0) than urban areas (53.8). (For comparison, the Healthy People 2020 target for lung cancer is 45.5).³⁶ Rural death rates are also statistically significantly higher for colon cancer. Urban death rates are higher for cancers of the breast and pancreas but neither difference is significant.



³⁵HealthyPeople.gov. Cancer Objectives C-1. Healthy People 2020. <https://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives>. Accessed May 18, 2017.

³⁶HealthyPeople.gov. Cancer Objectives C-2. Healthy People 2020. <https://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives>. Accessed May 18, 2017.



Leading Causes of Cancer Deaths Missouri, 2005-2015

Rank	Cancer Type	Rural		Urban	
		Count	Rate	Count	Rate
1	Lung/Bronchus/Trachea	18899	61.0*	24032	53.8
2	Colon/Rectum/Anus	5433	17.9*	7118	15.9
3	Breast	3733	23.2†	5999	23.8†
4	Pancreas	3364	11.0	5142	11.5
5	Prostate	2563	20.5‡	3352	19.6‡

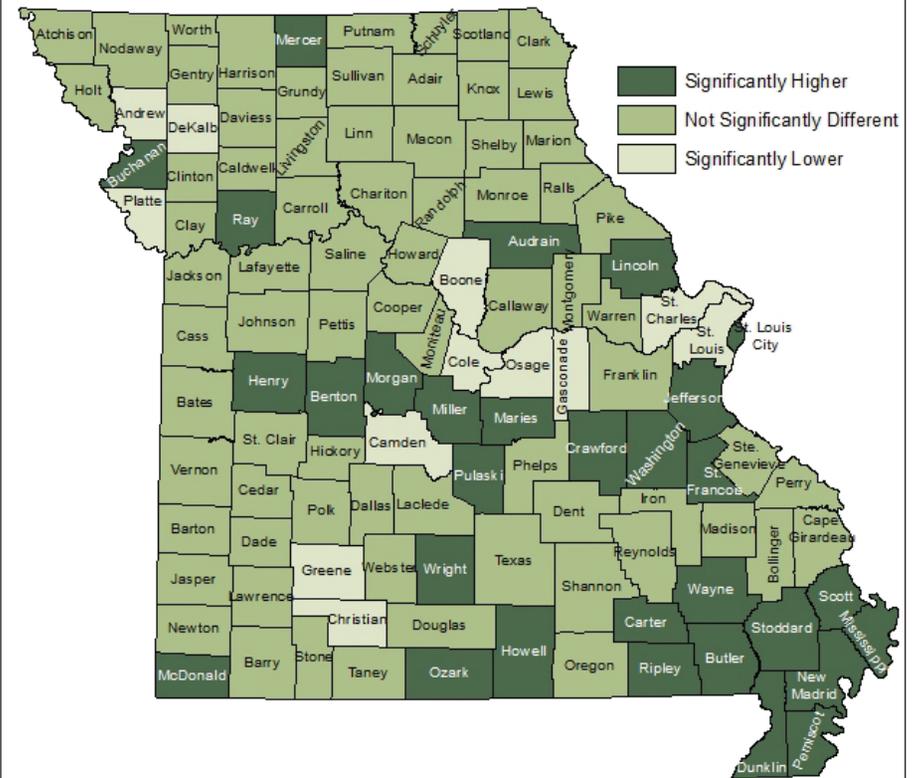
Age-adjusted rates per 100,000 residents

† Breast cancer rates reflect only the female population.

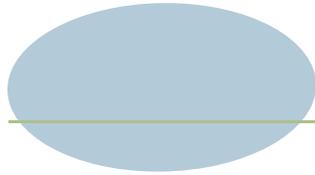
‡ Prostate cancer rates reflect only the male population.

* Asterisks indicate if either the rural or urban rate is statistically significantly high compared to the other geography.

Death Rates from Lung Cancer 2005-2015



Death rates are annualized per 100,000 residents and are age adjusted to the U.S. 2000 standard population.



Data on newly diagnosed cases of cancer are provided by the Missouri Cancer Registry. The cancer paradox, noted in previous editions of Health in Rural Missouri, in relationship to both cancer registry and hospitalization data, continues to persist. Urban residents are diagnosed with cancer more frequently than rural residents (455.9 versus 436.9), but rural residents die from cancer at a higher rate. For specific cancer sites, the results are varied. Rural Missourians are diagnosed with lung and bronchus cancer at a significantly higher rate than urban Missourians (72.2). In contrast, significantly higher rates of new diagnoses for breast and prostate cancer are found in urban Missouri populations.

Rank	Cancer Site	Rural		Urban	
		Count	Rate	Count	Rate
	<i>All Sites</i>	36,619	436.9	57,574	455.9*
1	Lung and bronchus	6,922	79.5*	9,126	72.2
2	Breast	4,955	116.3†	8,996	132.4†*
3	Prostate	3,879	91.7‡	6,446	106.4‡*
4	Colon	2,722	32.2	3,816	30.4

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.

Source: MOPHIMS- Cancer Registry MICA, Missouri Department of Health and Senior Services

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Carter	210	240.8	St. Louis City	7,571	219.0
2	Wayne	539	237.9	Jefferson	4,670	202.0
3	Ripley	498	235.7	Buchanan	2,193	195.8
4	Dunklin	1,047	235.7	Jackson	14,885	189.6
5	Mississippi	432	228.7	Jasper	2,593	188.5

Age-adjusted rates per 100,000 residents.

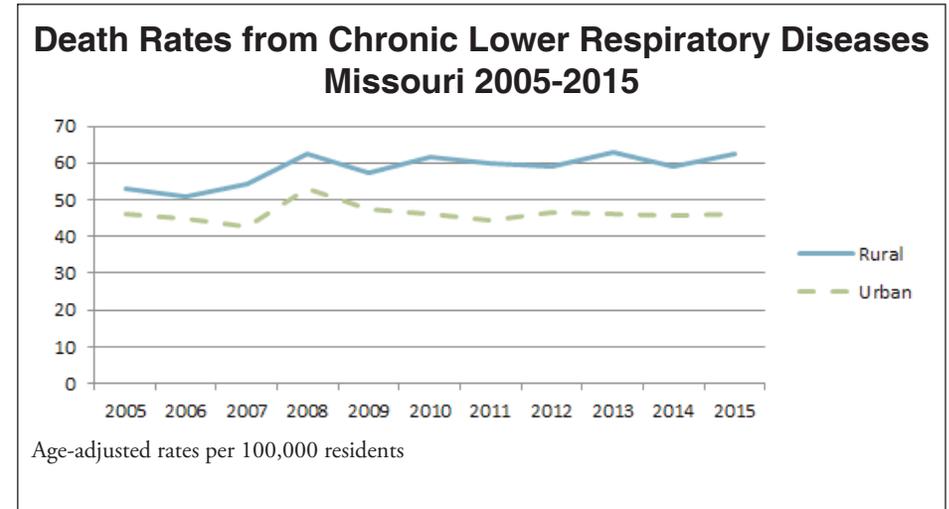
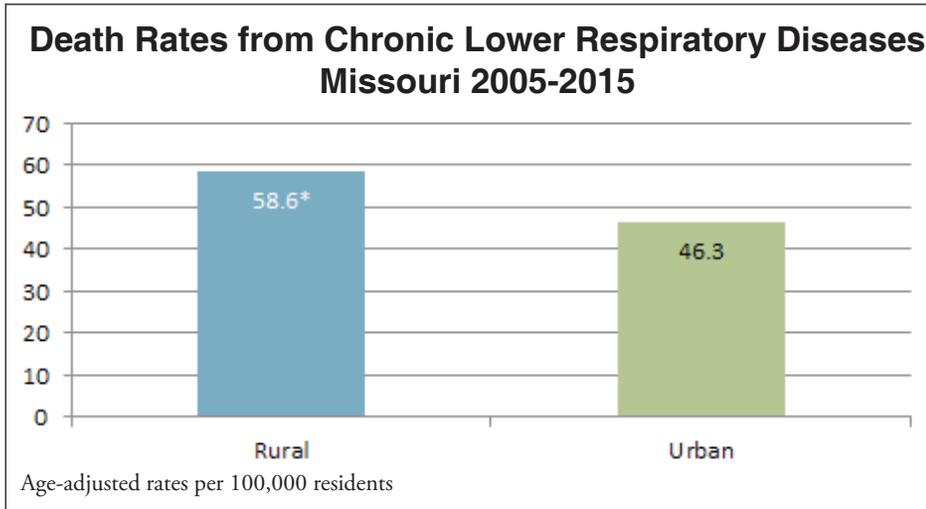
The highest rates of cancer deaths are found in rural counties located in the Southeast BRFSS region of Missouri (Carter, Wayne and Ripley counties). The highest rates of cancer mortality in urban areas are found in St. Louis City and the counties of Jefferson (St. Louis Metro BRFSS region) and Buchanan (Northwest BRFSS region), respectively.



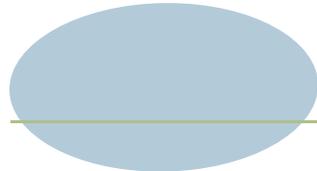
CHRONIC LOWER RESPIRATORY DISEASES

Chronic Lower Respiratory Diseases (CLRD) include bronchitis (unless it is specified as acute bronchitis), emphysema, asthma, bronchiectasis, and chronic airway obstruction not elsewhere classified.³⁷ CLRD is the third leading cause of death in both rural and urban Missouri. The 2005-2015 CLRD death rate for rural Missourians (58.6 per 100,000 residents) is 26.6 percent higher than the urban rate of 46.3, which is statistically significantly different.

Death rates from CLRD have fluctuated a bit in both rural and urban Missouri but the rural rates have continued to see moderate increases over the last decade, while the urban rates have remained steady except for a single increase seen in 2008.

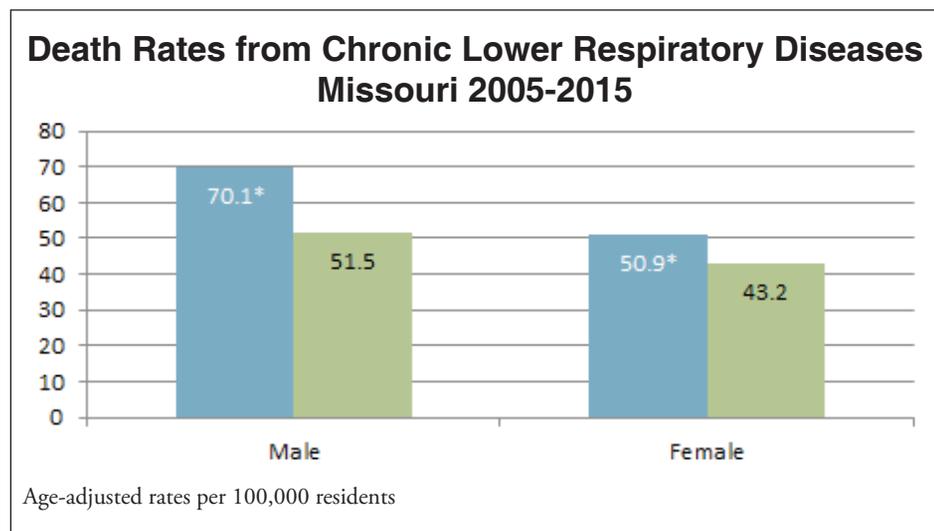


³⁷Missouri Department of Health and Senior Services. Missouri Resident Leading Causes of Death Profile. Missouri Department of Health and Senior Services. http://health.mo.gov/data/mica/CDP_MICA/CofDDefinitionofIndicators.html. Accessed May 11, 2017.



Males have significantly higher CLRD death rates in both rural and urban counties. However, the gender disparity in rural areas is much greater than in urban areas. Rural males have a 37.6 percent higher CLRD death rate than rural females, nearly double that between urban genders (19.2 percent).

Four of the five rural counties with the highest death rates from CLRD are located in the Southeast BRFSS Region with Iron County having the highest rate (96.9).

