

Population Health Needs Assessment

Oklahoma State Innovation Model

OKLAHOMA STATE DEPARTMENT OF HEALTH

July 30, 2015



Oklahoma State
Department of Health
Creating a State of Health

Draft Version 3

Population Health Needs Assessment

Oklahoma State Innovation Model

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Oklahoma Health Improvement Plan (OHIP)
Health Efficiency and Effectiveness Workgroup
July 30, 2015

Overarching Goal	Create a system of outcome-driven healthcare that supports patients and healthcare providers in making decisions that promote health by emphasizing preventive and primary care and the appropriate use of acute care facilities.
Objective 1	Reduce by 20% the rate, per 100,000 Oklahomans, of potentially preventable hospitalizations from 1656 in 2013 to 1324.8 by 2020.
Objective 2	Reduce by 20% the rate, per 1,000 population, of Hospital Emergency Room Visits, from 500 in 2012 to 400 Visits by 2020.

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1. Key Findings

All groups experience adverse health outcomes due to chronic disease and health risk behaviors.

Individuals from all geographies, race, gender, and age groups experience poor health outcomes. Evidence from high rates of chronic disease patterns, hospitalizations due to preventable causes, and patterns of unhealthy behaviors compels those seeking to improve health to consider interventions at the structural, policy, and community-wide level in order to positively impact the long-term health of as many Oklahoma residents as possible. A societal shift toward healthier lifestyles that includes quality nutrition, daily physical activity, optimal weight control, social support, tobacco cessation, and reduced substance abuse can have profound positive impacts on Oklahoma's health. Special consideration for mental health, a chronic condition that significantly influences overall health, is critical for achieving population health goals.

Greater socio-economic need and health impacts are found among certain groups and places.

There are areas of high socio-economic need across all counties, especially in southeastern Oklahoma. Disparities in educational attainment are also found across Oklahoma. These areas and groups with high socio-economic need are also the most affected by health problems, as evidenced by significantly worse health outcome measures, higher hospitalization rates, and myriad health challenges. While Oklahoma has relatively good health insurance coverage, some lower resourced Oklahomans remain uninsured. Oklahoma residents with a disability are also more likely to live in poverty than the general population, which puts them at further disadvantage to accessing needed care and services. When planning for health improvement, careful consideration should be given to the highest need groups identified geographically by socio-economic measures.

Limited care access results in greater health impacts. Access to health care is challenging in many counties due to shortages of primary and specialty care. Access challenges also exist for those with no or limited insurance, cultural differences, or complicated needs. Federally designated underserved areas and populations cover nearly the entirety of Oklahoma. Unmet behavioral health, chronic disease management needs, health education and literacy needs, economic development, and healthy behavior supports are recurring themes supported by data and key informant interviews. Addressing the medical and mental health shortage areas and increasing access to medical and community care are important needs in Oklahoma.

Rates of preventable hospitalizations are indicators of population-level access to primary care or community care. For chronic diseases, some hospitalizations could be avoided with regular and appropriate care that prevents the conditions from worsening. The cost associated with the hospital admissions that could have been avoided through high-quality outpatient care is high. More than \$14 million dollars in health care costs could be saved with a 20% drop in the nearly 6,280 preventable hypertension- and diabetes-related hospitalizations that occurred in Oklahoma during 2013. Specifically, the estimated cost savings from preventing 20% of the preventable hospitalizations associated with hypertension was \$1,822,857 and complications from diabetes was \$12,200,776.

Diabetes, hypertension, obesity, physical activity and nutrition, and tobacco use are risk factors associated with heart disease and cancer, the leading causes of death in Oklahoma. Many risk factors have been identified as increasing the risk for chronic disease. Some of these risk factors can be modified, changed, to decrease the risk of chronic disease or the complications associated with chronic disease. Tobacco use/exposure, physical inactivity, poor nutrition, and obesity are common risk factors for many chronic diseases and associated complications. Intervention strategies focused on common risk factors can prevent or delay multiple chronic diseases, but must be implemented with a long-term perspective and sustained effort.

A. Key Health Metrics

METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Overall Health Ranking			
America's Health Ranking®	46 (2014)	n.a.	
Commonwealth Fund State Health System Performance Scorecard	49, 4 th quartile (2014)	n.a.	3 rd quartile
Tobacco Use			
Adult Smoking Prevalence	23.7% (2013)	18.8% (2013)	18.0%
Youth Smoking Prevalence	15.1% High School (2013, unweighted) 4.8% Middle School (2013)	12.7% High School (2013) 2.9% Middle School (2013)	10.0% 2.0%
Obesity			
Adult Obesity	32.5% (2013)	29.4% (2013)	29.5%
Youth Obesity	11.8% High School (2013)	13.7% High School (2013)	10.6%
Adult No Leisure Time Activity	33.0% (2013)	26.3% (2013)	20.8%
Adult Fruit Consumption	49.6% at least 1/day (2013)	60.8% at least 1/day (2013)	50.0% at least 1/day
Adult Vegetable Consumption	1.5/day (2013)	1.6/day (2013)	2.1 per day
Food Desert/Food Availability	21.1% of population (2013)	12.3% of population (2013)	Under development
Diabetes			
Adult Diabetes	11.0% (2013)	8.7% (2010)	9%
Hypertension			
Adult Hypertension	37.5% (2013)	31.4% (2013)	36%
Heart Disease Deaths	9,703 (2013)	n.a.	8,204
Behavioral Health			
Untreated Mental Illness	86% treatment gap (2012-13)	n.a.	76% gap
Addiction Disorders	8.81% (2012-13)	8.66% (2013)	7.8%
Suicide Deaths 18 years and older	22.0 per 100,000 (2013)	16.5 per 100,000 (2013)	19.4 per 100,000
Children's Health			
Infant Mortality	6.8 per 1,000 live births (2013)	6.0 per 1000 live births (2013)	6.4 per 1,000 live births
Maternal Mortality	29.9 per 100,000 live births (2013)	17.8 per 100,000 live births (2011)	26.2 per 100,000 live births
Injury Deaths Among 0-17 years	14.4 per 100,000 (2013)	7.4 per 100,000 (2013)	13.9 per 100,000

2. Introduction

Oklahomans face many serious challenges to the quality of their health. The state of Oklahoma is dedicated to creating a healthcare system that provides high quality and affordable health care to its residents. The state appreciates the opportunity afforded by the federal State Innovation Model (SIM) cooperative agreement to help move toward a health care system that is innovative and capable of delivering quality health care at a better value for both the state and its residents.

The purpose of this comprehensive needs assessment is to offer a meaningful understanding of the health needs of Oklahomans and to serve as the foundation for setting statewide health priorities to help with the development of the Oklahoma SIM. The goal of the SIM is to provide state-based population and clinical interventions to improve health, provide better care, and reduce health expenditures for Oklahomans.

A. Needs Assessment Design

This assessment was designed to answer the questions of the state's needs: 1) to improve population health; 2) to have better clinical care; and 3) to reduce healthcare costs. The specific areas of health improvement that govern the assessment are those specified in Oklahoma's response to the SIM cooperative agreement and the Oklahoma Health Improvement Plan.

- Tobacco use
- Obesity
- Diabetes
- Hypertension
- Behavioral health
- Children's health, including maternal health

Special attention has been given to the issues of tobacco use, obesity, diabetes, hypertension, and behavioral health as these are the major areas of concern with respect to the health of Oklahomans, the cost to the healthcare system, taxpayers, and businesses, and the linkage with many other health issues, such as coronary heart disease, lung disease, cancer, arthritis, infertility, kidney disease, eye disease, neuropathy, immunosuppression, and suicide.

Method of Needs Assessment

The archival method was used to conduct the needs assessment. This method uses data that already existed in routinely maintained databases and records. Such data are typically proven as valid and specific and allow for comparison between state and federal level indicators. On the other hand, archival data may not exactly match the intent of the needs in question. Wherever possible, additional qualitative and quantitative data were considered to augment the analysis. A need was defined as a measurable discrepancy or gap between what is and what should be. Expressed as an equation, it is: $\text{Target} - \text{actual} = \text{need}$

Data Sources and Methods

An extensive array of secondary data was collected and synthesized for this report. Secondary data was analyzed using OK2SHARE, a publicly available data platform with a dashboard with multiple variables from 14 state and nationally reportable data sources that allowed for Oklahoma-specific race, age, gender, and geographic details. Online data queries were also run through the Centers for Disease Control and Prevention Wideranging Online Data for Epidemiologic Research (WONDER), Behavioral Risk Factor Surveillance, and Youth Risk Behavior Survey. Additionally, this extensive core data was analyzed using a highly systematic and quantitative approach that incorporated multiple benchmarks and comparisons of priorities identified by the Oklahoma Health Improvement Plan, Healthy Oklahomans 2020 and the 2014 State of the State's Health Report. And, lastly, supplemental information from recently published reports on Oklahoma's health and access to care were reviewed for additional key information on important topics such as health disparities as well as primary care and behavioral health needs.

3. Oklahoma Overall Health

Oklahoma is 68,595 square miles of diverse ecosystems that include plains, prairie, mountains, lakes, forests, swamps, and sand dunes.¹ The people of Oklahoma are just as diverse as its landscape. The culture of Oklahoma has many regional influences on its cultural norms, philosophies, and vernacular. The cultural identities within areas of Oklahoma are: The West culture in panhandle counties; Middle West culture in north central counties, Western culture in western counties, Southern culture in central counties, Ozarks culture in northeastern counties, and Deep South culture in southeastern counties.² Yet, as a whole, the state continues to rank poorly for both population health and health systems.

METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Overall Health Ranking			
America's Health Ranking®	46 (2014)	NA	
Commonwealth Fund State Health System Performance Scorecard	49, 4 th quartile (2014)	NA	3 rd quartile

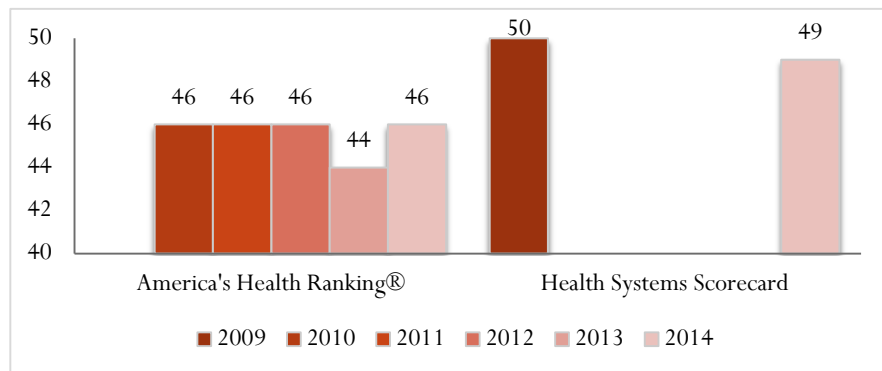
America's Health Rankings®, a project of the United Health Foundation, is the longest-running all state analysis of health and the factors that affect it. America's Health Rankings encompass a comprehensive set of clinical care, public policy, social determinants (community and environment), and behavioral measures of health indicators and outcomes for use in health improvement planning. Its purpose is to stimulate action by public officials, health care professionals, public health professionals, employers, educators, and communities to improve the health of the states and nation.

The State Health System Performance Scorecard is a project of the Commonwealth Fund, whose mission is “to promote a high-performing health care system that achieves better access, improved quality, and greater efficiency, particularly for society’s most vulnerable, including low-income people, the uninsured, minority Americans, young children, and elderly adults. In 2009 and 2014, the Scorecard ranked states based upon 42 indicators of health care access, quality, costs, and outcomes. The scorecard series provide performance benchmarks and improvement targets for states and the nation.

See Appendix of a comparison of indicators of the various ranking systems.

TRENDS IN HEALTH METRICS.

- America's Health Ranking® population health shows Oklahoma's rankings from 2010 to 2014.
- Health System Performance Scorecard shows the state's rankings from 2009 and 2014.



Healthy Oklahoma 2020 – Oklahoma Health Improvement Plan

Oklahoma is not keeping up with the rest of the nation, which means more Oklahomans are dying unnecessarily each and every year.

Given Oklahoma’s rankings for health determinants, it is not unexpected that it has the 4th highest rate of deaths among all the states in the nation. The state mortality rate (941.9 per 100,000, age-adjusted) is 23% higher than the national rate. While Oklahoma’s mortality rate dropped 5% over the past 20 years, the national mortality rate dropped 20% during the same period. Many have died prematurely with nearly 343,750 years of life lost due to deaths before the age of 75 years. In 2013, 38,379 Oklahomans died from various causes.

LEADING CAUSES OF DEATH BY AGE GROUPS, OKLAHOMA, 2013.

Causes of Death 2013	Overall Rank & #	Leading Cause	2 nd Leading Cause	3 rd Leading Cause	4 th &5 th Leading Cause
Heart Disease	#1 9,703	45-54 years 65 years and older	35-44 years 55-64 years		<1 year 15-24 years 25-34 years
Cancer	#2 8,029	55-64 years	5-14 years 45-54 years 65 years and older	35-44 years	15-24 years 25-34 years
Chronic Lower Respiratory Disease	#3 2,680			65 years and older	55 -64 years
Unintentional Injury	#4 2,454	1-4 years 5-14 years 15-24 years 25-34 years 35-44 years		<1 years 45-54 years 55-64 years	
Stroke	#5 1,878				65 years and older
Diabetes	#6 1,268				55-64 years
Alzheimer’s Disease	#7 1,145				65 years and older
Influenza/ Pneumonia	#8 758				<1 year
Suicide	#9 664		15-24 years 25-34 years		45-54 years
Nephritis/ Nephrosis	#10 606				

While leading causes of deaths are exclusively categorized, many of the diseases and conditions are related.

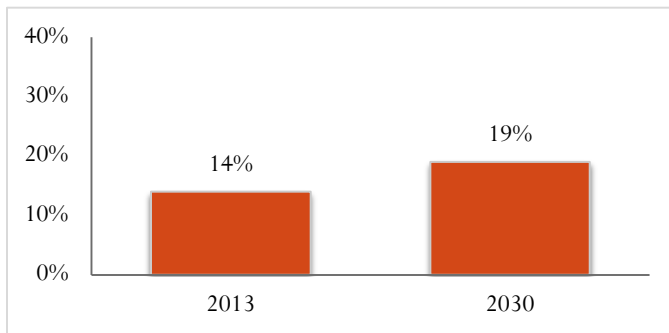
High blood pressure, high cholesterol smoking, physical inactivity, obesity, poor diet, and diabetes are the leading causes of cardiovascular disease.³

Many of these same cause also raise the risk of cancer.⁴

A. Population Health

From 2010 to 2014, the total population of Oklahoma grew from 3,761,702 to an estimated 3,878,051 (3.1% increase).⁵ Latest estimates show that 80% of the population reported their race as white, followed by American Indian (13%); African-American (9%); some other race (3%); Asian (2%); and/or Native Hawaiian and other Pacific Islander (<1%).⁶ The population was distributed among 50.5% females and 49.5% males. One-quarter (24.5%) of the state's residents were less than 18 years of age and 61% were between the ages of 18 and 64 years of age.

PERCENTAGE OF POPULATION AGED 65 YEARS AND OLDER, U.S. CENSUS ESTIMATES, OKLAHOMA.



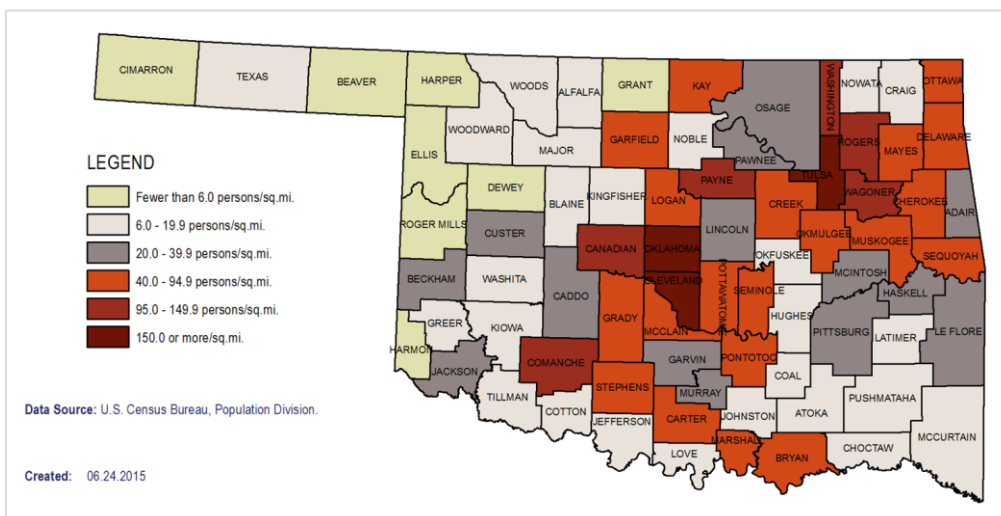
- In 2013, an estimated 14% of Oklahoma's population were 65 years of age and older.
- By 2030, nearly 1 in 5 Oklahomans will be 65 years of age and older.⁷
- This change will represent a 36% increase in the proportion of Oklahoma's population that is 65 years and older.

In 2014, Oklahoma was ranked 47th in the health of older adults, an improvement from a 49th ranking in 2013.⁸ America's Health Ranking[®] – Senior Report listed the significant challenges for the health of older adults in Oklahoma as: hip fractures, physical inactivity, falls, overall unhealthy behaviors, and hospitalized older adults who received recommended care for heart attack, heart failure, pneumonia, and surgical procedures.

Blend of rural and urban

In 2014, there were 54.7 persons per square mile in Oklahoma, ranging from 1.3 in Cimarron County to 1,058 in Tulsa County.⁹ Approximately one-third of Oklahomans lived in rural communities.¹⁰ On the other hand, 58.4% of Oklahomans lived within the 14 rural and urban counties that make up the Tulsa and Oklahoma City metropolitan statistical areas.¹¹ The population in metropolitan areas has steadily increased since the middle of the last century with much of the population growth concentrated around the metropolitan areas and expanding suburban communities while counties in western Oklahoma have decline in population.¹²

POPULATION DENSITY, PERSONS PER SQUARE MILE BY COUNTY, OKLAHOMA, 2014.



