HEALTH in RURAL MISSOURI

Biennial Report 2018-2019

Cover photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Dawn Scherer

thank you

Bureau of Health Care Analysis and Data Dissemination
Andrew Hunter, Chief
Whitney Coffey, Research Analyst IV
Evan Mobley, Research Analyst IV
Tanner Turley, Research Analyst III
Jeremy Rowles, Research Analyst III
Chelsea Fife, Research Analyst II
Teresia Karuga, Research Analyst II
AJ Womack, Research Analyst II

Office of Epidemiology
Erin Miller, Lead Chronic Disease Epidemiologist
Jiaqing Li, Research Analyst IV

Office of Rural Health and Primary Care
Kathryn Metzger, Rural Health Manager
Lisa Branson, Rural Health Coordinator
Lisa Eastman, Primary Care Manager
Sara Davenport, Loans Program Manager
Susan Liley, Project Specialist

TABLE OF CONTENTS

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Allison Fix.

EXECUTIVE SUMMARY

In the fall of 2018, Governor Parson hosted a Rural Health Care Summit in Bolivar, Missouri, to identify working solutions that address the challenges and unmet healthcare needs in rural Missouri. He "committed to making sure they too have access to both preventative and emergency care when it's needed."[1]

In line with the governor, the Office of Rural Health has selected several initiatives from the Department of Health and Senior Services, Strategic Management Priorities for inclusion in the 2018-2019 *Health in Rural Missouri* report. Selected topics disproportionately impact Missouri's 2.07 million rural residents and include Missouri's aging population, chronic disease, accidental opioid overdose deaths, infant and child mortality, and access to care.[2]

The 2018-2019 *Health in Rural Missouri* report uses the Social Determinants of Health (SDOH) lens to examine health behaviors, health outcomes, and access to healthcare issues by looking at where people were born, live, and work. This report focuses on five of the most important SDOHs impacting rural health: economic stability, neighborhoods and built environment, health and healthcare, social and community context, and education.

This report finds that Missourians living in a rural county, on average, have worse health behaviors, worse health outcomes, and more difficulty accessing the health care services they need in comparison to their urban counterparts. It also points out repeated instances where residents in the southeast and south central portions of the state have the highest rates of disease and disease-related death, as well as the lowest rates of health-protecting behaviors.

The 2018-2019 *Health in Rural Missouri* report key findings include:

- Rural populations have higher rates than urban populations in each of the top ten causes of death.
- Poverty is much more prevalent in rural areas than in urban areas, with a 29% lower per capita income. Rural Missouri also has much higher percentages of children and elderly living in poverty.
- Rural Missourians have a more difficult time accessing health services for reasons including distance to a healthcare provider, lower rates of insurance coverage, and cost. Additionally, rural residents are less likely to live in communities that have Internet access suitable for telehealth.
- Death rates from opioid overdose are increasing in rural areas, although less quickly than in urban areas. Similarly to urban areas, opioid overdose death rates are highest in the eastern portion of the state.
- Infant and maternal death rates, as well as maternal morbidity rates, continue to be highest in rural Missouri, driven in part by difficulties accessing care.
- Accessing basic hospital services is becoming increasingly difficult due to hospital closures and fewer available hospital beds in rural areas. Since the last published *Health in Rural Missouri* report in 2017, four rural, general acute care hospitals have closed bringing the number of rural counties without a hospital to 55. Many health services available in rural areas are provided by clinics, although they are not equipped to handle medical emergencies.
- Much of rural Missouri is designated by the federal government as a primary care Health Professional Shortage Area in medical, dental, and mental health.

Rural Missouri's health status distills down to a few overarching issues: unhealthy behaviors; inadequate access to preventative, emergency, and specialty care; and an older, poorer, less educated population. None of these can be addressed on their own but rather a broad, systematic, policy-level approach is needed that brings new and innovative strategies to reduce barriers while improving access to care.

INTRODUCTION

The Missouri State Office of Rural Health (SORH) 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 Rural Health and Primary Care (ORHPC), the SORH reports on current activities and makes recommendations to the Missouri Governor and General Assembly every two years.

The Office of Rural Health has selected several initiatives from the Department of Health and Senior Services, Strategic Management Priorities for inclusion in the 2018-2019 *Health in Rural Missouri* report. Selected topics have a greater impact Missouri's 2.07 million rural residents and include Missouri's aging population, chronic disease, accidental opioid overdose deaths, infant and child mortality, and access to care.[3]

In order to put the activities and recommendations of Missouri's SORH into context, this report focuses on the health status of, and factors that impact the health of rural Missourians. Urban Missouri data is included for two purposes:

1. To allow for a natural and readily understandable comparison to better highlight and understand health in rural Missouri, and
2. To present compelling evidence that geographic location in Missouri has a significant bearing on health.

The comparison between rural and urban Missouri covers five specific areas:

1. Demographic and Population Characteristics
2. Social Determinants of Health and Access to Care
3. Health Status of Missourians
4. Maternal and Child Health
5. Health Care in Rural Missouri

Terms that appear in the glossary are shown throughout this report in italicized bold font.

DEFINING RURAL HEALTH

The United States (U.S.) Census Bureau and various federal agencies use different definitions of rural. Each definition uses different criteria, such as commuting patterns, population size, and population density. This report uses the same rural/urban definition as recent editions of Health in Rural Missouri.

A county is considered rural if:

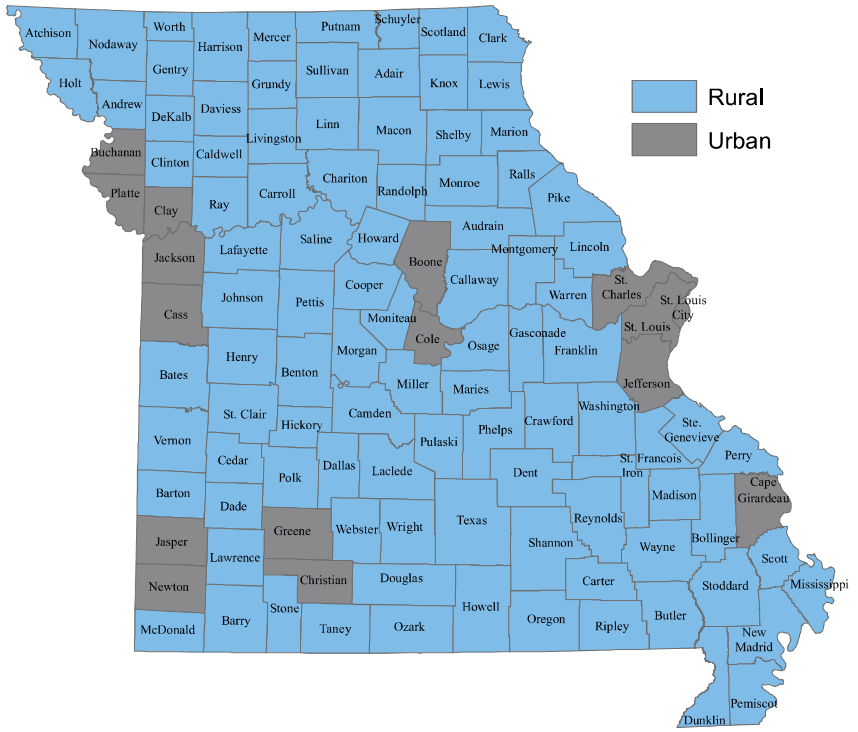
1. There are less than 150 people per square mile, *and*
2. It does not contain any part of a central city in a ***Metropolitan Statistical Area (MSA)***.

Based on this criteria and using 2017 population estimates, of the 115 counties in Missouri*

- 99 counties are rural
- 16 counties are urban

This is a change from previous editions of this report where 101 counties were classified as rural and 14 as urban. Based on the newest population data, Cape Girardeau County and Christian County both now meet the population density requirements to be classified as urban.

Rural/Urban County Classification
Missouri, 2018



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

*St. Louis City is an independent city which functions as its own county. It is therefore included as one of the 16 urban counties.

Rural Counties

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

Urban Counties

Boone
Buchanan
Cape Girardeau
Cass
Christian
Clay
Cole
Greene
Jackson
Jasper
Jefferson
Newton
Platte
St. Charles
St. Louis
St. Louis City

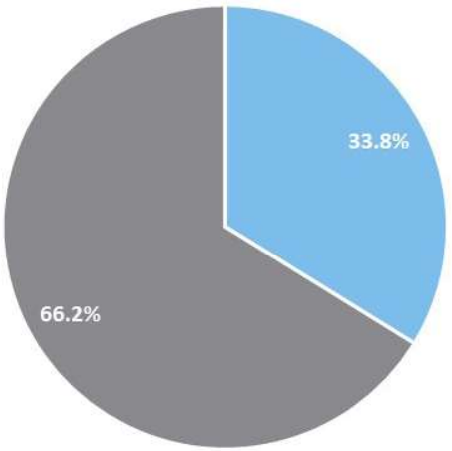
THE PEOPLE OF MISSOURI

POPULATION DISTRIBUTION

Of Missouri's more than 6.1 million residents, about one in three (or 2.07 million persons) live in rural counties. The remaining 4.05 million reside in urban counties.

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Eric Craft.

Rural/urban population proportions Missouri, 2017



Source: Centers for Disease Control and Prevention. National Center for Health Statistics. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm. Accessed June 24, 2019.

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Audra Linebaugh.

From 2007-2017, Missouri's population grew less than the national average with an increase of 3.8% versus 8.1%. The population growth over this time period differed within the rural and urban regions. The population increased by less than 1 percent (0.7%) in rural counties, while urban counties experienced a much larger 5.5% increase.

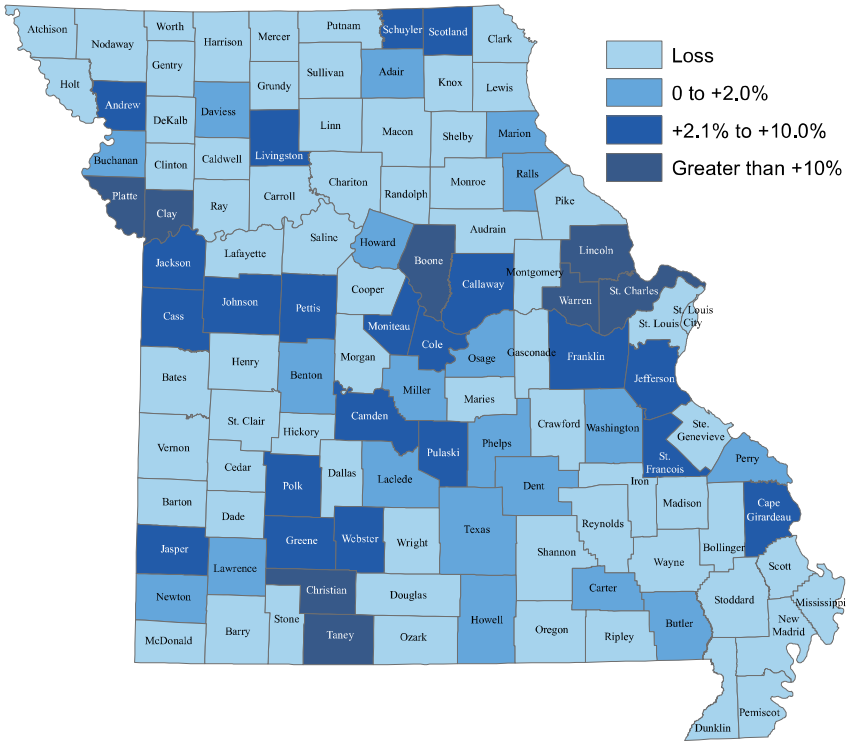
Other population trends over this time period were:

- Almost two-thirds of rural counties (or 64 of the 99 rural counties) experienced population decline.
- Statewide, 16 counties (all rural) lost more than 5% of their population and 11 of these 16 rural counties were located north of the Missouri River.
- Atchison and Holt Counties, two very small rural counties in the northwest corner of the state, as well as Pemiscot County in the Bootheel, experienced population loss greater than 10%.
- For counties that gained population, the increase ranged from a minor 0.1% (Osage County in central Missouri) to a vigorous 15.3% (Taney County in southwest Missouri).

The five rural counties which experienced larger population growth (8% or higher) can be categorized by one of the following descriptions:

1. Located in the suburban fringe of St Louis in eastern Missouri
2. Located in the Springfield/Branson area of southwest Missouri
3. Houses a major military base (Pulaski County in central Missouri is a unique case because Fort Leonard Wood plays a large role in the county's population fluctuations.)

Population Change Missouri, 2007-2017



Source: Centers for Disease Control and Prevention. National Center for Health Statistics. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm. Accessed June 24, 2019.

NATURAL INCREASE

Natural increase is calculated by subtracting the number of deaths within a chosen area from the number of births and does not take into account in- or out-migration. When a geography has more births than deaths, it will have a positive natural increase, which indicates population growth. Likewise, when deaths exceed births, there is a natural decrease or population loss. Between 2015 and 2017, the natural increase statewide was 38,941. Only 5% of the total natural increase was attributed to rural areas.

The ratio of births to deaths is a related statistic where, a ratio of 1.00 means equal numbers of births and deaths. If the ratio is above 1.00 then there were more births than deaths. Both rural and urban areas had more births than deaths but the rural ratio of 1.03 was much lower than the 1.35 experienced in urban areas.

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Kaylin Bade.

Natural Increase, 2015-2017

	Natural Increase, 2015-2017			
	Births	Deaths	Natural Increase	Number of Births for Every 1 Death
Missouri	222,723	181,500	41,223	1.23
Rural Missouri	73,868	71,586	2,282	1.03
Urban Missouri	148,855	109,914	38,941	1.35

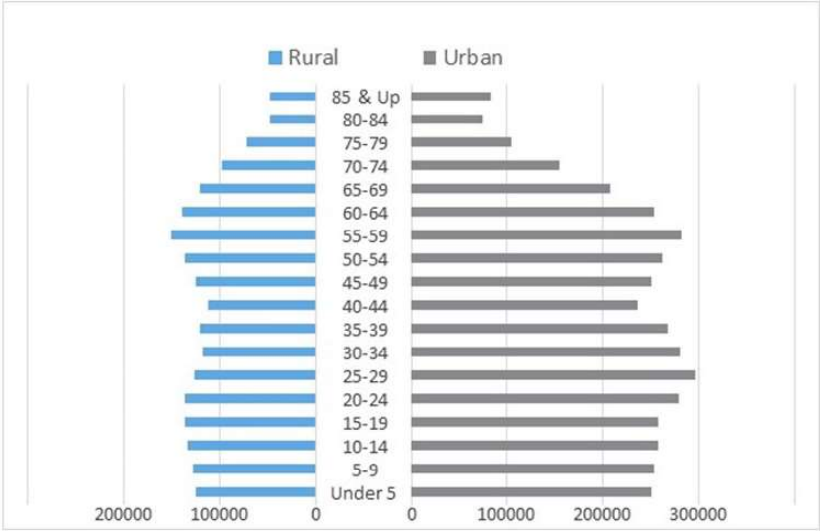
Source: Centers for Disease Control and Prevention. National Center for Health Statistics. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm. Accessed June 24, 2019.

AGING IN MISSOURI

Age pyramids are a useful way to examine differences in age structure for different population groups. While Missouri's rural population is smaller than the urban population for each age group, the general patterns are similar. Here are a few important notes:

- Rural Missouri is slightly older than their urban counterparts. The largest 5-year age group in rural areas is the 55-59 year olds, while 25-29 year olds are the largest grouping for the urban population.
- Individual counties in Missouri, especially in rural areas, often vary greatly from these averages. Counties with colleges, prisons, and military bases are generally much younger than other areas of the state.
- The Baby Boom generation (ages 53-70 in 2017) is fairly large for both groups.
- Both rural and urban Missouri experienced similar aging since 2007. Both groups saw an approximate two percentage point decline for the under 25 population and a corresponding three percentage point increase in the senior population.

Rural vs. Urban Population
Missouri, 2017



Source: Centers for Disease Control and Prevention. National Center for Health Statistics. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm. Accessed June 24, 2019.

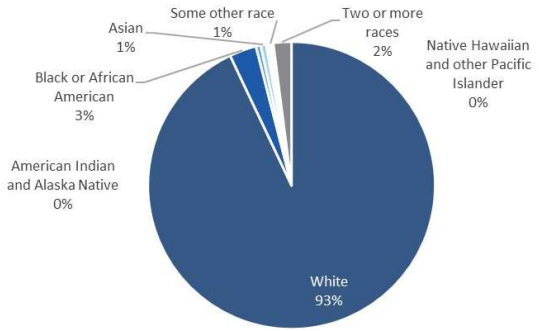
RACE AND ETHNICITY

Missouri's rural counties are less racially and ethnically diverse than its urban counties- there are fewer people who identify themselves as African American or Black, American Indian/Alaska Native, Asian, Native Hawaiian and other Pacific Islander, among others, residing in these areas. Based on Census survey data from 2013-2017, about 7% of rural residents identified as non-White, compared to over one-fifth (23%) of urban residents. In addition, more than half (54 of 99) of the rural counties had less than 5% of their population which identified in one of these categories. Other trends include:

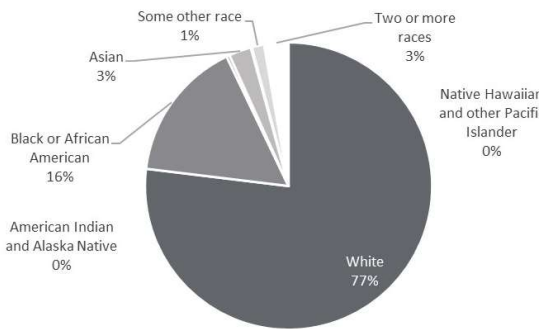
- The Black population comprised the largest non-White race group in both rural and urban areas of Missouri, but the proportion was much smaller in rural areas (3% vs 16% for urban areas).
- The largest rural Black population was in the Bootheel area of southeast Missouri. Pemiscot, Mississippi and New Madrid Counties each had Black populations that made up more than 15% of the total county population (27.2%, 24.1% and 16.1%, respectively).
- All other non-White racial groups (American Indians/Alaska Natives, Asians, Native Hawaiians and other Pacific Islanders, among others) collectively represented 4% of Missouri's rural population and 7% of its urban population. While still a small percentage of the overall population, this collection of race groups has increased by one full percentage point over the last seven years for both rural and urban areas.

Missouri's estimated Hispanic population of about 244,000 individuals (4.0% of the state total) was relatively small, especially when compared to the U.S. average of nearly 18%.[4] Those identifying as Hispanic or Latino made up 3% of Missouri's rural population and 5% of its urban population. The three rural counties with the largest Hispanic population are scattered across the state in the counties of Sullivan (northeast region, 18.5%), McDonald (southwest region, 11.6%) and Pulaski (central region, 10.9%).

Racial diversity in rural counties Missouri, 2013-2017



Racial diversity in urban counties Missouri, 2013-2017



Source: United States Census Bureau. American Fact Finder. Table B02001. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_B02001&prodType=table. Accessed May 7, 2019.

Lack of racial and ethnic diversity in rural areas has its own challenges, but those challenges can increase when individuals come from a very different culture. Missouri's immigrant populations have to face these challenges as they may not speak or understand English proficiently. Seven rural counties have foreign-born populations that are higher than the state average of 4%[5]:

- Sullivan (8.5%)
- McDonald (8.4%)
- Pettis (6.2%)
- Saline (6.1)
- Phelps (5.7%)
- Barry (5.5%)
- Pulaski (5.4%)

About 1% of Missouri residents have difficulty speaking English, with a range of 0%-6% by county. While urban areas have the largest total number of people over the age of five who report speaking English less than 'well', Sullivan, McDonald, and Barry Counties (all rural) have the highest percentage of residents with a lack of English comprehension.[6] Such language and cultural barriers can prove challenging to overcome in small, rural health systems. Those in racial and ethnic populations which are less populous in Missouri, or that migrated from non-English speaking countries, tend to receive poorer quality of care due to factors such as geography, lack of access to quality health coverage, difficulties communicating, and lack of access to providers.[7]

WHAT ARE THE SOCIAL DETERMINANTS OF HEALTH?

It is well known that family history of disease (genetics) and health behaviors such as smoking, exercising or diet impact people's health. It is also clear that the conditions in which people are born, grow, work, and age also play a key role in health.[8] These barriers to being and staying healthy are known as social determinants of health (SDOH). SDOH are place based factors that impact health, whether that place represents a physical location or where individuals fit within the structure of a society.[9] The following are some of the most well-known social determinants of health and this section will show how they affect the health status of those living in rural Missouri.

Source: Adapted from Healthy People 2020, https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health. Accessed August 20, 2019.

Economic Stability	Do people live in poverty? Have a steady income? Able to afford healthy foods and medicine? Are there job opportunities?
Neighborhood and Built Environment	Are there parks and sidewalks for exercise? Is there lead paint, uncollected trash, or air pollution? Are buildings wheelchair accessible? Are neighborhoods safe from crime?
Health and Healthcare	Are there doctors? Dentists? Mental health professionals? Are they far away? Are there appointments available? Can people afford to go?
Social and Community Context	Do people experience discrimination? Racism? Is a person's culture different than the community? Do they have the support of friends, family, or a community?
Education	Is there quality education and job training? Did they graduate high school? College?

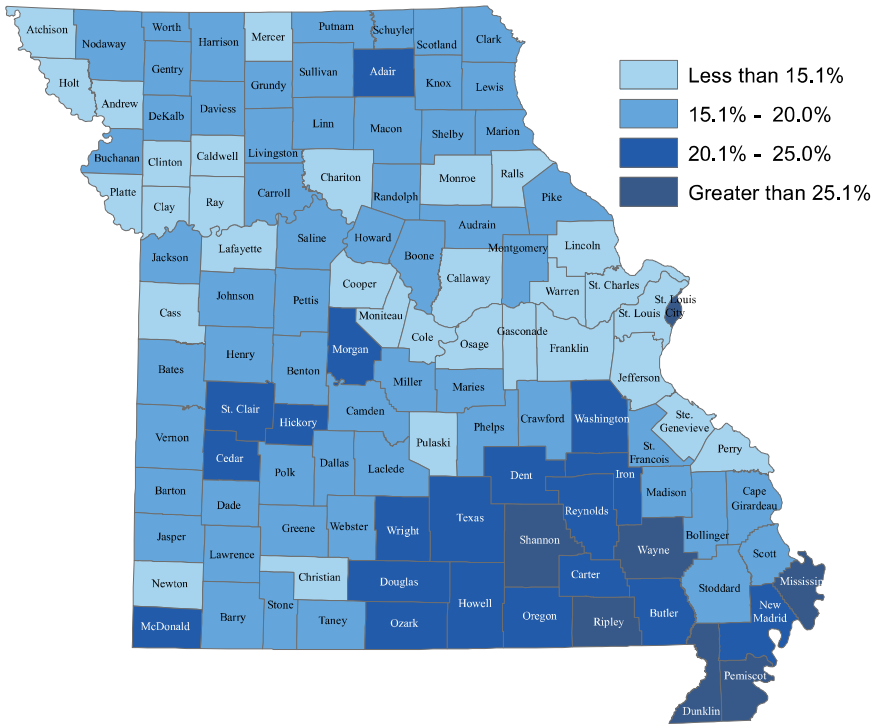
ECONOMIC STABILITY

Economic stability is one of the five broad types of social determinants of health currently being tracked by ***Healthy People 2020***, with the eventual goal of 'creating social and physical environments that promote good health for all'.[10]

Poverty and Income

Poverty and poor health are closely linked together. Residents living in impoverished neighborhoods are at increased risk for mental illness, chronic disease, more deaths, and lower life expectancy.[11] These environments often have increased crime rates, lower-performing schools, and less access to healthy foods, which can make getting exercise and creating a healthy diet harder.[12] Often residents can't afford regular checkups and don't see a doctor or dentist until is an emergency. If they have a prescription, they may not be able to afford the needed medicine. Once in these circumstances, the stress and hardship of poverty itself can be harmful, impacting many different systems in the body.[13]

Poverty rates
Missouri, 2013-2017

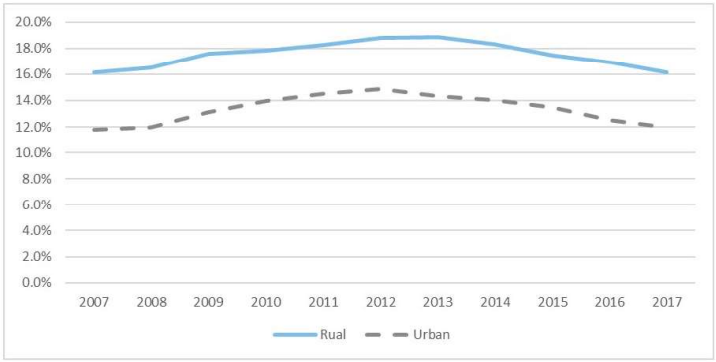


Source: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

In Missouri, poverty rates are 4.2 percentage points higher in rural areas compared to urban locations. But for youth (under 18), that disparity increases to 6.2 percentage points. In addition:

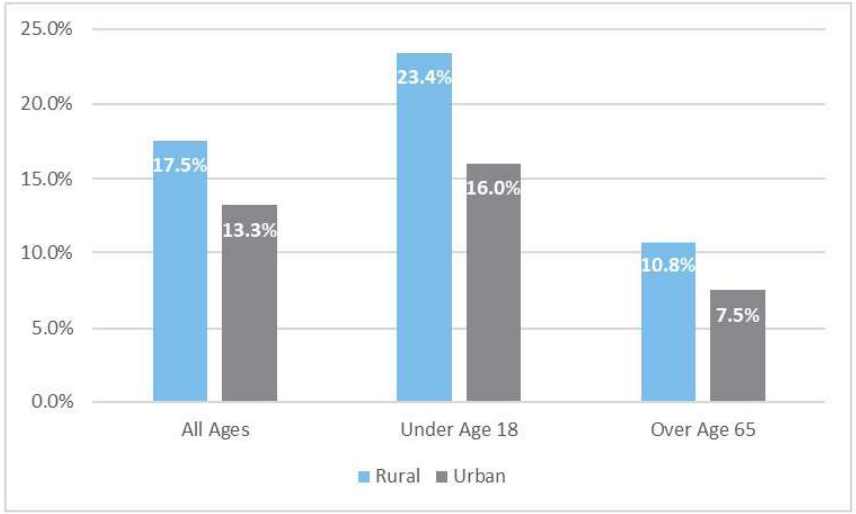
- More rural counties have poverty rates above 20%. In fact, 22 of 99 rural counties were above that 20% threshold whereas only one (St. Louis City) of the 16 urban counties had a poverty rate above it.
- The rural counties with the highest poverty rates are located in the south central and Bootheel regions of the state.
- Between 2005 and 2013, increases in poverty rates were observed across Missouri, peaking in 2013. More recently, rural and urban rates declined by 16% and 14% respectively between 2013 and 2017.