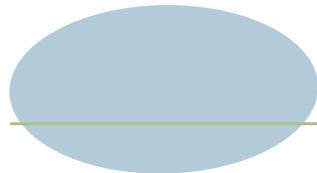


Highest Death Rates from Chronic Lower Respiratory Diseases Selected Rural and Urban Missouri Counties, 2005-2015

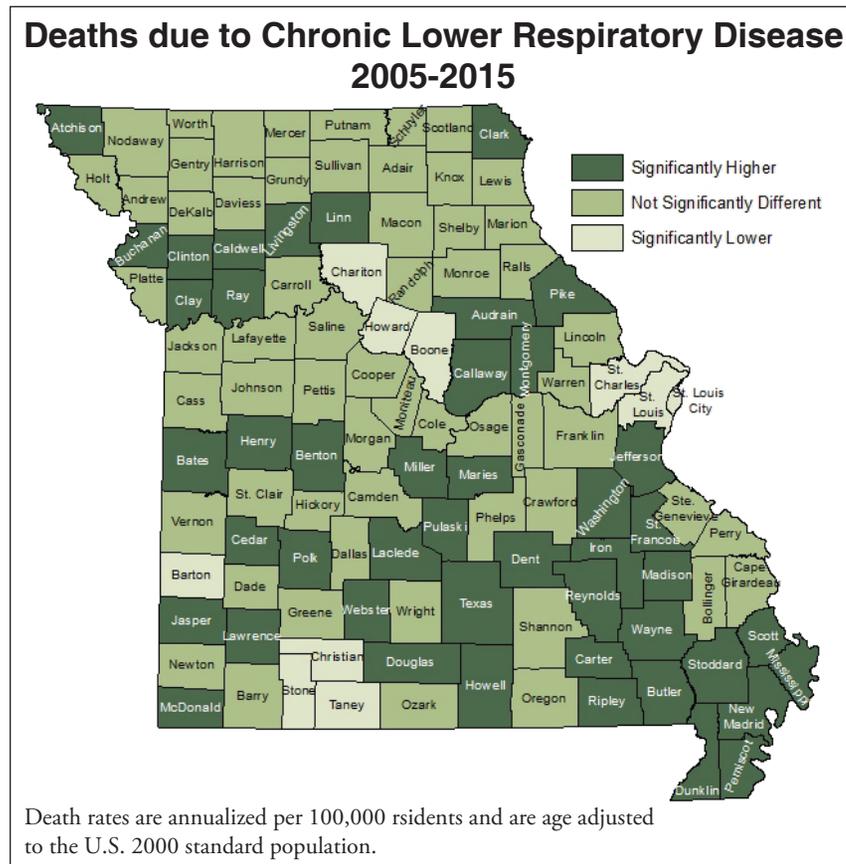
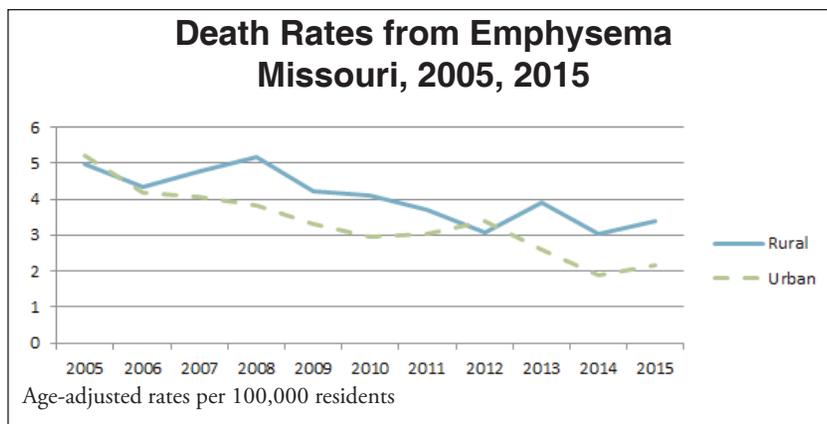
Rank	Rural	Count	Rate	Urban	Count	Rate
1	Iron	153	96.9	Buchanan	909	80.4
2	Clinton	271	92.5	Jasper	895	65.4
3	Dunklin	408	91.3	Jefferson	1,317	62.3
4	Carter	78	89.4	Clay	1,357	60.8
5	Stoddard	402	87.9	Cass	654	55.1

Age-adjusted rates per 100,000 residents

³⁸Missouri Department of Health and Senior Services. Missouri Resident County-Level Study Comparisons Profile. <https://webapp01.dhss.mo.gov/MOPHIMS/ProfileBuilder?pc=15>. Accessed May 22, 2017.



From 2005-2015, seven percent of CLRD deaths were due to emphysema. In contrast to the overall CLRD death rate, which is fairly level in urban areas and slowly increasing in rural locations, the death rates for emphysema in both rural and urban counties continue to decrease. Rural counties experienced a 32.3 percent decrease from 2005 to 2015, while urban counties saw an even greater decline of 58.5 percent. A contributing factor in these declines in emphysema mortality may be the declining smoking rates in Missouri, from 25.4 percent in 2007³⁸ to 22.3 percent in 2015.³⁹ Research shows that smoking is a risk factor for developing emphysema.⁴⁰

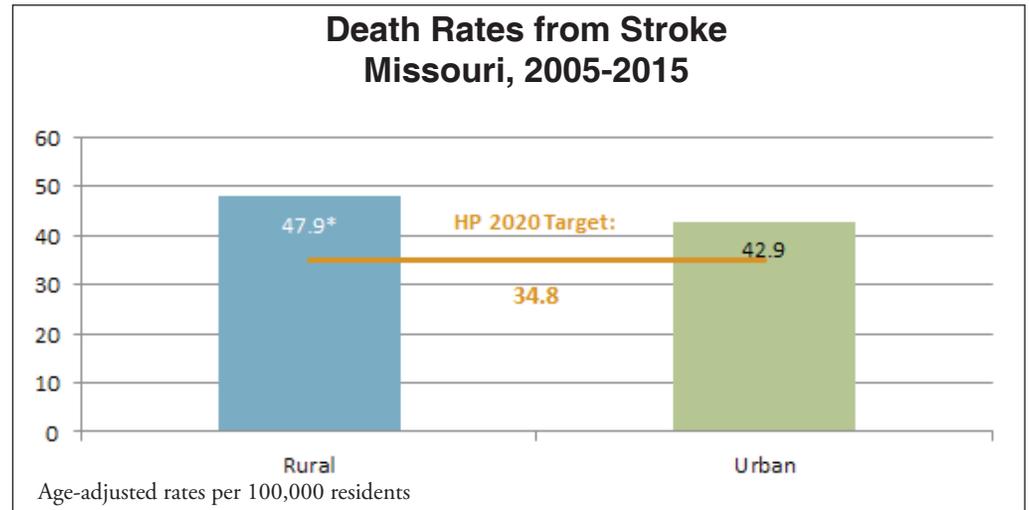


³⁹U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Extinguishing the Tobacco Epidemic in Missouri. <https://www.cdc.gov/tobacco/about/osh/program-funding/pdfs/missouri-508.pdf>. Updated April 11, 2017. Accessed May 22, 2017.

⁴⁰Emphysema. Cleveland Clinic. <https://my.clevelandclinic.org/health/articles/emphysema>. Updated January 28, 2015. Accessed May 23, 2017.

STROKE

Stroke is the fourth leading cause of death in Missouri for both rural and urban residents. A ten year trend from 2005 through 2015 shows the death rate for stroke was on the decline for both rural and urban populations. Rural rates decreased by 40 percent during this time period, where urban rates decreased by a more modest 21 percent. While the 2015 stroke death rates were very similar for rural and urban populations over the combined 11 year time period, the rural stroke death rate of 47.9 was statistically significantly higher than the urban rate of 42.9. As with many of the leading causes of death, age plays a large role in stroke deaths. Over 85 percent of stroke deaths for both rural and urban areas occurred in the 65 and over population and over 40 percent of stroke deaths occurred to persons age 85 and over.



Rank	Rural	Count	Rate	Urban	Count	Rate
1	Dunklin	356	80.5	Buchanan	738	60.7
2	Lewis	108	72.5	St. Louis City	1,828	52.3
3	Henry	242	64.0	Jefferson	1,044	52.2
4	Mississippi	120	63.8	Newton	355	47.2
5	Phelps	341	62.9	Cass	558	47.2

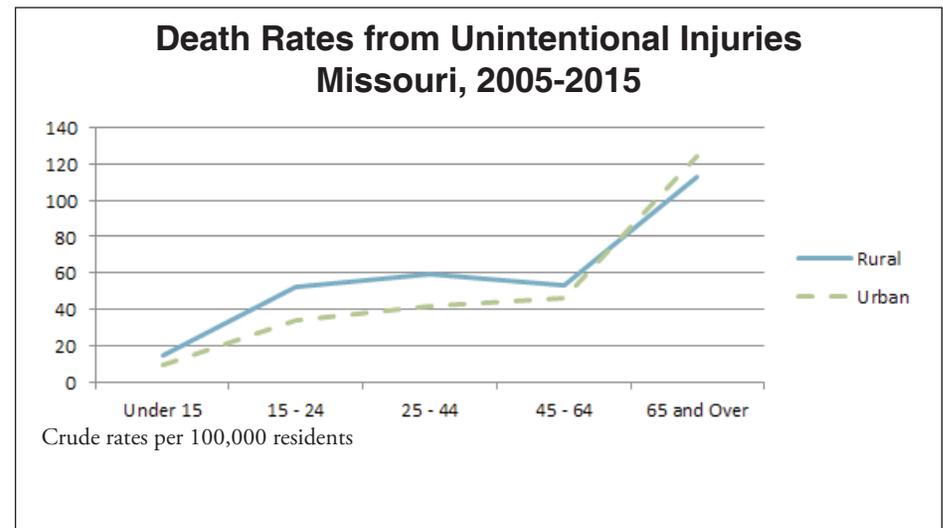
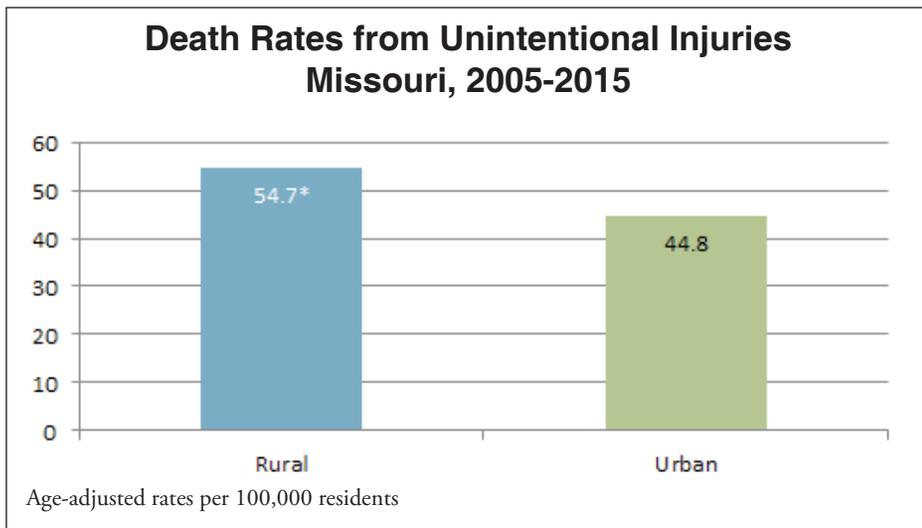
Age-adjusted rates per 100,000 residents

The rural Missouri county with the highest death rate due to stroke is Dunklin County in the Bootheel (80.5). Lewis County in Northeast Missouri has the second highest rate. The five rural counties with the highest stroke death rates are all higher than Buchanan County, which has the highest urban death rate (60.7).

UNINTENTIONAL INJURIES

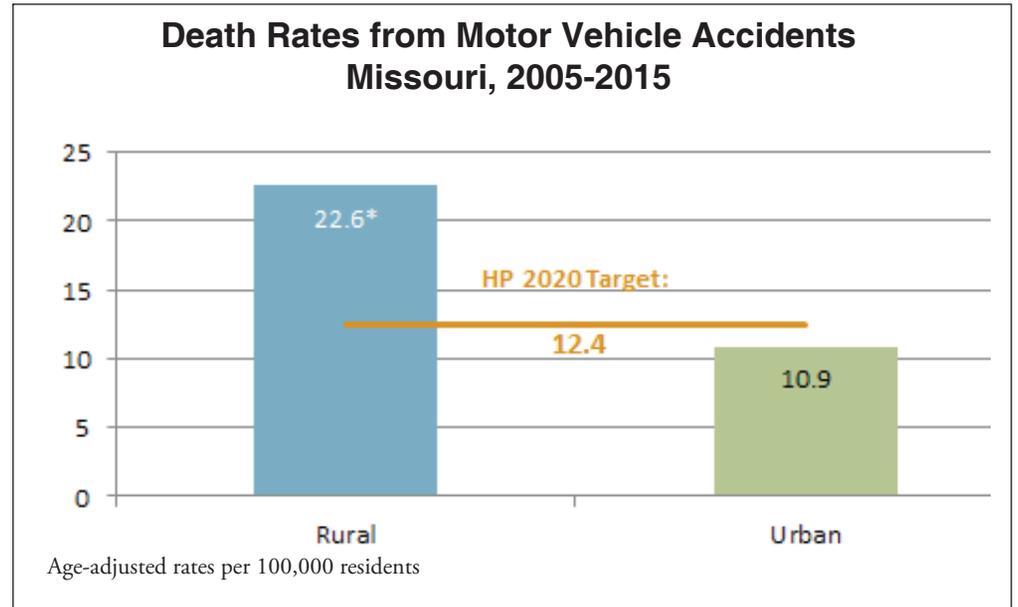
For both urban and rural populations, unintentional injuries are the fifth leading cause of death. Deaths from unintentional injuries include deaths from motor vehicle accidents (MVA), falls, drug overdoses, fires and drownings. Rural populations have statistically significantly higher rates of death from unintentional injuries (54.7 per 100,000) compared to their urban counterparts (44.8 per 100,000).

For both genders, death rates from unintentional injuries were statistically higher for rural Missourians; however, within each population, males have a significantly higher rate of death from unintentional injury compared to females. Individuals age 65 and over have the highest death rates from unintentional injuries for both populations (due in large part to falls); however, rural populations have significantly higher death rates than urban for all other age groups.