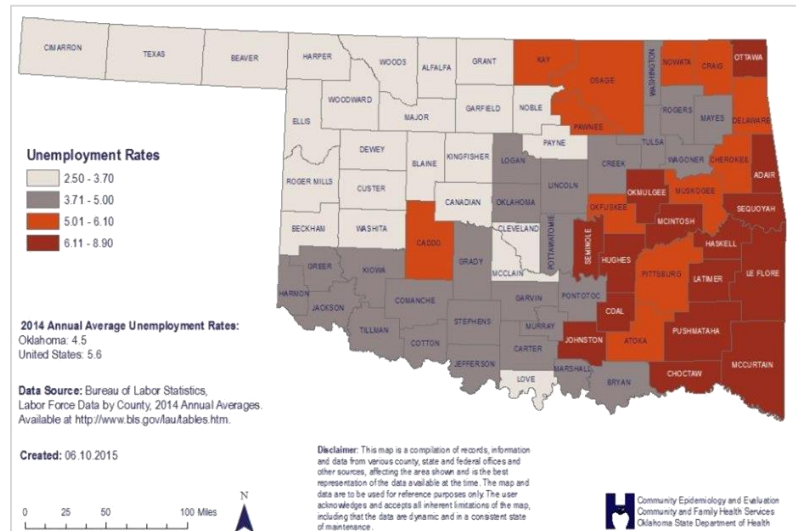
- Counties in the green and brown colors indicate fewer persons per square mile.
- Red colored counties indicate more persons per square mile.
- Most densely populated counties in shaded in the darkest red color.

Employment, Income, and Poverty

In 2014, Oklahoma's unemployment rate of 4.5% was lower than the national rate of 5.6%. However, the unemployment rate varied across the state ranging from 2.5% in Grant County to 8.9% in McIntosh County.

UNEMPLOYMENT RATES BY COUNTY, OKLAHOMA, SY2014.

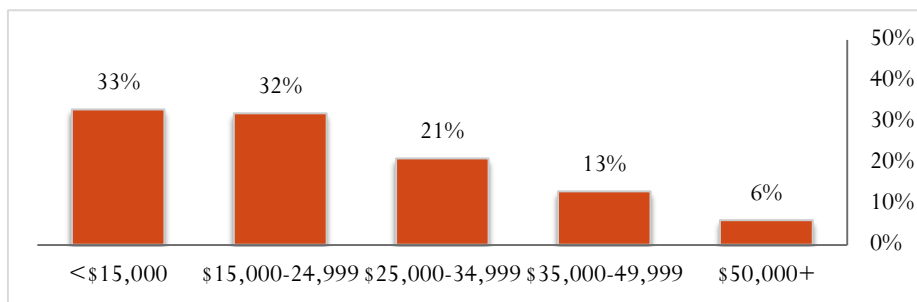
- Grant County's unemployment rate was lower than the state's historical low rate of 2.9%.
- McIntosh County's rate was the same as the state's historical high rate of unemployment (8.9%).
- Nearly one-third (31.1%) of Oklahoma's counties had a higher rate of unemployment than the nation.
- The unemployment rates in the eastern part of the state were higher than the rates in the western part of the state.



The Business Health and Wellness

Survey¹³ project gathered Oklahoma employer perspectives on health insurance and wellness programs as they relate to workforce costs, productivity, and returning value on investment. Over half (55%) of the survey respondents stated they had difficulty finding employees to meet their needs and, of those, 58% were actively involved in promoting workforce readiness through activities such as providing internships and working with educational or training institutions to develop skilled workers. Additionally, half of the respondents indicated that employee health impacts their businesses. Almost 40% of survey respondents paid 100% of employee health plan premiums and less than 1% paid none. Of the remaining: 19% paid 26%-50%, 18% paid 51%-75%, and 17% paid 76%-99%. Moreover, the respondents said that rising health care costs were impacting the bottom line of businesses; yet, 83% said that offering coverage was the right thing to do. As one respondent put it, "People trying to put their families on our insurance – it's incredibly expensive for them. I can't even imagine trying to pay those amounts."

INCOME AND LACK OF INSURANCE, OKLAHOMA, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, 2013.



- One-third of persons with household incomes less than \$25,000 did not have health insurance.
- The lack of insurance was statistically different between incomes under \$25,000 and each of the income categories over \$24,999.

Overall, the state's median household income of \$45,339 was 14.5% lower than the national median of \$53,046.¹⁴ Accordingly, more Oklahomans (16.8%) earned income in the past 12 months that was below poverty level, compared to the national average of 15.8% in 2013. Poverty is not evenly distributed with nearly one-quarter (24%) of Oklahoma's children (under 18 years) living in poverty.¹⁵ Many studies draw the link between poverty and health.

Food Insecurity

In 2012, an estimated 17.2% (656,300) of Oklahomans, including nearly 239,380 children, experienced a lack of access to enough food for all household members and uncertain availability of nutritiously adequate foods.¹⁶ In more than half of Oklahoma's counties (43/77, 55.9%), rural residents must travel more than 10 miles to reach a full service grocery store and urban residents must walk more than a mile to a grocery store.¹⁷

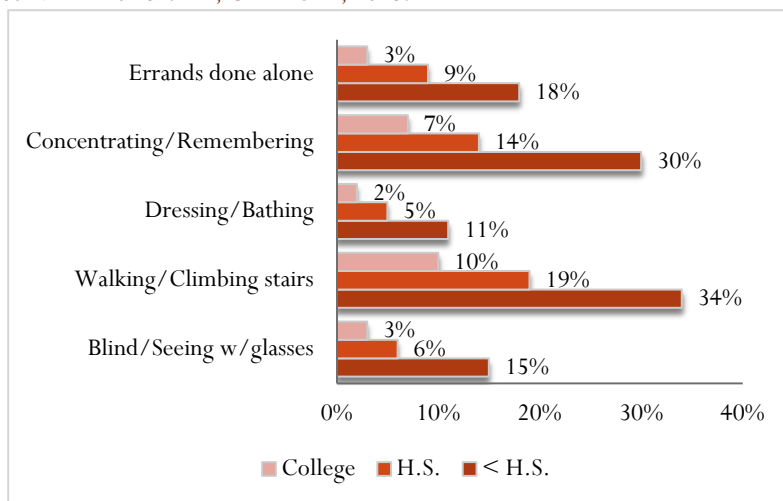
Diabetics who experience food insecurity (worry about having enough food to eat) have higher A1C (10) compared to diabetics without food insecurity (7.6).¹⁸

Education

In 2013, 85.0% of Oklahomans 25 years and older had at least a high school degree, of which 32.5% attended college but obtained no degree. Less than half of Oklahomans over 25 years of age (46.9%) had no college experience.¹⁹ Overall, 7% of Oklahomans earned an associate's degree, 16% earned a bachelor's degree, and 8% earned a graduate or professional degree.²⁰ One in four Oklahomans without a high school education lived in poverty, compared to one in 20 with a college degree.

According to the 2013 Behavioral Risk Factor Surveillance System, more than one-third (36%) of Oklahomans with less than a high school education were employed. Of the remaining, 11% were out of work, 23% were unable to work, 13% were homemakers, 13% were retired, and 3% were students.

DAILY LIVING DIFFICULTIES BY EDUCATIONAL STATUS, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.



- Oklahomans with less than a high school education were more likely to have difficulty with daily living activities than those with more education.
- About one-third (34%) of those with less than a high school education reported difficulty walking or climbing stairs and/or difficulty concentrating or remembering.
- Adults with less than a high school education were evenly distributed across all age categories: 15% were 18-24 years; 19% were 25-34 years; 16% were 35-44 years; 16% were 45-54 years; 14% were 55-64 years; and 20% were 65 years and older.

35-44 years; 16% were 45-54 years; 14% were 55-64 years; and 20% were 65 years and older.

Overall, 45% (40.7-49.4%, 95% CI) of those with less than a high school education reported their general health as fair or poor. The percentage was significantly different than the 16.3% (15.3-17.3%, 95% CI) of those with at least a high school education who reported their general health as fair or poor.

Health Literacy

Health literacy is defined as, “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”²¹ Adults who lack basic prose literacy skills (BPLS) may be able to locate easily identifiable information in short text that is organized in sentences or paragraphs and unable to read or understand any written information in English. Health literacy barriers can affect the ability to locate health care providers, complete medical forms, follow treatment, and take preventive actions.

Research found that persons with limited health literacy skills were more likely to skip important preventive measures such as mammograms, Pap smears, and flu shots.²² Another study showed that patients with limited health literacy skills enter the healthcare system when they were sicker, as compared to patients with adequate health literacy.²³ Moreover, patients with limited literacy skills have higher rates of hospitalization and use of emergency services. They are significantly more likely to report their health as poor.²⁴

Two national studies conducted a decade apart found that 12-13% [1993: 12% (10.4-14.0% 95% CI), 2003: 13% (8.5-18.8% 95% CI)] of Oklahomans 16 years and older had BPLS. There was no significant change in the percentage of the population from 1993-2003.²⁵

Interventions in the primary care and community settings are useful in supporting sustained change in health literacy for change in behavioral risk factors.²⁶

Oklahomans with Disabilities

Approximately 15.8% of Oklahomans living at home have a disability.²⁷ Among Oklahomans who are 65 years of age and older, 42.3% have a disability. While 14.1% of Oklahomans 18 to 64 years of age have a disability, they accounted for the largest number (319,463) of those with a disability.

PERCENTAGE OF POPULATION BY AGE GROUP WITH DISABILITY, U.S. CENSUS, OKLAHOMA, 2009-2013.

	Under 18 Years	18 to 64 Years	65 Years and Older
Population with Disability	4.8% (n=44,819)	14.1% (n=319,463)	42.3% (n=212,800)

According to the Behavioral Risk Factor Surveillance System in 2013, those who have activities limited due to a physical, mental, or emotional problem were more likely to delay a visit to the doctor because of the cost (29.6%, 27.1-32.2%, 95% CI) than those without limited activities (12.9%, 11.7-14.1%, 95% CI). Moreover, those who used special equipment for health conditions were also more likely to delay care (23.6%, 20.-27.0%, 95% CI) than those who did not use special equipment (16.5%, 15.3-17.7%, 95% CI).