Poverty rates
Missouri, 2007-2017



Source: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

Poverty rates
Missouri, 2013-2017



Sources: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019. (All Ages Poverty) and United States Census Bureau. American Fact Finder. Table S1701. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_S1701&prodType=table. Accessed July 2, 2019. (Under Age 18 and Over Age 65 Poverty)

Children and poverty

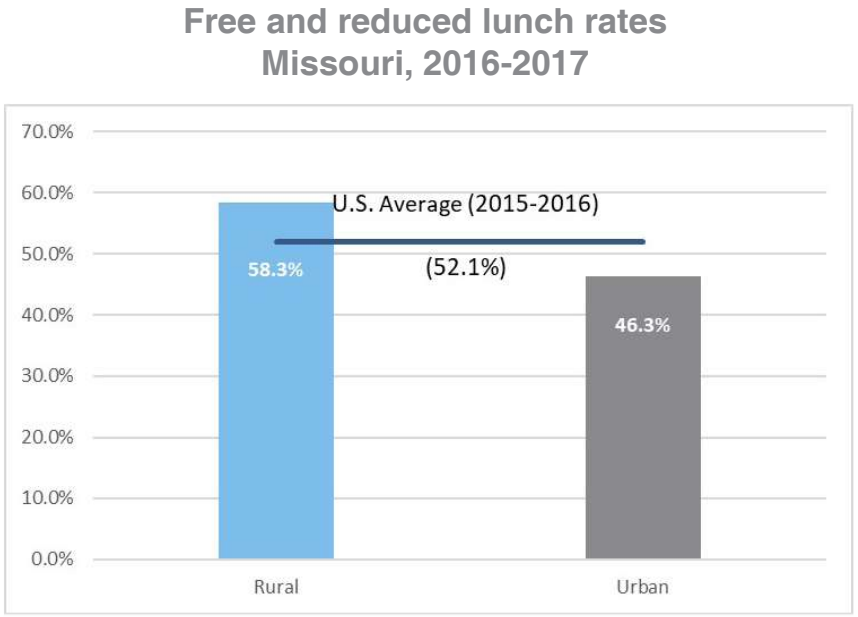
Children in poverty can face a multitude of additional and serious health problems such as low birth weight, asthma, obesity, high blood pressure, increased accidental injuries, lack of school readiness, stress, and ***adverse childhood experiences (ACEs)***.[14] Missouri child poverty statistics include:

- More than 1 in 6 children (18.5%) in Missouri live in poverty compared to just over 1 in 9 (11.9%) Missouri adults.
- In rural areas, 23 out of every 100 children experience poverty compared to 16 out of 100 for their urban counterparts.

Another way to measure children living in poverty is by looking at the USDA's Free and Reduced Lunch Program. Children from low-income families are eligible for free and reduced lunch.[15] Research has found that children from homes that provide less food were more likely to eat school lunches and received more of their food and nutrient intake from meals provided at school than other children.[16]

For the 2016-2017 school year, about 51% of Missouri's public school students were eligible to receive a free or reduced-price lunch. Also of note:

- The percent of population eligible for free or reduced-price lunch was 12 percentage points higher for rural counties compared to urban counties (58.3% versus 46.3%).
- Nine of the ten Missouri counties with the highest percentage of eligible students were rural.



Source: County Health Rankings and Roadmaps, Children Eligible for Free or Reduced Price Lunch. http://www.countyhealthrankings.org/app/missouri/2019/measure/factors/65/data?sort=sc. Accessed May 17, 2019.

Seniors and Poverty

As the Baby Boomer generation continues to age into retirement and as medical advancements extend life, the number of older Missourians will continue to rise. Job loss or retirement, the costs of health care, increased cost of living for items such as food, heating and cooling, housing, and insufficient savings all contribute to the growing number of elderly living in poverty.[17]

The poverty rate for the 65 and over population in 2013-2017 statewide was 8.8%. However, in rural communities more than one in ten (10.8%) elderly citizens live in poverty, compared to an urban rate of 7.5%. Additionally:

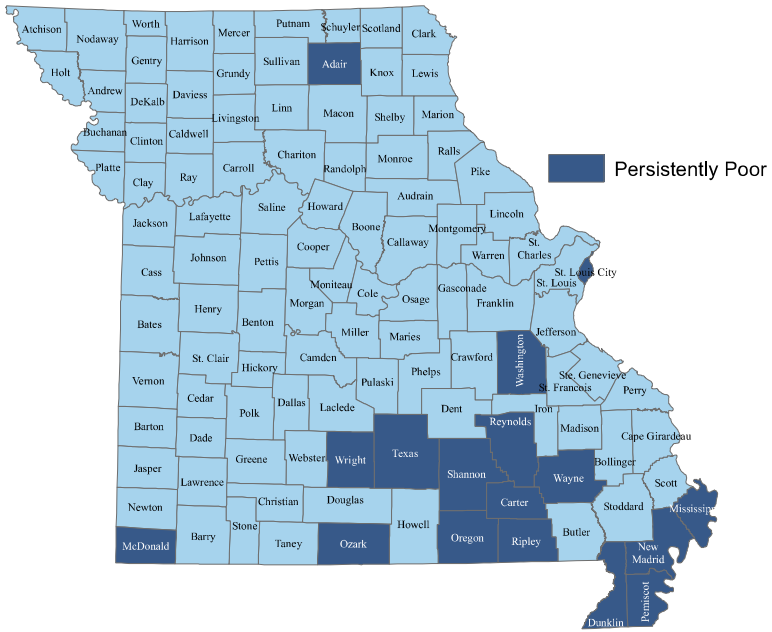
- Nine of the top ten Missouri counties with the highest rates of elder poverty are rural, (St. Louis City is the lone urban county).
- The Missouri counties with the highest percentages of elder poverty are the rural counties of Shannon, Oregon, and Howell (23.2%, 19.4%, and 17.6%, respectively).

Persistantly Poor Counties

Seventeen Missouri counties meet the United States Department of Agriculture definition of 'persistently poor'.[†] Sixteen of those counties are rural, with only the City of St. Louis qualifying as an urban area of persistent poverty. In order to qualify as a county facing persistent poverty, more than 20% of the county's residents must be considered living in poverty for at least 30 years, as measured by the 1990 U.S. Census, 2000 U.S. Census, and 2011-2015 American Community Survey. Current trends for persistent poverty include:

- All of the persistently poor counties in rural Missouri (except Adair) are located south of the Missouri River and heavily concentrated in the south central and southeast regions of the state.
- The Bootheel region of southeast Missouri has several counties that fall in this category. This set of counties also has some of the poorest health outcomes in the state.

Persistently poor counties
Missouri, 2017



Source: United States Department of Agriculture. Economic Research Service. https://www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps/. Accessed June 24, 2019.

[†]Missouri counties designated as persistently poor include: Adair, Carter, Dunklin, McDonald, Mississippi, New Madrid, Oregon, Ozark, Pemiscot, Reynolds, Ripley, Shannon, Texas, Washington, Wayne, Wright, and St. Louis City.

Per Capita Income

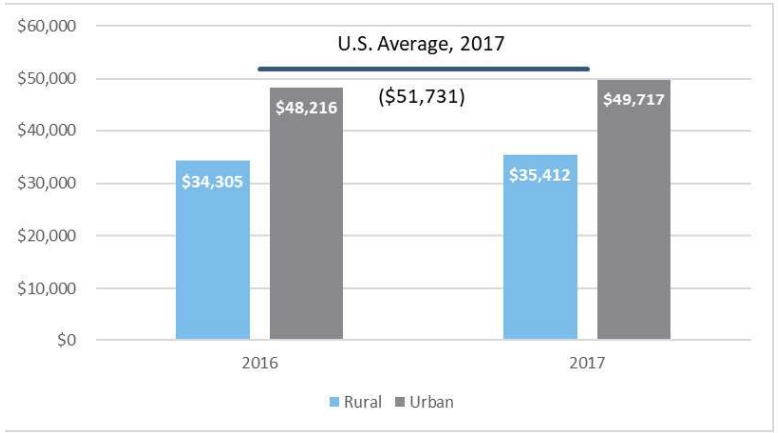
Higher income is linked to better health, just as lower income is linked to poorer health.[18] Americans with lower income levels have higher rates of heart disease, diabetes, stroke and other chronic conditions.[19] Lower income is also associated with high rates for multiple chronic disease risk factors including smoking, obesity, and physical inactivity.[20] Lower income reduces the ability of citizens to access basic requirements for good health: healthy food, medicine, and health care services.

A common measure of relative wealth is per capita income, or income per person. In 2017, residents of rural counties had an average per capita income of $35,412 which was 29% lower than urban Missouri residents ($49,717).

Additionally:

- The annual income growth rate between 2016 and 2017 for Missouri's rural areas was higher than that of urban areas (3.23% for rural and 3.11% for urban). This was a change from the 2014-2015 period when the urban income grew faster.
- Both rural and urban residents of Missouri generate lower per capita income than the U.S. average. In 2017, the national average income was more than $16,000 greater than our state's rural residents' income.
- Only two rural counties are included in the top ten list of Missouri counties for highest per capita income. The only counties to exceed the 2017 national average of $51,731 were urban (St. Louis County and Platte).
- Hickory County, a mid-Missouri county that is the poorest in the state, has a per capita income that is less than half the national average.

Per capita income Missouri, 2016-2017



Source: Missouri Economic and Research Center (MERIC). County Per Capita Income. https://www.missourieconomy.org/indicators/income/per_capita_county.stm. Accessed May 6, 2019.

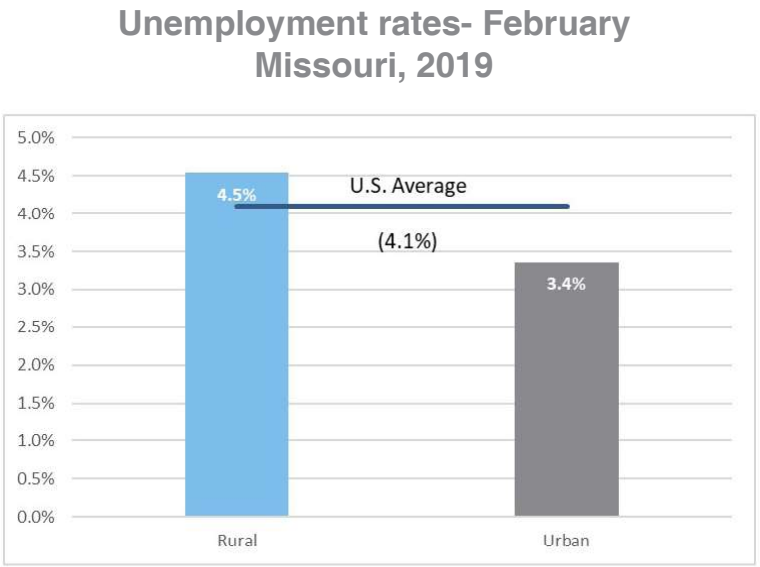
Selected rural and urban counties' per capita income Missouri, 2017

Rank	County	Rate	Type
1	Hickory	$26,346	Rural
2	Texas	$26,425	Rural
3	Douglas	$26,463	Rural
4	McDonald	$27,094	Rural
5	DeKalb	$27,236	Rural
6	Schuyler	$27,614	Rural
7	Oregon	$28,022	Rural
8	Washington	$28,139	Rural
9	Shannon	$28,210	Rural
10	Wayne	$28,879	Rural
68	Newton	$37,232	Urban

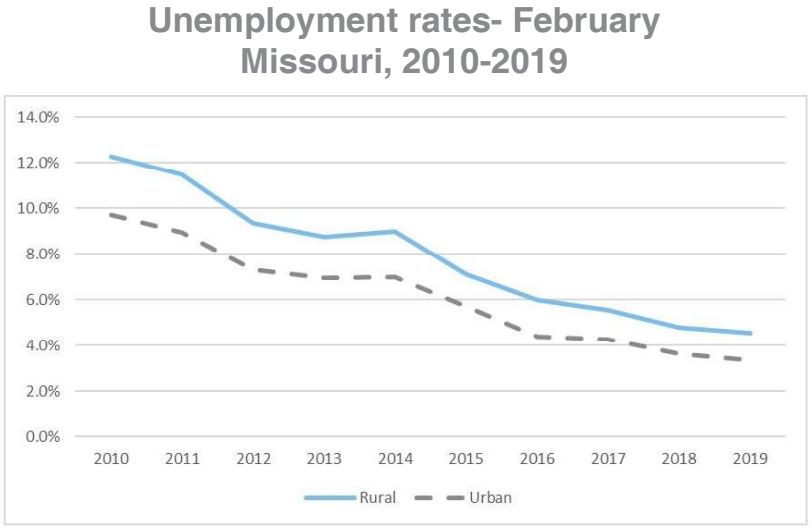
Source: Missouri Economic and Research Center (MERIC). County Per Capita Income. https://www.missourieconomy.org/indicators/income/per_capita_county.stm. Accessed May 6, 2019.

Unemployment

The first step in gaining access to health services is usually acquiring insurance through employment.[21] In 2017, the majority of Americans (56.0%) used employer-provided insurance.[22] As such, being unemployed creates a great barrier to adequate health care. Job loss, ***underemployment***, low pay, or unemployment can also cause stress that can impact physical and mental health. For rural areas, lower employment and the related employer-provided insurance creates an additional barrier to health care.



Source: Missouri Economic Research and Information Center (MERIC). Local Area Unemployment Statistics. https://www.missourieconomy.org/indicators/laus/default.aspx. Accessed May 16, 2019.



Source: Missouri Economic Research and Information Center (MERIC). Local Area Unemployment Statistics. https://www.missourieconomy.org/indicators/laus/default.aspx. Accessed May 16, 2019.

Over the last ten years, unemployment rates throughout the state of Missouri have been declining. At the end of the Great Recession in 2009[23], rates were 12.2% in rural areas and 9.7% in urban counties. Since then, the collective rates (2009-2019) have dropped to less than half those recorded a decade ago (4.5% for rural areas and 3.4% for urban areas). But rural areas face weighty challenges:

- The 39 Missouri counties with the highest rates of unemployment during the past decade were rural. St. Louis City (7.9% unemployment rate) was the highest urban county, ranking 40th overall.
- The gap between rural and urban unemployment rates has shrunk in recent years but a gap still remains. In February 2010, rural Missourians unemployment rate was 2.6 percentage points higher than their urban counterparts (12.3% versus 9.7%); but by February 2019, that gap had shrunk to 1.1 percentage points (4.5% versus 3.4%).
- Workforces in Taney and Stone counties (in the Branson area) experienced unemployment at rates well above every other county in the state (18.3% and 17.1% respectively) during February 2009-2019. This is likely due to the month of February being the survey month, which is outside the traditional Branson tourism season. Shannon County in rural south-central Missouri had the third highest unemployment rate at 11.5%.

Selected rural and urban counties' unemployment rates
Missouri, 2019

Rank	County	Rate	Type
1	Taney	18.3	Rural
2	Stone	17.1	Rural
3	Shannon	11.5	Rural
4	Morgan	11.3	Rural
5	Camden	11.2	Rural
6	Washington	10.7	Rural
7	Iron	10.6	Rural
8	Miller	10.4	Rural
9	Dunklin	10.3	Rural
10	Pemiscot	10.1	Rural
40	St. Louis City	7.9	Urban

Source: Missouri Economic Research and Information Center (MERIC). Local Area Unemployment Statistics. https://www.missourieconomy.org/indicators/laus/default.aspx. Accessed May 16, 2019.

NEIGHBORHOOD AND BUILT ENVIRONMENT

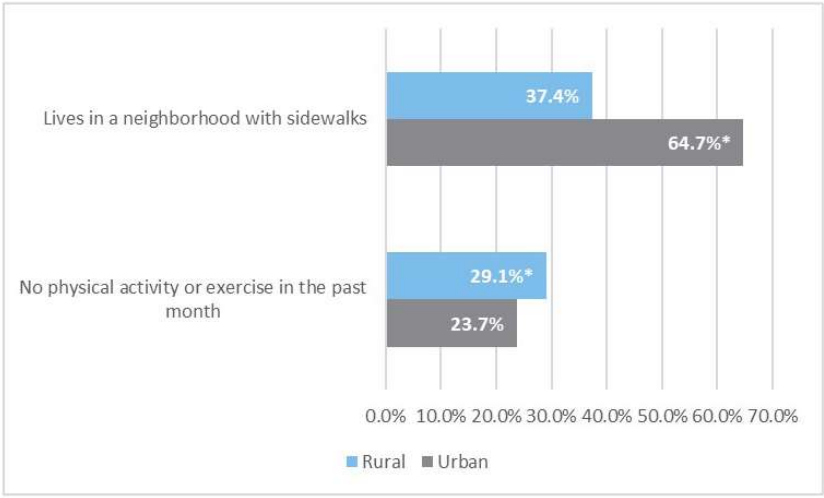
According to the CDC, the built environment includes all of the physical parts of where we live and work. This isn't just our homes or office buildings, but also includes streets, parks and other open spaces and ensuring those places are safe to use. Breathing clean air and living in a home that is free of toxins and pollutants could reduce chronic health conditions like asthma. A healthy community design could positively impact things like obesity and the health behaviors that contribute to this condition.[24] The built environment also includes infrastructure such as public transportation, internet availability, and water and sewage systems, among others.

Community Design and Physical Activity

A community design focused on health could positively impact things like obesity and the health behaviors that contribute to this condition.[25] For example, someone who lives in an environment that makes exercise difficult might become sedentary, which could lead to obesity. Although the built environment is not the only contributing factor, if that person lived in a safe community with sidewalks, bike lanes, or parks they might find a more active lifestyle attainable. Recent Missouri survey data show that:

- Only 1 out of 3 (37.4%) rural citizens live in a neighborhood with sidewalks. In urban environments, it is nearly the inverse, with 64.7% of respondents reporting that their neighborhood featured sidewalks, a statistically meaningful difference.
- ***Significantly*** more rural Missourians report no physical activities or exercise other than their regular job in the past month.
- Rural Missourians have ***significantly*** higher rates for obesity compared to urban Missourians. Using self-reported height and weight, more than one-third of rural Missouri adults are obese (33.7%), compared to 29.7% of urban Missourians.

Physical activity indicators
Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals
Results are based on a response of 'yes' to the question 'Does your neighborhood have any sidewalks?' and a response of 'no' to the question 'During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?'.

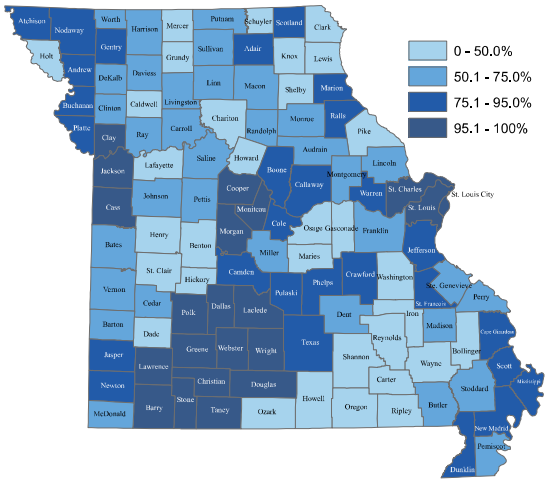
Internet

One way that healthcare is changing is through the use of telehealth technology. One of the main advantages of telehealth is the ability for people in rural areas to have better access to specialty health services. As telehealth becomes a part of the nation's healthcare delivery system, access to healthcare is increasingly being linked to access to broadband. Broadband connectivity has become critical as a means of providing care in ***Health Provider Shortage Areas (HPSAs)***. Data collected from the Federal Communications Commission displays how much of Missouri's population had at least one broadband provider servicing their area. Providers were only counted if they generated speeds of 25 megabits per second (Mbs) for downloads, and three Mbs for uploads. Internet by satellite was excluded due to noted concerns on speed, interference, and costs. A limitation of this data is that even with access to a provider, affordability is not guaranteed.

Findings include:

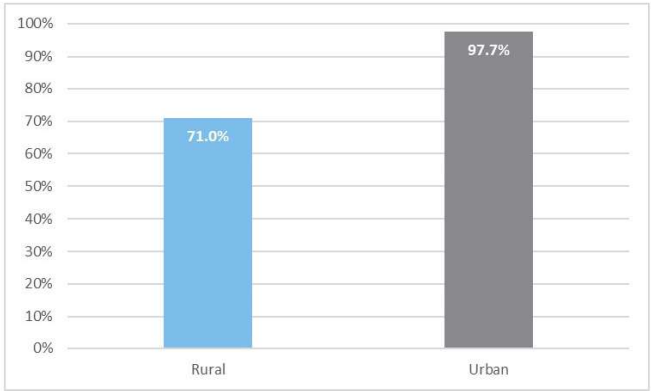
- Only 71.0% of rural Missourians have access to broadband internet, which was almost 27 percentage points less than the urban rate (97.71%).
- The south central region has a large block of counties with less than half of their population having high-speed access.
- A large section of rural southwest Missouri has over 95% broadband coverage.
- Rural northwest Missouri and the Bootheel area generally have higher rates, while north central and northeastern Missouri had lower access rates.
- All urban counties had at least 75% coverage with seven of the 16 urban counties having over 99.5% coverage.

Percent of population with a broadband internet provider Missouri, 2017



Source: Federal Communications Commission. Compare Broadband Availability in Different Areas. https://broadbandmap.fcc.gov/#/area-comparison?version=dec2017&tech=acfosw&speed=200&searchtype=county&searched=y&geoid=29. Accessed June 24, 2019.

Percent of population with a broadband internet provider Missouri, 2017



Source: Federal Communications Commission. Compare Broadband Availability in Different Areas. https://broadbandmap.fcc.gov/#/area-comparison?version=dec2017&tech=acfosw&speed=200&searchtype=county&searched=y&geoid=29. Accessed June 24, 2019.

Transportation

More Americans are commuting to work each year and at greater distances. In 2017, the average American spent 26.1 minutes commuting to work each way.[26] Studies are showing that the toll of a daily commute puts stress on the mind and body, and with that comes increased health risks. These risks can range from headaches and backaches, to psychological disorders, digestive problems, and high blood pressure.[27] Not only does the commute itself weigh heavy on individuals, but it leaves them with less time for life enriching activities like cooking healthy meals, exercising, and getting adequate amounts of sleep. The most recent Census Bureau survey shows that:

- The majority of Missouri residents work outside of the home. In fact, 94.7% of rural residents commute to work and 95.5% of urban residents commute to work.
- The average commute time is also very similar between Missouri's rural and urban residents (23.9 minutes versus 22.5 minutes).
- Eleven of the 12 counties whose residents spent, on average, more than 30 minutes commuting to work each way are rural.

Selected rural and urban counties with a mean travel time to work greater than 30 minutes (each way) Missouri, 2013-2017

	County	Rate	Type
1	Washington	33.3	Rural
2	Dallas	33.1	Rural
3	Lincoln	33.1	Rural
4	Bollinger	32.6	Rural
5	Caldwell	32.6	Rural
6	Clinton	31.7	Rural
7	Douglas	31.5	Rural
8	Maries	31	Rural
9	Jefferson	30.9	Urban
10	Warren	30.7	Rural
11	Ray	30.3	Rural
12	Bates	30.1	Rural

Source: United States Census Bureau. American Fact Finder. Table B08303. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_B08303&prodType=table. Accessed May 28, 2019.

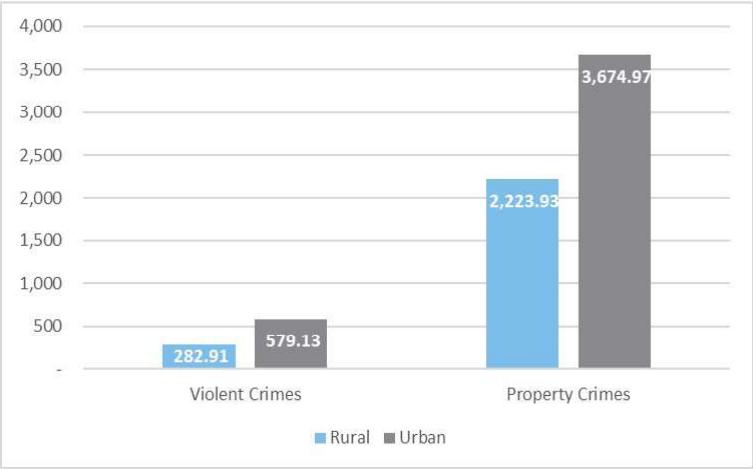
Crime

Crime and violence are important public health issues and often referenced as key ***social determinants*** of health. Violence can result in injuries or lead to premature death. Those who survive violent crime can endure pain and mental distress for many years leading to negative health outcomes.[28] Violent crime is only one piece of the relationship between crime and health. The fear of crime, particularly violent crime, can have serious effects on psychological and emotional health, so while crime occurs at lower rates in rural Missouri the effects are no less significant to the health of individuals living in those communities.[29]

Data from the Missouri State Highway Patrol's Uniform Crime Reporting System indicates the following:

- Property crimes occurred at a higher rate than violent crime for both rural and urban counties within Missouri.[30]
- Missouri's rural counties experience both lower property and violent crime rates than Missouri's urban counties. In fact, in 2017 rural Missourians experienced the lowest rates of crime since 2008.

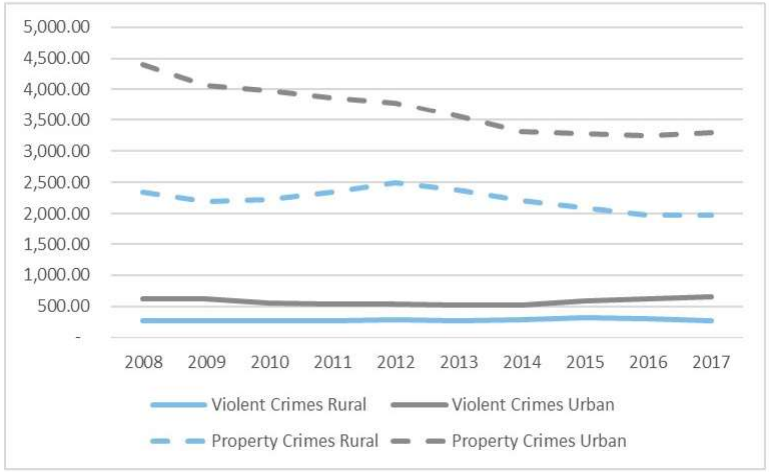
UCR crime rates
Missouri, 2008-2017



Rates per 100,000 resident population.