MOTOR VEHICLE ACCIDENTS

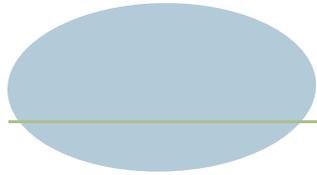
Motor Vehicle Accident death rates declined significantly between 2005 and 2015, but MVAs still account for 40 percent of unintentional injuries for rural residents and 24 percent for urban. These deaths represent a particularly large disparity between rural and urban populations in Missouri, where rates continue to be statistically significantly higher for rural populations as compared to urban populations. Disparities between urban and rural MVAs largely have been attributed to the greater risks posed by rural road travel caused by higher speed limits, narrow lanes, short sight distance because of hills and curves, potential delays in discovery of accidents or arrival of emergency services, and increased distances to emergency and trauma centers.^{41,42}



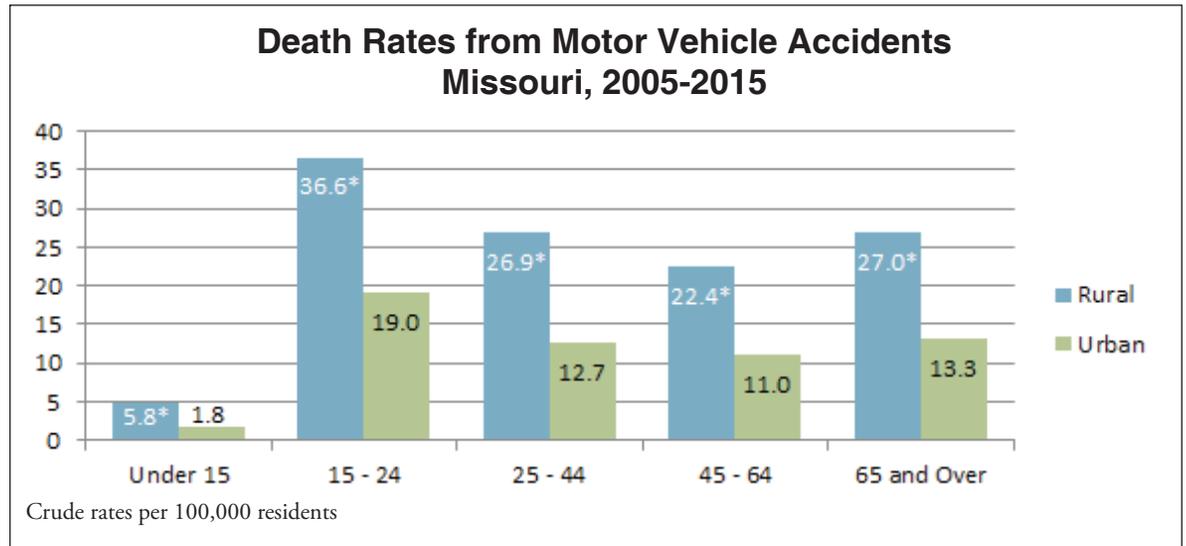
MVA death rates declined significantly between 2005 and 2015...

⁴¹U.S. Department of Transportation. 2015 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance. <https://www.fhwa.dot.gov/policy/2015cpr/>. Updated December 20, 2016. Accessed May 15, 2017.

⁴²U.S. Department of Transportation, Federal Highway Administration. Implementing the High Risk Rural Roads Program. <https://kutc.ku.edu/sites/kutc.ku.edu/files/docs/pdf/HRRR.pdf>. Published March 2010. Accessed May 16, 2017.



Rural death rates for MVAs are approximately double the urban rate for both male and female residents. The MVA death rates for males are statistically significantly higher compared to females in both rural and urban Missouri populations. The U.S. Department of Transportation states that men drive more miles and are more likely engage in risky motor vehicle behaviors such as speeding, driving while impaired, and not using safety belts when compared to female drivers.⁴³ Gender differences in MVA fatality rates are largest among individuals between the ages of 15 and 24.



When compared to urban Missourians, rural Missourians experience statistically significantly higher rates of death from motor vehicle accidents at all ages, with the highest rates of MVA deaths occurring between the ages of 15 and 24 for both urban and rural populations. The rural rate is more than twice the urban rate for all age groups, except 15-24 where the rural rate is nearly double.

⁴³Highway Loss Data Institute. General Statistics, Fatality Facts, Gender 2015. Insurance Institute for Highway Safety. <http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/gender>. Published November 2016. Accessed May 11, 2017.

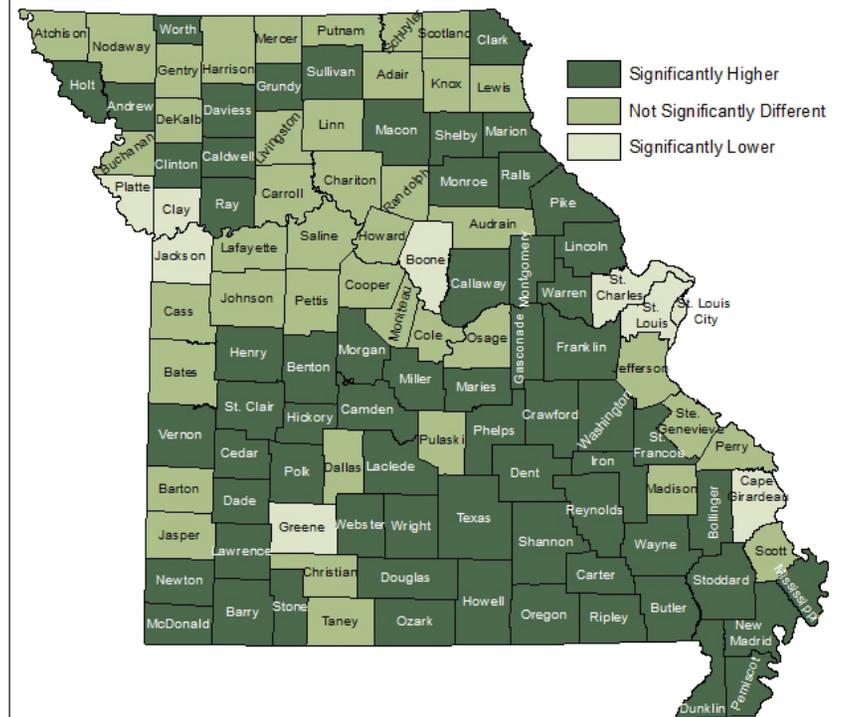
More than half of rural Missouri counties have higher death rates from MVAs than the top ranked urban county. The two highest death rates occur in the Southeast BRFSS region in the rural counties of Reynolds and Shannon, with the third highest rate in the nearby rural Washington County (Central BRFSS).

Highest Death Rates from Motor Vehicle Accidents Selected Rural and Urban Missouri Counties, 2005-2015

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Reynolds	35	54.5	Newton	145	22.8
2	Shannon	42	47.1	Jasper	222	17.6
3	Washington	123	46.0	Jefferson	401	17.0
4	Carter	28	44.7	Cole	115	13.9
5	Ripley	53	37.9	Buchanan	133	13.3

Age-adjusted rates per 100,000 residents.

Death Rates from Motor Vehicle Accidents 2005 - 2015

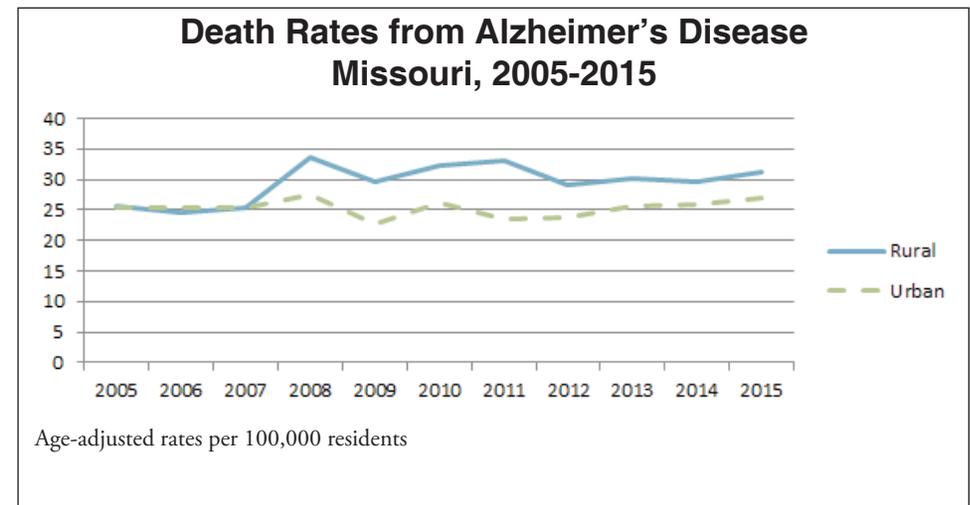
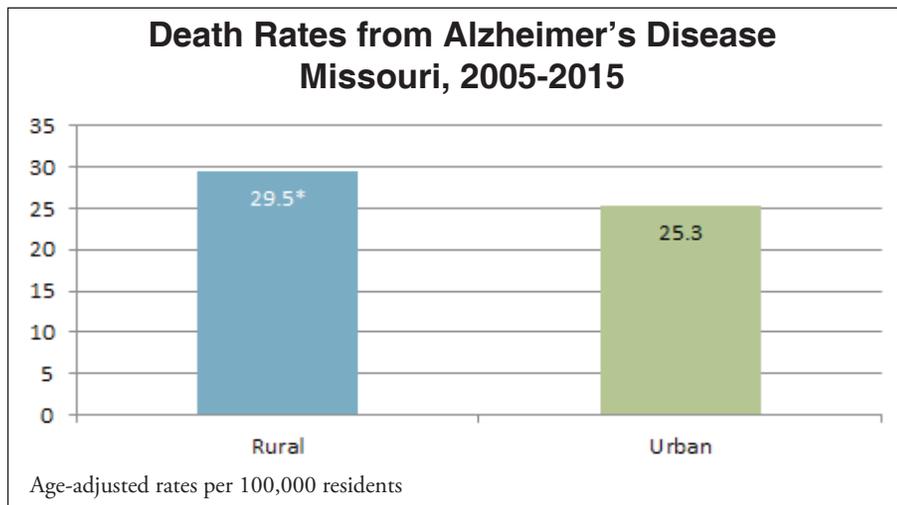


Death rates are annualized per 100,000 residents and are age adjusted to the U.S. 2000 standard population.

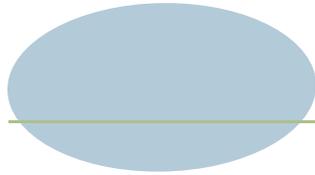
ALZHEIMER'S DISEASE

“Alzheimer’s Disease (AD) is an irreversible, progressive brain disorder that slowly destroys memory and thinking skills, and eventually the ability to carry out the simplest tasks.”⁴⁴ As the sixth leading cause of death for both rural and urban areas of Missouri, the rural AD death rate is 29.5. That is 16.7 percent higher than the urban rate of 25.3, a statistically significant difference.

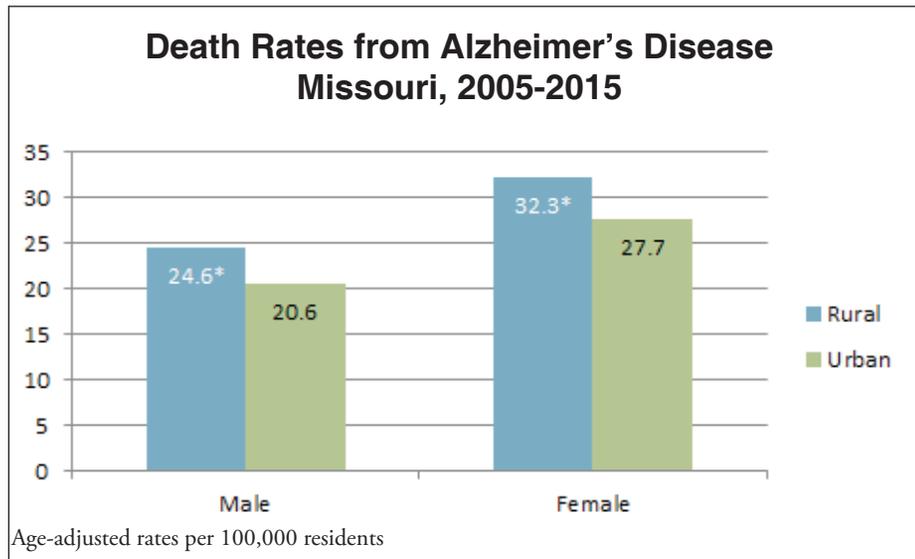
Urban and rural death rates from AD were similar from 2005-2007; however, in 2008 the rural rate spiked (increasing by 32 percent) while the urban rate experienced only a slight increase. In 2009, both geographic groups saw declining mortality and in the ensuing years rates have remained fairly consistent. Though the rural rate for Alzheimer’s disease deaths has been consistently higher during this time the rural/urban disparity has decreased.



⁴⁴National Institute on Aging. Alzheimer’s Disease Fact Sheet. National Institute of Health. <https://www.nia.nih.gov/alzheimers/publication/alzheimers-disease-fact-sheet>. Published August 2016. Updated May 5, 2017. Accessed May 11, 2017.



Female death rates from AD were significantly higher than male death rates in both rural and urban areas. The rural female death rate is significantly higher than the rates for all other region/gender groupings.



Missouri's demographic composition indicates that AD mortality rates could continue to rise in the state. As Baby Boomers continue to age in Missouri, longevity will undoubtedly lead to increased incidence of AD. A 2013 Centers for Disease Control report found that the very elderly population (age 85 and up) was 50 times more likely (nationally) to die from AD than the next lowest age group (65-74). Beyond the gender and age differences noted previously, nationally higher incidences of the disease are found in the non-Hispanic White population.⁴⁵ As discussed in the Population section, 92% of the Missouri rural population is non-Hispanic White, so race/ethnicity patterns are likely a major factor in the higher rural death rates for AD in Missouri. The five rural counties with the highest AD death rates were found in the southern part of the state, in both the Southwest and Southeast BRFSS regions.