Housing

Research shows that residential housing can influence health at several levels: physical condition within the home, conditions in the surrounding neighborhood, and housing affordability.²⁸ Housing is considered affordable when it accounts for less than 30% of the resident’s income. Nearly one-quarter of Oklahomans (24.4%) pay home mortgages that are 30% or more of their incomes. Nearly one in five (18%) of Oklahomans pay 35% or more of their income for housing. Approximately 45% of Oklahomans pay rents at or above 30% of their income and 36.3% pay rents at 35% or more of their income.²⁹ The financial burden of unaffordable housing can prevent Oklahomans from meeting other basic needs like health care or nutritional needs or result in the instability of frequent moves.

Housing insecurity is associated with delay in visiting a doctor, poor or fair health status, limited daily activity, 14 or more days of poor mental health, and smoking.³⁰

Community Concerns

To inform the Oklahoma Health Improvement Plan – Healthy Oklahoma 2020, community chats, tribal consultations, and online surveys asked the following essential questions: 1. What is your vision for a healthy community? 2. What are the barriers that prevent us from achieving that vision? 3. How can we address those barriers? The following table summarizes the findings.

COMMUNITY VISION FOR A HEALTHY OKLAHOMA, 2014

General	African-American	Hispanic	Tribal*
Access	Community focus	Family focus	Inter-government
Healthy foods	Safety	Health education	Collaboration
Physical activity	Physical activity outlets	Economic development	Mind, body, spirit
Health services	Economic development	Youth key family member	Health literacy
Health education	Education		Chronic disease
Community	Prevention		Data
Economic development			
Education			
Transportation			
Behavioral health			

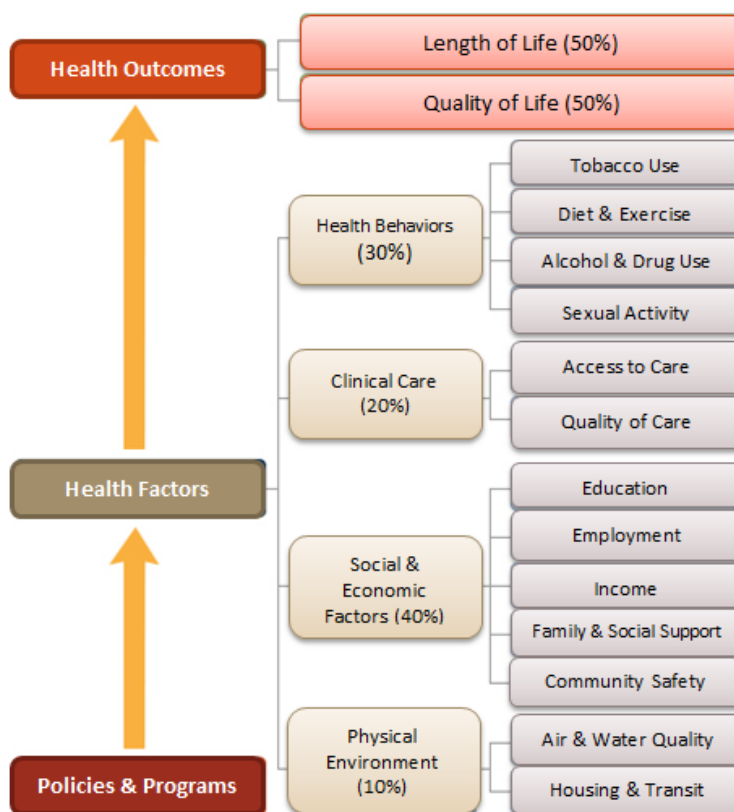
*American Indian people residing in the State of Oklahoma are citizens of the state, and as such possess all the rights and privileges afforded by Oklahoma to its citizens. They are also the citizens of tribal nations. Each of the 38 federally recognized Oklahoma tribal nations have inalienable self-governance power over their citizens and territories, and possess unique culture, beliefs, value systems, and history as sovereign nations.

Each of the groups listed essential needs for creating a healthy Oklahoma. One theme that emerged from all of the groups was the recognition of the connection between individuals, families, communities, and culture. The Oklahoma Health Improvement Plan acknowledges the dynamic interrelationships between individuals, groups of individuals, communities, and organizations by framing prevention within a socio-ecological model.

The relationship between poor health outcomes, rates of diseases, and mortality is complex, but reductions in major health challenges such as tobacco use or reduction in health inequity can have rippling effects throughout the population and healthcare system. Just as the America’s Health Rankings® and State Health System Performance Scorecard provided rankings for the State of Oklahoma, the County Health Rankings provided rankings for the counties within Oklahoma. The University of Wisconsin Population Health Institute compiles data from national and state sources into standardized measures that are weighted based upon scientific evidence. Based upon population health, improvement in the measures can help make communities healthier places to live, learn, work, and play. See Appendix – Oklahoma and U.S. Comparison, County Health Rankings for details on the measures and data sources for the state and nation.

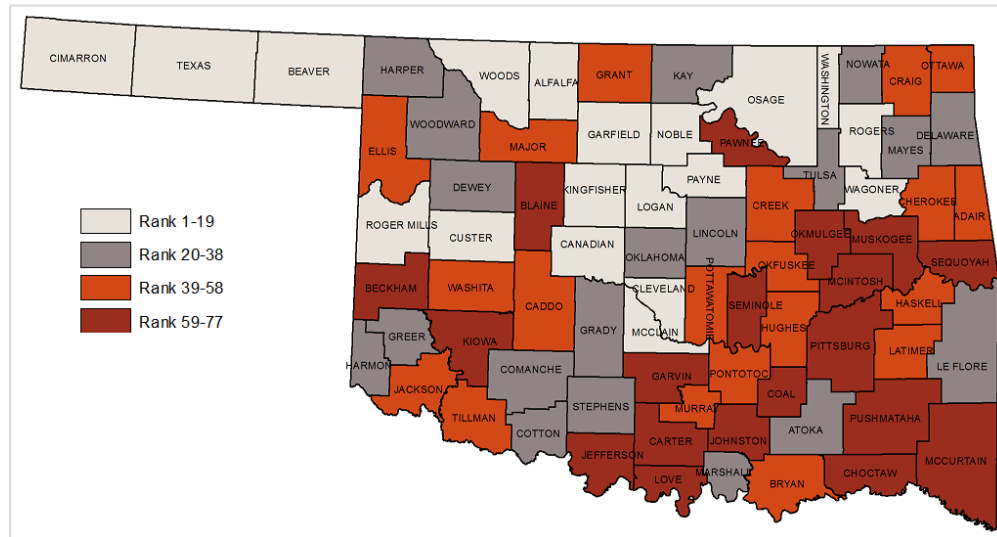
COUNTY HEALTH RANKINGS ALGORITHM FOR RANKING.³¹

- Health Outcomes represent how healthy a county was compared to other counties in the state.
- Length of Life and Quality of Life are the two Health Outcomes measures.
- Health Outcomes resulted from the Policies and Programs-influenced Health Factors in communities,
- Health Factors represent the influences on the health of the county.
- Health Behaviors, Clinical Care, Social & Economic Factors, and Physical Environment are four Health Factors measures.



Tobacco use, poor diet, physical inactivity, excessive alcohol consumption, uncontrolled high blood pressure, and hyperlipidemia contribute to most of today’s leading causes of death.³²

COUNTY HEALTH OUTCOMES BY QUARTILE RANKING, OKLAHOMA, 2015. ³³



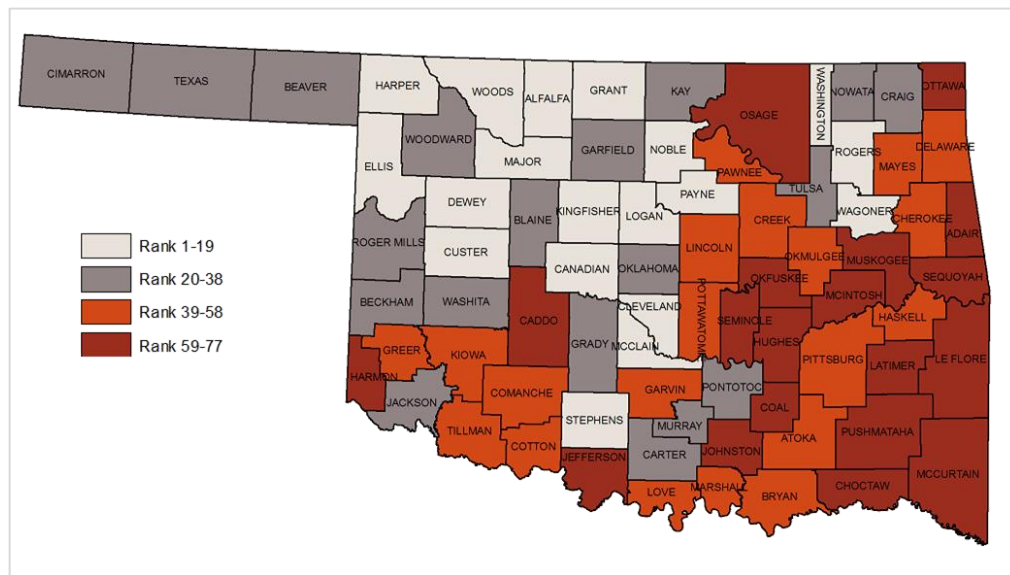
- Lighter colors indicate better performance in Length of Life and Quality of Life measures.
- Table lists the county rankings highlighted in map.