Source: Uniform Crime Reporting (UCR) Statistical Analysis Website. Missouri Highway Patrol Statistics Analysis Center. https://www.mshp.dps.missouri.gov/MSHPWeb/SAC/data_and_statistics_ucr_query_backup.html. Accessed May 13, 2019.

UCR crime rates
Missouri, 2008-2017



Source: Uniform Crime Reporting (UCR) Statistical Analysis Website. Missouri Highway Patrol Statistics Analysis Center. https://www.mshp.dps.missouri.gov/MSHPWeb/SAC/data_and_statistics_ucr_query_backup.html. Accessed May 13, 2019.

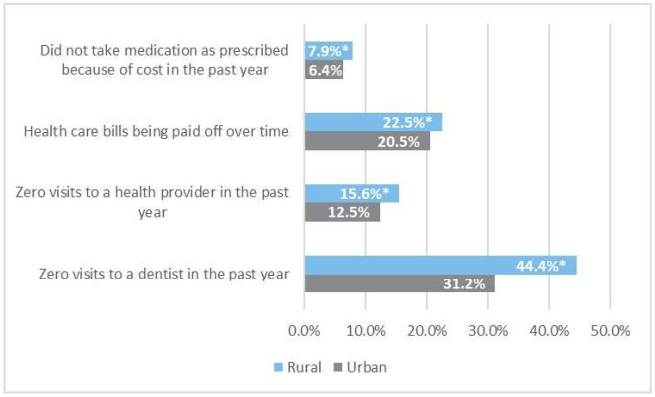
HEALTH AND HEALTH CARE

Access to Care

For individuals that live in rural Missouri, accessing the health resources necessary to live a quality and healthy life can be challenging. Obstacles include availability of physicians and specialists, distance, cost, policy, environment, and social norms and attitudes. The most recent ***Missouri County Level Study*** survey (2016) shed some light on this issue. Rural Missourians fare ***significantly*** worse than their urban counterparts for each of the following access to care indicators:

- Did not take medication as prescribed due to cost in the past year (7.9% vs 6.4%)
- Health care bills are being paid off over time (22.5% versus 20.5%)
- Zero visits to a health provider in the past year (15.6% versus 12.5%)
- Zero visits to a dentist in the past year (44.4% versus 31.2%)

Access to care indicators
Missouri, 2016



*indicates a rate that is statistically significantly higher, using 95% confidence intervals

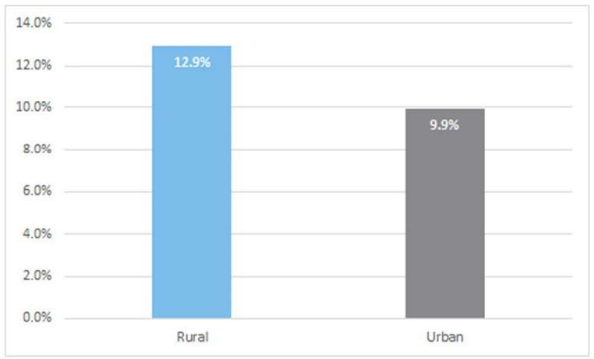
Health Insurance

Health insurance provides access to health care that individuals could not otherwise afford. Uninsured residents are more likely to delay health care screenings and forgo medical treatments and preventative health care. For many with a chronic disease, this lack of health insurance increases health risk and can result in higher death rates.[31]

Statewide, the Small Area Health Insurance Estimates (SAHIE)[32] showed that the rates of uninsured residents were higher for rural areas as compared to urban regions (12.9% versus 9.9%). Other trends include:

- Rural and urban areas both experienced declines in the uninsured during the past five years of about 4.5 percentage points each.

Uninsured rates
Missouri, 2017

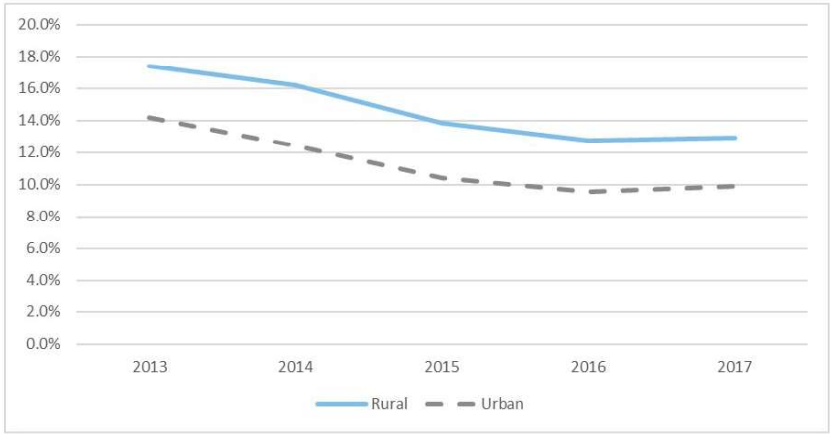


Source: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

Results for Access to care indicators graph are based on a responses of 'yes' to the questions 'Other than over-the-counter (OTC) medication, was there a time in the past 12 months when you did not take your medication as prescribed because of cost?' and 'Do you currently have any health care bills that are being paid off over time?' or responses other than 'Within the past year' to the question 'How long has it been since you last visited a dentist or dental clinic for any reason?' or a response of 'none' to the question 'How many times have you been to a doctor, nurse, or other health professional in the past 12 months?'.

- The number of uninsured Missourians from 2013-2016 showed a steady decline. However in 2017, there was a small uptick in the rate.
- During 2013-2017, 50 out of 99 rural counties exceeded a rate of 15% uninsured. Conversely, only two out of 16 urban counties, both in the Joplin area (Newton and Jasper), had such low rates.
- The rural counties of McDonald, Scotland, and Morgan had the highest rate of uninsured residents with 22.0%, 20.6%, and 20.1% respectively.
- When examining the counties with the ten lowest uninsured rates, only two of the ten counties were rural (Andrew in northwest Missouri and Perry south of St. Louis).

Uninsured rates
Missouri, 2013-2017



Source: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

Uninsured rates
Missouri, 2013-2017

Rank	County	Rate	Type
1	McDonald	22.00%	Rural
2	Scotland	20.60%	Rural
3	Morgan	20.10%	Rural
4	Knox	19.80%	Rural
5	Ozark	19.50%	Rural
6	Hickory	19.10%	Rural
7	Taney	19.00%	Rural
8	Schuyler	18.70%	Rural
9	Barry	18.70%	Rural
10	Daviess	18.50%	Rural
34	Newton	16.30%	Urban

Rank	County	Rate	Type
106	Perry	11.30%	Rural
107	Jefferson	11.20%	Urban
108	Andrew	11.00%	Rural
109	Boone	10.80%	Urban
110	Cole	10.70%	Urban
111	Cass	10.00%	Urban
112	Clay	9.50%	Urban
113	St. Louis	9.50%	Urban
114	Platte	8.20%	Urban
115	St. Charles	7.30%	Urban

Source: United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

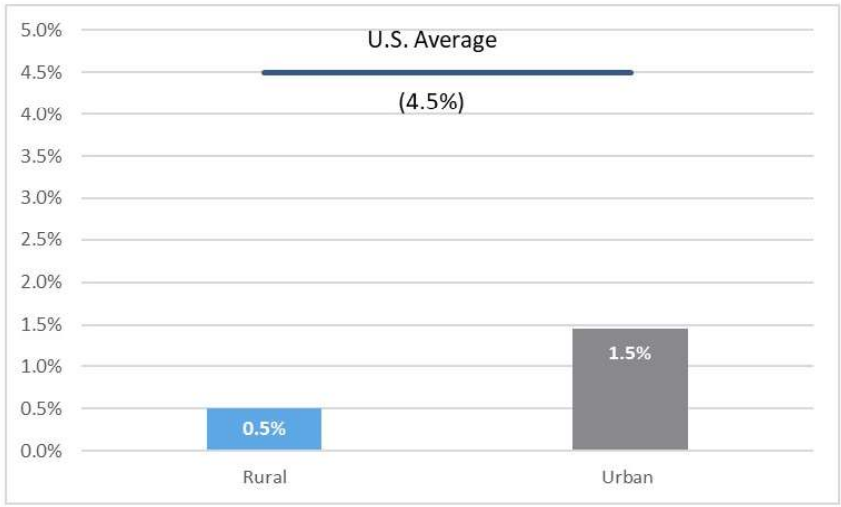
SOCIAL AND COMMUNITY CONTEXT

Limited English-speaking Households

Education, health literacy, and language barriers often go hand-in-hand. Non-English speakers often have difficulty understanding how to get the care they need within the health care system. Miscommunication due to language differences is the primary cause of unsatisfactory patient-provider interactions. Furthermore, poor communication causes patients to lose trust in health care providers while also reducing the provider's ability to successfully diagnose health problems.[33] One potential solution is for healthcare-related information and translators to be available to those who speak limited English. Missouri has a relatively small portion (1.1%) of homes where the ability of speaking English is limited. Rural-urban differences show that:

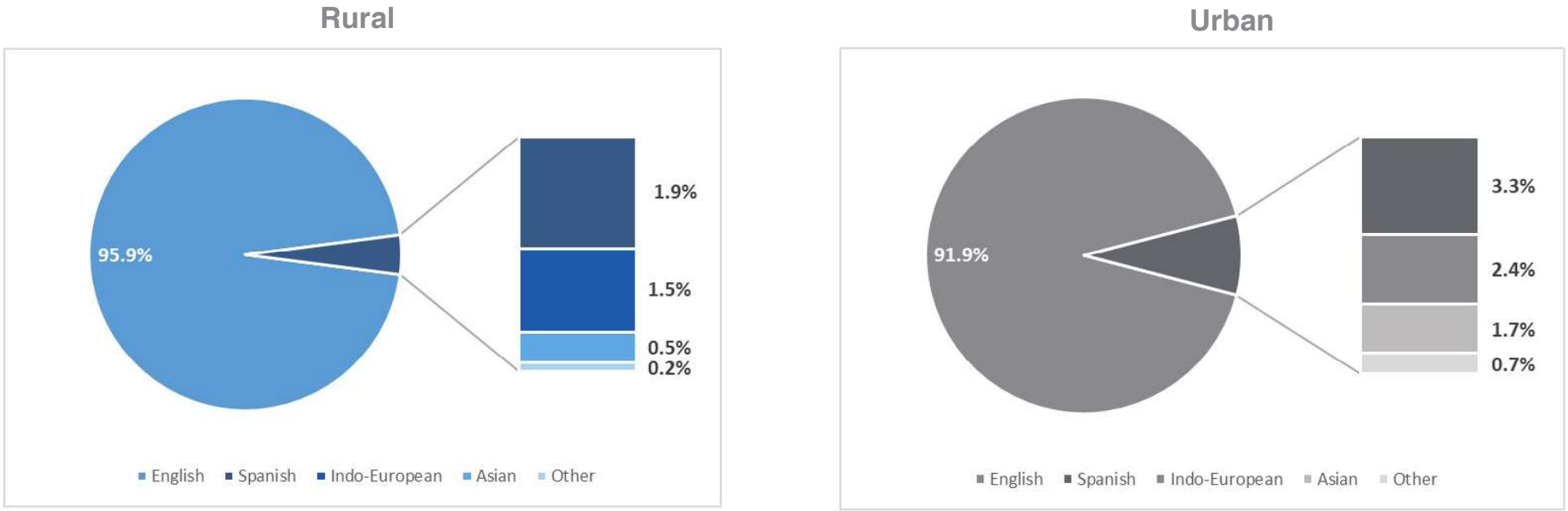
- Both rural and urban areas of Missouri have a much smaller proportion of limited English-speaking households than the United States as a whole (1.1% versus 4.5%).
- Urban counties have about three times greater percentage of households with limited English (1.5%) compared to rural counties (0.5%).
- When examining which language is predominantly used in limited English-speaking households in Missouri, rural and urban citizens show similar patterns.
- Spanish is the most common language spoken in limited English Missouri households.

Limited English-speaking households
Missouri, 2013-2017



Source: U.S. Census Bureau. American Community Survey 5-Year Estimates. Language Spoken in Household Percentage. Accessed June 11, 2019.

Language spoken in household
Missouri, 2013-2017



Source: U.S. Census Bureau. American Community Survey 5-Year Estimates. Language Spoken in Household Percentage. Accessed June 11, 2019.

EDUCATION

Higher levels of education have been linked to better health. Research shows that more education leads to increasingly healthy behaviors while also reducing risky health behaviors, which leads to overall better health outcomes. In a sense, education provides protective factors against the onset of certain diseases.[34] It can also help individuals find work, understand how to access health care resources, and advances 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 risk of premature death and certain diseases even when accounting for other social and economic factors.[35]

Rural Missourians (over the age of 25) fail to obtain a high school diploma or equivalency at a higher rate (14.8%) than urban Missourians (8.7%).[36] In addition:

- A larger proportion of rural residents only have a high school diploma and no post-secondary education (39.4% versus 26.5%).
- Rural Missourians complete a four year degree at a rate less than half that of urban residents (16.8% versus 34.1%).
- Both rural and urban residents have similar proportions of residents who are working towards a degree, achieved some college credits, or have earned a technical or associates degree.

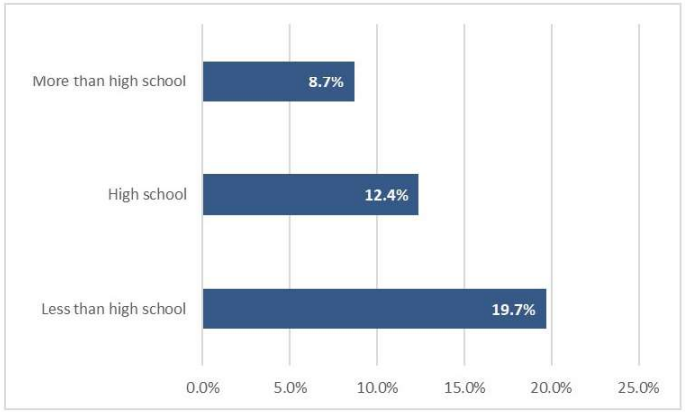
Education rates (for adults over 25 years of age)
Missouri, 2013-2017

Source: U.S. Census Bureau. Table S1501. 2013-2017 American Community Survey 5-Year Estimates. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed May 18, 2019.

Education and other social determinants of health (such as poverty, exposure to crime, etc.) have been correlated with the prevalence of chronic disease in a community, as they often affect behaviors (like dietary choices, physical activity, or substance use).[37] In Missouri, self-reported diabetes status and level of high school education are two variables that show this potential ***correlation***. For instance:

- Those with less than a high school education are significantly more likely to report a diagnosis of diabetes than those who completed high school or had post-secondary schooling.
- Diabetes prevalence rates for those Missourians who had any post-secondary education were less than half the rates of those who did not finish high school (8.7% versus 19.7%).

Diabetes prevalence and education
Missouri, 2016



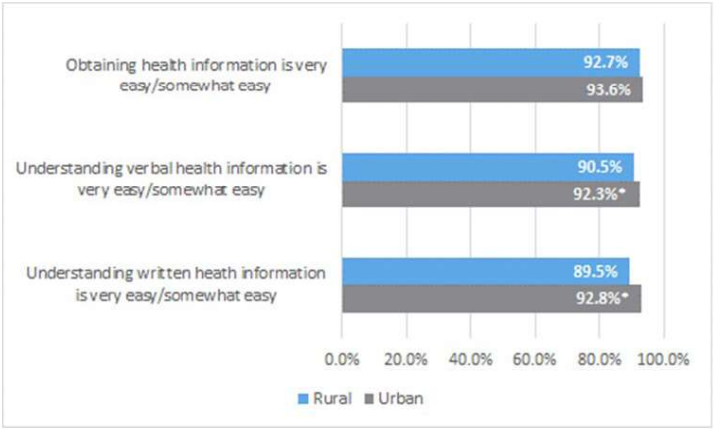
Results are based on a response of 'yes' to, 'Has a doctor, nurse, or other health professional EVER told you that you have diabetes?' and the question, 'What is the highest grade or year of school you completed?'

Health Literacy

Health literacy is a SDOH. CDC uses the Patient Protection and Affordable Care Act of 2010, Title V to define health literacy as, "…the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions."[38] Survey data is one of the best resources for measuring self-reported health literacy. The most recent 2016 County Level Study survey shows that:

- More than 93% of Missourians feel that is it very easy or somewhat easy to get advice or information about health or medical topics.
- However, rural Missourians are statistically less likely to report that it is easy to understand both written and verbal health information.

Health literacy measures
Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Results are based on responses of 'very easy or somewhat easy' to the questions, 'How difficult is it for you to get advice or information about health or medical topics if you need it?', 'How difficult is it for you to understand information that doctors, nurses, and other health professionals tell you?', and 'In general, how difficult is it for you to understand written health information?'.

THE HEALTH STATUS OF RURAL MISSOURIANS‡

LIFE EXPECTANCY

Life expectancy at birth is a good overall gauge of the health of a community. The formula uses birth, death and population data to calculate a theoretical life expectancy at birth if the conditions present for the years of study were to remain unchanged. The 2017 life expectancy for rural areas of 76.3 was 1.4 years lower than the 77.7 calculated for urban areas and 2.3 years lower than the US life expectancy rate of 78.6 that same year.[39]

Recently, life expectancy has been declining both in Missouri and nationwide although it has been declining at a faster pace in Missouri.[39] This trend impacts both rural and urban populations, with suicides and drug overdose deaths the major drivers in the decline in rural Missouri (with homicides also playing a large role in the decline in urban Missouri).

Life expectancy
Missouri, 2012 and 2017

Life Expectancy (in years)	Rural	Urban	U.S.
2012	76.7	78.3	78.8
2017	76.3	77.7	78.6
Percent Change (2012 & 2017)	-0.52%	-0.77%	-0.25%

Source: Murphy SL, Xu JQ, Kochanek KD, Arias E. Mortality in the United States, 2017. NCHS Data Brief, no 328. Hyattsville, MD: National Center for Health Statistics. 2018.

ALL CAUSES OF DEATH§

Rural residents in Missouri die at significantly higher rates than urban residents. For every 100,000 people living in a rural area of the state during the years 2007-2017, there were nearly 869 deaths, compared to only 785 in urban areas (a difference of >10%). This suggests that citizens in rural areas are experiencing factors or engaging in behaviors that make mortality more likely than in urban areas. Alternatively, living in an urban region of the state could offer more protective factors to its residents. Further, when compared to the national average, mortality rates in rural Missouri exceed the United States' while urban areas of the state have a lower than average rate of death.

Death rates from all causes
Missouri, 2007-2017

	Rural	Urban
Frequency	249,583	378,015
Rate	868.83	785.21
Percent Change (2007 & 2017)	-1.19%	-1.90%

Age-adjusted rates per 100,000 population

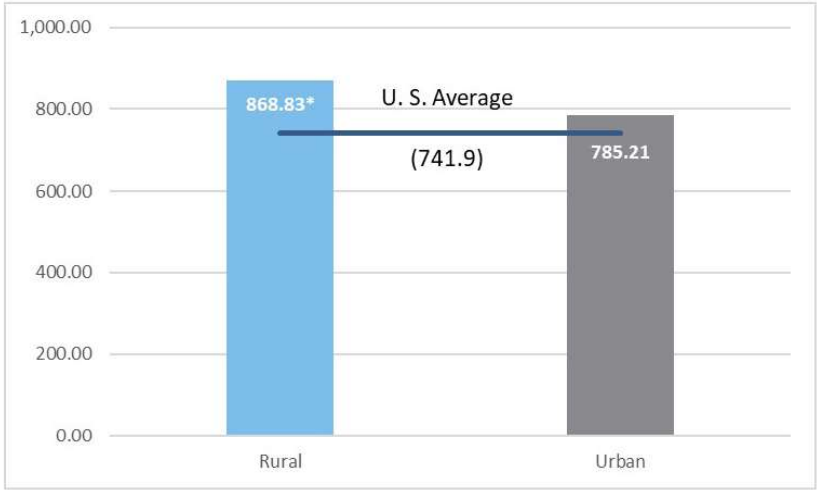
‡Unless otherwise noted, all data in The Health Status of Rural Missourians was accessed using the Missouri Public Health Information Management System, Missouri Information for Community Assessment. More information on these data sources can be found in Appendix B.

§Unless otherwise noted, all death rates (also known as mortality rates) presented in this report are ***age-adjusted*** per 100,000 population. This allows a fair comparison of geographies with different age and sex structures. Rates are based on the residence of the decedent, not the location where they expired. Frequencies, or counts, are used to report the total number of cases over a period of time.

LEADING CAUSES OF DEATH

Rural counties' rates of death are ***significantly*** higher than urban counties' rates in all ten categories of Missouri's leading causes of death. According to Center for Disease Control and Prevention (CDC), social determinants of health, and the lifestyles of rural residents (greater rates of smoking and obesity, lower rates of physical activity and seatbelt usage, etc.), along with rural environmental factors, (e.g. longer travel distances to health care facilities) are reasons why rural residents have higher mortality rates than urban residents.[40]

Death rates from all causes Missouri, 2007-2017



Age-adjusted rates per 100,000 population

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Diana Herlic.

Leading causes of death Missouri, 2007-2017

Rank	Cause	Rural Frequency	Rural Rate	Urban Frequency	Urban Rate
1	Heart disease	65,227	222.18	90,913	185.87
2	Cancer	55,498	188.04	84,098	173.62
3	Chronic lower respiratory diseases	18,346	61.58	21,937	45.83
4	Accidents/ unintentional injuries	13,482	56.59	21,104	46.73
5	Stroke (cerebrovascular diseases)	13,369	45.40	20,227	41.61
6	Alzheimer's disease	8,969	30.02	13,273	26.93
7	Diabetes	6,583	22.61	9,193	19.00
8	Kidney disease (nephritis, nephrotic syndrome, and nephrosis)	5,969	20.19	8,748	18.05
9	Influenza and pneumonia	5,842	19.90	8,269	16.95
10	Suicide	3,969	17.37	6,433	14.49

Age-adjusted rates per 100,000 population

HEART DISEASE - #1

Heart disease is the leading cause of death for Missourians living in both rural and urban areas. A citizen living in a rural Missouri county during the years 2007-2017 is 20% more likely to die of heart disease than one who lives in an urban county. Other notable details about heart disease in Missouri include the following:

- Missouri's heart disease mortality (199.32) is higher than the ***Healthy People 2020*** target of 103.4 deaths—the rural rate (222.18) is more than double the national goal and far exceeds the statewide rate.
- In Missouri, a rural male is 15.7% more likely to die of heart disease than an urban male and over 51% more likely than a female living in a rural community.
- Heart disease death rates have been declining in Missouri for several decades. Between 2007 and 2017 there was a 12.1% decrease in heart disease deaths statewide. However, this decrease is largely attributable to fewer deaths in urban areas (14.3% decrease) -- rural areas saw a much smaller reduction (8.5% decrease).