Highest Death Rates from Alzheimer's Disease Selected Rural and Urban Missouri Counties, 2005-2015

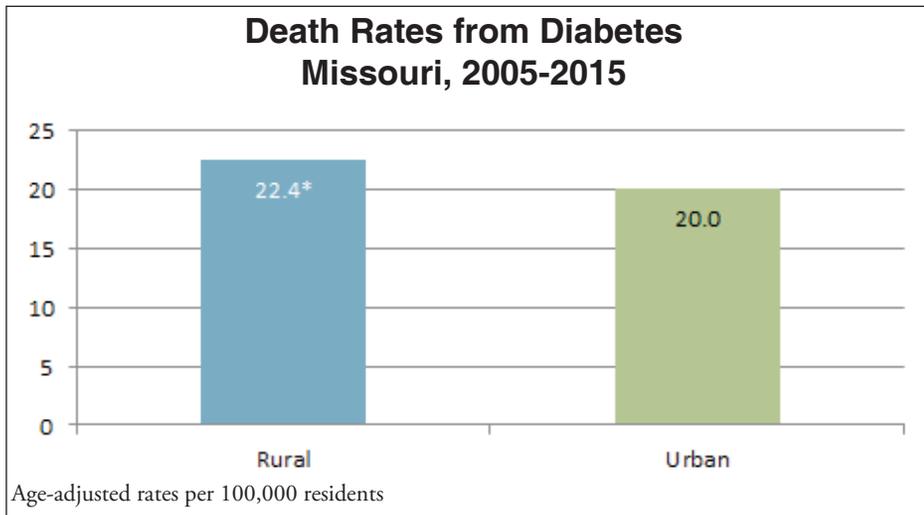
Rank	Rural	Count	Rate	Urban	Count	Rate
1	Butler	334	55.5	Platte	307	35.1
2	Madison	104	53.6	Cass	396	33.8
3	Lawrence	309	52.7	Jefferson	573	32.2
4	Douglas	102	47.8	Greene	1,208	32.1
5	Iron	71	47.7	Cole	287	32.1

Age-adjusted rates per 100,000 residents

⁴⁵Tejada-Vera B. Mortality from Alzheimer's disease in the United States: data for 2000 and 2010. NCHS Data Brief; 2013 (116). <https://www.cdc.gov/nchs/data/databriefs/db116.htm>. Published March 2013. Accessed July 13, 2017.

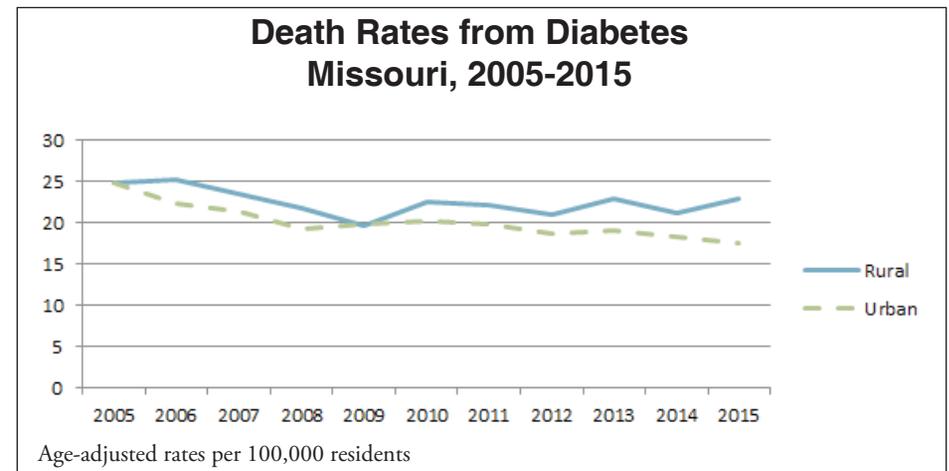
DIABETES

In Missouri, diabetes was the seventh leading cause of death for both rural and urban communities from 2005 through 2015. The rural diabetes death rate (22.4) was statistically significantly higher than the urban rate (20.0).

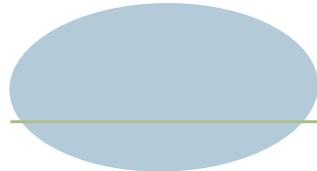


Diabetes is of particular interest when understanding disparities between rural and urban communities because of the comorbidities associated with this disease. Diabetes is the primary cause of kidney failure and according to the CDC diabetes “increases the all-cause mortality rate 1.8 times” compared to individuals without the disease.⁴⁶ Furthermore, cognitive impairment, incontinence, fracture risk and cancer risk and prognosis are all comorbidities which have been found to be associated with diabetes.⁴⁶

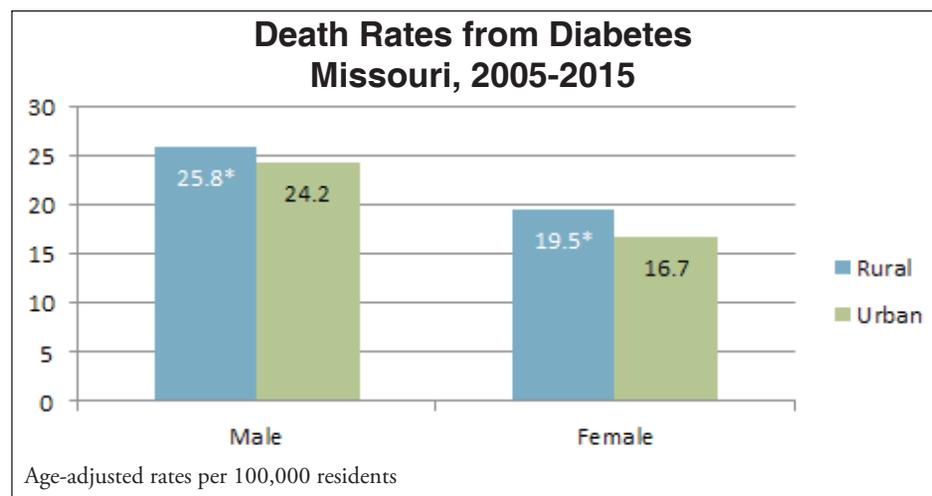
In 2009, the rural diabetes death rate (19.6) dipped below the urban rate (19.9) for the first and only time in the 2003-2013 decade. Since that year, rural and urban trends have diverged with rural rates increasing by 16.7 percent through 2013, while urban rates declined by 11.8 percent over the same time period. In 2013, urban rates stood at a decade low of 17.5 while rural rates were now 30.3 percent higher than their urban counterparts.



⁴⁶HealthyPeople.gov. Diabetes Overview. Healthy People 2020. <https://www.healthypeople.gov/2020/topics-objectives/topic/diabetes>. Accessed June 18, 2017.



A gender disparity between both rural and urban populations seems to exist within the geographic disparity as well. Females of both rural and urban regions have a statistically significantly lower rate of diabetes than their male counterparts. Rural males experienced rates of death due to diabetes at 25.8 residents where as their urban male counterparts are just under this at a rate of 24.2.



Geographically, the highest rural mortality rates due to diabetes are dispersed throughout the state. The Missouri county with the highest rate, Moniteau, is located in the Central BRFSS region, while other counties with high rates are located in the Northeast (Randolph and Lewis Counties), Southwest (Dade County) and Southeast (Wayne County) regions.

Highest Death Rates from Diabetes Selected Rural and Urban Missouri Counties, 2005-2015

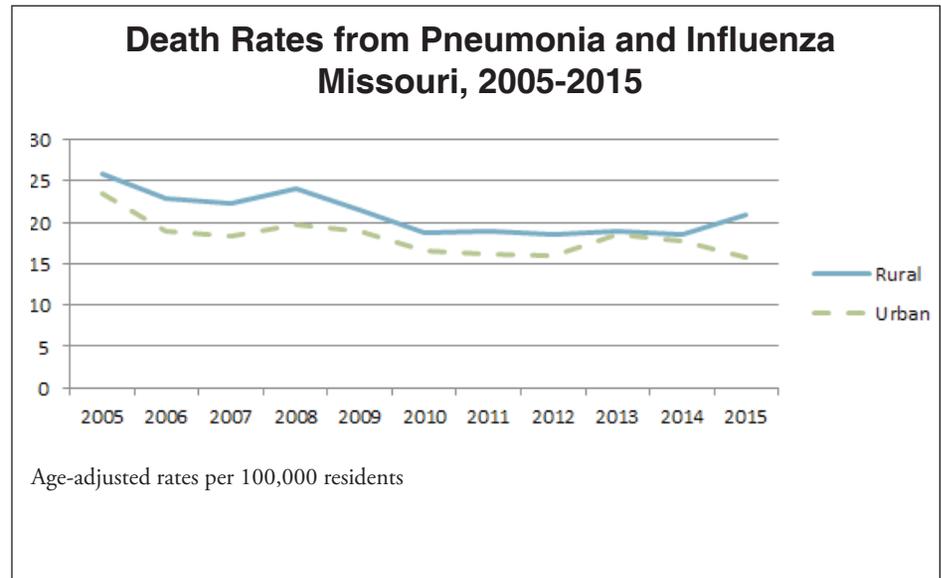
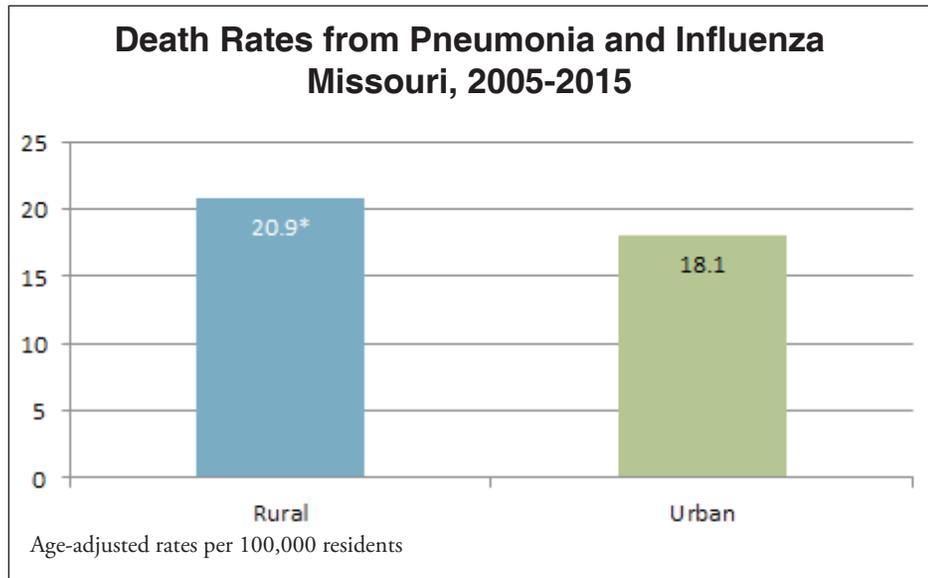
Rank	Rural	Count	Rate	Urban	Count	Rate
1	Moniteau	93	46.6	Buchanan	505	44.3
2	Randolph	145	44.6	St. Louis City	1,108	32.2
3	Dade	57	41.6	Jackson	1,787	22.8
4	Lewis	63	41.0	Jefferson	480	21.7
5	Wayne	88	40.3	Cole	190	21.5

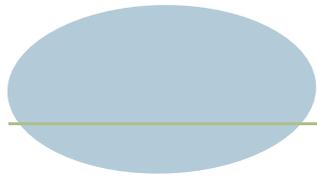
Age-adjusted rates per 100,000 residents

PNEUMONIA AND INFLUENZA

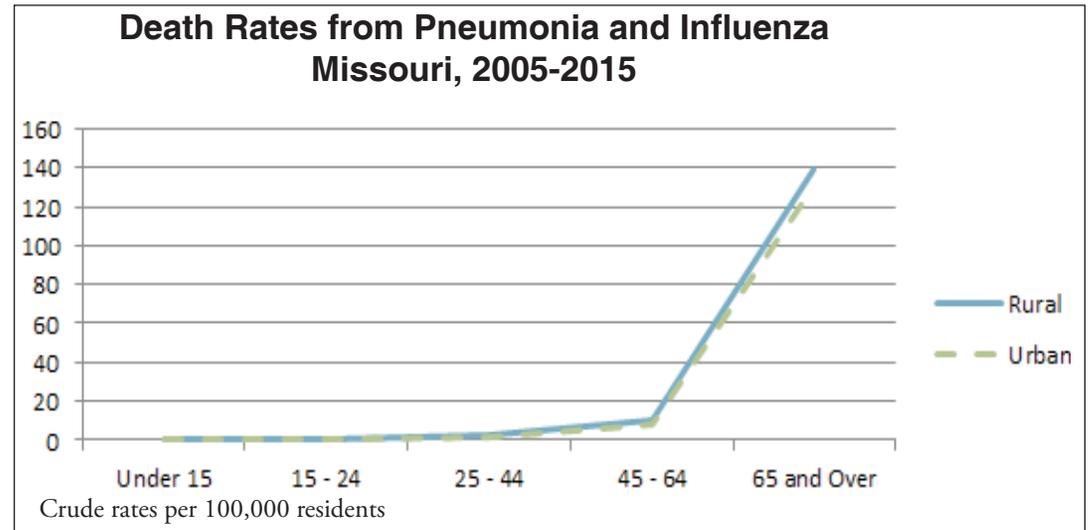
Pneumonia and influenza combined make up the eighth leading cause of death for Missourians; however, death rates from pneumonia and influenza significantly decreased between 2005 and 2015 for both urban and rural populations. Still, rural Missourians experience significantly higher rates of mortality from pneumonia and influenza (20.9) compared to their urban counterparts (18.1).