COUNTY HEALTH OUTCOMES RANKING, OKLAHOMA, 2015.

County	Health Outcome Rank	County	Health Outcome Rank	County	Health Outcome Rank	County	Health Outcome Rank
Adair	56	Delaware	31	Lincoln	23	Pittsburg	67
Alfalfa	18	Dewey	34	Logan	7	Pontotoc	47
Atoka	38	Ellis	48	Love	63	Pottawatomie	44
Beaver	14	Garfield	15	Major	52	Pushmataha	72
Beckham	61	Garvin	74	Marshall	25	Roger Mills	10
Blaine	66	Grady	26	Mayes	28	Rogers	8
Bryan	40	Grant	39	McClain	17	Seminole	73
Caddo	46	Greer	27	McCurtain	59	Sequoyah	62
Canadian	6	Harmon	35	McIntosh	70	Stephens	37
Carter	69	Harper	22	Murray	55	Texas	2
Cherokee	45	Haskell	49	Muskogee	71	Tillman	53
Choctaw	68	Hughes	57	Noble	13	Tulsa	20
Cimarron	3	Jackson	42	Nowata	30	Wagoner	16
Cleveland	4	Jefferson	77	Okfuskee	58	Washington	12
Coal	60	Johnston	75	Oklahoma	33	Washita	43
Comanche	24	Kay	32	Okmulgee	65	Woods	9
Cotton	29	Kingfisher	1	Osage	19	Woodward	21
Craig	41	Kiowa	76	Ottawa	54		
Creek	51	Latimer	50	Pawnee	64		
Custer	11	Le Flore	36	Payne	5		

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COUNTY HEALTH FACTORS BY QUARTILE RANKING, OKLAHOMA, 2015.



- Lighter colors indicate better performance in Health Behaviors, Clinical Care, Social/Economic Factors, and Physical Environment measures.
- Table lists county rankings highlighted in map.

COUNTY HEALTH FACTORS RANKING, OKLAHOMA, 2015.

County	Health Outcome Rank	County	Health Outcome Rank	County	Health Outcome Rank	County	Health Outcome Rank
Adair	77	Delaware	56	Lincoln	44	Pittsburg	48
Alfalfa	13	Dewey	14	Logan	18	Pontotoc	34
Atoka	54	Ellis	2	Love	43	Pottawatomie	52
Beaver	21	Garfield	20	Major	8	Pushmataha	76
Beckham	37	Garvin	39	Marshall	46	Roger Mills	23
Blaine	29	Grady	28	Mayes	53	Rogers	12
Bryan	45	Grant	10	McClain	5	Seminole	68
Caddo	66	Greer	41	McCurtain	72	Sequoyah	74
Canadian	4	Harmon	65	McIntosh	67	Stephens	17
Carter	38	Harper	19	Murray	33	Texas	25
Cherokee	55	Haskell	49	Muskogee	64	Tillman	42
Choctaw	73	Hughes	75	Noble	15	Tulsa	22
Cimarron	31	Jackson	30	Nowata	35	Wagoner	16
Cleveland	3	Jefferson	69	Okfuskee	59	Washington	6
Coal	70	Johnston	63	Oklahoma	26	Washita	27
Comanche	47	Kay	32	Okmulgee	58	Woods	1
Cotton	50	Kingfisher	7	Osage	61	Woodward	24
Craig	36	Kiowa	51	Ottawa	60		
Creek	57	Latimer	62	Pawnee	40		
Custer	11	Le Flore	71	Payne	9		

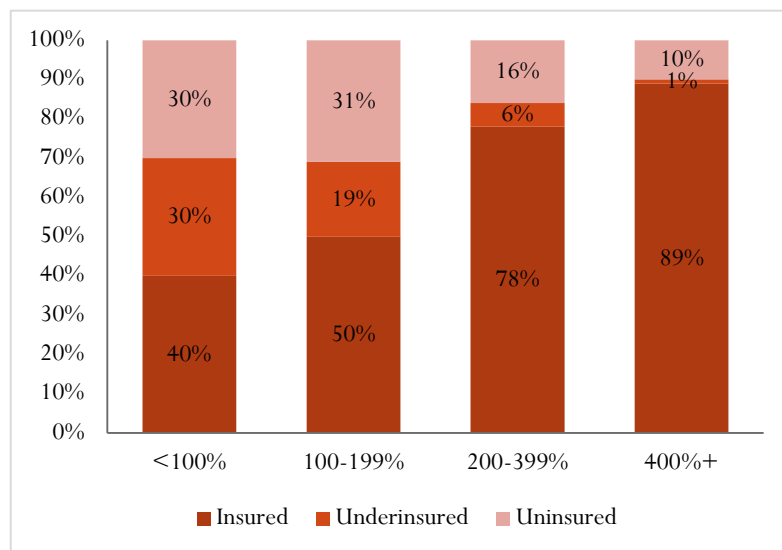
B. Clinical Care

Common barriers make gaining access to the healthcare system and community care difficult. These barriers can create inequitable health outcomes and often impact certain populations (rural, minority, lower income, etc.) more frequently than others. Two of the major types of barriers to the access to care are financial and structural, which interact with personal/cultural barriers in complicated ways. These barriers to accessing health care may lead to unmet health needs, an inability to receive preventive services, or hospitalizations that could have been prevented.³⁴

Lack of Health Insurance

Financial barriers restrict access to care. These barriers may inhibit the ability of an individual or group of individuals to pay for needed medical services. Individuals may delay seeking care because of the costs of services. Uninsured people are less likely to receive medical care.³⁵ The rate of uninsured Oklahoman adults was 17.7% in 2013, 5.0% higher than the national rate.³⁶ Among Oklahomans younger than 65 years of age, 20.6% were uninsured; however, only 10.6% of those less than 19 years were uninsured.³⁷ Additionally, the highest uninsured rate (68.8%) was among Hispanic males aged 18-64 years with incomes less than 138% of the federal poverty level (FPL). Even those with health insurance may experience barriers to accessing health care because they're underinsured.

PERCENTAGE OF INSURED, UNDERINSURED, AND UNINSURED POPULATION, UNDER-65 POPULATION, OKLAHOMA, 2014.³⁸



- Persons at or near poverty levels were more likely to have no insurance or be underinsured.
- For this study, underinsured meant persons were insured but spent a high share of annual income on medical care.
- In total, there were 1,014,452 Oklahomans who were uninsured or underinsured.
- The federal poverty level takes into account family size. For example, 100% FPL was \$11,670 for a single individual, \$15,730 for 2 persons, and \$23,850 for a family of four in 2014.³⁹

Health Provider Access

Structural barriers impede access to care. These barriers relate to the number, type, concentration, location, or organizational structure of healthcare providers. People who do not have a personal physician or healthcare provider most often rely upon local emergency rooms (ER) and hospital outpatient clinics for their care. Preventive care and continuity of care for a medical problem most often is missing from care delivered in the ER or outpatient setting. Only 75% of adults in Oklahoma (35th in the nation) reported that they have a usual source of care.⁴⁰

The number of primary care physicians in Oklahoma has continued to increase from 78.5 per 100,000 population in 2005 to 84.8 per 100,000 in 2014; however Oklahoma still ranks 48th in the nation.⁴¹ Massachusetts, the highest ranking state for primary care physicians, has 200.8 per 100,000 population.⁴² In rural areas of Oklahoma, 40% of the population was reported to be served by 28% of the 3,660 primary care physicians in Oklahoma.⁴³ Another study

The Health Resources and Services Administration (HRSA) designates medically underserved areas and health professional shortage areas, a prerequisite for participation in programs like the National Health Service Corps Scholarship and loan repayment programs, Medicare rural provider enhanced payments, and eligibility for federal assistance of federally qualified health center, and rural health clinics.

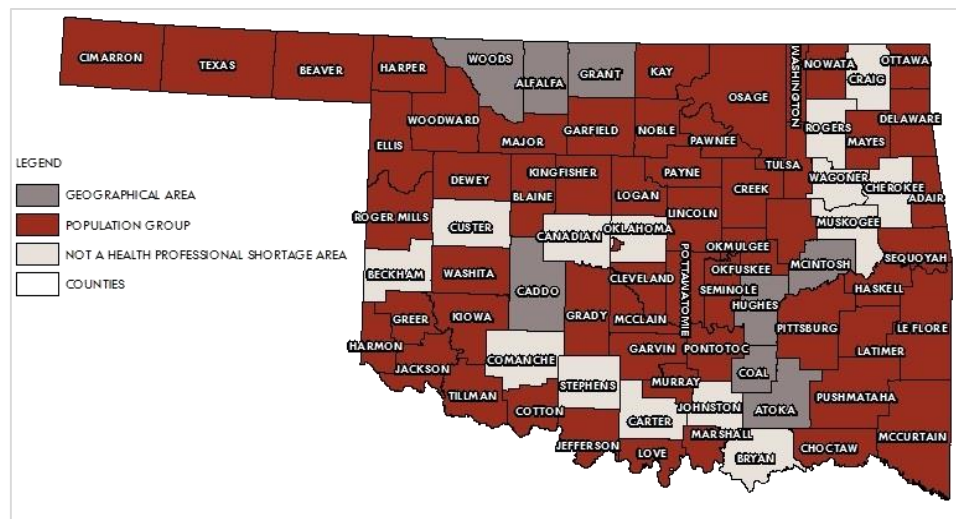
found that while the entire physician workforce is aging, primary care physicians in rural Oklahoma were older compared to their urban counterparts.⁴⁴

The availability of primary care providers is important to improve the health of the population. Areas where healthcare is hard to find are known as Health Professional Shortage Areas (HPSAs). Shortages of health professionals

include the disciplines of primary care (general or family practice, general internal medicine, pediatrics, or obstetrics and gynecology), dental, and mental health (psychiatrists, clinical psychologists, clinical social workers, psychiatric nurse specialists, and marriage and family therapists). HPSAs designations may be based upon geographic, demographic, or facility locations; moreover, members of federally recognized American Indian tribes are automatically designated as population group level HPSAs. Designations are made every 3-4 years. Additionally, Indian Health Service has established 12 federally-owned health services facilities in Oklahoma to serve eligible members of federally recognized American Indian and Alaskan Native tribes. Also, Tribal Nations within Oklahoma established 38 tribally-owned health service facilities.