Death rates from heart disease Missouri, 2007-2017

	Rural	Urban
Frequency	65,227	90,913
Rate	222.18	185.87
Percent Change (2007 & 2017)	-8.50%	-14.24%

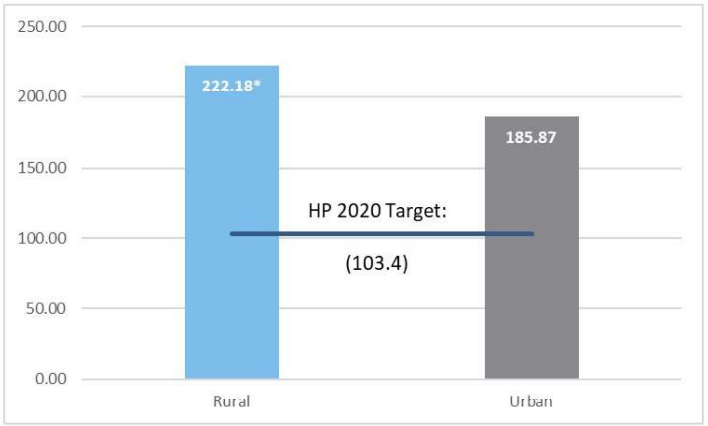
Age-adjusted rates per 100,000 population

Selected rural and urban counties' heart disease death rates Missouri, 2007-2017

Rank	County	Rate	Type
1	Washington	380.02	Rural
2	Mississippi	353.47	Rural
3	Pemiscot	349.85	Rural
4	New Madrid	314.00	Rural
5	Oregon	311.99	Rural
6	Carroll	301.02	Rural
7	Crawford	298.14	Rural
8	Iron	293.35	Rural
9	Ripley	289.35	Rural
10	Dunklin	284.41	Rural
18	Jasper	255.57	Urban

Age-adjusted rates per 100,000 population

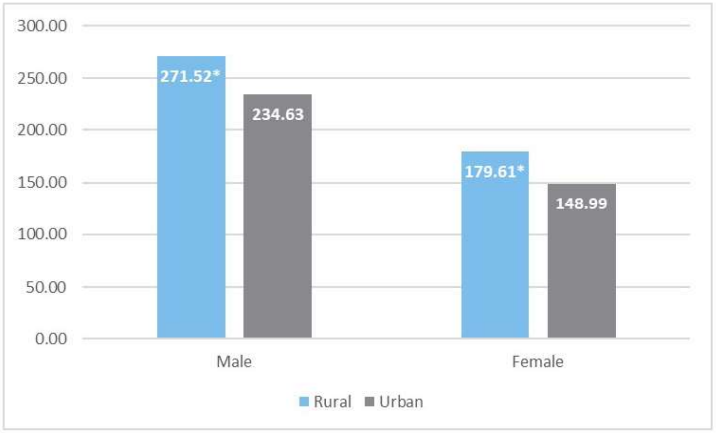
Death rates from heart disease
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

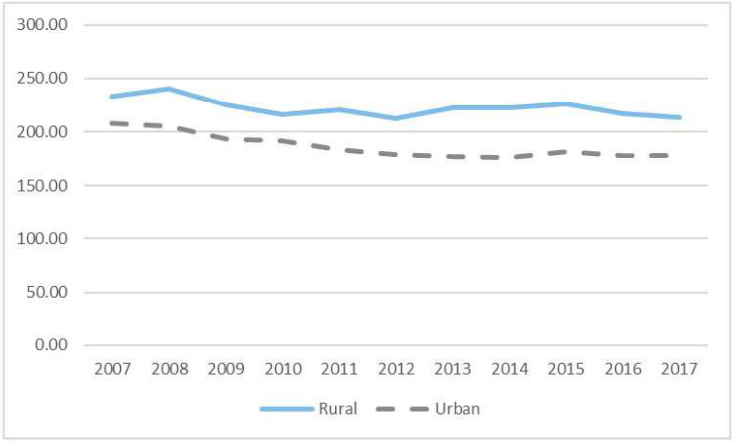
Death rates from heart disease
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Death rates from heart disease
Missouri, 2007-2017

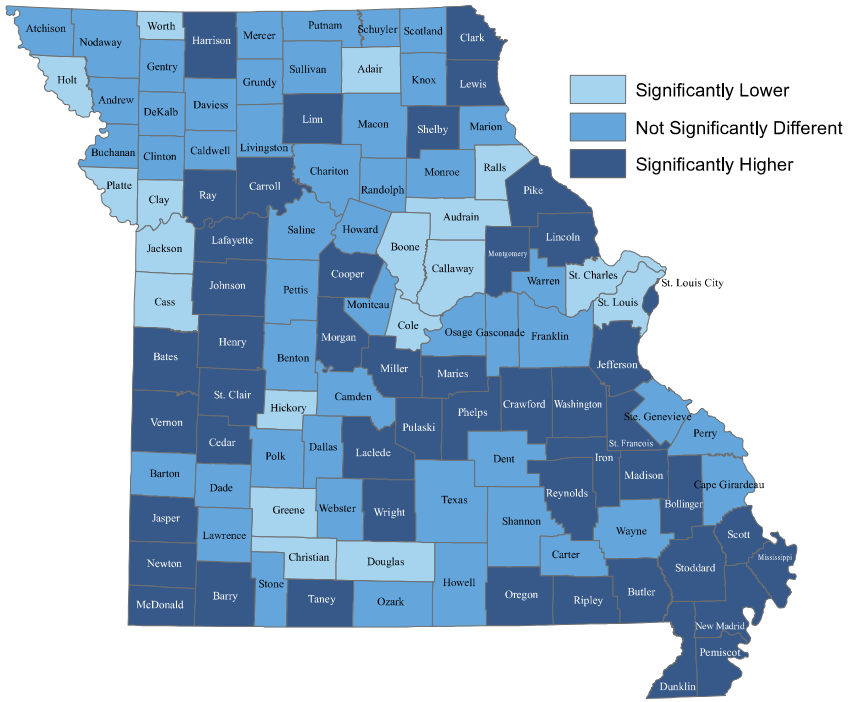


Age-adjusted rates per 100,000 population

Many heart disease deaths are preventable. The American Heart Association (AHA) often uses cholesterol to predict future risk of heart attack and stroke and recommends individuals over the age of 20 have their cholesterol checked every 4 to 6 years.[41] If a Missourian knows their blood cholesterol is high, lifestyle changes and medication could reduce the risk of mortality due to heart disease. Other facts and figures related to blood cholesterol include:

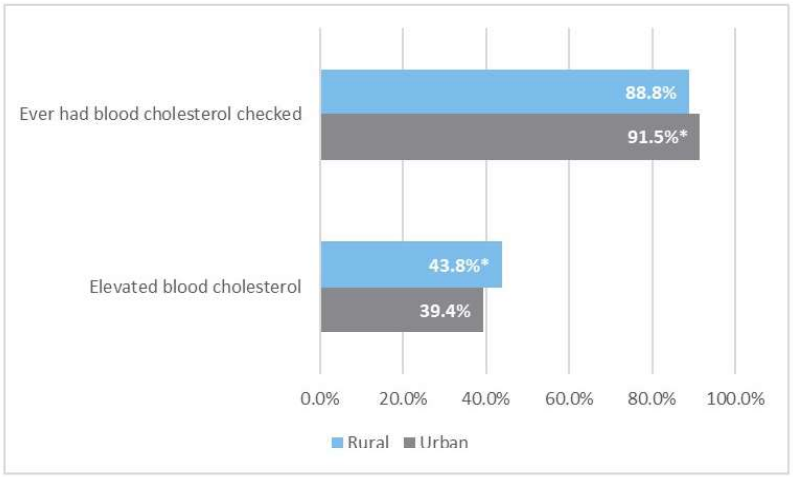
- Recent data from the 2016 ***Missouri County Level Study*** indicates that more than 90% of Missourians age 35 and older have had their blood cholesterol checked. However, that number is ***significantly*** lower for rural residents (88.8% versus 91.5%).
- Rural Missourians who have been screened have a ***significantly*** higher rate of elevated blood cholesterol compared to urban Missourians (43.8% versus 39.4%).
- Of the ten Missouri counties with the highest heart disease mortality rates, all are rural and nine are located in the southeast portion of the state. Jasper County, in southwest Missouri, had the highest urban rate but was outranked by 17 rural Missouri counties.

Death rates from heart disease
Missouri, 2007-2017



Focusing preventive services to areas with a high number of heart disease deaths could improve the length and quality of life of hundreds of thousands of Missourians, especially those who live in rural areas of the state. The decline of deaths due to heart disease in recent years has mostly been attributed to the increase in screenings and other medical and preventative services that have become available.

Blood cholesterol screening and levels
Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Results are based on responses of 'yes' to the questions, 'Have you ever had your blood cholesterol checked?' and 'Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?' among those 35 and older.

CANCER - #2

Cancer is the 2nd leading cause of death for all Missourians, both rural and urban. The rural death rate from cancer (188.04) is ***significantly*** higher than the urban cancer death rate (173.62). In addition:

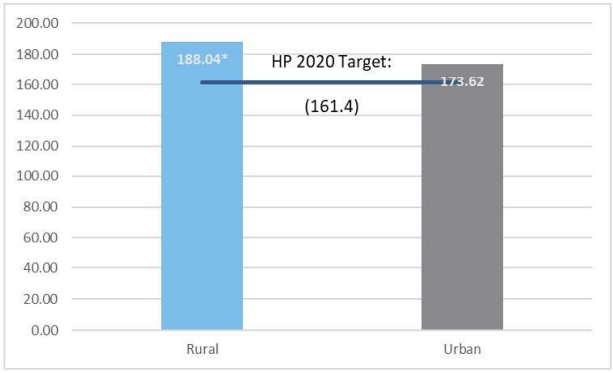
- Data shows ***significant*** downward trends in cancer mortality for both rural and urban groups of Missourians. The rural cancer death rate of 200.28 in 2007 declined by 10.6% in 2017 (rate of 179.02).
- Missouri's rural cancer death rate of 188.04 ***significantly*** exceeds the ***Healthy People 2020*** target rate of 161.4. While the urban rate (173.62) was also above the target for the full 11-year period, in 2017 the urban cancer death rate dipped below the target rate.[42]
- Rural males have the highest rate of death from cancer (226.63), which is ***significantly*** higher than the urban male rate (208.79). And while females are at ***significantly*** lower risk of cancer mortality than males, rural females are at a ***significantly*** higher risk (188.04) than urban females (173.62).
- The ten counties in Missouri with the highest cancer death rates are all rural counties geographically clustered in the southeastern portion of the state.

Death rates from cancer
Missouri, 2007-2017

	Rural	Urban
Frequency	55,498	84,098
Rate	188.04	173.62
Percent Change (2007 & 2017)	-10.62	-13.23

Age-adjusted rates per 100,000 population

Death rates from cancer
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Selected rural and urban counties' cancer death rates
Missouri, 2007-2017

Rank	County	Rate	Type
1	Carter	247.80	Rural
2	Mississippi	238.88	Rural
3	Wayne	234.73	Rural
4	Dunklin	232.30	Rural
5	Pemiscot	229.76	Rural
6	New Madrid	226.34	Rural
7	Ripley	224.73	Rural
8	Madison	220.21	Rural
9	Iron	216.94	Rural
10	St. Francois	216.88	Rural
15	St. Louis City	208.25	Urban

Age-adjusted rates per 100,000 population

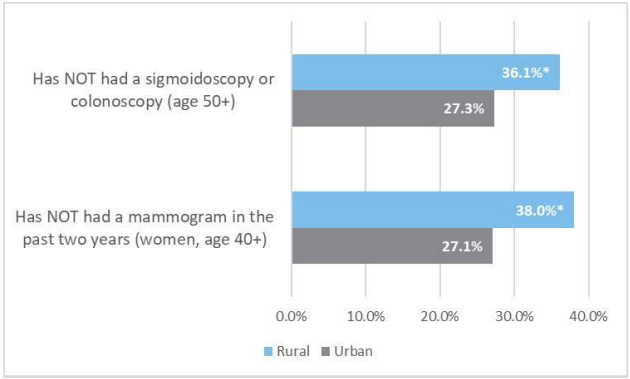
Cancer deaths can be categorized into separate subtypes of cancer and those featured here have the highest rates of death.**For lung and colon cancer subtypes, rural counties are at ***significantly*** greater risk of death. Regional differences among cancer subtypes include:

- The counties at the highest risk for lung cancer death are in the southeastern region of the state, mirroring the pattern seen for mortality rates due to all-types cancer.
- Five of the ten counties most at risk for colon cancer death are in the southeastern region (New Madrid, Dunklin, Pemiscot, Mississippi, and Wayne Counties), with most of the remaining top ten being rural counties in the northeastern region.
- The ten highest counties for pancreas, breast, and prostate cancer deaths are all rural (with the exception of St. Louis City, which is ranked tenth for prostate cancer), but they are more geographically spread around the state than counties with the highest rates for lung and colon cancer mortality.

The American Cancer Society recommends screening of at at-risk individuals. Cancers caught early may be easier to treat.[43]

- For breast cancer it is recommended that women receive annual mammograms between the ages of 45 and 54 (and be screened every other year after age 55).
- Everyone should be screened regularly at age 45 to rule out colorectal cancer.[44]
- According to recent survey data, Missourians are not following the American Cancer Society guidelines and screening adherence is meaningfully lower in rural areas.

Cancer screening adherence Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Based on responses of 'no' to the questions, 'Have you had a mammogram in the past 2 years?' (women, age 40 and older) and 'Have you had a sigmoidoscopy or colonoscopy?' (among those 50 and older).

Leading causes of cancer death Missouri, 2007-2017

	Rural Rate	Urban Rate
Lung/trachea/bronchus	59.60*	50.74
Breast	22.58	22.51
Colon/rectum/anus	17.63*	15.11
Prostate	19.16	18.58
Pancreas	11.21	11.23

*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

**Only female population counts are used to calculate the death rates, for breast cancer, and only male population counts are used to calculate prostate cancer death rates.

CHRONIC LOWER RESPIRATORY DISEASES- #3

Chronic lower respiratory diseases (CLRD) include progressive lung diseases that obstruct airflow, such as COPD (chronic obstructive pulmonary disease), emphysema, bronchitis, and asthma. CLRD is the 3rd leading cause of death statewide (2007-2017). The death rate from CLRD for rural Missouri counties during this time period was 61.58, ***significantly*** higher than the urban rate of 45.83. Other notable information about how CLRD affects rural Missourians:

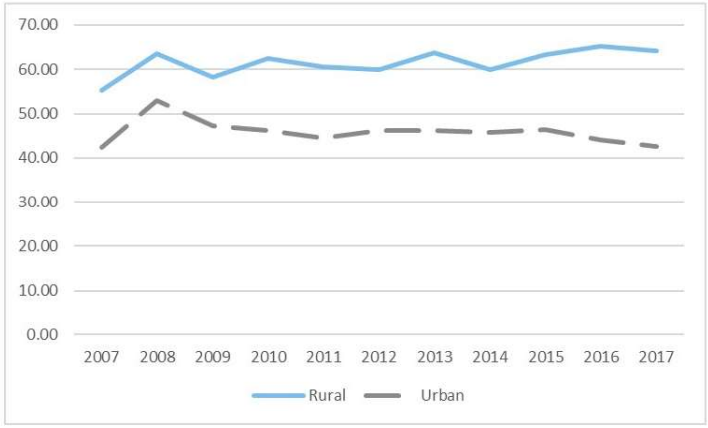
- The rural CLRD death rate was 34% higher than urban.
- The CLRD death rates for rural Missouri counties had a ***significant*** increase of 16.3% between 2007 (55.25) and 2017 (64.24).
- The gap between rural and urban CLRD mortality rates has widened. Rural Missourians are now 51% more likely to die from CLRD than their urban neighbors, compared to 30% more likely in 2007.
- Rural counties make up the entire top ten and 24 of the top 25 for CLRD death rates in Missouri for 2007-2017. The rural counties with the highest risk of death from CLRD are mostly in the southeastern region of the state, with eight of the ten rural counties with highest rates residing in that region.

Death rates from chronic lower respiratory diseases Missouri, 2007-2017

	Rural	Urban
Frequency	18,346	21,937
Rate	61.58	45.83
Percent Change (2007 & 2017)	+16.27%	+0.35%

Age-adjusted rates per 100,000 population

Death rates from chronic lower respiratory disease Missouri, 2007-2017



Age-adjusted rates per 100,000 population

Death rates from chronic lower respiratory diseases Missouri, 2007-2017

*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

CLRD is usually caused by cigarette smoking, though secondhand smoke can also contribute to this condition.[45] While research is ongoing, vaping or e-cigarette usage could have similar health consequences as tobacco use. It is, however, certain that the inhalation of harmful chemicals can cause irreversible lung damage or disease and that e-cigarettes contain a number of potentially toxic substances.[46] The behaviors of rural Missourians related to smoking and tobacco use directly influence health. Some of these behaviors include:

- Missouri has one of the highest rates of current cigarette use in the United States—ranking 11th out of the 50 states.[47] Citizens in rural areas of the state report current smoking status at a rate that is more than 30% higher than urban areas, a ***significant*** difference (rural 25.6% versus urban 19.5%).

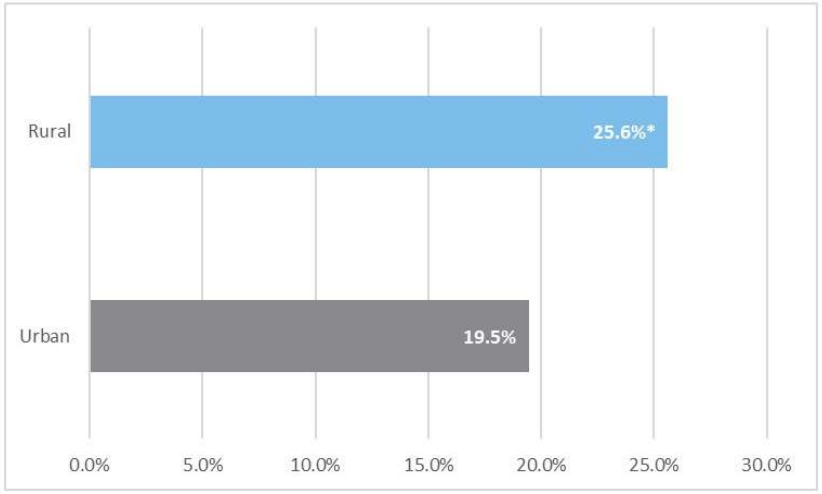
Selected rural and urban counties' death rates from chronic lower respiratory disease (CLRD) Missouri, 2007-2017

Rank	County	Rate	Type
1	Iron	99.42	Rural
2	Dunklin	98.85	Rural
3	Stoddard	91.80	Rural
4	Wayne	89.46	Rural
5	Clinton	87.83	Rural
6	Carter	87.14	Rural
7	Linn	86.78	Rural
8	Pemiscot	82.72	Rural
9	Clark	80.23	Rural
10	New Madrid	79.81	Rural
14	Buchanan	77.52	Urban

Age-adjusted rates per 100,000 population

- In 2016, more than 5% of Missouri adults report using e-cigarettes or other electronic vaping products every day or some days.
- Forty percent of Missouri high school students report having tried e-vapor products (2017), a 233% increase from 2013, a possible preview of Missouri's future health.[48]

Current smoking status Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Results are based on response of 'yes' and 'every day or some days' to the questions, 'Have you smoked at least 100 cigarettes in your entire life?' and 'Do you now smoke cigarettes every day, some days, or not at all?'.

ACCIDENTS/UNINTENTIONAL INJURY- #4

For rural and urban counties in Missouri, accidents/unintentional injuries are the 4th leading cause of death. Deaths from unintentional injuries include, but are not limited to:

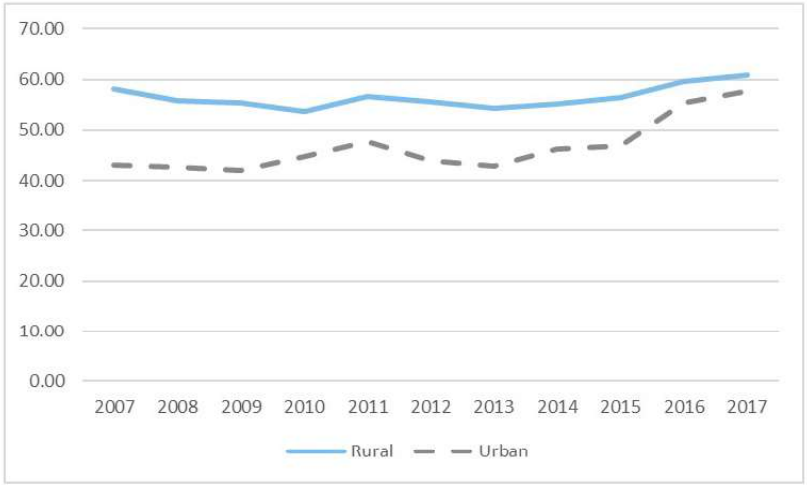
- Falls
- Motor vehicle accidents (MVA)
- Drug overdoses and poisonings
- Fires
- Drownings

Death rates from unintentional injury Missouri, 2007-2017

	Rural	Urban
Frequency	13,482	21,104
Rate	56.59	46.73
Percent Change (2007 & 2017)	+4.80%	+33.88%

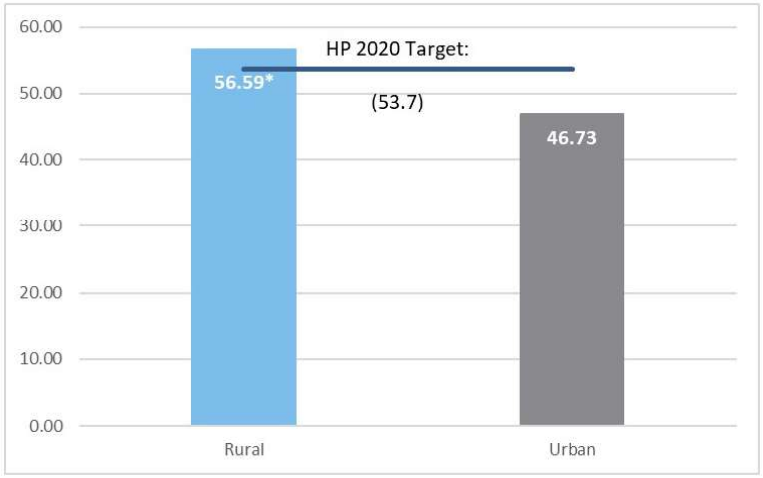
Age-adjusted rates per 100,000 population

Deaths from unintentional injury Missouri, 2007-2017



Age-adjusted rates per 100,000 population

Deaths from unintentional injury Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Rural populations have ***statistically significantly*** higher rates of death from unintentional injuries (56.59) compared to their urban counterparts (46.73) over the 2007-2017 time period. Other important differences between rural and urban unintentional injury rates in Missouri include:

- Rural counties have a death rate above the ***Healthy People 2020*** mortality rate target (53.7), while the urban counties rate is below the target.
- When comparing deaths from unintentional injuries by gender, males are statistically more likely to die than females. Furthermore, rural males are statistically more likely to die (73.7) than their urban male counterparts (63.1).
- Excluding falls, rural populations have ***significantly*** higher death rates than their urban neighbors for all age groups.
- Due in large part to falls, individuals age 65 and over have the highest death rates from unintentional injuries for both populations.
- Each of the ten counties with the highest rates are rural with Reynolds County leading by a large margin. In fact, 48 of the top 50 highest unintentional injury counties are rural. Jefferson County is the highest ranking urban county, placing it 13th in the state.

When comparing rural and urban death rates due to unintentional injuries for the 11-year time period, rural counties have consistently had a higher rate. However that picture is changing due to the recent surge in accidental drug overdoses, including opioids and over the counter drugs. In 2007, there was a vast 26.0% difference in rural and urban death rates due to unintentional injury which dropped to only a slight difference (5.4%) in 2017.

Selected rural and urban counties' death rates from unintentional injury Missouri. 2007-2017

Rank	County	Rate	Type
1	Reynolds	103.35	Rural
2	Pemiscot	83.60	Rural
3	Washington	83.53	Rural
4	Gasconade	82.99	Rural
5	Dent	82.20	Rural
6	Wayne	82.00	Rural
7	Carter	81.83	Rural
8	Franklin	77.15	Rural
9	Iron	73.33	Rural
10	Shannon	73.21	Rural
13	Jefferson	70.11	Urban

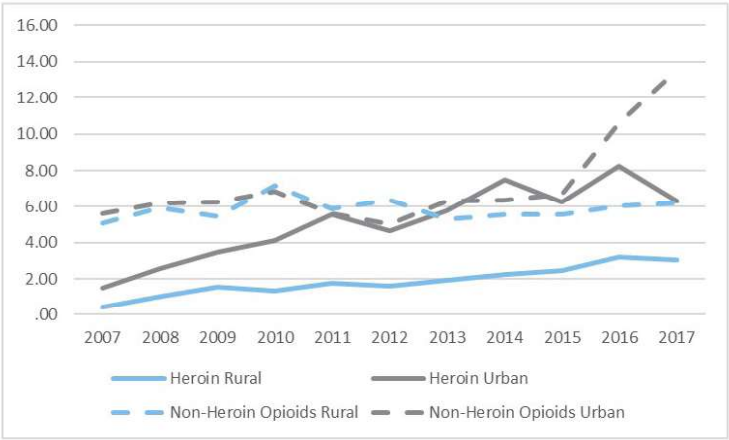
Age-adjusted rates per 100,000 population

Unintentional Injury: Drug Overdose‡‡

The CDC has recognized three distinct waves in the opioid mortality crisis.[49] The first wave involved prescription opioids and the second wave was due to a rise in heroin. During the third wave, fentanyl and other synthetic opioids are now the primary drivers. Deaths due to opioid overdose in this third wave have been increasing at an alarming rate in Missouri—the 2017 mortality rate statewide was nearly 150% higher than in 2007. Also of note are the stark differences in experience among different geographic and demographic groups in the state, which include:

- Opioid overdose deaths in rural areas throughout Missouri have been increasing at a steady rate (+35%, 2007-2017), though the increase has been more dramatic in urban areas (+181%).
- Fatal opioid overdoses are highest for both rural and urban counties on the eastern side of the state. Franklin County, a rural county in the St. Louis region, had the highest rural rate of opioid overdose mortality (20.27).
- In recent years, 77% of opioid overdoses in rural areas of Missouri have been due to non-heroin opioids, compared to only 59% in urban areas. Of the ten counties with the highest non-heroin opioid overdose rates, most are rural counties in southeastern and south central Missouri.
- The 25-44 age group has the highest opioid overdose mortality rate for both rural and urban regions. Rural Missouri's death rate for this age group (15.85) is nearly double the rate of 45-64 year olds (8.70) which has the second highest rate.
- Both rural and urban rates were over three times higher for males than females.
- Males were statistically more likely to fatally overdose using opioids than females in both rural and urban areas. The rate of opioid overdoses for rural males (9.50) was over 60% higher than the rural female rate (5.90).
- The rise of fentanyl is changing opioid patterns, causing heroin rates to decline and non-heroin rates to go up. Between 2007 and 2015, rates for non-heroin opioid overdoses in both rural and urban areas were very similar but in recent years the increase for rural areas has been more modest. The large spike in urban areas is largely attributed to drug overdose trends shifting to more lethal opioids outside of heroin such as fentanyl, which have not yet compromised the rural drug supply to the same degree.[50]

Death rates from heroin and non-heroin opioid overdoses Missouri, 2007-2017

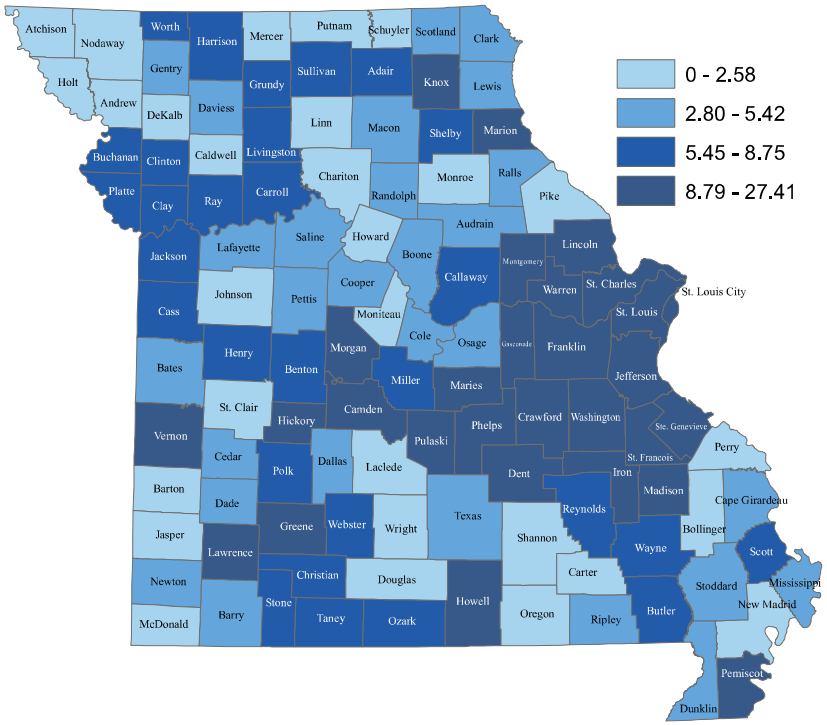


Age-adjusted rates per 100,000 population

‡‡To be consistent with other data publications recently released by the Missouri Department of Health and Senior Services related to the drug poisoning crisis, if a death record displays both heroin and non-heroin opioid codes, the record is considered a heroin overdose instead of a non-heroin opioid overdose. Non-heroin cases include poisonings due to traditional prescription drugs and illicit fentanyl analogs.