The overall decline in pneumonia and influenza mortality primarily took place prior to 2010 and the rates remained relatively stable from 2010-2014. In 2015, the pneumonia and influenza mortality rate trends between the two populations diverged, with a decline in mortality for urban populations (17.8 in 2014 compared to 15.8 in 2015) and an increase in mortality for rural Missourians (18.5 in 2014 compared to 20.8 in 2015).





Missourians aged 65 and over face the highest risk of death from pneumonia and influenza and related illness. Both urban and rural Missouri populations have high levels of mortality from influenza and pneumonia at older ages, and rural mortality rates are significantly higher for ages 65 and over.



The highest rates of pneumonia and influenza mortality were found in the rural counties of Scotland, Cedar and Ripley. The three urban counties with the highest rates of pneumonia and influenza mortality were Jasper, Newton and Jefferson. Four of the six counties with the highest death rates from influenza and pneumonia are located in the Southwest BRFSS region (Rural: Cedar and Ripley; Urban: Jasper and Newton).

Highest Death Rates from Pneumonia and Influenza Selected Rural and Urban Missouri Counties, 2005-2015

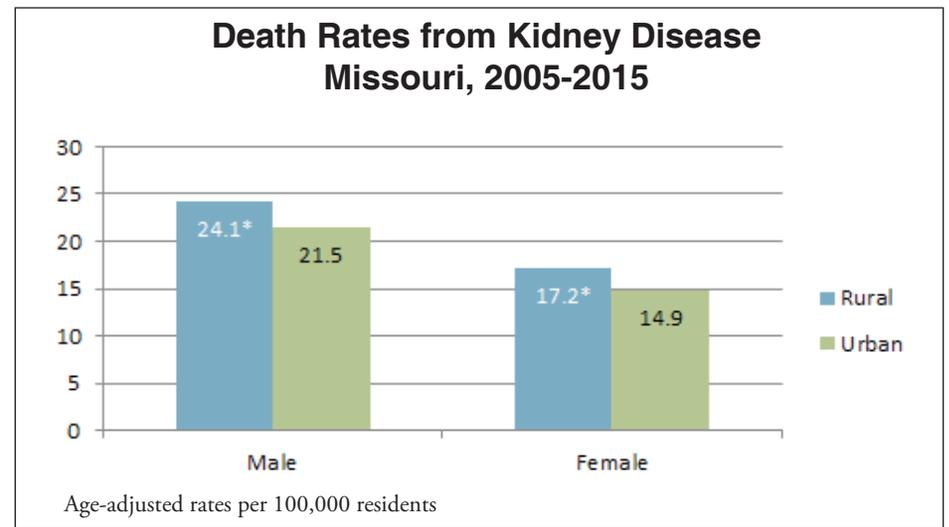
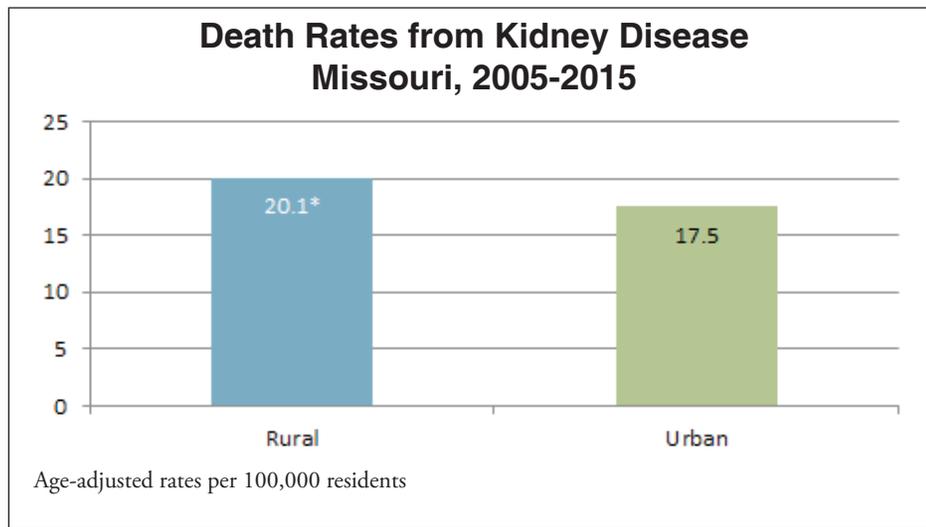
Rank	Rural	Count	Rate	Urban	Count	Rate
1	Scotland	37	41.0	Jasper	455	33.0
2	Cedar	104	40.7	Newton	217	29.3
3	Ripley	76	39.6	Jefferson	437	22.3
4	Schuyler	31	36.5	St. Louis City	763	21.9
5	Texas	135	34.5	St. Charles	629	17.9

Age-adjusted rates per 100,000 residents

KIDNEY DISEASE

Kidney diseases (including nephritis, nephrosis, and nephrotic syndrome) damage the kidneys, which causes an inability to properly filter wastes from the bloodstream.⁴⁷ It is the ninth leading cause of death for Missourians. The 2005-2015 rural kidney disease death rate of 20.1 is 14.8 percent greater than the urban death rate of 17.5. This is a statistically significant difference.

Males have significantly higher kidney disease death rates in both rural and urban counties, though the gender disparity in rural areas is slightly lower than in urban areas. Rural males have a 40.1 percent higher kidney disease death rate than rural females, while in urban areas the difference is 44.1 percent between males and females.



47 National Institute of Diabetes and Digestive and Kidney Diseases. Kidney Disease Statistics for the United States. National Institute of Health. <https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease>. Published December 2016. Accessed May 15, 2017

Over the 2005 to 2015 time period, rural kidney disease death rates increased by 8.7 percent. The urban death rate also increased, by 8.0 percent. The continued increase in rates of kidney disease could be due to an increasing prevalence of diabetes, hypertension, obesity and overuse of some over-the-counter pain killers.⁴⁸

The rural counties with the highest death rates due to kidney disease are scattered throughout the state.



**Highest Death Rates from Kidney Disease
Selected Rural and Urban Missouri Counties, 2005-2015**

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Pemiscot	98	41.0	Cass	293	24.9
2	Phelps	195	35.3	Jackson	1,773	22.7
3	Linn	78	33.4	St. Louis City	752	21.9
4	Caldwell	45	31.6	Jasper	274	20.1
5	New Madrid	82	30.9	Newton	131	17.4

Age-adjusted rates per 100,000 residents

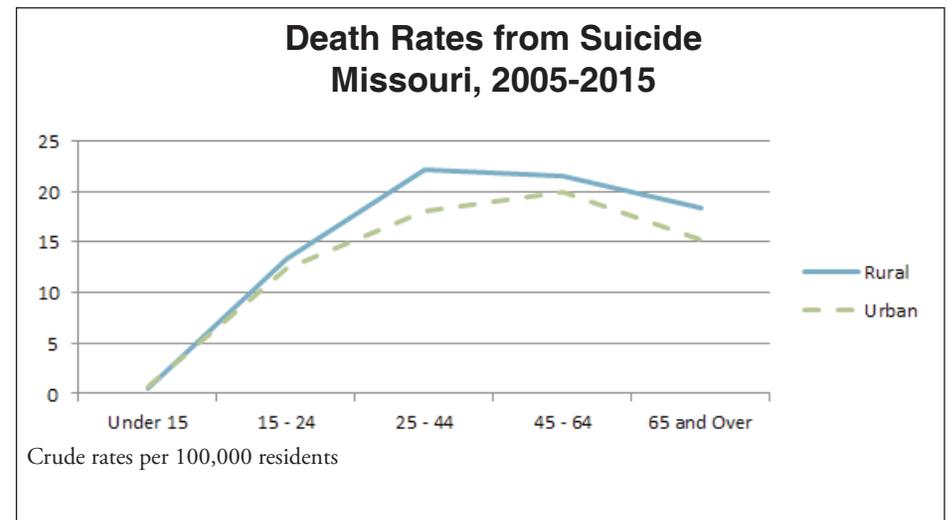
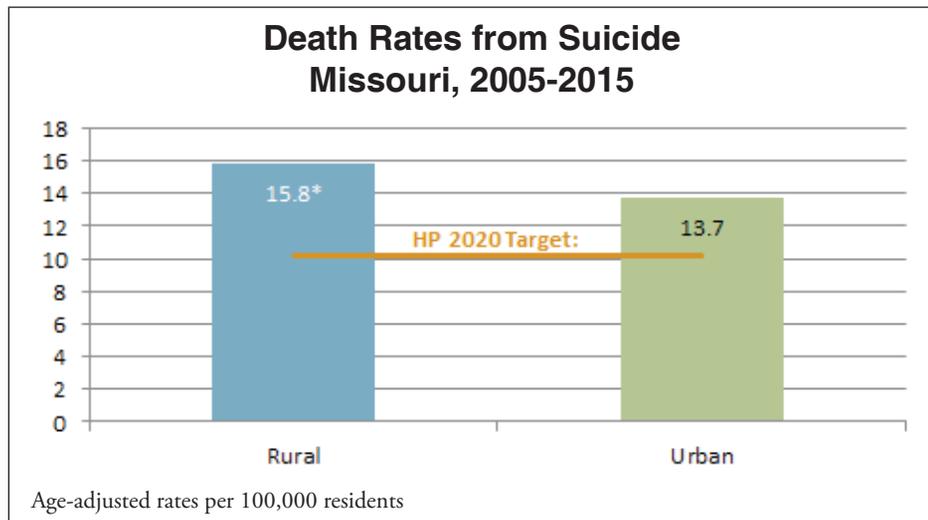
⁴⁸National Kidney Foundation. Kidney Disease: Causes. National Kidney Foundation. <https://www.kidney.org/atoz/content/kidneydiscauses>. Published 2015. Accessed May 15, 2017.

SUICIDE

Deaths from suicide comprise the tenth leading cause of death for Missourians with 6,948 Missourians committing suicides between 2005 and 2015. The rate of suicide deaths increased from 2005 to 2015 for all Missourians. Rural residents die from suicide at statistically significantly higher rates (15.8) than residents of urban counties (13.7). Rural Missouri counties saw a 23.3 percent increase in suicide mortality between 2005 and 2015. Residents of urban areas experienced an increase of 42.7 percent during that same time period, a statistically significant increase.

For both rural and urban areas of Missouri, male suicide rates are significantly higher than female suicide rates and rural male populations feature a rate that is statistically significantly higher than their urban male counterparts.

Rural suicide rates are higher than in urban areas for all age groups except children under 15. The highest rates of rural suicide are for residents between 25 and 44 years of age, a rate that is significantly higher than the urban rate for the same age group. Rural suicide rates for the elderly population, ages 65 and over, are also significantly higher than elderly urban suicide rates.



Rural counties make up the three highest rates of death from suicide. In fact, out of 115 counties, the 39 highest rates of suicide mortality (17.7 to 28.0) are found in rural counties, with the highest suicide rates found in Schuyler and Macon Counties in the Northeast BRFSS region. Please note that even when including eleven years of data the Schuyler County rate is based on less than 20 events and is therefore considered unreliable. This is the case for many rural Missouri counties.



Highest Death Rates from Suicide Selected Rural and Urban Missouri Counties, 2005-2015

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Schuyler	13	28.0#	Jefferson	428	17.6
2	Macon	45	26.9	Jasper	219	17.5
3	Ozark	25	23.4	Cass	181	17.1
4	Cedar	25	23.3	Newton	101	15.9
5	Howell	38	23.3	Clay	385	15.4

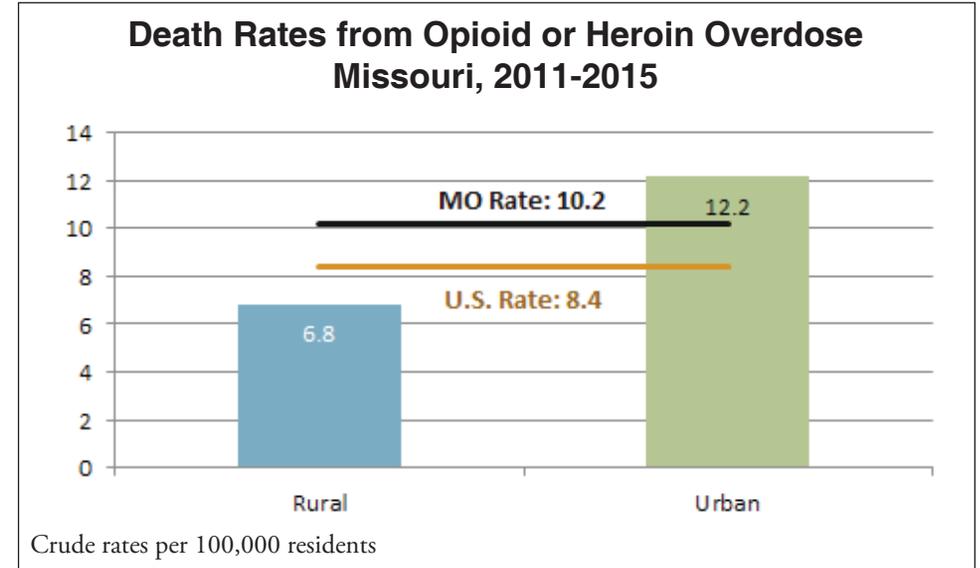
Age-adjusted rates per 100,000 residents

#This rate is based on less than 20 events and is considered unreliable

THE OPIOID EPIDEMIC IN MISSOURI

The national opioid abuse epidemic is well evidenced in Missouri, where the state rate of opioid-related mortality was 10.2⁴⁹ during 2011-2015, nearly 20 percent higher than the national rate of 8.4.^{50,51} Missouri's rural areas have a rate that is 21 percent lower than the national average, but urban areas have a mortality rate that is higher than both the state rate and the national rate, by 18 percent and 37 percent, respectively.