PRIMARY CARE HEALTH PROFESSIONAL SHORTAGE AREAS BY TYPE, OKLAHOMA, 2015.⁴⁵

- Oklahoma has 162 total HPSAs: Geographic area=7, Population group=56, and Facility=99.
- Population within the HPSAs is 2,271,706 (58.6% of Oklahomans).⁴⁶
- 68.5% of need is being met.
- 102 additional practitioners are required to meet the full need.⁴⁷



Dental Health Professional Shortage Areas (HPSAs) signify a shortage of oral health professionals. This ratio is usually 5,000 residents to 1 non-federal dentist. As of 2015, 98 Dental Care HPSAs have been designated in Oklahoma: geographic=3, Population=6, and Facility =89. Only 235,387 individuals reside in the designated nine county areas with 81% of need met. An additional 17 practitioners are needed to achieve a population-to-provider ratio above a shortage level.

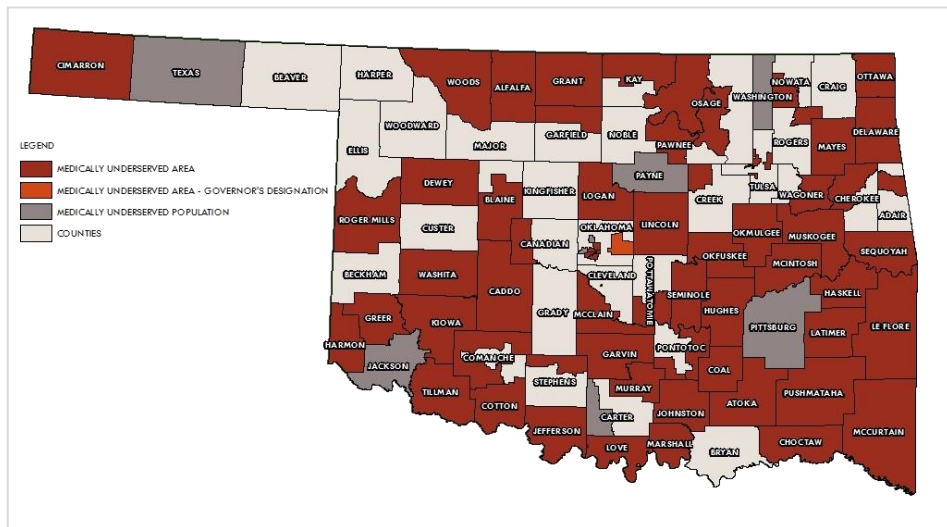
Mental Health Professional Shortage Areas are another form of HPSA that have a shortage of mental health professionals. Mental Health HPSAs are designated using several criteria, including population-to clinician ratios. This ratio is usually 30,000 residents to 1 mental health professional. Oklahoma has 107 designated mental health HPSAs: Geographic=4, Population=6, and Facility=97. With Mental Health HPSAs in 69 counties only 36.7% of the need

was met. Sixty additional mental health providers are needed to achieve a population-to-provider ratio below the thresholds necessary for designation.

Medically Underserved Areas and Populations (MUA/MUP) have too few primary care providers, high infant mortality rates, a high population percentage of poverty, and/or a high percentage of elderly in the population. MUA/MUP designations do not expire. This designation is a way to identify extreme local issues that may not show up at a larger, county-level scale.

MEDICALLY UNDERSERVED AREAS AND POPULATIONS, OKLAHOMA, 2015.⁴⁸

- Residents experienced a shortage of personal health services in parts of 66 counties.⁴⁹
- The Governor designated a MUA because of health literacy and poverty barriers to personal health services.



Health System Performance

The Agency for Healthcare Research and Quality's Prevention Quality Indicators (PQI measures) were developed to monitor health system performance over time, across regions, and among populations using patient data found in a typical hospital discharge abstract. The Prevention Quality Indicators (PQIs) are a set of measures that can be used to identify quality of care for "ambulatory care sensitive conditions," conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. Preventable hospitalizations data based on adjusted-PQI and state hospital discharge data were aggregated by disease/condition and geographic area for use in quality improvement.

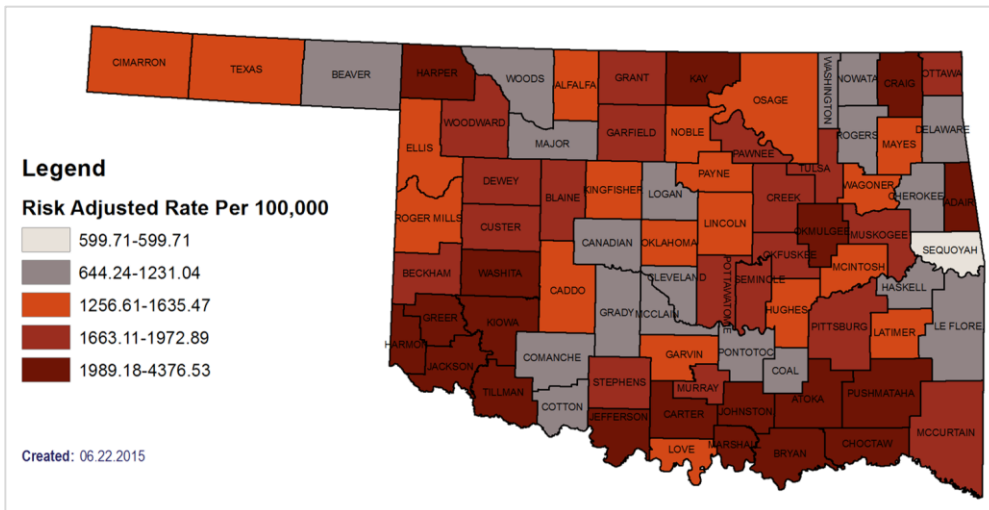
In Oklahoma, an estimated 45,355 hospital stays could have been prevented in 2013. The preventable hospitalization conditions were: diabetes (short-term complications, long-term complications, uncontrolled, and lower-extremity amputation), chronic obstructive pulmonary disease, adult asthma, hypertension, heart failure, angina without a cardiac procedure, dehydration, bacterial pneumonia, or urinary tract infection.

Pneumonia can be a complication especially among infants or persons with other chronic conditions, such as diabetes, heart disease, chronic obstructive pulmonary disease (COPD), cancer, or asthma.⁵⁰

The PQI overall composite was set as a single composite to capture the concept of preventable or avoidable hospitalizations for acute and chronic diseases and conditions. As expressed non-academically, the measure answers “how well providers prevent patients from having serious health problems.”⁵¹ The PQI overall composite is presented as a rate per 100,000 population aged 18 years and older and county of residence.

PREVENTION QUALITY INDICATOR **OVERALL** COMPOSITE RATE PER 100,000 POPULATION, OKLAHOMA, 2013.

- The median rate was 1,635.5 in Mayes County.
- Sequoyah County had the lowest rate at 599.7, followed by Cleveland (644.2), Coal (690.1), Washington (889.6), Beaver (870.0), Cherokee (890.8), and Grady (980.8) counties.

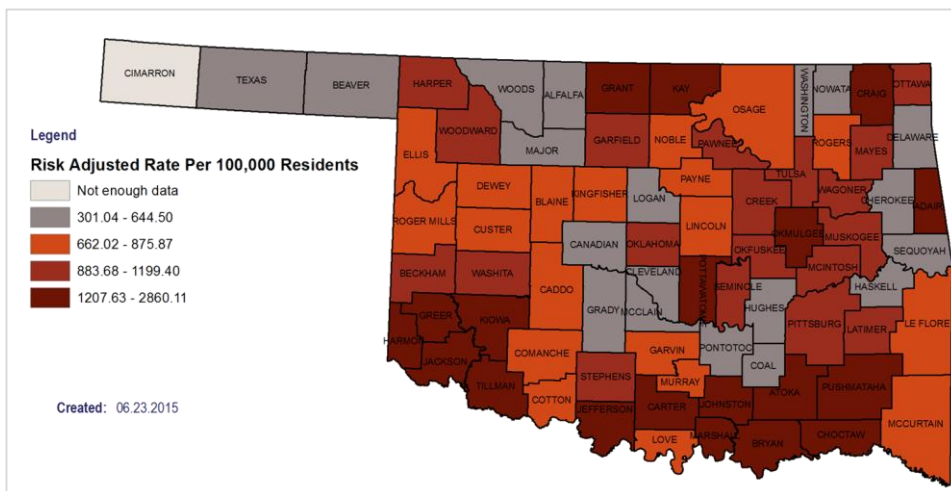


- Kiowa County had the highest rate at 4,376.5, followed by Choctaw (3,538.8), Harmon (3,491.7), Pushmataha (2,880.7), and Marshall (2,620.1) counties.