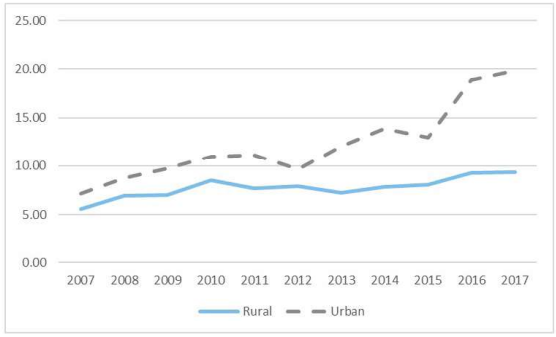
Recent CDC findings indicate that opioid prescribing rates are typically higher in rural areas, which could be driving rural increases in mortality.[51] Moreover, a lack of resources and physicians who provide ***medication assisted treatment*** (MAT) for those with opioid use disorder has remained a constant issue for several rural communities.[52] Health care resources are also being impacted by the opioid poisoning crisis. Emergency department visits due to opioid overdose have more than doubled in recent years statewide, with ***significant*** increases in many of Missouri's rural areas.[53]

Death rates from opioid overdose Missouri, 2007-2017



Age-adjusted rates per 100,000 population

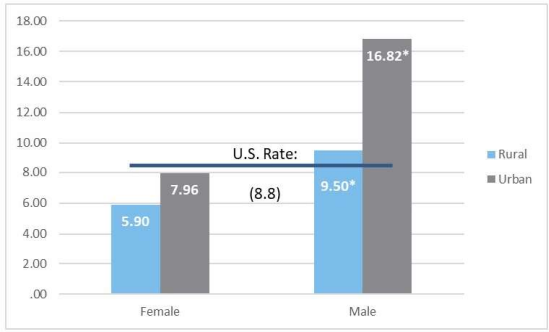
Death rates from opioid overdose Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Death rates from opioid overdose Missouri, 2007-2017



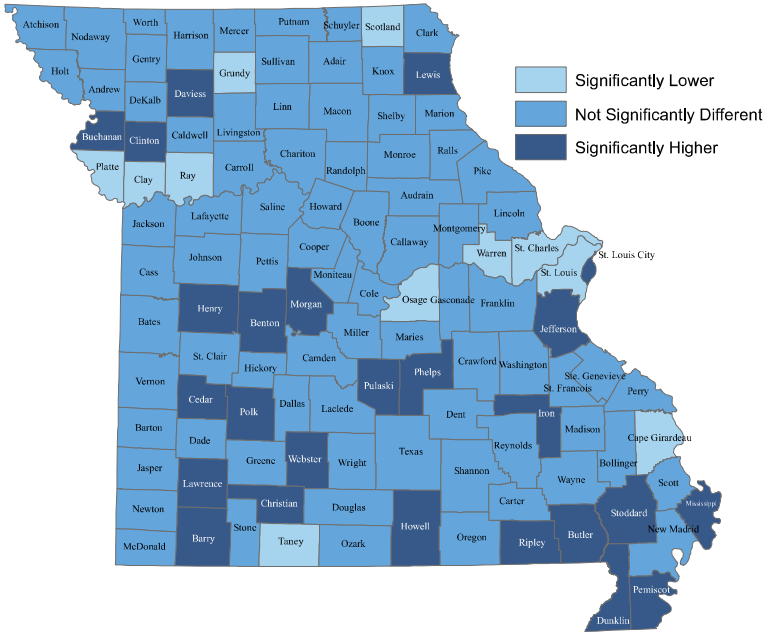
*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

STROKE - #5

Stroke occurs when brain cells die because of lack of oxygen due to restricted blood flow. It is the 5th leading cause of death for 2007-2017 for both rural and urban Missourians. The death rate from stroke for rural counties was 45.40, significantly higher than the urban death rate of 41.61.

Death rates from stroke Missouri, 2007-2017

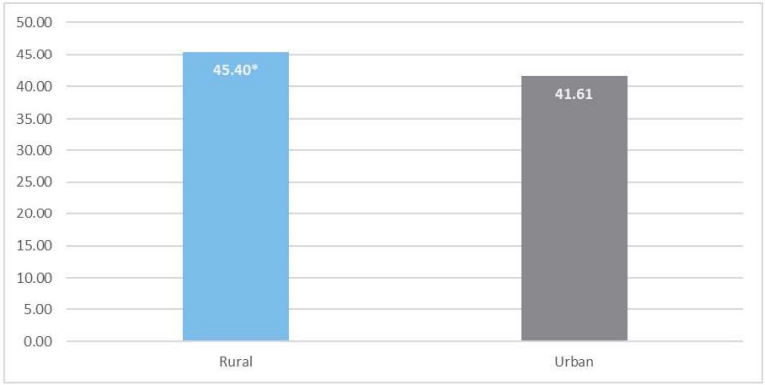


Death rates from stroke Missouri, 2007-2017

	Rural	Urban
Frequency	13,369	20,227
Rate	45.40	41.61
Percent Change (2007 & 2017)	-23.79%	-11.78%

Age-adjusted rates per 100,000 population

Deaths from stroke Missouri. 2007-2017



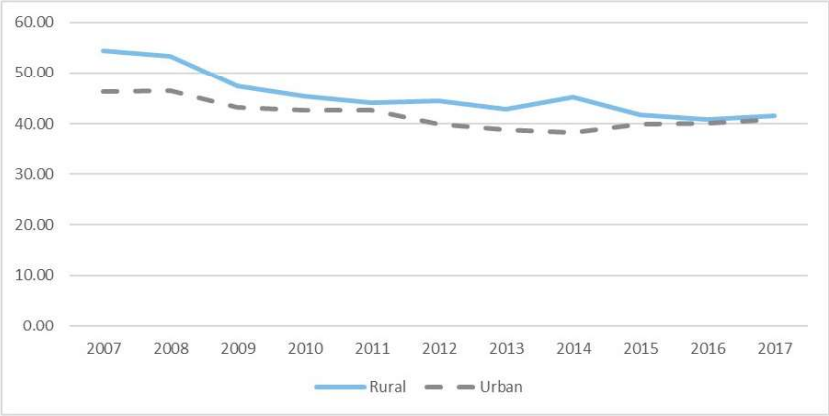
*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

The stroke death rates for rural Missouri counties decreased by a ***statistically significant*** 23.8% between 2007 and 2017 (54.48 versus 41.52). While the rural rate has been higher than the urban rate every year during this period, the gap has narrowed considerably in the most recent three years.

Rural counties have nine of the ten highest stroke death rates and 23 of the top 25. The rural counties with the highest rate of death from stroke are spread geographically around the state, but there is a cluster of six counties with high rates in the southeast section of the state (Butler, Carter, Dunklin, Iron, Mississippi, and Pemiscot Counties).

Death rates from stroke Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Selected rural and urban counties' death rates from stroke Missouri, 2007-2017

Rank	County	Rate	Type
1	Dunklin	74.48	Rural
2	Daviess	62.65	Rural
3	Iron	61.59	Rural
4	Henry	60.24	Rural
5	Phelps	59.85	Rural
6	Lewis	59.37	Rural
7	Mississippi	58.66	Rural
8	Buchanan	57.61	Urban
9	Carter	57.34	Rural
10	Butler	56.65	Rural

Age-adjusted rates per 100,000 population

ALZHEIMER'S DISEASE - #6

Alzheimer's disease (AD) is the 6th leading cause of death in both rural and urban Missouri. The rural AD death rate for the 2007-2017 time period is 30.02, which is ***significantly*** higher than the urban AD death rate of 26.93. However, the number of AD deaths both in Missouri and the US overall could be underreported. The World Health Organization specifies that AD should be identified as the underlying cause of death when it is the disease or injury that directly led to death."[54] If AD is not immediately recognized, then there is a chance that the victim's underlying cause of death will not be accurately reported. For example, someone with AD may lose memory of how to walk down the stairs and as a result fall to their death. Without a proper diagnosis of the victim's AD, the underlying cause of death may be incorrectly attributed to a fall. Some characteristics of AD in Missouri's rural communities include:

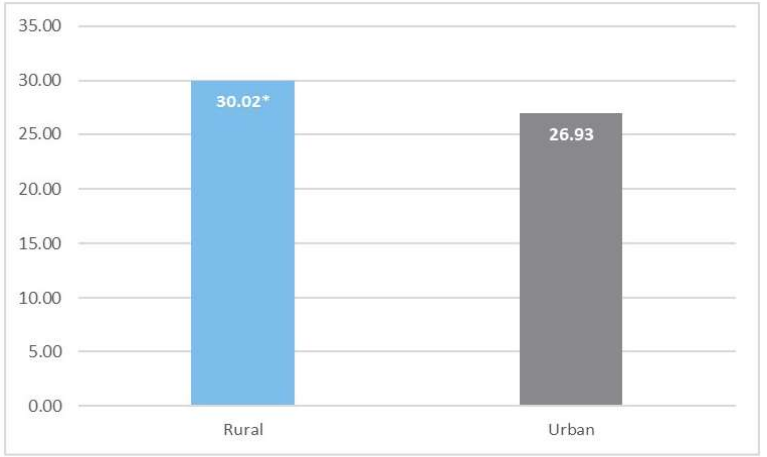
- The number one risk factor for Alzheimer's disease is age.[55] Individuals 85 and older living in rural areas are over three times as likely to die from AD (1,180.02) than rural people in the 80 to 84 age bracket (343.62) and more than nine times as likely than rural residents age 75 to 79 (128.94).
- In 2007, the rural and urban county AD death rates were almost identical (rural 25.42; urban 25.47), but in 2008 the rural rate spiked while the urban rate remained stable for several years.
- Since 2013, the rural rates have remained steady while urban rates have been increasing. In 2017, the rural rate was lower than the urban rate for the first and only time in that span.

Death rates from Alzheimer's disease Missouri, 2007-2017

	Rural	Urban
Frequency	8,969	13,273
Rate	30.02	26.93
Percent Change (2007 & 2017)	+24.08%	+28.50%

Age-adjusted rates per 100,000 population

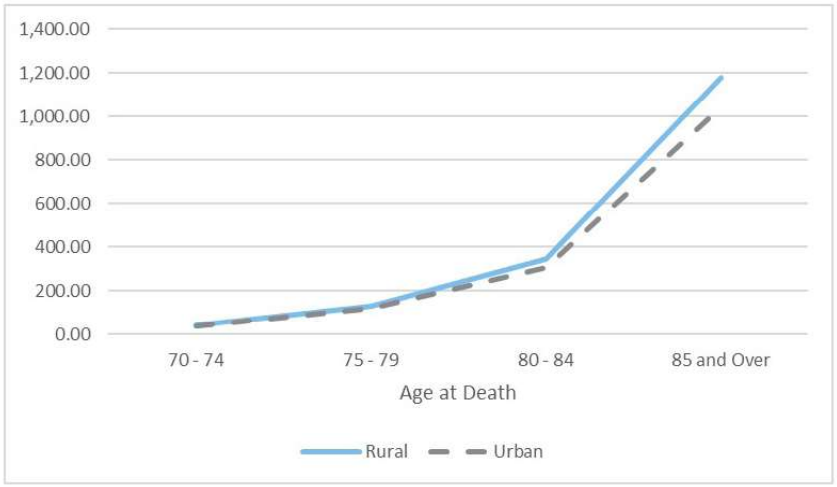
Death rates from Alzheimer's disease Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

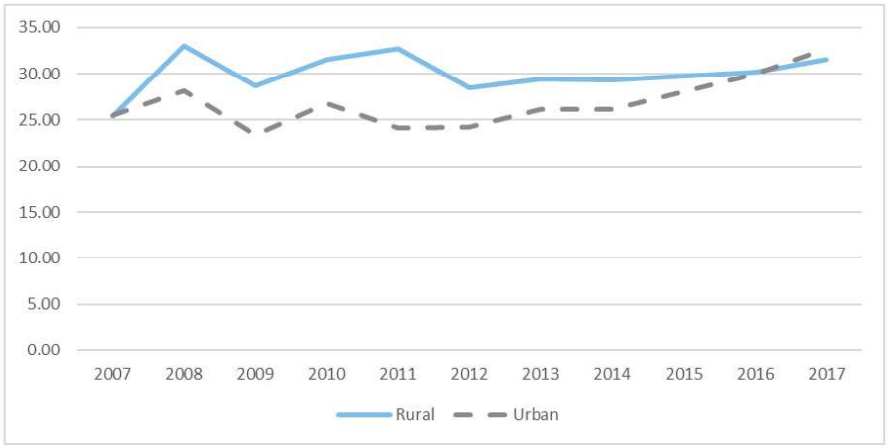
Age-adjusted rates per 100,000 population

Death rates from Alzheimer's disease Missouri, 2007-2017



Crude rates per 100,000 population

Death rates from Alzheimer's disease Missouri, 2007-2017



Age-adjusted rates per 100,000 population

Alzheimer's disease is the 6th leading cause of death in both rural and urban Missouri.

DIABETES - #7

Between 2007 and 2017, in both urban and rural areas, diabetes was the 7th leading cause of death in the state of Missouri. During that time, the diabetes death rate was ***significantly*** higher in rural counties than in urban counties (22.61 versus 19.00). Since 2009, Missouri's rural diabetes death rates have shown an upward trend, while the death rates for urban counties have declined slightly. Thus in 2017, the rural-urban disparity was the largest in this time frame, with rural rates 34% higher (25.03 versus 18.67).

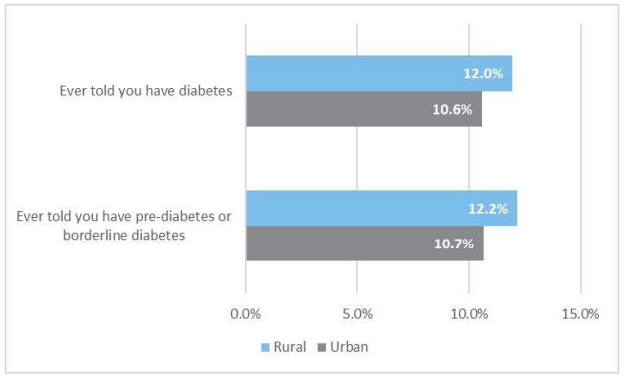
Using Missouri County Level Study data from 2016, rural adults self-reported higher rates of being told they were diabetic, pre-diabetic, or borderline diabetic compared to urban areas. Rural communities have higher rates for many risk factors associated with diabetes such as obesity, older age, and physical inactivity. In addition, a lack of access to care and health education makes it more difficult to effectively prevent and control diabetes.[56]

Death rates from diabetes Missouri, 2007-2017

	Rural	Urban
Frequency	6,583	9,193
Rate	22.61	19.00
Percent Change (2007 & 2017)	+7.38%	-13.16%

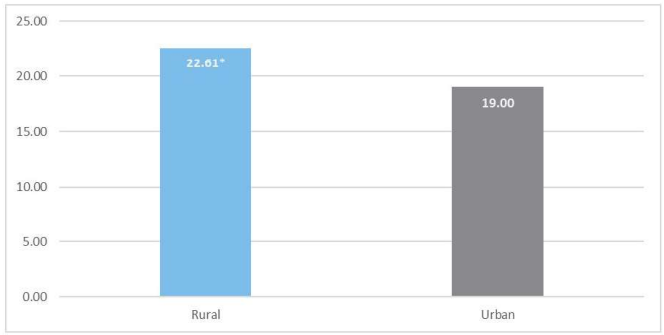
Age-adjusted rates per 100,000 population

Diabetes prevalence Missouri, 2016



Results are based on responses of 'yes' to the questions, 'Have you ever been told you have diabetes?' and 'Have you ever been told by a doctor or other health professional that you have pre-diabetes or borderline diabetes?'.

Death rates from diabetes Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

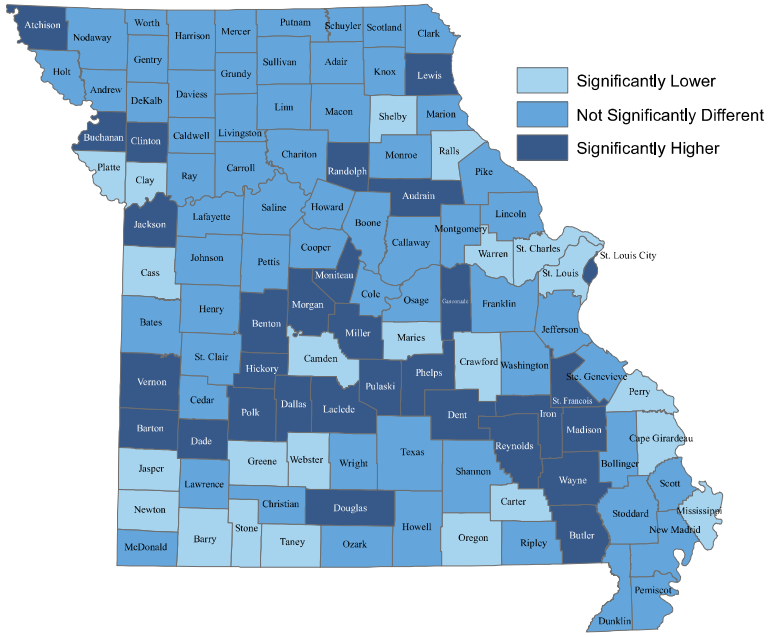
Selected rural and urban counties' death rates from diabetes Missouri, 2007-2017

Rank	County	Rate	Type
1	Moniteau	60.77	Rural
2	Buchanan	46.66	Urban
3	Wayne	43.36	Rural
4	Dade	39.03	Rural
5	Randolph	38.23	Rural
6	Dallas	36.82	Rural
7	Laclede	35.93	Rural
8	Butler	35.00	Rural
9	St. Francois	34.97	Rural
10	Atchison	34.33	Rural
11	Reynolds	33.53	Rural

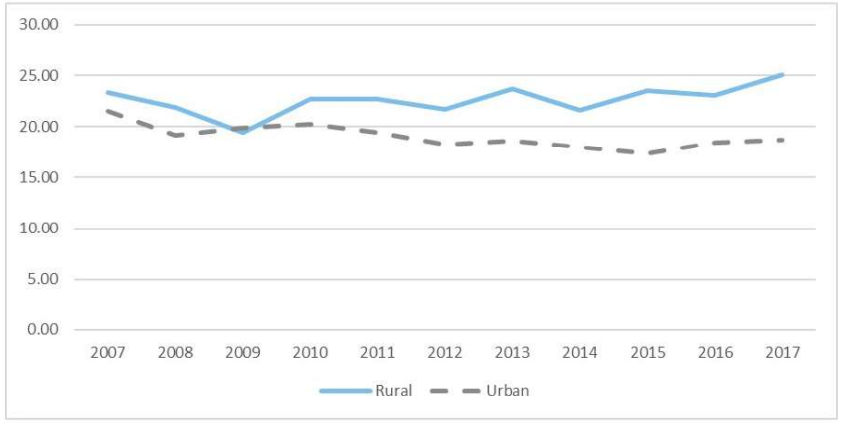
Age-adjusted rates per 100,000 population

One piece of evidence supporting the positive effects of diabetes education is the slight decline of diabetes death rates in the rural southeastern counties of Missouri. In 2014, the Center for Disease Control identified a "Diabetes Belt" of counties across the Southern and Midwestern portions of the United States whose residents are at high risk of developing diabetes, and created a program that educates those residents on how to prevent and control Type 2 diabetes.[57] Although no Missouri counties are in the Diabetes Belt, the counties south of Cape Girardeau along the Mississippi River (Scott, Mississippi, New Madrid, Dunklin, and Pemiscot) border the Diabetes Belt counties that were identified in Kentucky, Tennessee, and Arkansas. There is evidence that these Missouri counties might be benefiting from the spillover of the Diabetes Belt intervention programs because their diabetes death rates are among the lowest for rural Missouri counties.[58] By comparison, there are a block of rural counties (Butler, Wayne, and Madison) just to the west that might not be receiving the same benefits. This set of counties have diabetes death rates that are among the highest statewide. However, Moniteau County in central Missouri has the highest diabetes death rate in the state and is both 30% higher than any other county and is three times higher than the state average.

Death rates from diabetes
Missouri, 2007-2017



Death rates from diabetes
Missouri, 2007-2017



Age-adjusted rates per 100,000 population

KIDNEY DISEASE - #8

Kidney disease mortality is the 8th leading cause of death in Missouri and is classified as any death that is the result of the kidneys' inability to filter waste from the bloodstream due to damage to the kidneys. Kidney disease is often undiagnosed until it is too late for successful medical intervention, and is also commonly caused by other life-threatening illnesses, such as high blood pressure and diabetes.[59] The 2007-2017 kidney disease death rate for rural Missouri counties was 20.19. In comparison, the death rate for urban Missouri counties was ***statistically significantly*** less at 18.05.

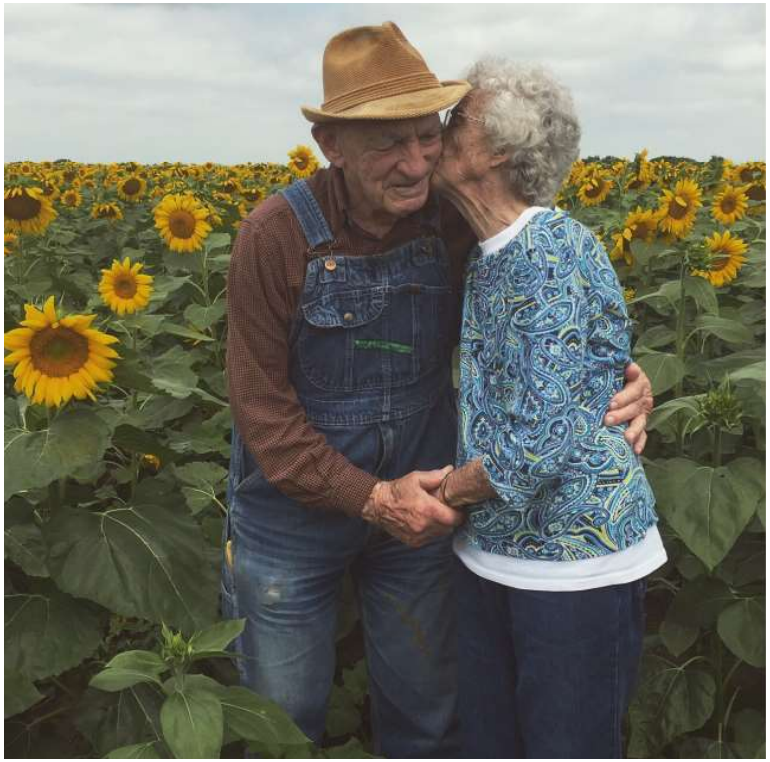


Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Emily Meneely.

Death rates from kidney disease Missouri, 2007-2017

	Rural	Urban
Frequency	5,969	8,748
Rate	20.19	18.05
Percent Change (2007 & 2017)	-3.94%	+16.02%

Age-adjusted rates per 100,000 population

Death rates from kidney disease Missouri, 2007-2017

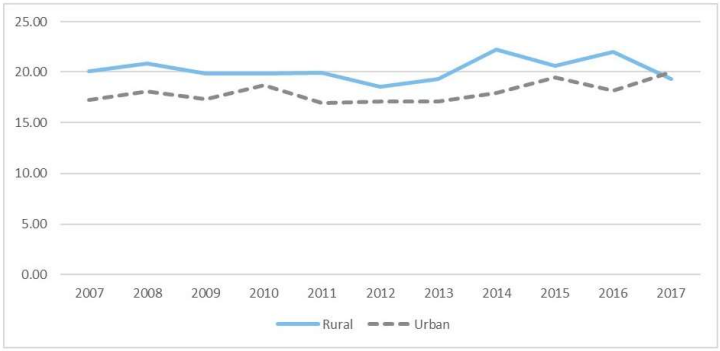
*indicates a rate that is **statistically significantly** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Other noteworthy statistics related to kidney disease mortality include:

- All of the top ten Missouri counties and 34 of the top 35 counties with the highest rates of kidney disease mortality are classified as rural.
- Pemiscot County has a death rate due to kidney disease that is nearly 70% higher than the urban county (Cape Girardeau County) with the highest rate (41.13 versus 24.40, respectively), though they are geographically in the same southeastern region.
- In 2017, urban kidney death rates were higher than rural rates for the first and only time in this 11-year time frame, due to both a downward movement in rural county rates (19.27) and an upward movement in urban county rates (19.99).
- Men have statistically significantly higher rates of kidney disease mortality than women in both rural and urban Missouri counties.

Death rates from kidney disease Missouri, 2007-2017



Age-adjusted rates per 100,000 population

Selected rural and urban counties' death rates from kidney disease Missouri, 2007-2017

Rank	County	Rate	
1	Pemiscot	41.13	Rural
2	Phelps	36.21	Rural
3	Caldwell	35.01	Rural
4	Linn	33.34	Rural
5	Pike	33.12	Rural
6	New Madrid	32.54	Rural
7	Texas	32.45	Rural
8	Carter	30.36	Rural
9	Bollinger	30.32	Rural
10	Bates	30.17	Rural
29	Cape Girardeau	24.40	Urban

Age-adjusted rates per 100,000 population

PNEUMONIA AND INFLUENZA - #9

Deaths from pneumonia and influenza (combined) are the 9th leading cause of death for 2007-2017 statewide. The pneumonia/influenza death rate for rural Missouri counties was 19.90, ***significantly*** higher than the urban rate of 16.95. Other statistics of interest include:

- The pneumonia and influenza death rates for rural Missouri counties had a ***significant*** decrease of more than 20% between 2007 (22.73) and 2017 (17.96).
- Rural counties have nine of the ten highest pneumonia and influenza death rates in Missouri for 2007-2017, and 23 of the top 25. The rural counties with the highest rate of death from pneumonia and influenzas are spread geographically around the state, but there are clusters of high rate counties in the southeastern and southwestern portions of the state.
- Pneumonia and influenza deaths occur at ***significantly*** higher rates to those age 65 and older. In fact, less than 15% of deaths due to this cause affect Missourians 64 and younger.