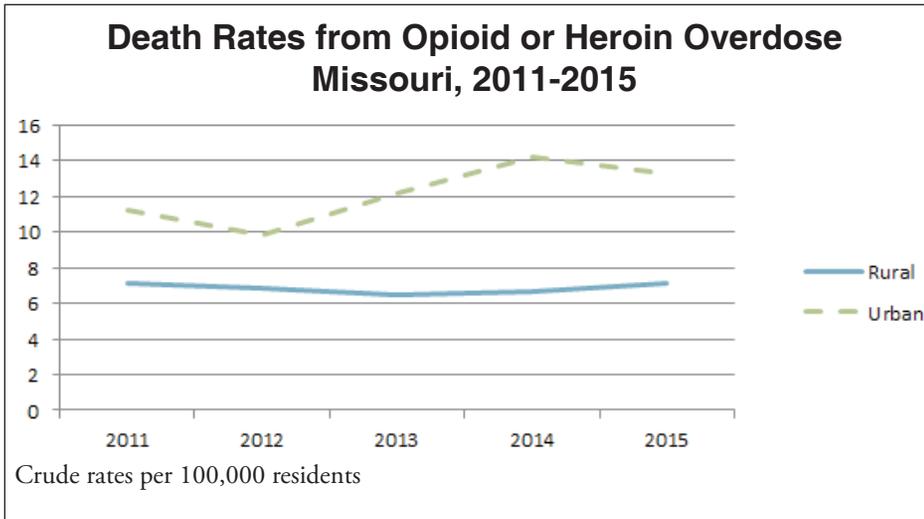
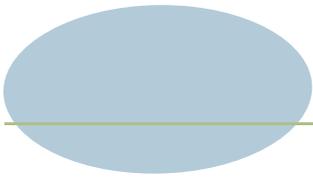
Rural rates of opioid and heroin-related mortality remained stable from 2011-2015. The frequencies from which the rural rates were derived ranged from 144 (in 2013) to a high of 159 (in 2015). Conversely, the pattern in Missouri's urban areas has been less stable with a decrease in deaths between 2011-2012, then steady growth until 2014, and another dip in 2015. Provisional 2016 frequencies, however, indicate that deaths are once again increasing substantially statewide.



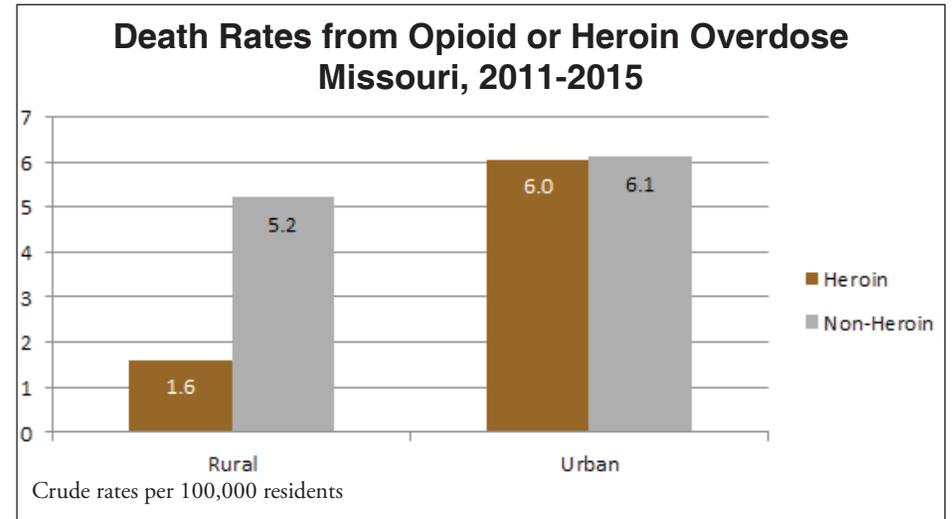
⁴⁹Opioid and heroin overdose mortality data in this section of the report was provided by the Missouri Department of Health and Senior Services' Bureau of Vital Statistics. More detail of this variety is available upon request. Opioid overdoses were identified using death certificates in which the underlying cause of death included codes for unintentional drug poisoning (X40-X44), intentional self-poisoning (X60-X64), assault drug poisoning (X85), or drug poisoning of undetermined intent (Y10-Y14) along with ICD-10 codes T40.0-T40.4 or T40.6. Overdoses where both heroin and non-heroin drug use were indicated were attributed to heroin mortality incidence.

⁵⁰National Institute on Drug Abuse. Overdose Death Rates. National Institute of Health. <https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates>. Updated January 2017. Accessed July 18, 2017

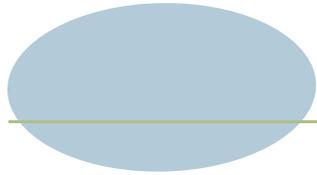
⁵¹The U.S. overdose rate of 8.4 does not include underlying cause of death ICD-10 code T40.0, though it is included in all Missouri opioid rates.



The combined opioid/heroin overdose patterns shown above are noteworthy mainly because of the high rates of overdose occurring over time. Yet, when separating heroin and non-heroin opioid of overdose deaths, a new story emerges. (Non-heroin opioid overdoses can be caused by licit or illicit use of pharmaceuticals like oxycodone, hydrocodone, morphine, fentanyl and methadone, among others.) Urban areas had comparable death rates due to non-heroin opioid overdose and heroin overdose in the years 2011-2015.

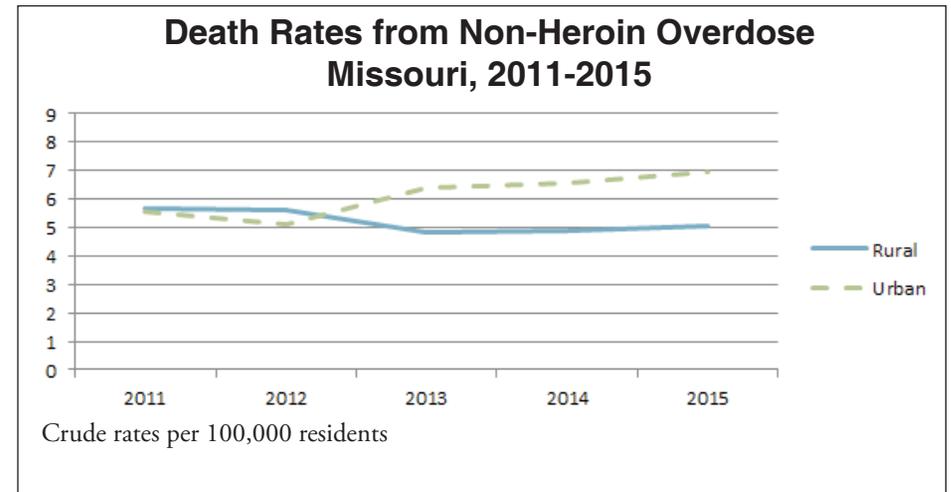
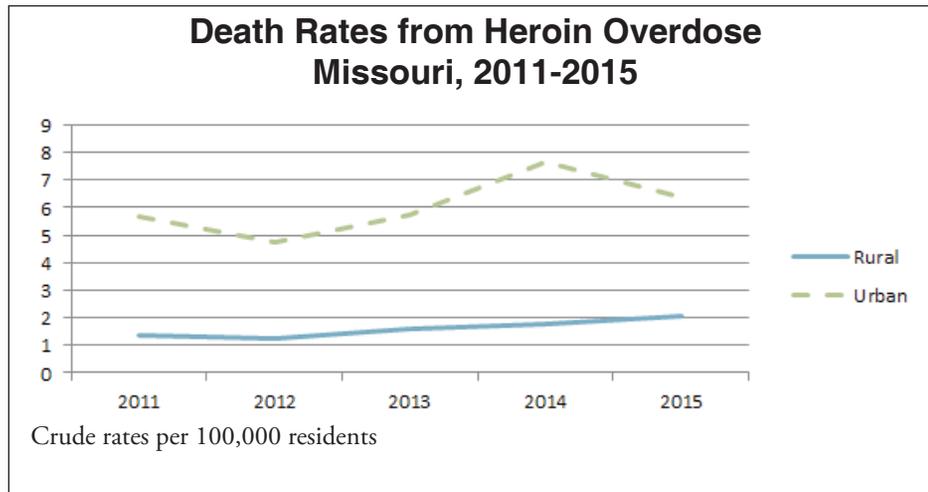


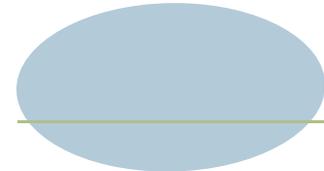
While many factors contribute to overdose, at minimum, this seems to indicate that those in urban counties have access to both types of substances in quantities and sub-types that can induce overdose. However, in rural areas the non-heroin overdose rates during the 2011-2015 time period were more than three times higher than heroin overdose rates. This could indicate rural areas lack access to the types of heroin that are more likely to induce overdose.



Heroin overdose trends follow the same pattern as opioid-related mortality statewide over the past few years. Rural rates slowly increased by almost 50 percent over five years, but overall rates remain low, with fewer than two rural residents in 10,000 dying of a heroin overdose during this time. Heroin-specific urban overdose has trended much higher and with more fluctuation, increasing 61 percent in the two-year time period between 2012 and 2014. In 2015, urban death rates declined but provisional figures in 2016 (not shown) indicate another steep increase in urban heroin deaths rates.

Non-heroin opioid overdose deaths show a much different pattern. The urban and rural rates are more similar to each other compared to heroin. With only two exceptions, both the rural and urban rates have remained consistent. Rural areas saw a dip in death rates between 2012 and 2013. In contrast, urban rates saw a similarly sized increase at the same time. From 2013 through 2015, the urban rates have been consistently higher than for rural areas. This change could be due, in part, to polysubstance drug use and the introduction of illicit fentanyl and fentanyl analogues (extraordinarily deadly non-heroin opioids) into urban markets.





Mortality rates are often established using low frequencies (either a cause of death is rare or a population of interest is small). This is the case for much of the opioid mortality data when analyzed at the county level. Rates based on death frequencies of less than 20 are considered unreliable and should be used with caution.



**Death Rates from Heroin-Specific and Non-Heroin Opioid Overdose
Selected Rural and Urban Missouri Counties, 2005-2015**

	Rural	Count	Rate	Urban	Count	Rate
Heroin-Specific	Pulaski	23	8.6	St. Louis City	328	20.6
	Lincoln	22	8.2	Jefferson	122	11.0
	Franklin	38	7.5	St. Louis County	457	9.1
Non-Heroin Opioids	Livingston	11	14.7#	Jefferson	144	13.0
	Washington	15	12.0#	Greene	134	9.5
	Benton	11	11.7#	Jackson	260	7.6

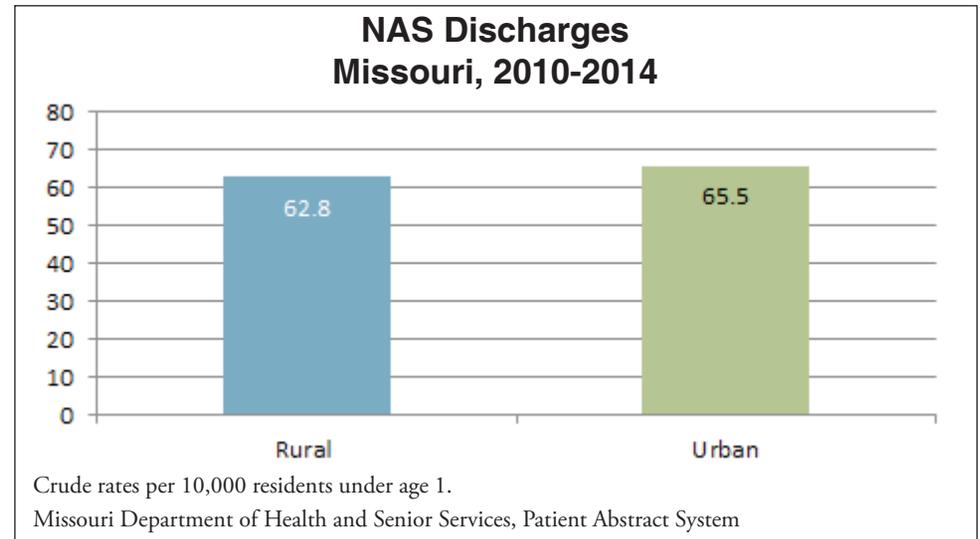
Crude rates per 100,000 residents

#This rate is based on less than 20 events and is considered unreliable

NEONATAL ABSTINENCE SYNDROME (NAS)

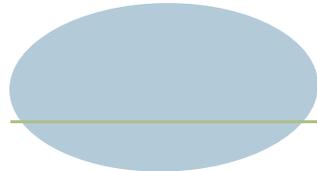
As established in the section above, opioid abuse is an epidemic statewide, though abuse of specific substances varies based on many factors including rural/urban geography. Overall, though, the majority of opioid overdose mortality (in 2010) occurred in the 25-44 age group, which indicates this is a population of special concern. More concerning is that females in this group are of childbearing age. A 2014 article from the journal *Pediatrics* describes neonatal abstinence syndrome (NAS) as, ‘... a result of sudden discontinuation of fetal exposure to substances that were abused by the mother during pregnancy,’ and notes that this condition can be present whether the substances to which the infant was exposed are licit or illicit.⁵² Exposure to these substances can also occur via the placenta or breast milk.