The PQI chronic composite helps answer “How often patients are admitted to a hospital because a long-lasting (or chronic) condition is causing health problems.” The PQI chronic composite is a risk adjusted rate per 100,000 population aged 18 years and older by county of residence. The chronic composite includes admissions for one of the following conditions: diabetes (short-term complications, long-term complications, uncontrolled, and lower-extremity amputation), chronic obstructive pulmonary disease, adult asthma, hypertension, heart failure, or angina without a cardiac procedure.

PREVENTION QUALITY INDICATOR **CHRONIC** COMPOSITE RATE PER 100,000 POPULATION, OKLAHOMA, 2013.

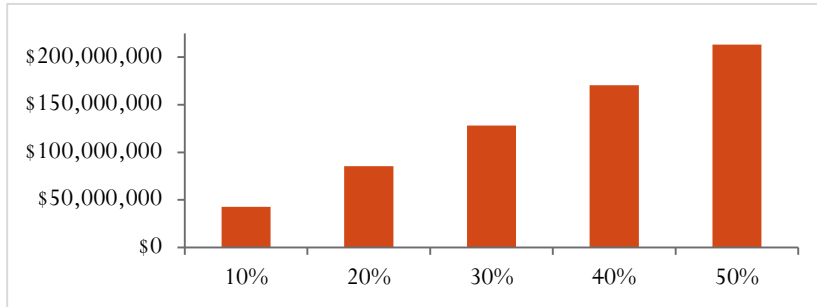
- The median rate was 866.2 per 100,000 population in Ellis County.
- Sequoyah County had the lowest rate of 301.0, followed Beaver (336.9), Cleveland (404.9), Texas (473.6), and Coal (507.0) counties.
- Kiowa County had the highest rate at 2,860.1 per 100,000 population, followed by Harmon (2,513.2), Choctaw (2,331.3), Adair (1,764.7), and Johnston (1,450.9) counties.



C. Health Costs

Prevention Quality Indicators and Composites were used by the MONAHRQ® web query system to provide estimated cost savings through the reduction of a percentage of preventable hospitalizations. While not all avoidable, an estimated 45,355 stays for acute and chronic diseases and conditions were identified as potentially preventable through outpatient services in Oklahoma during 2013. The cost savings was also calculated.

ESTIMATED COST SAVINGS BY % REDUCTION IN PREVENTABLE HOSPITALIZATIONS, OKLAHOMA, 2013.



- Nearly \$43 million in hospitalization costs could be saved with only a 10% decrease in both acute and chronic-related preventable hospitalizations.
- A 50% reduction equated to more than a \$213 million dollar savings.

Diabetes, hypertension, and chronic obstructive pulmonary disease (primarily caused by smoking) were among the preventable hospitalization diseases and conditions. More than half of the cost savings from the overall composite come from chronic diseases and conditions. In 2013, nearly 27,000 hospitalizations for chronic disease and conditions could have been avoided. A 10% reduction in that number would save an estimated \$26 million dollars.

PREVENTION QUALITY INDICATOR, CHRONIC DISEASE/CONDITION COMPOSITE RATE PER 100,000 POPULATION AGED 18 YEARS AND OLDER BY COUNTY OF RESIDENCE AND ESTIMATED COST SAVINGS, OKLAHOMA, 2013.

County	# of Stays	Risk-Adjusted Rate	Annual Savings per Percentage Reduction in Number				
			10%	20%	30%	40%	50%
Adair	300	1,764.7	\$117,077	\$234,154	\$351,232	\$468,309	\$585,387
Alfalfa	32	577.7	\$37,578	\$75,157	\$112,736	\$150,315	\$187,894
Atoka	170	1,402.8	\$144,174	\$288,348	\$432,522	\$576,696	\$720,870
Beaver	16	336.9	\$22,096	\$44,193	\$66,289	\$88,386	\$110,483
Beckham	148	899.3	\$199,605	\$399,211	\$598,817	\$798,422	\$998,028
Blaine	79	861.4	\$96,382	\$192,765	\$289,148	\$385,531	\$481,913
Bryan	512	1,420.4	\$462,111	\$924,223	\$1,386,335	\$1,848,446	\$2,310,558
Caddo	178	772.5	\$142,639	\$285,278	\$427,917	\$570,556	\$713,195
Canadian	491	577.4	\$503,020	\$1,006,040	\$1,509,060	\$2,012,080	\$2,515,100
Carter	515	1,336.1	\$560,362	\$1,120,725	\$1,681,088	\$2,241,450	\$2,801,813
Cherokee	205	557.6	\$204,960	\$409,921	\$614,881	\$819,842	\$1,024,803
Choctaw	320	2,331.3	\$255,837	\$511,674	\$767,512	\$1,023,349	\$1,279,187
Cimarron	c	c	c	c	c	c	c
Cleveland	721	404.9	\$813,925	\$1,627,850	\$2,441,776	\$3,255,701	\$4,069,626
Coal	27	507.0	\$33,217	\$66,434	\$99,651	\$132,868	\$166,086
Comanche	643	794.9	\$609,666	\$1,219,333	\$1,829,000	\$2,438,667	\$3,048,334
Cotton	41	786.4	\$30,534	\$61,068	\$91,603	\$122,137	\$152,672
Craig	172	1,266.4	\$131,079	\$262,158	\$393,237	\$524,317	\$655,396
Creek	644	1,080.4	\$623,870	\$1,247,740	\$1,871,611	\$2,495,481	\$3,119,352
Custer	169	808.6	\$172,750	\$345,500	\$518,251	\$691,001	\$863,752

County	# of Stays	Risk-Adjusted Rate	Annual Savings per Percentage Reduction in Number				
			10%	20%	30%	40%	50%
Delaware	234	549.9	\$214,117	\$428,235	\$642,353	\$856,471	\$1,070,589
Dewey	31	672.2	\$36,751	\$73,502	\$110,253	\$147,004	\$183,755
Ellis	34	875.8	\$23,797	\$47,594	\$71,391	\$95,188	\$118,985
Garfield	550	1,079.6	\$649,431	\$1,298,862	\$1,948,293	\$2,597,724	\$3,247,156
Garvin	180	746.9	\$134,647	\$269,295	\$403,943	\$538,591	\$673,239
Grady	243	578.2	\$235,580	\$471,159	\$706,739	\$942,319	\$1,177,899
Grant	66	1,415.7	\$72,640	\$145,281	\$217,921	\$290,562	\$363,202
Greer	78	1,374.8	\$66,722	\$133,445	\$200,168	\$266,891	\$333,614
Harmon	60	2,513.2	\$63,111	\$126,223	\$189,334	\$252,446	\$315,558
Harper	37	1,077.5	\$24,517	\$49,034	\$73,551	\$98,068	\$122,585
Haskell	64	549.1	\$54,420	\$108,841	\$163,262	\$217,683	\$272,104
Hughes	73	604.3	\$69,621	\$139,242	\$208,864	\$278,485	\$348,106
Jackson	265	1,378.1	\$251,758	\$503,517	\$755,276	\$1,007,034	\$1,258,793
Jefferson	73	1,230.6	\$77,788	\$155,577	\$233,365	\$311,154	\$388,942
Johnston	137	1,450.9	\$117,951	\$235,902	\$353,853	\$471,804	\$589,755
Kay	497	1,207.6	\$415,270	\$830,540	\$1,245,811	\$1,661,081	\$2,076,351
Kingfisher	93	728.8	\$148,754	\$297,508	\$446,262	\$595,016	\$743,771
Kiowa	232	2,860.1	\$153,044	\$306,089	\$459,133	\$612,178	\$765,223
Latimer	98	957.2	\$80,257	\$160,515	\$240,773	\$321,030	\$401,288
Le Flore	279	662.0	\$162,173	\$324,346	\$486,519	\$648,692	\$810,866
Lincoln	225	780.8	\$234,702	\$469,405	\$704,108	\$938,811	\$1,173,514
Logan	191	591.2	\$202,998	\$405,996	\$608,994	\$811,992	\$1,014,990
Love	58	694.5	\$57,776	\$115,552	\$173,328	\$231,104	\$288,880
Major	38	519.1	\$44,617	\$89,235	\$133,853	\$178,471	\$223,089
Marshall	193	1,223.6	\$148,483	\$296,967	\$445,451	\$593,935	\$742,418
Mayes	355	1,009.5	\$455,298	\$910,597	\$1,365,896	\$1,821,195	\$2,276,494
McClain	172	625.3	\$131,765	\$263,530	\$395,296	\$527,061	\$658,827
McCurtain	233	861.8	\$180,891	\$361,782	\$542,673	\$723,564	\$904,455
McIntosh	191	883.6	\$187,767	\$375,535	\$563,303	\$751,071	\$938,839
Murray	106	866.1	\$110,703	\$221,406	\$332,109	\$442,812	\$553,516
Muskogee	687	1,199.4	\$787,020	\$1,574,040	\$2,361,060	\$3,148,081	\$3,935,101
Noble	84	809.1	\$98,084	\$196,169	\$294,254	\$392,338	\$490,423
Nowata	55	556.6	\$69,177	\$138,355	\$207,533	\$276,711	\$345,888
Okfuskee	103	975.6	\$121,432	\$242,864	\$364,297	\$485,729	\$607,161
Oklahoma	5,297	994.6	\$5,056,118	\$10,112,237	\$15,168,356	\$20,224,475	\$25,280,594
Okmulgee	421	1,245.3	\$400,589	\$801,179	\$1,201,768	\$1,602,358	\$2,002,947
Osage	351	852.1	\$362,935	\$725,870	\$1,088,805	\$1,451,740	\$1,814,675
Ottawa	253	904.7	\$204,199	\$408,398	\$612,598	\$816,797	\$1,020,996
Pawnee	134	915.7	\$134,423	\$268,846	\$403,269	\$537,692	\$672,115
Payne	413	829.3	\$434,004	\$868,009	\$1,302,014	\$1,736,019	\$2,170,023
Pittsburg	423	1,002.2	\$337,254	\$674,508	\$1,011,762	\$1,349,016	\$1,686,270
Pontotoc	196	644.5	\$220,438	\$440,876	\$661,314	\$881,752	\$1,102,190