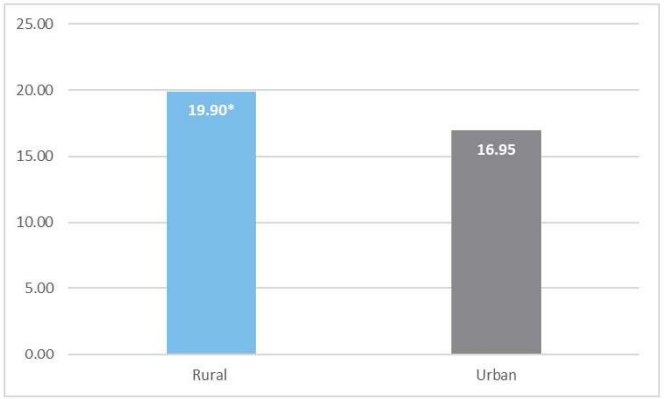
Because older populations are at a greater risk of complications due to pneumonia and influenza, the CDC recommends that most adults older than 65 receive vaccinations that will decrease the risk of acquiring bacterial pneumonia.[60] However, recent survey data from the 2016 ***Missouri County Level Study*** indicates that older rural Missourians are being vaccinated at a rate that is ***significantly*** lower than their urban counterparts. Rural residents aged 65 and older had a lower pneumonia vaccination rate by 5.4 percentage points compared to urban counties, and 16.8 percentage points lower than the ***Healthy People 2020*** goal of 90.0%.[61]

Death rates from pneumonia and influenza Missouri, 2007-2017

	Rural	Urban
Frequency	5,842	8,269
Rate	19.90	16.95
Percent Change (2007 & 2017)	-20.99%	-12.07%

Age-adjusted rates per 100,000 population

Death rates from pneumonia and influenza Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

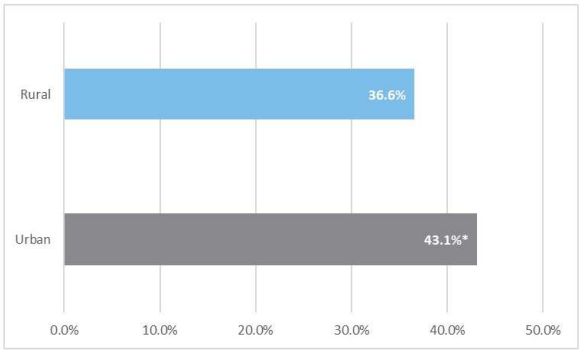
CDC also recommends that everyone 6 months of age and older receive a flu vaccine before flu season starts. This is especially important for those who are at high risk of developing serious complications should they contract influenza.[62] Again, rural Missourians age 18 and older were less likely by 7.5 percentage points to have received a flu vaccine in the past year compared to urbanites, which was a ***statistically significant*** difference.

Selected rural and urban counties' death rates from pneumonia and influenza Missouri, 2007-2017

Rank	County	Rate	Type
1	Scotland	37.04	Rural
2	Cedar	36.07	Rural
3	Carter	34.86	Rural
4	Carroll	33.68	Rural
5	Butler	32.51	Rural
6	Texas	32.31	Rural
7	Jasper	31.10	Urban
8	Wayne	30.67	Rural
9	Barton	29.16	Rural
10	Atchison	28.90	Rural

Age-adjusted rates per 100,000 population

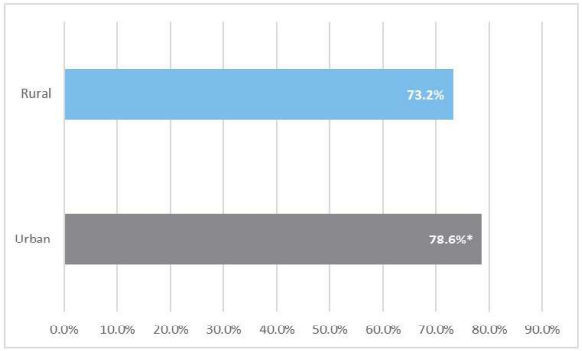
Influenza vaccination rates Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals.

Results are based on a response of 'yes' to the question, 'During the past 12 months, have you had either a flu shot or a flu vaccine that was sprayed in your nose?'

Pneumococcal vaccination rates Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Results are based on a response of 'yes' to the question, 'Have you ever had a pneumonia shot?' among those 65 and older.

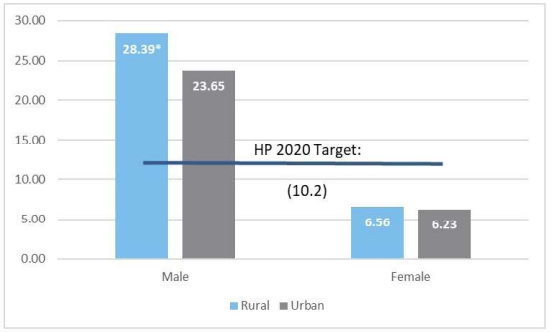
SUICIDE - #10

There were 10,402 deaths from suicide in Missouri from 2007 through 2017, which ranked it the 10th leading cause of death. However, when deaths from injury are broken down into its individual categories (motor vehicle accident deaths, deaths from poisonings, etc.), suicide deaths are the number one cause of injury-related deaths in Missouri for this time period. CDC notes that while the causes of suicide, '…are complex and determined by multiple factors, the goal of suicide prevention is to reduce factors that increase risk and increase factors that promote resilience.' They go on to say that effective prevention strategies must not only affect individuals, but promote awareness and a community commitment to social change.[63]

The rural suicide rate of 17.37 was ***significantly*** higher than the urban rate of 14.49. Both of these Missouri rates are much higher than the Healthy People 2020 target of no more than 10.2 suicides per 100,000 population. Other suicide related statistics of interest include:

- Both rural and urban counties posted increases of greater than 35% between 2007 and 2017.
- Suicide deaths in rural Missouri counties are overwhelmingly male, with the rural male suicide rate (28.39) ***significantly*** higher than the urban male rate and over four times greater than the rural female suicide rate (6.56) for 2007-2017.
- The age group with the highest rate of death due to suicide in rural counties is the 25-44 age group (24.85).
- Rural areas also have a ***significantly*** higher suicide rate for seniors (65+) than urban areas (19.39 versus 15.49).

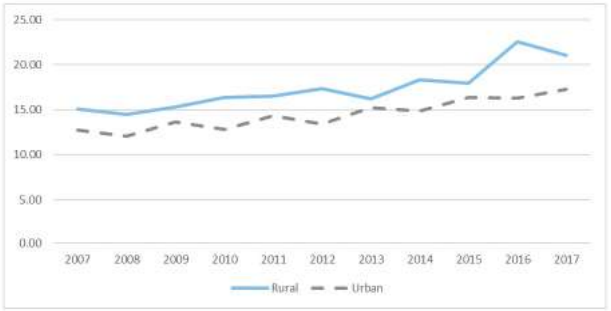
Death rates due to suicide
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Death rates due to suicide
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Age-adjusted rates per 100,000 population

Survey data can provide insight into reducing suicide risk factors and increasing resilience. The 2016 Missouri County Level Study survey contained many questions that allowed people to share important information related to their mental health. Significantly more rural Missourians report ever being told they had a depressive disorder. Nearly 14% of Missourians (for both rural and urban groupings) have self-reported having more than 14 days of poor mental health in a month.

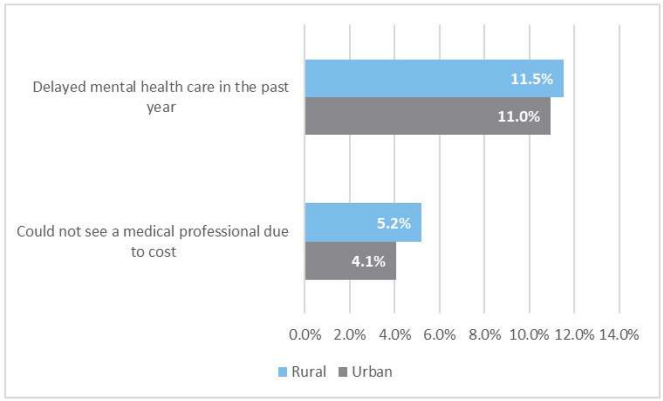
In the past year, nearly 12 in every 100 Missourians delayed getting necessary mental health care because they couldn't get an appointment soon enough, could not find a mental health professional to see them, could not take off work, or did not have transportation. In a separate question, nearly 5% of all Missourians listed cost as a major barrier to seeing a mental health professional when needed. The rural rate was higher than the urban rate for both questions.

Death rates due to suicide
Missouri, 2007-2017

	Rural	Urban
Frequency	3,969	6,433
Rate	17.37	14.49
Percent Change (2007 & 2017)	+39.02%	+35.66%

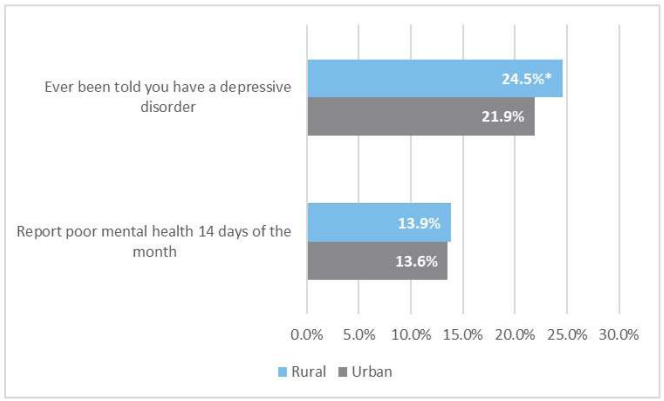
Age-adjusted rates per 100,000 population

Mental health care
Missouri, 2016



Results are based on 'yes' responses to the questions, 'Have you delayed getting needed mental health care for any of the following reasons in the past 12 months?' and 'Was there a time in the past 12 months that you needed to see a mental health professional but could not due to cost?'.

Mental health status
Missouri, 2016



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Results are based on a 'yes' response to the question, 'Have you ever been told you have a depressive disorder, including depression, major depression, dysthymia, or minor depression?' and '14 or more days' to 'Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?'.

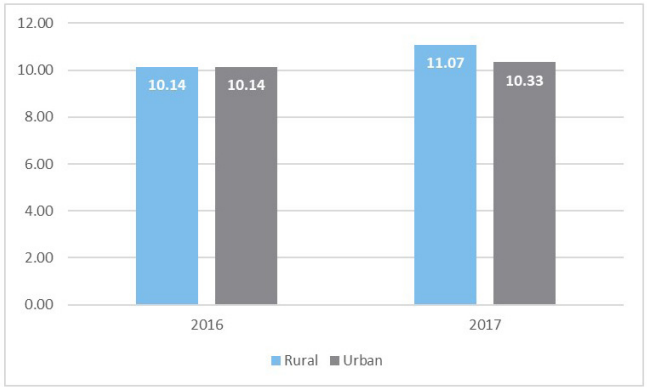
MATERNAL MORBIDITY AND MORTALITY

Many rural women, specifically adolescents, at risk for maternal morbidity and mortality could be protected by skilled care before, during, or after childbirth.[64] In Missouri, more than 1,500 cases of maternal morbidity or mortality were reported in 2016-2017. Infant mortality is greatly impacted by maternal and pregnancy complications, preterm birth, and low birth weight.[65] However, social determinants of health and other access to care and health status issues in Missouri clearly signal the risk to these vulnerable populations. For many rural locations there is limited access to care, specifically obstetric, gynecological, and pediatric care.

The CDC definition of maternal morbidity includes unexpected outcomes of labor and delivery that result in ***significant*** short- or long-term consequences to a woman's health.[66] Given the poorer outcomes observed in rural areas, access to women's health resources should also be examined as a contributing factor for maternal outcomes. These additional details further point to the seriousness of negative pregnancy-related outcomes in rural Missouri:

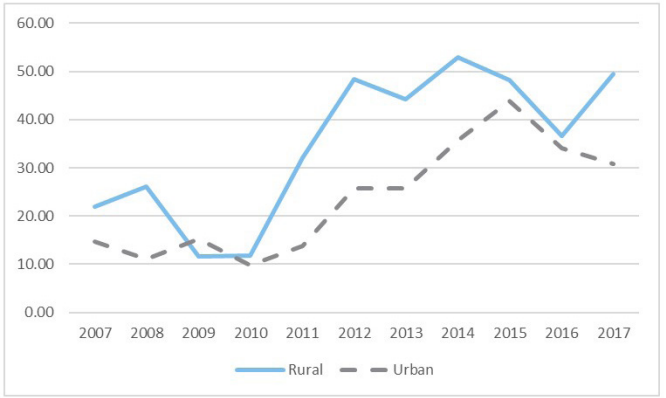
- Maternal morbidity in rural areas of the state increased between 2016 and 2017 by nearly 10%, compared to a much lower increase of 2% in urban areas.
- Missouri's rates have increased over the last few years, mirroring what has been observed on the national level with maternal morbidity rates.[67]
- Maternal morbidity is greatly influenced by the age of the mother. For mothers in both rural and urban areas of Missouri, the age groups of 35-44 and 45-54 experienced much higher morbidity rates than younger age groupings. In rural areas, the morbidity rate for the oldest age group (45-54) was nearly four times greater than the youngest age group (15-24).
- The ten counties with the highest rates of maternal morbidity statewide are all rural.

Rate of maternal morbidity
Missouri, 2016-2017



Crude rates per 1,000 live births

Rate of maternal mortality
Missouri, 2007-2017

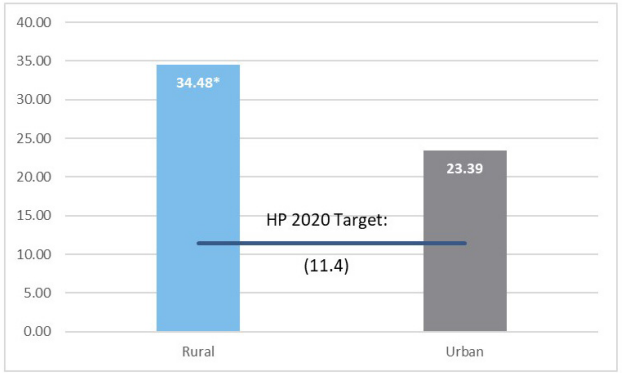


Crude rates per 1,000 live births

Maternal mortality is the loss of life while pregnant or within one year of the end of pregnancy.[68] To be classified as maternal mortality, it must be due to or aggravated by the pregnancy or its management, not from accidental or incidental causes. In 2015, the US saw an increase in the rate of maternal deaths (26.4 per 100,000 live births), as modernized countries experienced dramatic decreases to below 10.0.[69] Missouri has mirrored the US increase in rates and pregnant women from rural Missouri have consistently had higher rates of death than urban women.

- The main causes of maternal mortality are infections, bleeding, embolisms, and cardiomyopathy (weakened heart walls). Pregnant women who have chronic conditions like hypertension, chronic heart disease, and diabetes are more likely to have complications when delivering[70] Socio-economic factors are correlated with higher risk of maternal mortality including race and income.
- Due to small numbers, rural and urban rates have fluctuated, however, the large increases that both groups experienced in 2011 have been sustained through 2017.
- In Missouri between 2007 and 2017, pregnancy related death rates were 47% higher and ***significantly*** greater for rural communities (34.48) than their urban counterparts (23.39).
- During the years 2007-2017, Missouri did not meet the ***Healthy People 2020*** target rate of no more than 11.4 maternal deaths. In fact, rural rates were three times worse (34.48).
- Rural women in the 35-44 age group are ***significantly*** more likely to experience maternal mortality than those in urban areas.
- In Missouri, women who give birth at age 45 and older die at rates nearly 200 times that of younger women. For every 100 live births to mothers older than age 45 living in rural areas of the state, approximately eight women will die from a pregnancy related cause while pregnant or within the first year after pregnancy.

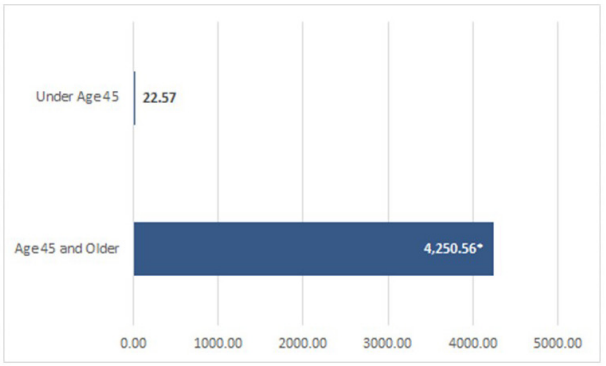
Rate of maternal mortality
Missouri, 2007-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Crude rates per 100,000 live births

Maternal mortality rates
Missouri, 2007-2017

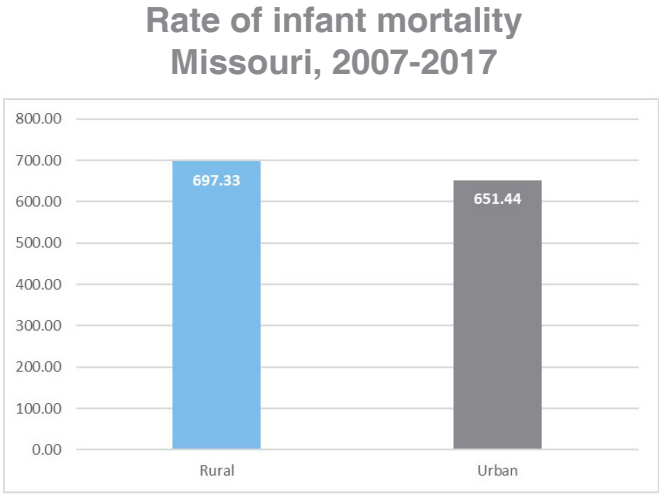


Crude rates per 100,000 live births

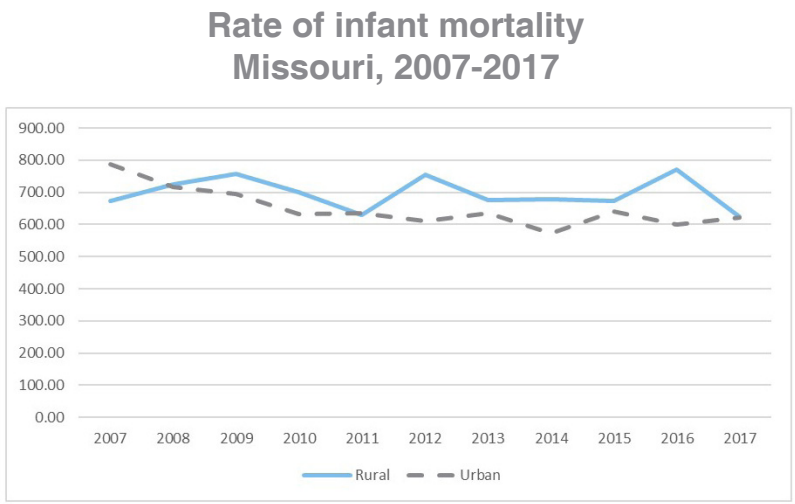
INFANT MORTALITY

Infant mortality is defined as, "the death of a baby before his or her first birthday".[71] A recent study found a relationship between rural areas and high neonatal mortality rates.[72] Authors assert that this discrepancy exists due to the lack of access to adequate healthcare in rural areas.[73] More specifically, a large portion of rural counties within the U.S. do not have obstetric units (facilities specifically for babies to be born).[74] The lack of these healthcare opportunities are causing major problems in rural America and higher infant mortality rates is one of the by-products:

- For the years 2007-2017, rural counties had an infant mortality rate of 697.33 (per 100,000) while urban counties recorded a rate of 651.44. During this 11-year time span, 5,620 children under the age of one died in Missouri.



Crude rates per 100,000 live births



Crude rates per 100,000 live births

- Rural and urban rates of infant mortality have traditionally trended quite close to one another. In 2007, urban areas had an infant mortality rate that was 16.8% higher than that of rural areas. Since then rural areas have largely seen a higher burden of infant mortality. The gap is once again narrowing, though. In 2017, the rural and urban infant mortality rates were nearly identical.
- A total of seven counties logged infant mortality rates that were ***statistically significantly*** higher than the state average. Five of those seven were classified as rural and all were located in southeast and south central Missouri.
- Further, of the ten counties with the highest infant mortality rate, six are located in the south central or southeast region of Missouri and nine are rural.

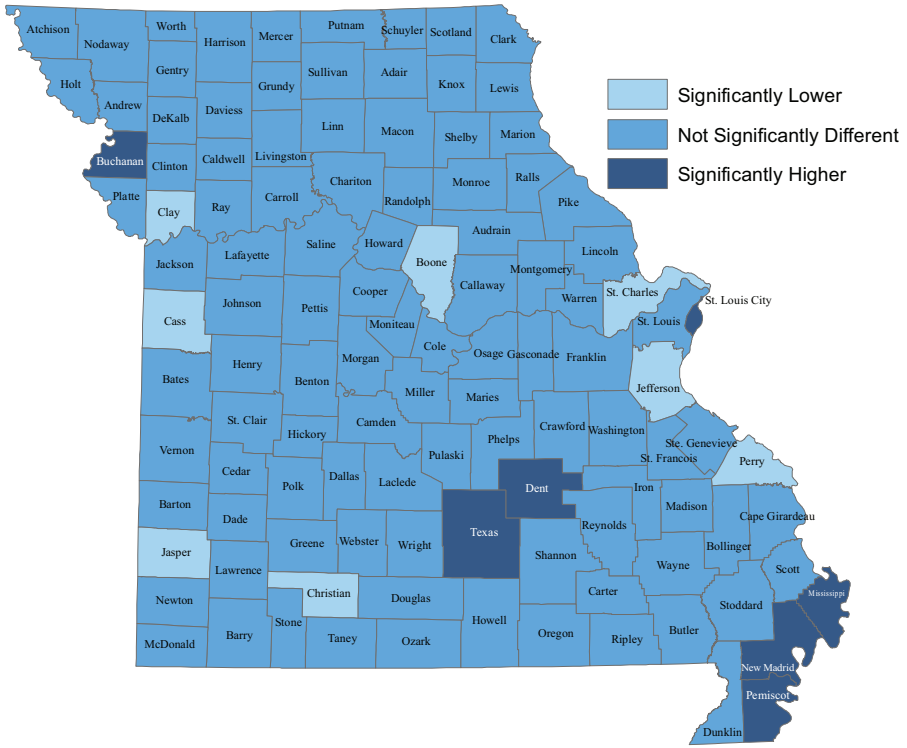
Selected rural and urban counties' rates of infant mortality Missouri, 2007-2017

Rank	County	Rate	Type
1	Worth	1,646.09[a]	Rural
2	Pemiscot	1,345.72	Rural
3	Mississippi	1,190.48	Rural
4	Dent	1,115.62	Rural
5	Oregon	1,093.29[a]	Rural
6	New Madrid	1,069.93	Rural
7	Texas	1,061.89	Rural
8	Ralls	1,040.76[a]	Rural
9	Mercer	1,022.49[a]	Rural
10	St. Louis City	1,007.96	Urban

Crude rates per 100,000 live births

[a] indicates an unreliable/unstable rate based on less than 20 events

Infant mortality Missouri, 2007-2017



MEDICAID AND WIC UTILIZATION

Medicaid is a government funded health care program that assists low-income individuals and families in paying for medical expenses like hospital stays and doctor visits among other benefits. Maternal, infant, and child health are areas where Medicaid utilization, as noted on the infant's birth certificate, is typically high.

Financial reimbursement is an important consideration for the viability of hospitals. Private insurance pays between 100% - 250% more than Medicaid for typical procedures, though different services have different reimbursement rates.[75] Rural hospitals often have higher percentages of Medicaid patients creating a potential financial risk that may contribute to its closing. Ultimately this leads to fewer health care options for rural populations, which is a serious area of concern, as increased access to resources is ***correlated*** with better health outcomes.

Selected rates of maternal Medicaid utilization
Missouri, 2013-2017

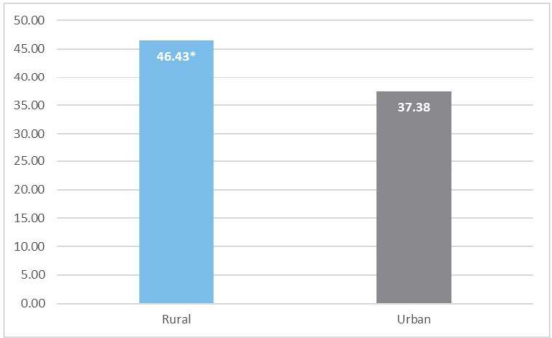
Rank	County	Rate	Type
1	Dunklin	76.93	Rural
2	Pemiscot	75.60	Rural
3	Mississippi	72.36	Rural
4	Ripley	70.99	Rural
5	Oregon	69.12	Rural
6	Wayne	67.23	Rural
7	Iron	67.13	Rural
8	New Madrid	66.89	Rural
9	Shannon	66.67	Rural
10	Reynolds	66.43	Rural
16	St. Louis City	59.68	Urban

Crude rates per 100 live births with known Medicaid status

In Missouri:

- A February 2019 report shows that 882,720 Missourians (or 14% of the population) utilize Medicaid.[76]
- In 2017, about 38% of Missouri women who had a baby utilized Medicaid.
- In Missouri, mothers who utilized Medicaid had nearly double the rates of inadequate prenatal care (63.97% versus 36.03%) during the years 2013-2017, using the Missouri Prenatal Care Adequacy Index.[‡‡]
- Rural mothers utilized Medicaid at a ***significantly*** higher rate than urban mothers (46.43% vs 37.38%) over the 2013-2017 period.
- The rural utilization rates decreased by 13.4% between 2013 and 2017, while urban rates decreased by 7.9% showing a closing, but still ***significant***, gap.
- The 15 highest maternal Medicaid utilization rates are in counties classified as rural. Dunklin County in southeast Missouri has the highest rate at 76.93%.

Rates of maternal Medicaid utilization
Missouri, 2013-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

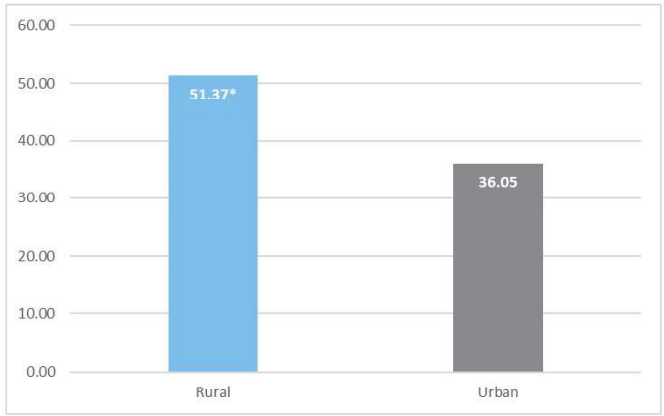
Crude rates per 100 live births with known Medicaid status

[‡‡]Fewer than five prenatal care visits for pregnancies less than 37 weeks gestation, or fewer than eight visits for pregnancies 37 or more weeks, or prenatal care began after the first four months of pregnancy are considered "Inadequate."

WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children) is a government assisted program that provides nutritious food, counseling on healthy eating, breastfeeding support, and health care referrals to low-income women, infants and children at nutritional risk. WIC participation has been linked to a number of positive outcomes, which include increased nutrition, better health care, and higher academic achievement.[77] WIC is utilized in Missouri in the following ways:

- In 2017, about 38% of Missouri mothers who have a baby participate in WIC in 2013-2017, as noted on the infants' birth certificates.
- Over half (51.37%) of rural mothers participated in WIC, this is a ***significantly*** larger percentage than their urban counterparts (36.05%).
- Rural Missouri counties saw a 15.4% decrease in WIC utilization 2013-2017 compared to an 18.4% decrease in urban counties. However, there is still a sizeable difference between rural and urban counties, with rural citizens being more likely to utilize WIC in 2017 (47.4% versus 32.4%).
- When ranked high to low, the 40 Missouri counties with the highest WIC utilization rates are all rural and the top ten all have WIC utilization above or near 70%.

Rate of maternal WIC utilization Missouri, 2013-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

Crude rates per 100 live births with known Medicaid status

Selected rural and urban counties maternal WIC utilization rates Missouri, 2013-2017

Rank	County	Rate	Type
1	Dunklin	76.93	Rural
2	Pemiscot	75.60	Rural
3	Mississippi	72.36	Rural
4	Ripley	70.99	Rural
5	Oregon	69.12	Rural
6	Wayne	67.23	Rural
7	Iron	67.13	Rural
8	New Madrid	66.89	Rural
9	Shannon	66.67	Rural
10	Reynolds	66.43	Rural
16	St. Louis City	59.68	Urban

Crude rates per 100 live births with known WIC status

For more information on how WIC operates, see "Policy Basics: Special Supplemental Nutrition Program for Women, Infants, and Children," Center on Budget and Policy Priorities, updated February 6, 2017.

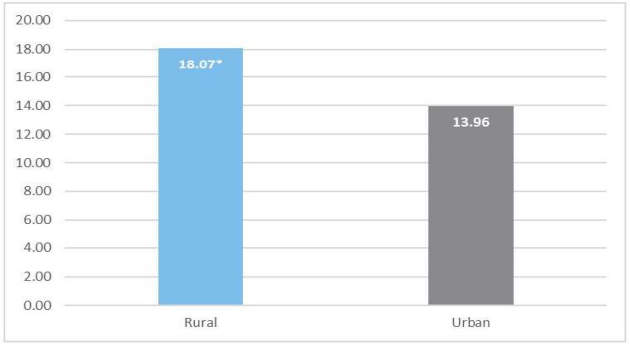
Teenage Pregnancy

In 2017, a total of 194,377 babies were born to women ages 15-19, setting a record low for U.S. teens.[78] These decreases are partially due to lower rates of sexual activity among the teenage population and an increased use of birth control for those who are sexually active.[79] Over the years more resources have gone into helping educate teenage girls and boys about family planning and reproductive health.[80] Adolescent pregnancy can result in immediate and long term health, economic, and social consequences for mothers and infants.[81] Rates in rural areas remain higher than in urban areas of Missouri, which could signal that rural teenage girls' ability to access birth control is far less than that of teen girls living in urban areas[82], combined with lack of availability of clinical services, poverty, and educational opportunities.[83]

In Missouri:

- The teenage pregnancy rate has been steadily decreasing, going from 18.0 in 2013 to 13.2 in 2017.

Teenage pregnancy rates Missouri, 2013-2017



Crude rates per 1,000 women age 15-19

*indicates a rate that is statistically significantly higher, using 95% confidence intervals

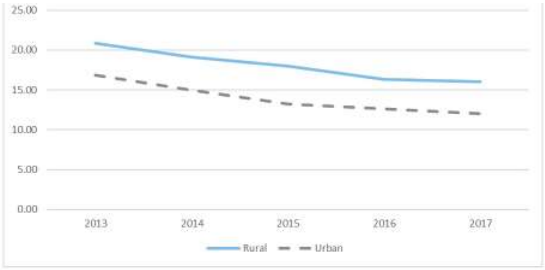
- Rural counties in Missouri had a ***statistically significantly*** higher rate of teenage pregnancies compared to urban counties for 2013 to 2017 (18.07 for rural and 13.96 for urban).
- Nine of the top ten counties for teen pregnancy are rural and the top five are in southeast Missouri.

Selected rural and urban counties' teenage pregnancy county Missouri, 2013-2017

Rank	County	Rate	Type
1	Pemiscot	31.61	Rural
2	Dunklin	30.22	Rural
3	Mississippi	30.06	Rural
4	Ripley	27.16	Rural
5	New Madrid	26.72	Rural
6	McDonald	25.47	Rural
7	Sullivan	25.27	Rural
8	Washington	24.85	Rural
9	St. Louis City	24.77	Urban
10	Laclede	24.48	Rural

Crude rates per 1,000 women age 15-19

Teenage pregnancy rates Missouri, 2013-2017



Crude rates per 1,000 women age 15-19

Breastfeeding

The positive infant and maternal health outcomes, as well as the economic benefits, makes breastfeeding the most beneficial feeding choice, if possible.[84,85] In Missouri, fewer rural women breastfeed than their urban sisters:

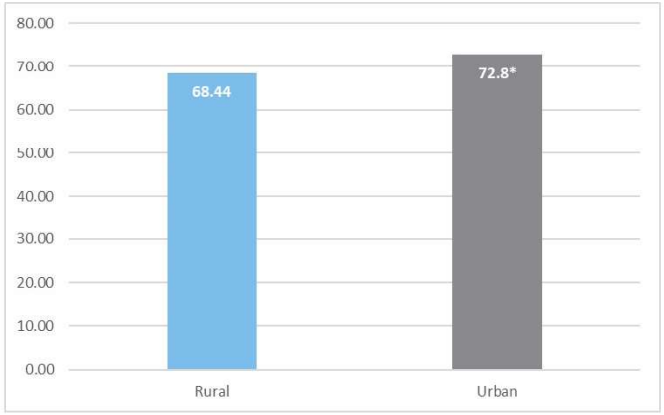
- Over the past five years (2013-2017), 68.44% of rural mothers utilizing WIC services breastfed, while 72.75% of urban WIC mothers breastfed, a ***significant*** difference.
- There has been a noticeable 7.7% increase in breastfeeding across Missouri in the years between 2013 and 2017.
- The ten lowest breastfeeding rates in Missouri all feature rural counties. Only 33% of Pemiscot County mothers (who utilize WIC services) breastfeed, which was the lowest rate in the state during years 2013-2017.

Selected rural and urban counties' ever breastfed rates Missouri, 2013-2017

Rank	County	Rate	Type
1	Pemiscot	33.00	Rural
2	Mississippi	37.52	Rural
3	New Madrid	38.78	Rural
4	Dunklin	46.28	Rural
5	Clark	47.55	Rural
6	Perry	49.54	Rural
7	Washington	52.72	Rural
8	Ripley	54.91	Rural
9	Scotland	55.30	Rural
10	Oregon	56.18	Rural
17	Cape Girardeau	59.37	Urban

Crude rate per 100 known breastfeeding status of WIC mothers

WIC mothers, ever breastfed Missouri, 2013-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

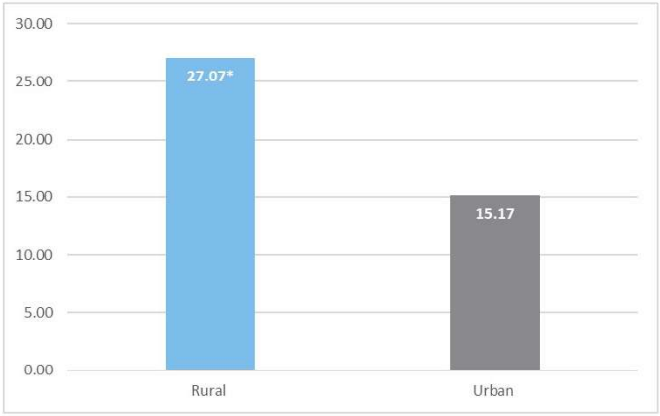
Crude rates per 100 WIC pregnancies with known smoking status

Maternal Smoking

Maternal smoking adversely affects infant health. In Missouri, more in-depth education regarding the potential consequences to both maternal and infant health could be beneficial in preventing the higher rates of maternal smoking. WIC data is often used as a proxy for the entire maternal population, due to the high quality of the data and because mothers often participate both pre- and post-pregnancy. The data from both sides of the pregnancy allows for a more thorough picture of the maternal experience. Recent findings include:

- Rural expectant mothers who utilize WIC have smoking rates nearly 80% higher than their urban counterparts between 2013-2017 (27.07% vs 15.17%).
- There has been a slow decrease in maternal smoking between 2013 and 2017. Rural mothers enrolled in WIC smoke 12.7% less than they did five years ago and their urban counterparts smoke 16.9% less.
- Each of the ten counties with the highest rates of maternal smoking by WIC participants are rural. Caldwell County in northwest Missouri has the highest rate at 41.14%. In fact, the highest 52 rates for maternal WIC smoking are all rural. Buchanan County, ranked 53rd had the highest urban rate at 28.53%

Smoking rate of WIC mothers during the last three months of pregnancy
Missouri, 2013-2017



*indicates a rate that is ***statistically significantly*** higher, using 95% confidence intervals

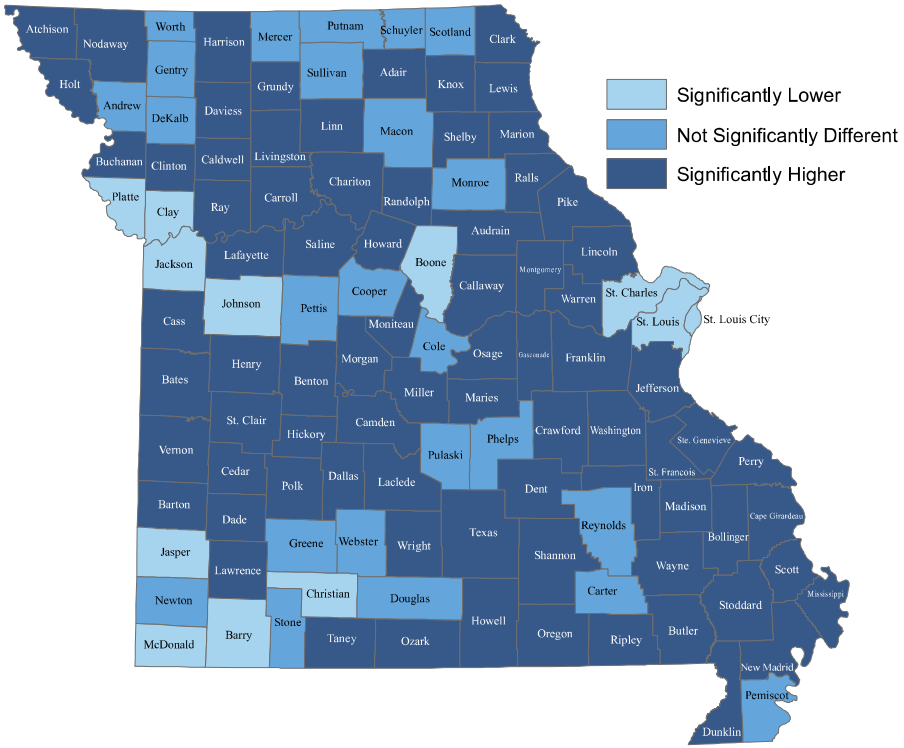
Crude rates per 100 WIC pregnancies with known smoking status

Selected rural and urban counties' maternal smoking rates 2013-2017

Rank	County	Rate	Type
1	Caldwell	41.14	Rural
2	Osage	37.97	Rural
3	Howard	36.65	Rural
4	Livingston	35.85	Rural
5	Madison	35.65	Rural
6	Crawford	35.29	Rural
7	Clark	35.14	Rural
8	Iron	35.00	Rural
9	Holt	34.94	Rural
10	Lafayette	34.81	Rural
53	Buchanan	28.53	Urban

Crude rates per 100 WIC pregnancies with known smoking status

Smoking rate of WIC mothers during the last three months of pregnancy Missouri, 2013-2017



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. However, 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 vast.

Specialty Services

The lack of hospital and specialty services in rural Missouri is one of the contributors to the higher death rates seen in the Health Status section of this report. Given the lower incomes and increased age of rural residents, the lack of specialty services can mean no access to or less consistent care for vulnerable populations. Rural Missourians generally have to travel long distances to obtain specialty care, such as cardiology, oncology, and nephrology. Additionally, few rural communities have access to the specialty emergency care necessary to save lives when minutes matter.

No rural Missouri counties have a Level 1 Trauma Center, Pediatric Trauma Center, Stroke Center, or STEMI Center as this level of care is only available in urban Missouri. STEMI, or ST-Elevation Myocardial Infarction, is the term used for a type of serious heart attack where one of the major arteries that supply oxygen and blood to the heart is blocked.

Designated hospitals: rural vs. urban

	LEVEL 1		LEVEL 2		LEVEL 3		LEVEL 4	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Trauma Center	0	12	0	9	5	4	n/a	n/a
Stoke Center	0	11	2	23	21	5	3	0
STEMI Center	0	21	5	18	7	0	7	0

Source: https://health.mo.gov/living/healthcondiseases/chronic/tcdsystem/designatedhospitals.php

Rural Hospitals

Rural hospitals are a crucial component of a community's wellbeing. In addition to providing primary, acute, and long-term care, they are often a major employer and natural leader in community-based health programs and initiatives. However, low reimbursement rates from Medicare, Medicaid, and insurance; increased regulation; reduced patient volumes; and unpaid patient medical bills have caused many rural hospitals to struggle financially.[86]

Since July of 2011, 14 General Acute Care Hospitals in Missouri have closed, eight of which were located in rural counties. Since the last Health in Rural Missouri was published in 2017, four rural hospitals have closed increasing the number of rural counties without a hospital to 55.

As of the writing of this report, Missouri has 126 licensed general acute care hospitals, 46.8% (59 total) are located in rural counties. These hospitals provide 1.84 beds per 1,000 residents in rural counties while urban counties have 3.96 beds per 1,000 residents.

Critical Access Hospitals (CAHs)

Critical Access Hospital is a special designation designed to improve access to health care in rural areas while reducing the financial vulnerability of rural hospitals. In order to be designated as a CAH, a hospital must:

- Have 25 or less acute care inpatient beds
- Be more than 35 miles from another hospital
- Have an average length of stay of no more than 96 hours for acute care patients
- Provide 24/7 emergency care services[87]

Missouri has 36 CAH's, 32 of which are located in rural counties.

Federally Qualified Health Centers

One in six rural residents gets their essential services, including primary care, behavioral health, and dental care, from Federally Qualified Health Centers. Deemed a "safety net" provider, FQHCs must meet the following qualifications in order to qualify:

- Offer services regardless of the person's ability to pay
- Establish a sliding fee discount program
- Be a nonprofit or public organization
- Be community-based, with the majority of its governing board of directors composed of patients
- Serve a medically underserved area or population
- Provide comprehensive primary care services
- Have an ongoing quality assurance program[88]

Missouri has 29 FQHCs, 23 of which have at least one location in a rural county.

Rural Health Clinics

Rural Health Clinics (RHCs) are public, nonprofit, or for-profit healthcare facilities intended to increase access to primary care in rural areas. RHCs are required to:

- Be located in a rural, underserved area
- Be staffed at least 50% of the time with a Nurse Practitioner (NP), Physician Assistant (PA), or Certified Nurse Midwife (CNM)
- Have a team approach of physicians working with non-physician providers such as NPs, PAs, or CNMs
- Provide outpatient primary care services
- Provide basic laboratory services[89]

Missouri has 356 Rural Health Clinics, the most than any other state.[90]

Health Professional Shortage Area (HPSA)

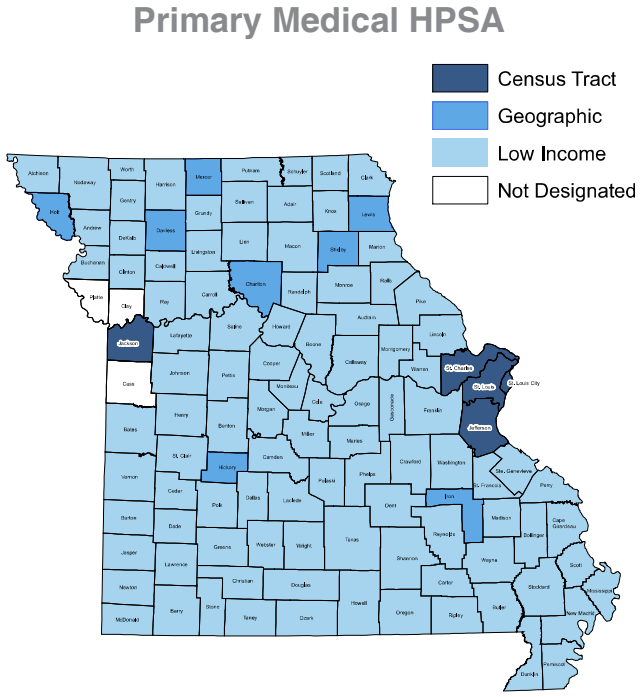
Health Professional Shortage Area (HPSA) is a designation that indicates that an area does not have enough health care resources to meet the need of its residents. HPSAs can occur when there are too few, if any, providers in an area; when there are more patients than providers can see; or when transportation barriers prevent patients from reaching providers. HPSAs are based on geography (a county, defined service area, or census tract), population-based (including specific population groups such as low income or Medicaid eligible), or facility-based (including correctional facilities, state mental hospitals, Federally Qualified Health Centers, and Auto-HPSAs).

More than 35 federal programs use HPSA designations to determine if a facility, program, or area is eligible for federal funding.[91] Primary medical care, dental care, and mental health care each have unique HPSA designations.[92] Large sections of Missouri, especially rural Missouri, are designated HPSAs due to low-income populations.

Primary Medical Care

84 of the 106 Primary Medical Care HPSAs in Missouri are in rural areas.

Primary Medical HPSAs are defined using a ratio between the general population and the number of 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); as well as a wide range of other factors such as the percent of the population below 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.

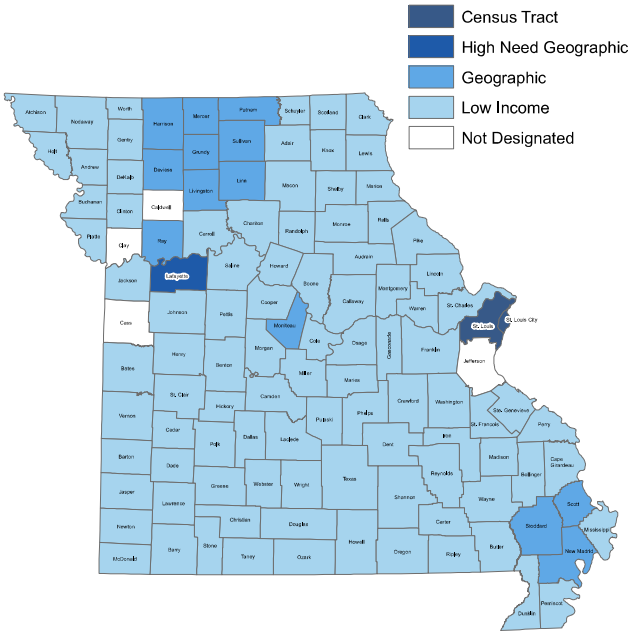


Primary Care Mental Health

18 of the 23 Mental Health HPSAs are in rural areas of Missouri.

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.

Mental Health HPSA

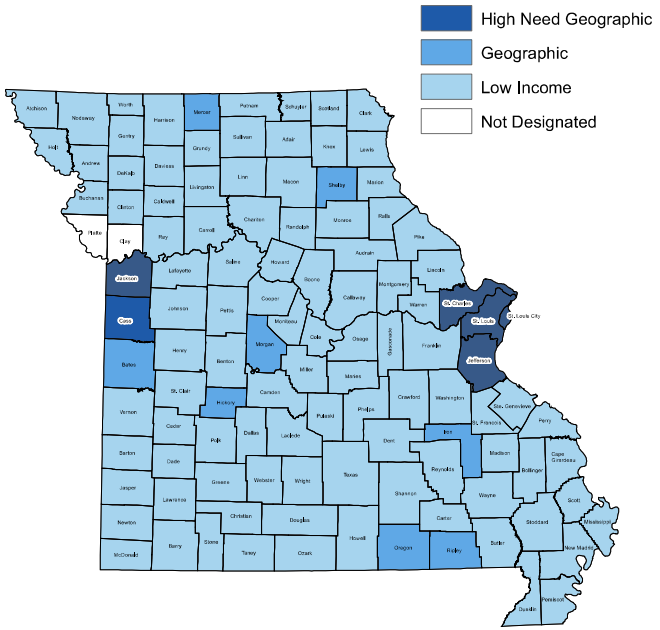


Primary Care Dentists

79 of the 95 Dental Health HPSAs in Missouri are in rural areas.

Dental Health HPSAs are designated using a ratio between the general population and the number of FTE licensed General, or Pediatric, Doctors of Dental Surgery (DDS) or Doctors of Dental Medicine (DMD), the percent of the population below 100 percent of the Federal Poverty Level, the water fluoridation status, and the travel time to the nearest source of care outside the HPSA designation's given service area.

Dental HPSA



OFFICE OF RURAL HEALTH AND PRIMARY CARE

The State Office of Rural Health is located within the Missouri Department of Health and Senior Services, Office of Rural Health and Primary Care, 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:

State Office of Rural Health

The Missouri Office of Rural Health's (MORH) purpose is to support the health of rural communities. While health care providers and systems are the primary recipients of MORH's services, all members of the rural community are eligible as they too are necessary partners in the effort to protect and improve rural health.

A primary function of the MORH is to collect and disseminate information and resources to rural areas. The MORH completes this function using a variety of mechanisms including presentations, print, and web-based media. The MORH maintains and continuously updates a web page serving as a resource for rural Missouri communities, organizations, and providers. The webpage has a wealth of information including, but not limited to, toolkits, infographics and fact sheets, special reports, rural health policy announcements, and grant opportunities.

Some of the "special topic" sections include:

- Rural Hospitals
- Rural Health Clinics
- Rural Veteran Mental Health
- Rural Health Information Center and
- Rural Health Training and Webinars

The MORH's website can be found at health.mo.gov/living/families/ruralhealth/.

MORH also regularly updates its blog, the "Rural Spotlight" with news from its federal partners including information about funding opportunities, federal policy updates, research updates, and informational webinars and resources, among many others.

The Rural Spotlight can be found at ruralhealthinfocenter.health.mo.gov.

Additionally, MORH operates two HRSA-funded programs specifically designed to strengthen the viability of critical access hospitals while improving their quality of care.

1. The Small Hospital Improvement Program (SHIP) provides funds for small rural hospitals for a variety of operational projects. The funds assist eligible hospitals in meeting data system requirements established under the Medicare Program and assist hospitals to improve health care quality and value. SHIP also provides funds to purchase hardware, software, and telemedicine equipment.
2. The Medicare Rural Hospital Flexibility Program (FLEX) focuses on continuous quality improvements to improve patient care, financial practices, and hospital operations. Beginning in 2019, FLEX will also aid hospitals in special population health projects in their communities.

The Rural Spotlight can be found at ruralhealthinfocenter.health.mo.gov.

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
- Participate in the National Health Service Corps site visits with HRSA
- Administration of the Conrad State 30/J-1Visa Waiver Program and National Interest Waiver Program
- The provision of technical assistance to entities interested in expanding access to primary care services

Health Professional Student Loan and Loan Repayment Program

The Office of Rural Health and Primary Care implements programs that directly address the shortage of primary health care providers statewide.

The Primary Care Resource Initiative for Missouri (PRIMO) is a competitive state program that awards forgivable loans to Missouri residents attending a Missouri institution pursing primary care training leading to Missouri licensure. The awardees receive funding in exchange for services in designated underserved areas in Missouri experiencing shortages of mental health, medical, and dental professionals, upon completion of training.

The State Loan Repayment Program (SLRP) is a competitive federal grant program that allocates funds to states to award funding for educational loan repayment to Missouri licensed practicing psychiatry, medical, and dental health professionals in exchange for services in Missouri areas with a shortage of mental health, medical, and dental professionals.

The Nurse Student Loan (NSL) Program is a competitive state program that awards funding to Missouri residents attending a Missouri institution pursuing education leading to careers as Missouri licensed practical nurses or professional nurses. The awardees receive funding in exchange for services in designated underserved areas in Missouri experiencing nursing shortages, upon completion of training.

The Nurse Loan Repayment Program (NLRP) is a competitive state program that awards funding for educational loan repayment to Missouri licensed practicing nurses in exchange for services in designated underserved areas in Missouri experiencing nursing shortages.

RECOMMENDATIONS

As demonstrated throughout this report, rural Missourians face many challenges related to their health. Overcoming the long-standing inequality in health between rural and urban Missourians will require a systematic approach. In light of this, the Missouri State Office of Rural Health makes the following recommendations.

State regulations and policies need to continue to consider the unique qualities that define rural health as well as the particularly difficult healthcare challenges that impact rural health systems. Rural areas present a unique set of challenges that impacts health. Limited providers, area economics, geographical barriers, lack of transportation resources, and limited internet infrastructure are just a small selection of factors that disproportionately impact rural healthcare delivery. Small rural hospitals or providers characteristically have limited resources, experience payer reimbursement issues unique to rural practice, and serve a small population characterized by poorer health, lower education levels, lack of insurance, and lower levels of income. While urban health facilities face many unique challenges of their own, regulations and policies that may be good for providers in large urban areas may not be good for their smaller rural counterparts.

Access to health care services needs to continue to improve, or at the very least be sustained, throughout rural Missouri. As described in the Health Care in Rural Missouri section of this report, access to health care services is limited for rural Missourians, even if an individual has health insurance, adequate transportation, and adequate 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 of Missourians 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.

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Kimberly Patke.