Rates of NAS discharges⁵³ from Missouri hospitals and emergency rooms are remarkably similar for both rural and urban counties. This differs slightly from the patterns of abuse explored above, where more urban areas generally had higher rates of heroin-specific mortality, while rural areas saw higher rates for non-heroin deaths. The lack of difference based on rurality in NAS rates could be because there is no clinical differentiation between NAS due to heroin or non-heroin opioids.



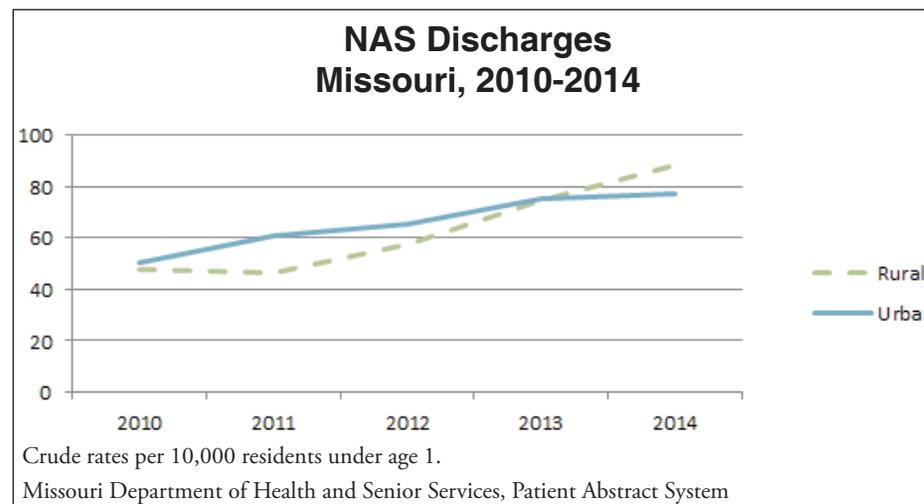
⁵²Kocherlakota P. Neonatal Abstinence Syndrome. *PEDIATRICS*. 2014; 134(2):e547-e561. doi:10.1542/peds.2013-3524.

⁵³ Neonatal Abstinence Syndrome hospitalization and emergency department data in this section of the report was provided by the Missouri Department of Health and Senior Services' Bureau of Health Care Analysis and Data Dissemination and is available upon request. NAS cases were identified through the Patient Abstract System dataset using ICD-9-CM codes 779.5 (drug withdrawal syndrome in newborn) or 760.72 (narcotics affecting fetus or newborn via placenta or breast milk), appearing anywhere on the newborn record or a record where the admission date was the patient's birthdate. The dataset was de-duplicated, meaning that though a patient may have had multiple discharges NAS incidence was attributed only once in the year of birth.



As rates of opioid-related abuse and mortality increase, so do inpatient and emergency department discharges of newborns with NAS. There was a 64 percent increase in NAS discharges statewide between 2010 and 2014 and the percent change in rural areas (84 percent) and urban areas (53 percent) are both staggeringly high. Rural rates were consistently lower until 2014 when they surpassed urban rates for the first time (88.3 versus 77.0).

Because of the low frequencies of NAS discharges at a county level, some of the rates are based on low frequencies and should be treated with caution. However, at a regional level, the rural and urban counties with the highest NAS discharge rates cluster around the St. Louis metro region and areas to its south.



Highest Discharge Rates from NAS Selected Rural and Urban Missouri Counties, 2010-2014

Rank	Rural	Count	Rate	Urban	Count	Rate
1	Iron	14	261.2#	St. Louis City	323	135.3
2	Madison	12	172.2#	Jefferson	99	74.5
3	Phelps	43	159.8	St. Louis County	427	73.2
4	St. Francois	49	131.3	St Charles	144	63.5
5	Dent	10	113.9#	Greene	102	57.3

Age-adjusted rates per 100,000 residents

#This rate is based on less than 20 events and is considered unreliable

Missouri Department of Health and Senior Services, Patient Abstract System

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, 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, Specialty and Primary Care services, differences between urban and rural are stark.

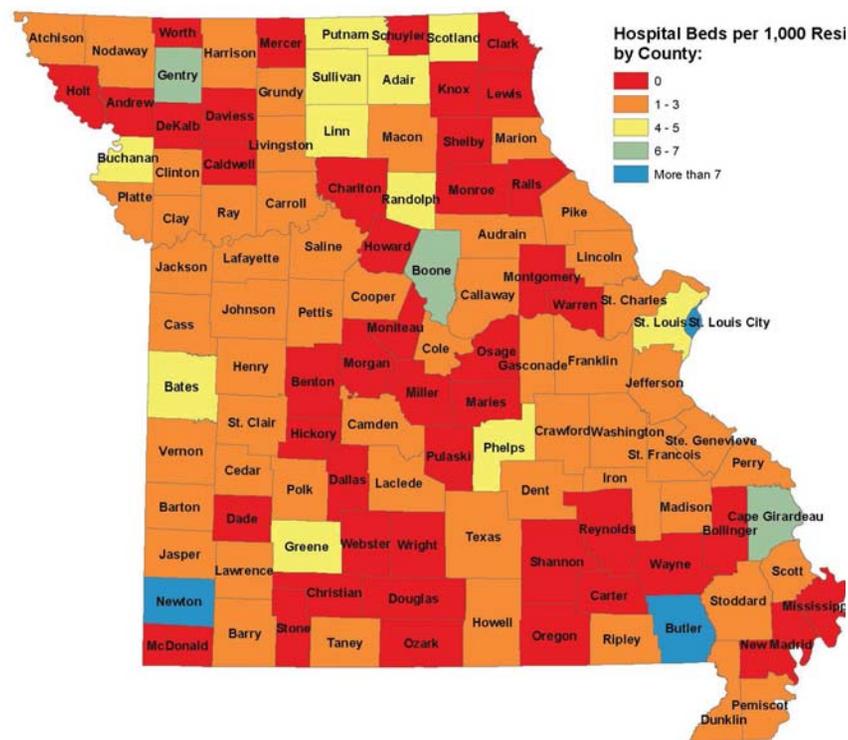
HOSPITAL AND SPECIALTY SERVICES

At the time of this report there are 164 licensed hospitals in Missouri. Of those, only 46 percent (75 total) are located in rural counties. Of the 75 rural hospitals, 36 are Critical Access Hospitals (CAH), with 25 or less beds. In total, urban areas have 4.8 beds per 1,000 residents and rural areas have 2.5 beds per 1,000 residents.

From 2010 to present date there have been 82 rural hospital closures nationally. During this same time period, three Missouri rural hospitals have closed their doors.

The lack of hospital and specialty services in rural Missouri is one of the contributors to rural Missourian's lower rate of hospitalizations outlined in the Health Status section of this report. 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 social services can mean no access to or less consistent care for vulnerable populations.

Hospital Beds per 1,000 Residents, 2017



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.⁵⁴

The best way to holistically view access to primary health care services is through federally designated Health Professional Shortage Areas (HPSAs). States submit applications for population (low income), geographic and certain facility HPSAs to the U.S. Health and Human Services, Health Resources and Services Administration (HRSA).

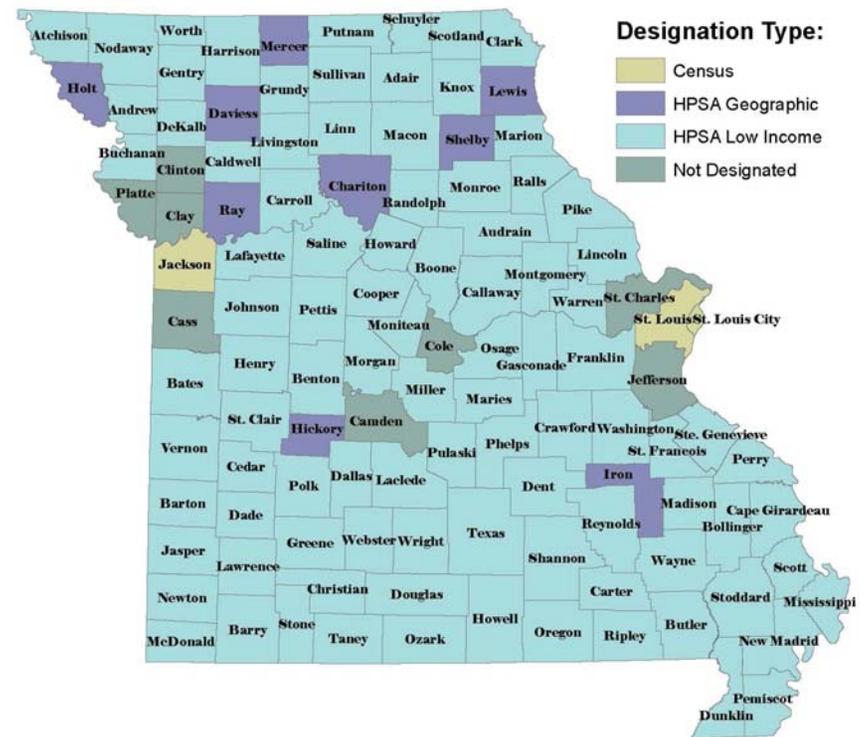
The state utilizes data sources such as Missouri Professional Registration data, Census Bureau data, and Geographic Information System data in the submission of HPSA designation applications.

Primary Medical HPSAs are defined using a ratio between the general population and the number, in Full Time Equivalents (FTE), of licensed Primary Care Physicians (Allopathic and Osteopathic Doctors who specialize in Family Practice, General Practice, Pediatrics, Internal Medicine, and Obstetrics/Gynecology); in addition to a wide range of other factors such as the percent of population below 100 percent of the Federal Poverty Level, the Infant Health Index (based on Infant Mortality Rate or Low Birth Weight) and the travel time to the nearest source of care outside the HPSA designation's given service area.

The HPSAs in Missouri are predominately Low-Income Population HPSAs, and to a lesser extent, Geographic HPSAs. Low-income HPSAs represent limited access for the part of the population below 200 percent of the Federal Poverty Level in a given area, while Geographic HPSAs represent limited access for an entire population in a given area.

Of the 101 rural counties in Missouri, 99 are considered Primary Medical Care HPSAs.

Designated Primary Care Shortage Areas, 2017



⁵⁴ Council on Graduate Medical Education, Twentieth Report, Advancing Primary Care, 2010

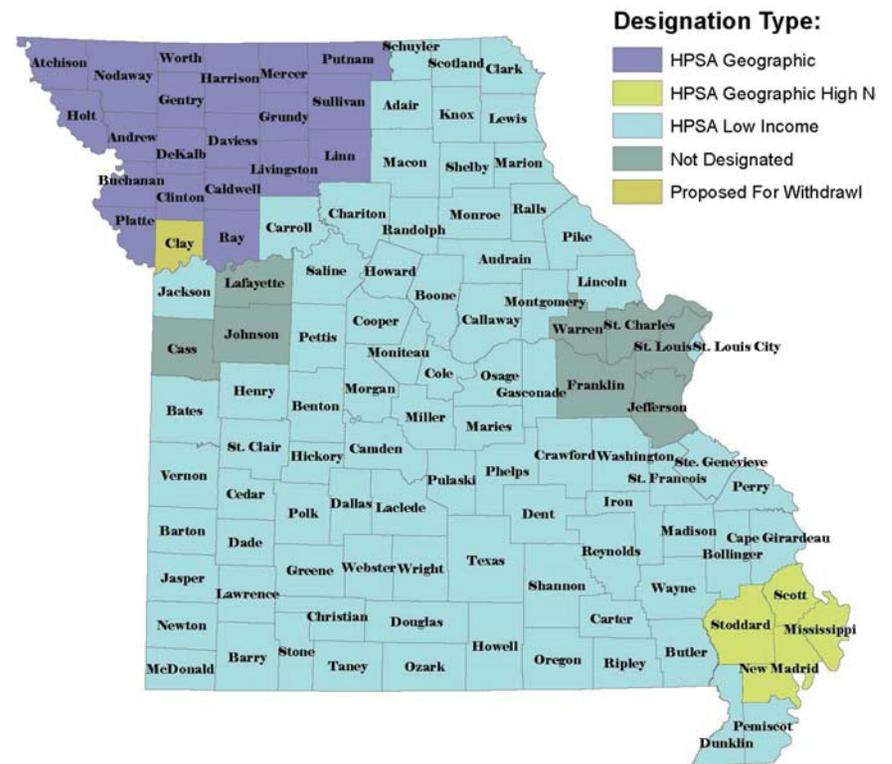
PRIMARY CARE MENTAL HEALTH

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.⁵⁵ Access to appropriate resources is critical to the proper recovery and treatment of mental health problems and disorders.

In Missouri, Mental Health HPSAs are designated using a ratio between the general population and the number of FTE licensed Psychiatrists (Allopathic and Osteopathic); as well as other factors such as the percent of population below 100 percent of the Federal Poverty Level, the elderly ratio of the population, the youth ratio, the alcohol abuse prevalence, the substance abuse prevalence, and the travel time to the nearest source of care outside the HPSA designation's given service area.

Nearly all rural counties, 97 in total, are considered Mental Health HPSAs. The majority of these HPSAs are Low-Income Population HPSAs.

Designated Mental Health Shortage Areas, 2017



⁵⁵ Institute of Medicine, Improving the Quality of Health Care for Mental and Substance-Use Conditions: Quality Chasm Series (2006)

RECOMMENDATIONS

As demonstrated throughout this report, rural Missourians face many challenges related to their health. Overcoming the long standing inequality in health between urban and rural 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 urban and rural 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 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 the uninsured, making 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

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.



Each year the National Organization of State Offices of Rural Health and its partners set aside the third Thursday of November to celebrate National Rural Health Day.

NRHD is an opportunity to
“Celebrate the Power of Rural.”

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 Health Information Center is a webpage where all rural health information, including research on rural health, updates from the Federal Office of Rural Health Policy and funding opportunities. <http://health.mo.gov/blogs/ruralspotlight/>
- The Health in Missouri Briefs highlight specific health disparities within the rural areas of Missouri, and provides 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 North Dakota, to track technical assistance and information dissemination activities. During State Fiscal Year 16 (July 1, 2016-May 31, 2017) the Office assisted with a total of 1,200 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 health care 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.

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) and to enhance quality improvement. The 36 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, 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.

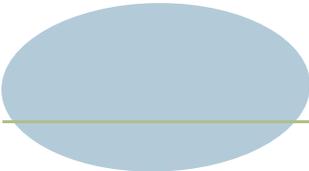


SMALL RURAL HOSPITAL IMPROVEMENT PROGRAM

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 2016, \$392,899.00 was distributed among 41 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, and 3) Value-Based Purchasing (VBP) for financial improvement. The majority of funds were used for purchases under the VBP (53 percent), PB/PPS (21 percent) and ACO/Shared Savings Category (26 percent). The majority of these purchases consist of HCAHPS collection, software, hardware, education and training, and telemedicine within those categories.





THE OFFICE OF PRIMARY CARE AND RURAL HEALTH

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

Primary Care Office

The Primary Care Office (PCO) works to improve access to services for underserved populations. Access to quality preventive and primary care services is central to improving the health status of Missourians. The PCO is vital to ensuring that efforts are undertaken related to the availability of primary care services for residents of the state. The office collaborates with various state and federal organizations, coordinates activities in the state related to the delivery of primary care services, and helps facilitate the recruitment and retention of health care providers.

The Primary Care Office is responsible for:

- Conducting a Statewide Primary Care Needs Assessment.
- Management of the state's shortage area designations.

- Coordination of the site application process for the National Health Service Corps.
- Administration of the Conrad State 30/J-1 Visa Waiver Program and National Interest Waiver Program.
- The provision of technical assistance to entities interested in expanding access to primary care services.

The PCO implements programs that directly address the shortage of primary health care providers statewide. The Primary Care Resource Initiative for Missouri (PRIMO) is a student loan program that awards forgivable loans to students pursuing primary care training leading to Missouri licensure. The State Loan Repayment Program (SLRP) provides loan repayment to primary care physicians and general dentists in return for provision of health care services in health professional shortage areas. The Nurse Loan and Nurse Loan Repayment Programs provide financial aid to students pursuing a nursing career as licensed practical or professional nurses and provide funding for the repayment of loans for Advanced Practice and Registered Nurses. Funding is also provided to community organizations to develop healthcare services in areas where services are currently unavailable and to expand existing health care services for disparaged 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 Office of Oral Health, Bureau of Outpatient Healthcare, the Bureau of Health Care Analysis and Data Dissemination, the Bureau of Emergency Medical Services, the Bureau of Chronic Disease, the Office of Minority Health, the Office of Women's Health, and the Bureau of Hospital Standards.

Critical external partners include the Missouri Hospital Association, the Missouri Primary Care Association, the Missouri Dental Association, the Missouri Association for Rural Health Clinics, the Missouri Rural Health Association, the Department of Social Services, the Department of Mental Health, the Department of Economic Development, the United States Department of Agriculture, 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.

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 than a county with a younger population. (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.

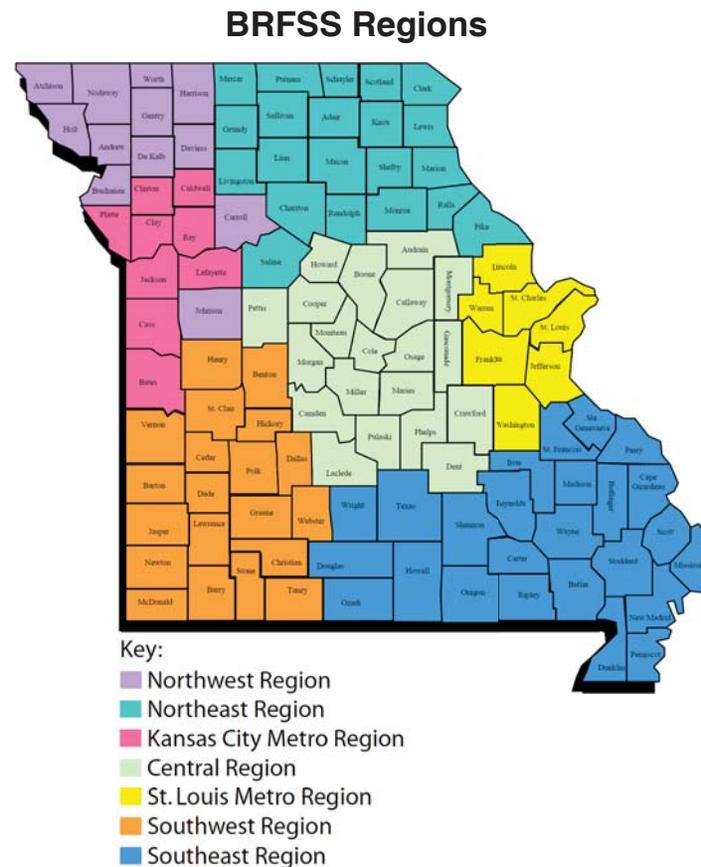
If rates from different sources are compared, the same standard population must be used on both sides of the comparison. It is not legitimate to compare adjusted rates which use different standard populations. The use of different standard populations can affect general trends in total mortality and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

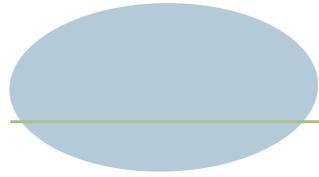
Age-adjusted rates published elsewhere (e.g., in the annual Missouri Vital Statistics) may be slightly different from those found in the MICAs or Community Data Profiles due to updating of population estimates for years between decennial Censuses.

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>



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>.

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.

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 MICA (Missouri Information for Community Assessment) 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.

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.

Unreliable Rates

Unreliable 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 reliable multi-year rate. Similarly, data from several counties can be combined to create a reliable 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.

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

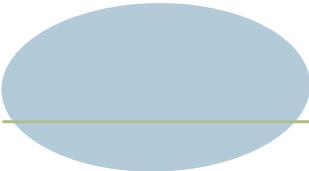
Many of the health data included in this report may be accessed on the Missouri Department of Health and Senior Services (DHSS) Community Data Profiles and MICA websites. Users can easily create different types of tables, graphs, charts and maps pertaining to health indicators.

Visitors to the website might notice a change in appearance and functionality. In 2017 the MICAs and Community Data Profiles became part of MOPHIMS (Missouri Public Health Information Management System). This new platform expanded the types of data, amount of data, and data visualization that is available on the DHSS website.

The MOPHIMS home page can be found at <https://webapp01.dhss.mo.gov/MOPHIMS/MOPHIMSHome>. From here users can access the Community Data Profiles, Data MICAs, and EPHT (Environmental Public Health Tracking) query system.

For more information on using the Community Data Profiles and MICAs, please contact the DHSS Bureau of Health Care Analysis and Data Dissemination at 573-751-6285.





Rural Counties

Adair	Daviess	McDonald	Ralls
Andrew	DeKalb	Macon	Randolph
Atchison	Dent	Madison	Ray
Audrain	Douglas	Maries	Reynolds
Barry	Dunklin	Marion	Ripley
Barton	Franklin	Mercer	St. Clair
Bates	Gasconade	Miller	St. Francois
Benton	Gentry	Mississippi	Ste. Genevieve
Bollinger	Grundy	Moniteau	Saline
Butler	Harrison	Monroe	Schuyler
Caldwell	Henry	Montgomery	Scotland
Callaway	Hickory	Morgan	Scott
Camden	Holt	New Madrid	Shannon
Cape Girardeau	Howard	Nodaway	Shelby
Carroll	Howell	Oregon	Stoddard
Carter	Iron	Osage	Stone
Cedar	Johnson	Ozark	Sullivan
Chariton	Knox	Pemiscot	Taney
Christian	Laclede	Perry	Texas
Clark	Lafayette	Pettis	Vernon
Clinton	Lawrence	Phelps	Warren
Cooper	Lewis	Pike	Washington
Crawford	Lincoln	Polk	Wayne
Dade	Linn	Pulaski	Webster
Dallas	Livingston	Putnam	Worth
			Wright

Urban Counties



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

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

2005-2015 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>All causes</i>	258,934	866.7	355,774	796.8
Males	131,471	1,019.4	173,228	948.1
Females	127,463	737.2	182,546	679.1
Under 15	3,166	67.0	5,063	62.4
15 to 24	2,993	88.7	5,043	86.5
25 to 44	10,893	188.7	17,507	157.7
45 to 64	49,709	763.9	70,993	655.4
65 and Over	192,167	4,864.7	257,143	4,751.5
<i>Heart disease</i>	68,698	225.4	87,520	193.5
Males	35,360	274.6	43,675	243.1
Females	33,338	183.3	43,845	156.4
Under 15	66	1.4	95	1.2
15 to 24	84	2.5	138	2.4
25 to 44	1,567	27.1	2,153	19.4
45 to 64	12,310	189.2	15,975	147.5
65 and Over	54,761	1,384.0	69,155	1,277.8
<i>Cancer</i>	58,130	190.3	80,671	180.3
Males	31,586	230.3	41,147	218.3
Females	26,544	160.3	39,524	154.8
Under 15	117	2.5	172	2.1
15 to 24	109	3.2	218	3.7
25 to 44	1,383	24.0	2,197	19.8
45 to 64	15,760	242.2	22,807	210.6
65 and Over	40,759	1,031.8	55,276	1,021.4

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

2005-2015 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Chronic lower respiratory diseases (CLRD)</i>	18,017	58.6	20,437	46.28
Males	9,219	70.1	9,101	51.5
Females	8,798	50.9	11,336	43.2
Under 15	11	0.2 @	40	0.5
15 to 24	8	0.2 @	28	0.5
25 to 44	150	2.6	189	1.7
45 to 64	2,893	44.5	2,864	26.4
65 and Over	14,955	378.6	17,314	319.9
<i>Stroke</i>	14,629	47.9	19,304	42.9
Males	5,874	46.8	7,488	42.9
Females	8,755	47.8	11,816	42.2
Under 15	21	0.4	43	0.5
15 to 24	20	0.6	21	0.4
25 to 44	215	3.7	330	3.0
45 to 64	1,556	23.9	2,415	22.3
65 and Over	12,817	324.5	16,495	304.8

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

2005-2015 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Unintentional injuries</i>	13,853	54.7	19,132	44.8
Males	8,701	71.9	11,678	60.3
Females	5,152	38.0	7,454	30.7
Under 15	688	14.6	759	9.4
15 to 24	1,763	52.3	1,960	33.6
25 to 44	3,451	59.8	4,690	42.2
45 to 64	3,485	53.6	5,021	46.4
65 and Over	4,465	113.0	6,698	123.8
<i>Motor vehicle accidents (subset of Unintentional injuries)</i>	5,547	22.6	4,579	10.9
Males	3,802	31.2	3,227	16.1
Females	1,745	14.1	1,352	6.2
Under 15	236	5.0	145	1.8
15 to 24	1,235	36.6	1,109	19.0
25 to 44	1,550	26.9	1,413	12.7
45 to 64	1,459	22.4	1,193	11.0
65 and Over	1,066	29.0	719	13.3

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

2005-2015 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Alzheimer's disease</i>	9,130	29.5	11,528	25.3
Males	2,849	24.6	3,262	20.6
Females	6,281	32.3	8,266	27.7
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	88	1.4	113	1.0
65 and Over	9,040	228.8	11,413	210.9
<i>Diabetes</i>	6,765	22.4	8,937	20.0
Males	3,439	25.8	4,571	24.2
Females	3,326	19.5	4,366	16.7
Under 15	4	0.1 @	6	0.1 @
15 to 24	15	0.4 @	35	0.6
25 to 44	239	4.1	337	3.0
45 to 64	1,577	24.2	2,347	21.7
65 and Over	4,930	124.8	6,212	114.8
<i>Pneumonia and influenza</i>	6,369	20.9	8,180	18.1
Males	2,891	23.8	3,647	21.6
Females	3,478	18.9	4,533	16.0
Under 15	45	1.0	49	0.6
15 to 24	24	0.7	26	0.5
25 to 44	131	2.3	193	1.7
45 to 64	669	10.3	854	7.9
65 and Over	5,500	139.2	7,056	130.4

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

2005-2015 Age-Adjusted Death Rates per 100,000 Residents	Rural Number	Rural Rate	Urban Number	Urban Rate
<i>Kidney disease</i>	6,142	20.1	7,839	17.5
Males	3,019	24.1	3,759	21.5
Females	3,123	17.2	4,080	14.9
Under 15	12	0.3 @	14	0.2 @
15 to 24	8	0.2 @	15	0.3 @
25 to 44	74	1.3	148	1.3
45 to 64	709	10.9	1,197	11.1
65 and Over	5,339	135.2	6,465	119.5
<i>Suicide</i>	3,879	15.8	5,769	13.7
Males	3,180	26.2	4,492	22.5
Females	699	5.8	1,277	5.9
Under 15	28	0.6	53	0.7
15 to 24	447	13.3	724	12.4
25 to 44	1,282	22.2	2,000	18.0
45 to 64	1,399	21.5	2,165	20.0
65 and Over	723	18.3	827	15.3

Source: Death MICA

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



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