RURAL HEALTH PARTNERS

Partnerships are essential to any effort targeting health improvements in rural Missouri. MORH is fortunate to have the crucial partnerships needed to make an impact in rural health. Internal DHSS partners include but are not limited to the Bureau of Health Care Analysis and Data Dissemination, the Office of Epidemiology, the Office of Dental Health, the Bureau of Emergency Medical Services, the Bureau of Cancer and Chronic Disease, the Office of Minority Health, the Section for Women's Health, the Bureau of Hospital Standards, the Bureau of Narcotics and Dangerous Drugs, and the Office of Public Information. External partners include the Missouri Hospital Association, the Missouri Primary Care Association, the Missouri Association for Rural Health Clinics, the Missouri Rural Health Association, Missouri Area Health Education Centers, the Missouri Dental Association, the Department of Social Services, the Department of Mental Health, the United States Department of Agriculture, the Centers for Medicare & Medicaid Services, the Health Resources and Services Administration Office of Rural Health Policy, the National Organization of State Offices of Rural Health, the University of Missouri, the Foundation for Health Leadership & Innovation, and the Rural Recruitment and Retention Network.

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; (l. to r.) Pamela Thompson, Emily Meneely, Lorin Fahrmeier and Joshua Gregg.

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) MOPHIMS (Missouri Public Health Information Management System) website, which includes the Community Data Profile and MICA (Missouri Information for Community Assessment) tools. Users can easily create different types of tables, graphs, charts and maps pertaining to health indicators.

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

Information about the MOPHIMS system, opportunities for free health data training, and online versions of our course materials can be found on the Health Data Training webpage at https://health.mo.gov/data/mica/MICA/healthdatatraining.html.

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 or email MOPHIMSUserGroup@health.mo.gov.

For more information regarding Community Data Profiles and MICAs:

573-751-6285
MOPHIMSUserGroup@healthmo.gov

Photo courtesy of the Missouri Department of Agriculture's Focus on Missouri Agriculture Photo Contest; Donna Gordon.

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

2007-2017 Age-Adjusted Death Rates per 100,000 Population	Rural Number	Rural Rate	Urban Number	Urban Rate
All causes	*249,583*	*868.83*	*378,015*	*785.21*
Males	127,915	1,018.05	185,909	934.78
Females	121,668	740.06	192,106	667.34
Under 15	2,916	66.98	5,054	59.85
15 to 24	2,704	87.45	5,278	87.19
25 to 44	10,343	195.34	18,753	161.88
45 to 64	48,812	795.37	75,654	660.87
65 and Over	184,805	4,790.66	273,260	4,607.28
Heart disease	*65,227*	*222.18*	*90,913*	*185.87*
Males	34,202	271.52	46,171	234.63
Females	31,025	179.61	44,742	148.99
Under 15	67	1.54	90	1.07
15 to 24	76	2.46	136	2.25
25 to 44	1,471	27.78	2,220	19.16
45 to 64	12,025	195.94	16,887	147.52
65 and Over	51,588	1,337.30	71,576	1,206.80
Cancer	*55,498*	*188.04*	*84,098*	*173.62*
Males	30,353	226.63	43,003	208.79
Females	25,145	158.37	41,095	149.48
Under 15	108	2.48	181	2.14
15 to 24	86	2.78	202	3.34
25 to 44	1,209	22.83	2,097	18.10
45 to 64	15,047	245.18	23,689	206.93
65 and Over	39,047	1,012.21	57,929	976.71

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

2007-2017 Age-Adjusted Death Rates per 100,000 Population	Rural Number	Rural Rate	Urban Number	Urban Rate
Chronic lower respiratory disease (CLRD)	*18,346*	*61.58*	*21,937*	*45.83*
Males	9,321	72.15	9,757	50.10
Females	9,025	54.51	12,180	43.15
Under 15	13	0.30@	45	0.53
15 to 24	15	0.49@	29	0.48
25 to 44	141	2.66	189	1.63
45 to 64	2,979	48.54	3,201	27.96
65 and Over	15,198	393.97	18,472	311.45
Stroke	*13,369*	*45.40*	*20,227*	*41.61*
Males	5,533	44.92	7,968	41.78
Females	7,836	44.96	12,259	40.80
Under 15	20	0.46	44	0.52
15 to 24	22	0.71	21	0.35
25 to 44	208	3.93	320	2.76
45 to 64	1,486	24.21	2,501	21.85
65 and Over	11,633	301.56	17,341	292.38

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

2007-2017 Age-Adjusted Death Rates per 100,000 Population	Rural Number	Rural Rate	Urban Number	Urban Rate
Diabetes	*6,583*	*22.61*	*9,193*	*19.00*
Males	3,410	26.17	4,814	23.38
Females	3,173	19.57	4,379	15.63
Under 15	4	0.09@	5	0.06@
15 to 24	19	0.61@	38	0.63
25 to 44	208	3.93	334	2.88
45 to 64	1,603	26.12	2,474	26.12
65 and Over	4,749	123.11	6,342	106.93
Kidney disease	*5,969*	*20.19*	*8,748*	*18.05*
Males	2,915	23.64	4,290	22.30
Females	3,054	17.65	4,458	15.22
Under 15	8@	0.18	15@	0.18
15 to 24	10@	0.32	13@	0.21
25 to 44	78	1.47	150	1.29
45 to 64	706	11.50	1,369	11.96
65 and Over	5,167	133.94	7,201	121.41

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

2007-2017 Age-Adjusted Death Rates per 100,000 Population	Rural Number	Rural Rate	Urban Number	Urban Rate
Pneumonia and influenza	*5,842*	*19.90*	*8,269*	*16.95*
Males	2,658	22.20	3,753	20.17
Females	3,184	18.35	4,516	14.92
Under 15	40	0.92	48	0.57
15 to 24	23	0.74	23	0.38
25 to 44	123	2.32	189	1.63
45 to 64	658	10.72	920	8.04
65 and Over	4,998	129.56	7,089	119.52
Suicide	*3,969*	*17.37*	*6,433*	*14.49*
Males	3,233	28.39	4,999	23.65
Females	736	6.56	1,434	6.23
Under 15	30	0.69	59	0.70
15 to 24	464	15.01	842	13.91
25 to 44	1,316	24.85	2,178	18.80
45 to 64	1,411	22.99	2,435	21.27
65 and Over	748	19.39	919	15.49
Alzheimer's disease	*8,969*	*30.02*	*13,273*	*26.93*
Males	2,811	24.62	3,874	22.21
Females	6,158	33.14	9,399	29.46
Under 15	0	0.00	0	0.00
15 to 24	0	0.00	0	0.00
25 to 44	1	0.02@	2	0.02@
45 to 64	88	1.43	137	1.20
65 and Over	8,879	230.17	13,134	221.44

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

2007-2017 Age-Adjusted Death Rates per 100,000 Population	Rural Number	Rural Rate	Urban Number	Urban Rate
Unintentional injury	*13,482*	*56.59*	*21,104*	*46.73*
Males	8,425	73.70	12,957	63.11
Females	5,057	39.80	8,147	31.84
Under 15	670	15.39	816	9.66
15 to 24	1,502	48.57	2,034	33.60
25 to 44	3,353	63.33	5,433	46.90
45 to 64	3,471	56.56	5,484	47.91
65 and Over	4,486	116.29	7,334	123.65
*Opioid overdose**	*1,605*	*7.75*	*5,292*	*12.32*
Males	990	9.50	3,527	16.82
Females	615	5.90	1,765	7.96
Under 15	7	0.16@	16	0.19@
15 to 24	191	6.18	623	10.29
25 to 44	839	15.85	2,632	22.72
45 to 64	534	8.70	1,901	16.61
65 and Over	34	0.88	120	2.02

Source: Death MICA

* Opioid overdose mortality data is derived using death certificate data and calculated by the Bureau of Health Care Analysis and Data Dissemination

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

GLOSSARY

Adverse childhood experiences (ACEs)

Adverse Childhood Experiences, or ACEs, are potentially traumatic events that occur in childhood and can undermine a sense of safety, stability, or the ability to bond. Growing up in a household with violence, abuse or neglect, substance misuse, mental health problems, parental separation, or where a member has been incarcerated are some examples of ACEs. ACEs are linked to risky health behaviors, chronic health conditions, and early death; as the number of ACEs increases, so does the risk for these outcomes. Adapted from https://www.cdc.gov/.

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.

Correlation

A correlation is a relationship or connection between variables and how much they relate to one another. However, additional investigation is always needed before accepting that one variable causes or influences another. Adapted from https://mysidewalk.com/.

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.

Health Professional Shortage Area (HPSA)

Health Professional Shortage Area is discussed at length on page 68.

Medication-assisted treatment (MAT):

Medicated-Assisted Treatment (MAT) is the use of FDA-approved medications, in combination with counseling and behavioral therapies, in the treatment of substance use disorders. MAT is used in the treatment of alcohol, tobacco, and opioid use disorders. Adapted from SAMHSA.

Metropolitan Statistical Area (MSA)

An MSA consists of one or more counties that contain a city of 50,000 or more inhabitants, or contain a Census Bureau-defined urbanized area and have a total population of at least 100,000. Examples include areas surrounding St Joseph, Kansas City, Jefferson City, Cape Girardeau, Joplin, and Springfield. Adapted from U. S. Census Bureau.

Missouri County Level Study (CLS)

The Missouri County Level Study is a Missouri specific, telephone-based survey that generates county and region estimates on health behaviors and outcomes. It has been conducted by the Missouri Foundation for Health in collaboration with the Department of Health and Senior Services as funding allows, but in the past has been approximately every five years.

Ranks

Rural and urban county ranks are reported in some sections of this report. This report is structured so that "1" always indicates the worst rate, regardless of whether the worst rate is the highest or lowest value.

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.

Underemployment

Underemployment is term that indicates "involuntary part-time employment, poverty-wage employment, and insecure employment (i.e., intermittent unemployment)."Underemployment includes situations where the social status and income of a job does not match an employee's education, abilities, and skills. Adapted from Healthy People 2020.

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.

REFERENCES

1. Office of Governor Michael L. Parson. (December 4, 2018). Governor Mike Parson Hosts Rural Healthcare Summit in Bolivar [Press Release]. Retrieved from: https://governor.mo.gov/press-releases/archive/governor-mike-parson-hosts-rural-healthcare-summit-bolivar.
2. State of Missouri. Strategic Management Priorities. https://strategicchange.mo.gov/agency/department-health-and-senior-services. Accessed August 29, 2019.
3. State of Missouri. Strategic Management Priorities. https://strategicchange.mo.gov/agency/department-health-and-senior-services. Accessed August 29, 2019.
4. United States Census Bureau. Facts for Features: Hispanic Heritage Month 2017. https://www.census.gov/newsroom/facts-for-features/2017/hispanic-heritage.html. Accessed May 30, 2019.
5. U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk. Accessed July 24, 2019.
6. County Health Rankings and Roadmaps. Percent not proficient in English. http://www.countyhealthrankings.org/app/missouri/2017/measure/factors/59/data. Accessed May 30, 2019.
7. American College of Physicians. Racial and Ethnic Disparities in Health Care. https://www.acponline.org/acp_policy/policies/racial_ethnic_disparities_2010.pdf. Accessed May 30, 2019.
8. World Health Organization. About social determinants of health. https://www.who.int/social_determinants/sdh_definition/en/. Accessed May 10, 2019.
9. Healthy People 2020. Social determinants of health. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health. Accessed July 26, 2019.
10. Healthy People 2020. Social determinants of health. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health. Accessed June 14, 2019.
11. Healthy People 2020. Poverty. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health/interventions-resources/poverty. Accessed May 22, 2019.
12. Goodman J. and Conway C. Poor Health: When Poverty Becomes a Disease. https://www.ucsf.edu/news/2016/01/401251/poor-health-when-poverty-becomes-disease. Accessed May 22, 2019.
13. Goodman J. and Conway C. Poor Health: When Poverty Becomes a Disease. https://www.ucsf.edu/news/2016/01/401251/poor-health-when-poverty-becomes-disease. Accessed May 22, 2019.
14. Healthy Children. Poverty and Child Health. https://www.healthychildren.org/English/family-life/Community/Pages/Poverty-and-Child-Health.aspx. Accessed May 31, 2019.
15. Food Research and Action Center. School Meal Eligibility and Reimbursements. http://frac.org/school-meal-eligibility-reimbursements. Accessed May 29, 2019.
16. United States Department of Agriculture. National School Lunch Program. https://www.ers.usda.gov/topics/food-nutrition-assistance/child-nutrition-programs/national-school-lunch-program/. Accessed May 29, 2019.

17. Walter, Jonathan. Poverty Among Seniors Getting Harder to Ignore. https://www.governing.com/topics/health-human-services/gov-poverty-among-elderly-harder-to-ignore.html. Accessed May 31, 2019.

18. World Health Organization. The Determinants of Health. https://www.who.int/hia/evidence/doh/en/. Accessed May 20, 2019.

19. Health Affairs. Health, Income, and Poverty: Where We Are and What Could Help. https://www.healthaffairs.org/do/10.1377/hpb20180817.901935/full/. Accessed May 20, 2019.

20. Urban Institute. Center on Society and Health. How are Income and Wealth Linked to Health and Longevity? https://www.urban.org/sites/default/files/publication/49116/2000178-How-are-Income-and-Wealth-Linked-to-Health-and-Longevity.pdf. Accessed May 20, 2019.

21. Healthy People 2020. Access to Health Services. https://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services. Accessed May 16, 2019.

22. United States Census Bureau. Health Insurance Coverage in the United States: 2017. https://www.census.gov/library/publications/2018/demo/p60-264.html. Accessed May 17, 2019.

23. Center on Budget and Policy Priorities. Chart Book: The Legacy of the Great Recession. https://www.cbpp.org/research/economy/chart-book-the-legacy-of-the-great-recession. Accessed June 28, 2019.

24. Centers for Disease Control and Prevention. Impact of the Built Environment on Health. https://www.cdc.gov/nceh/publications/factsheets/impactofthebuiltenvironmentonhealth.pdf. Accessed June 21, 2019.

25. Centers for Disease Control and Prevention. Impact of the Built Environment on Health. https://www.cdc.gov/nceh/publications/factsheets/impactofthebuiltenvironmentonhealth.pdf. Accessed June 21, 2019.

26. United States Census Bureau. Average One-Way Commuting Time by Metropolitan Areas. https://www.census.gov/library/visualizations/interactive/travel-time.html. Accessed May 28, 2019.

27. Schaefer, Annette. Commuting Takes Its Toll. https://www.scientificamerican.com/article/commuting-takes-its-toll/?redirect=1 . Accessed May 28, 2019.

28. Healthy People 2020. Healthy People: Crime and Violence. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health/interventions-resources/crime-and-violence . Accessed May 22, 2019.

29. Macdonald, Gordon. Violence and Health: The Ultimate Public Health Challenge. https://academic.oup.com/heapro/article/17/4/293/606998 . Accessed May 22, 2019.

30. Missouri State Highway Patrol. Uniform Crime Reporting (UCR) Statistical Query. https://www.mshp.dps.missouri.gov/MSHPWeb/SAC/data_and_statistics_ucr_query_backup.html. Accessed May 13, 2019.

31. Brooks EL, Preis SR, Hwang SJ, Murabito JM, Benjamin EJ, Kelly-Hayes M, Sorlie P, Levy D. Health insurance and cardiovascular disease risk factors. The American journal of medicine. 2010 Aug 1;123(8):741-7.

32. United States Census Bureau, Small Area Health Insurance Estimates. https://www.census.gov/programs-surveys/sahie.html. Accessed May 4, 2019.

33. Cristancho S, Garces DM, Peters KE, Mueller BC. Listening to rural Hispanic immigrants in the Midwest: a community-based participatory assessment of major barriers to health care access and use. Qualitative health research. 2008 May;18(5):633-46.

34. Goldman D, Smith JP. The increasing value of education to health. Social science & medicine. 2011 May 1;72(10):1728-37.

35. Baker DP, Leon J, Smith Greenaway EG, Collins J, Movit M. The education effect on population health: a reassessment. Population and development review. 2011 Jun;37(2):307-32.

36. U.S. Census Bureau. Table S1501. 2013-2017 American Community Survey 5-Year Estimates. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk. Accessed May 18, 2019.

37. Healthy People 2020. Determinants of Health. https://www.healthypeople.gov/2020/about/foundation-health-measures/Determinants-of-Health. Accessed June 21, 2019.

38. Centers for Disease Control and Prevention. What is health literacy? https://www.cdc.gov/healthliteracy/learn/index.html. Accessed June 21, 2019.

39. Murphy SL, Xu JQ, Kochanek KD, Arias E. Mortality in the United States, 2017. NCHS Data Brief, no 328. Hyattsville, MD: National Center for Health Statistics. 2018.

40. CDC Newsroom. Rural Americans at higher risk of death from five leading causes. Centers for Disease Control and Prevention. https://www.cdc.gov/media/releases/2017/p0112-rural-death-risk.html. Accessed May 29, 2019.

41. American Heart Association. What Your Cholesterol Levels Mean. https://www.heart.org/en/health-topics/cholesterol/about-cholesterol/what-your-cholesterol-levels-mean. Accessed June 18, 2019.

42. Healthy People 2020. Cancer Objectives C-1. https://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives. Accessed June 4, 2019.

43. American Cancer Society. Cancer Screening Guidelines. https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines.html. Accessed June 20, 2019.

44. American Cancer Society. American Cancer Society Guidelines for the Early Detection of Cancer. https://www.cancer.org/healthy/find-cancer-early/cancer-screening-guidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html. Accessed June 20, 2019.

45. Centers for Disease Control and Prevention. Smoking and COPD. https://www.cdc.gov/tobacco/campaign/tips/diseases/copd.html. Accessed June 20, 2019.

46. American Lung Association. The Impact of E-Cigarettes on the Lung. https://www.lung.org/stop-smoking/smoking-facts/impact-of-e-cigarettes-on-lung.html. Accessed June 20, 2019.

47. Centers for Disease Control and Prevention. State Tobacco Activities Tracking and Evaluation (STATE) System. https://www.cdc.gov/statesystem/cigaretteuseadult.html. Accessed June 20, 2019.

48. Missouri Department of Health and Senior Services. Youth Risk Behavior Surveillance System. https://health.mo.gov/data/yrbss/infographics.php. Accessed. June 20, 2019.

49. Centers for Disease Control and Prevention. Understanding the Epidemic. https://www.cdc.gov/drugoverdose/epidemic/index.html. Accessed June 24,2019.

50. "Opioid Overdose." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 19 Dec. 2018, www.cdc.gov/drugoverdose/epidemic/index.html. Accessed June 20, 2019.

51. García MC, Heilig CM, Lee SH, et al. Opioid Prescribing Rates in Nonmetropolitan and Metropolitan Counties Among Primary Care Providers Using an Electronic Health Record System — United States, 2014–2017. MMWR Morb Mortal Wkly Rep 2019;68:25–30. DOI: http://dx.doi.org/10.15585/mmwr.mm6802a1.

52. Hancock, Christine, et al. "Treating the Rural Opioid Epidemic." National Rural Health Association, Feb. 2017, www.ruralhealthweb.org/NRHA/media/Emerge_NRHA/Advocacy/Policy documents/Treating-the-Rural-Opioid-Epidemic_Feb-2017_NRHA-Policy-Paper.pdf

53. Coffey, W., et al. Rural-Urban Trends in Opioid Overdose Discharges in Missouri Emergency Departments, 2012-2016. The Journal of Rural Health. Advance online publication. DOI: https://doi.org/10.1111/jrh.12368.

54. World Health Organization. International Statistical Classification of Diseases and Related Health Problems, 10th Edition. 2010, www.who.int/classifications/icd/ICD10Volume2_en_2010.pdf. Accessed June 20, 2019.

55. Tejada-Vera, Betzaida. "Mortality From Alzheimer's Disease in the United States: Data for 2000 and 2010." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, Mar. 2013, www.cdc.gov/nchs/products/databriefs/db116.htm#ref5. Accessed June 20, 2019.

56. Rural Diabetes Prevention and Management Toolkit. Why Diabetes is a Concern for Rural Communities. https://www.ruralhealthinfo.org/toolkits/diabetes/1/rural-concerns. Rural Health Information Hub. Accessed May 31, 2019.

57. Center for Disease Control. CDC Identifies Diabetes Belt. https://www.cdc.gov/diabetes/pdfs/data/diabetesbelt.pdf. Center for Disease Control and Prevention. Accessed May 31, 2019.

58. Rural Health Information Hub. Diabetes Management in Rural Areas Takes Holistic, Community Approaches. https://www.ruralhealthinfo.org/rural-monitor/rural-diabetes-management/. The Rural Monitor. Published August 20, 2014. Accessed May 31, 2019.

59. National Institute of Diabetes and Digestive and Kidney Diseases. Kidney Disease Statistics for the United States. https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease. Published December 2016. Accessed May 30, 2019.

60. Centers for Disease Control and Prevention. Adults: Protect Yourself with Pneumococcal Vaccines. https://www.cdc.gov/features/adult-pneumococcal/index.html. Accessed June 19, 2019.

61. Healthy People 2020. IID-13.1 Increase the percentage of noninstitutionalized adults aged 65 and older who are vaccinated against pneumococcal disease. https://www.healthypeople.gov/node/4670/data_details. Accessed June 19. 2019.

62. Centers for Disease Control and Prevention. Who Needs a Flu Vaccine and When. https://www.cdc.gov/flu/prevent/vaccinations.htm. Accessed June 19, 2019.

63. Centers for Disease Control and Prevention. Suicide Prevention. https://www.cdc.gov/violenceprevention/suicide/. Accessed June 19, 2019.

64. World Health Organization. Maternal Mortality. https://www.who.int/news-room/fact-sheets/detail/maternal-mortality. Accessed June 21, 2019.

65. Centers for Disease Control and Prevention. Infant Mortality. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm. Accessed June 21, 2019.

66. Centers for Disease Control and Prevention. Severe Maternal Morbidity in the United States. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html. Accessed June 20, 2019.

67. Centers for Disease Control and Prevention. Severe Maternal Morbidity in the United States. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html. Accessed June 20, 2019.

68. Centers for Disease Control and Prevention. Pregnancy Mortality Surveillance System. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Freproductivehealth%2Fmaternalinfanthealth%2Fpmss.html. Accessed June 28, 2019.

69. Kassebaum NJ, Barber RM, Bhutta ZA, Dandona L, Gething PW, Hay SI, Kinfu Y, Larson HJ, Liang X, Lim SS, Lopez AD. Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet. 2016 Oct 8;388(10053):1775-812.

70. MacKay AP, Berg CJ, Duran C, Chang J, Rosenberg H. An assessment of pregnancy related mortality in the United States. Paediatric and perinatal epidemiology. 2005 May;19(3):206-14.

71. Missouri Department of Health and Senior Services. Infant Mortality. https://health.mo.gov/living/families/infantmortality/index.php. Accessed June 20, 2019.

72. NCBI. Poverty, Urban-Rural Classification and Term Infant Mortality: A Population Based Multilevel Analysis. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6343321/. Accessed May 21, 2019.

73. ACSH. Infant Mortality 25% Higher in Rural Areas. https://www.acsh.org/news/2017/10/25/infant-mortality-25-higher-rural-areas-12031. Accessed May 21, 2019.

74. NCBI. Poverty, Urban-Rural Classification and Term Infant Mortality: A Population Based Multilevel Analysis. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6343321/. Accessed May 21, 2019.

75. Pelech D. An Analysis of Private-Sector Prices for Physicians' Services. Working Paper 2018-01. Washington, DC: Congressional Budget Office; 2018 Jan.

76. 2019 02 Preliminary applications, eligibility, determinations and enrollment data. https://data.medicaid.gov/Enrollment/2019-02-Preliminary-applications-eligibility-deter/whv7-vvjc. Accessed June 24, 2019.

77. Steven Carlson and Zoë Neuberger, "WIC Works: Addressing the Nutrition and Health Needs of Low-Income Families for 40 Years," Center on Budget and Policy Priorities, revised March 29, 2017.

78. CDC. About Teen Pregnancy. https://www.cdc.gov/teenpregnancy/about/index.htm . Accessed May 20, 2019.

79. US Department of Health and Human Services. Office of Women's Health. Decrease in teen pregnancy. https://www.womenshealth.gov/30-achievements/09. Accessed June 11, 2019.

80. US Department of Health and Human Services. Office of Women's Health. Decrease in teen pregnancy. https://www.womenshealth.gov/30-achievements/09. Accessed June 11, 2019.

81. World Health Organization. Adolescent Pregnancy. https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy. Accessed August 30, 2019.

82. Women's Health Research Institute. Teen Births Proportionately Higher in Rural vs. Metro Areas. http://www.womenshealth.northwestern.edu/blog/teen-births-proportionately-higher-rural-vs-metro-areas. Accessed May 20, 2019.

83. USA Today. Rural Teens at High Risk for Pregnancy, Analysis Finds. https://www.usatoday.com/story/news/nation/2013/02/20/rural-teen-births-analysis/1928727/. Accessed May 20, 2019.

84. March of Dimes. Breastfeeding is best. https://www.marchofdimes.org/baby/breastfeeding-is-best.aspx. Accessed June 11, 2019.

85. Auestad, N, et al. Visual, cognitive, and language assessments at 39 months: a follow-up study of children fed formulas containing long-chain polyunsaturated fatty acids to 1 year of age. Pediatrics. 2003 Sept; 112(3 Pt 1):e177-83.

86. Rural Health Information Hub. Rural Hospitals. https://www.ruralhealthinfo.org/topics/hospitals. Accessed August 13, 2019.

87. Rural Health Information Hub. Critical Access Hospitals. https://www.ruralhealthinfo.org/topics/critical-access-hospitals. Accessed August 12, 2019.

88. Rural Health Information Hub. Federally Qualified Health Centers. https://www.ruralhealthinfo.org/topics/federally-qualified-health-centers. Accessed August 12, 2019.

89. Rural Health Information Hub. Rural Health Clinics (RHCs). https://www.ruralhealthinfo.org/topics/rural-health-clinics. Accessed August 13, 2019.)

90. Centers for Medicaid and Medicare Services. Survey and Certification: Quality, Certification & Oversight Reports (S&Q's QCOR). https://qcor.cms.gov/advanced_find_provider.jsp?which=12&backReport=basic#. Accessed August 13, 2019.

91. Kansas Department of Health and Environment. Health Professional Underserved Areas Report: 2018. Available at www.kdheks.gov/rural.html.

92. Health Resource and Service Administration. HPSA Find. https://data.hrsa.gov/tools/shortage-area/hpsa-find. Accessed August 13, 2019.

Missouri Department of Health and Senior Services
Office of Rural Health and Primary Care
P. O. Box 570
Jefferson City, MO 65102-0570
573.751.6219
health.mo.gov

For an electronic copy of the report, visit:
http://health.mo.gov/living/families/ruralhealth/publications.php

This publication was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling $176,522 with zero percentage financed with non-governmental sources. The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement by, HRSA, HHS or the U.S. Government.