County	# of Stays	Risk-Adjusted Rate	Annual Savings per Percentage Reduction in Number				
			10%	20%	30%	40%	50%
Pottawatomie	703	1,273.4	\$635,578	\$1,271,157	\$1,906,736	\$2,542,315	\$3,177,893
Pushmataha	158	1,373.1	\$100,897	\$201,794	\$302,691	\$403,588	\$504,486
Roger Mills	28	855.9	\$36,808	\$73,616	\$110,424	\$147,233	\$184,041
Rogers	498	701.2	\$520,038	\$1,040,077	\$1,560,116	\$2,080,155	\$2,600,194
Seminole	232	1,086.0	\$233,880	\$467,760	\$701,640	\$935,520	\$1,169,400
Sequoyah	105	301.0	\$85,268	\$170,536	\$255,804	\$341,072	\$426,340
Stephens	422	1,029.7	\$357,909	\$715,819	\$1,073,728	\$1,431,638	\$1,789,547
Texas	62	473.6	\$78,792	\$157,584	\$236,376	\$315,168	\$393,960
Tillman	84	1,274.9	\$63,459	\$126,919	\$190,379	\$253,839	\$317,299
Tulsa	4,692	1,039.5	\$4,740,970	\$9,481,940	\$14,222,911	\$18,963,881	\$23,704,852
Wagoner	515	907.6	\$471,271	\$942,542	\$1,413,814	\$1,885,085	\$2,356,356
Washington	278	566.3	\$328,769	\$657,538	\$986,308	\$1,315,077	\$1,643,847
Washita	106	1,032.8	\$103,487	\$206,974	\$310,461	\$413,948	\$517,435
Woods	41	556.4	\$52,582	\$105,164	\$157,746	\$210,329	\$262,911
Woodward	165	1,035.0	\$174,456	\$348,913	\$523,370	\$697,827	\$872,284

*Cost savings are based on charges that have been adjusted to costs, using hospital-specific cost-to-charge ratios. Values based on 10 or fewer discharges are designated with a "c" to protect confidentiality of patients.

Identification of High User Groups

Limited data was available that illustrated the identification of a group of high volume health care users. The purpose was to investigate care coordination as a way to help high volume users better manage their health. The report, Feasibility of Care Coordination for Persons Dually Eligible for Medicaid and Medicare dated December 2013⁵², examined dual-eligibles, people who are covered by both Medicare and Medicaid at the same time. Most primary and acute care service costs were covered by Medicare while long-term care and community-based services were covered by Medicaid funds. Most, but not all, dual-eligibles are low income individuals aged 65 years or older.

According to the report, more than 109,000 Oklahomans were dual-eligible. Dual eligibles accounted for 14% of the Medicaid enrollment population, but accounted for a disproportional 32% of Medicaid expenditures. However, dual eligibles were further defined into four populations based on need:

- Frail elders and persons with physical disabilities in long-term care accounted for 26% of the dual population but 79% of expenditures.
- Persons with intellectual or development disabilities in long-term care accounted for 1% dual population, but 10% of expenditures.
- Adults with chronic physical and/or mental health needs in the community accounted for 48% of the dual population and 20% of expenditures.
- Healthy seniors residing in the community accounted for 25% of the dual population and 1% of expenditures.

The report concluded with the exploration of coordinated care to rebalance services in a manner that improves member quality of life and health outcomes and yields significant savings, particularly with respect to long-term care recipients.

4. Tobacco Use

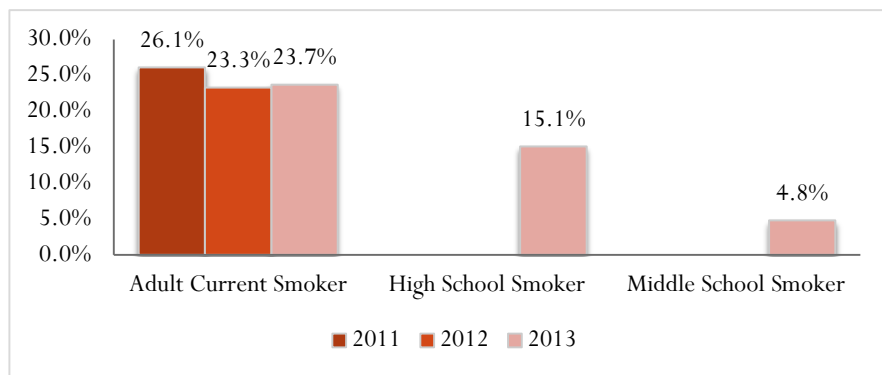
Smoking has long been associated with the development of cancer. Moreover, smoking has been found to increase the risk of developing diabetes and/or hypertension.⁵³ Tobacco contributed to an estimated 80-90% of lung cancer deaths and 90% of deaths from chronic lower respiratory disease. Health care costs associated with smoking were approximately \$1.62 billion dollars with \$264 million covered by the Medicaid program⁵⁴. Oklahoma has consistently had one of the highest rates of adult and youth smoking in the nation. Additionally, 21.2% of male high school students used smokeless or spit tobacco in 2013 compared to 14.7% of U.S. males students. The Tobacco Free Kids Campaign estimates that each year 4,000 youths in Oklahoma become daily smokers.

METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Tobacco Use			
Adult Smoking Prevalence	23.7% (2013)	18.8% (2013)	18.0%
Youth Smoking Prevalence	15.1% High School (2013, unweighted)	12.7% High School (2013)	10.0%
	4.8% Middle School (2013)	2.9% Middle School (2013)	2.0%

According to American's Health Rankings[®] 2014, Oklahoma was among the five worst states for smoking prevalence, ranking 45th and with a rate 26% higher than the national average. However, over the decades, the rate of smoking in Oklahoma has declined with the trend slowing in the most recent years.

TRENDS IN HEALTH METRICS.

- The Behavioral Risk Factor Surveillance System results on OK2SHARE calculated the confidence intervals for the responses.
- The 2011 rate of 26.1% (24.7-27.5%, 95% CI) was not statistically different than the 2013 rate of 23.7% (22.4-25.0%, 95% CI).

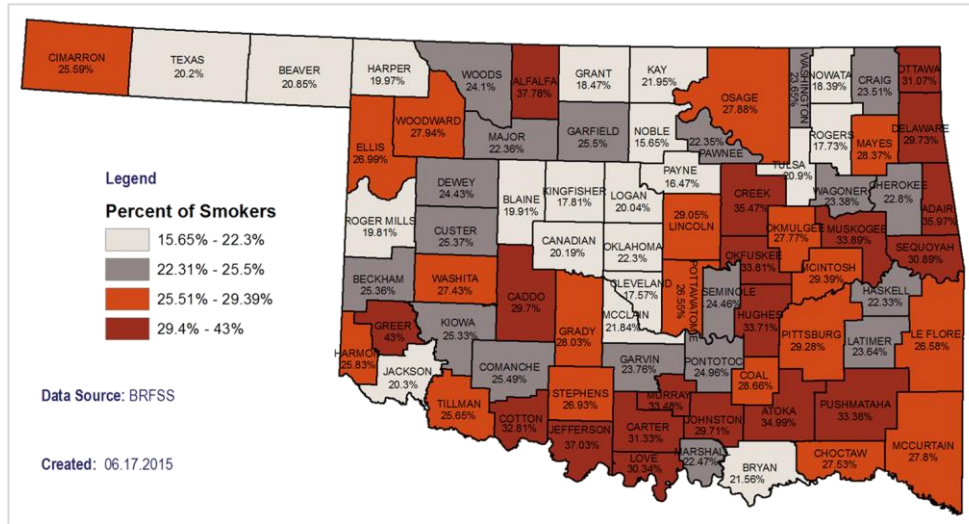


The youth prevalence of current smokers was determined by the Youth Tobacco Survey, administered to public school students in both middle school and high school. The Youth Risk Behavior Survey, conducted in conjunction with the Centers for Disease Control and Prevention, has been conducted as a weighted survey to obtain representative data for states and the nation. Since the unweighted data may vary from the weighted data, it should be noted that the high school data is unweighted and the middle school data is weighted.

A. Population Health

The burden of tobacco use varied across Oklahoma. While limited information was publicly available on youth tobacco use in Oklahoma, more was available on adult smokers. The 2013 rate of current smokers in the northwestern Oklahoma of 19.3% (16.2-22.5%, 95% CI) was lower than the state rate of 23.7% (22.4-25.0%, 95% CI). The rates in the other regions of the state were not statistically different than the state rate: Tulsa area (20.4%), Central (21.2%), Southeast (26.7%), Southwest (28.9%), or Northeast (26.3%). The rate of current smokers ranged from a low of 15.6% in Noble County to a rate 2.7 times higher (43.0%) in Greer County.

PERCENTAGE OF SMOKERS BY COUNTY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

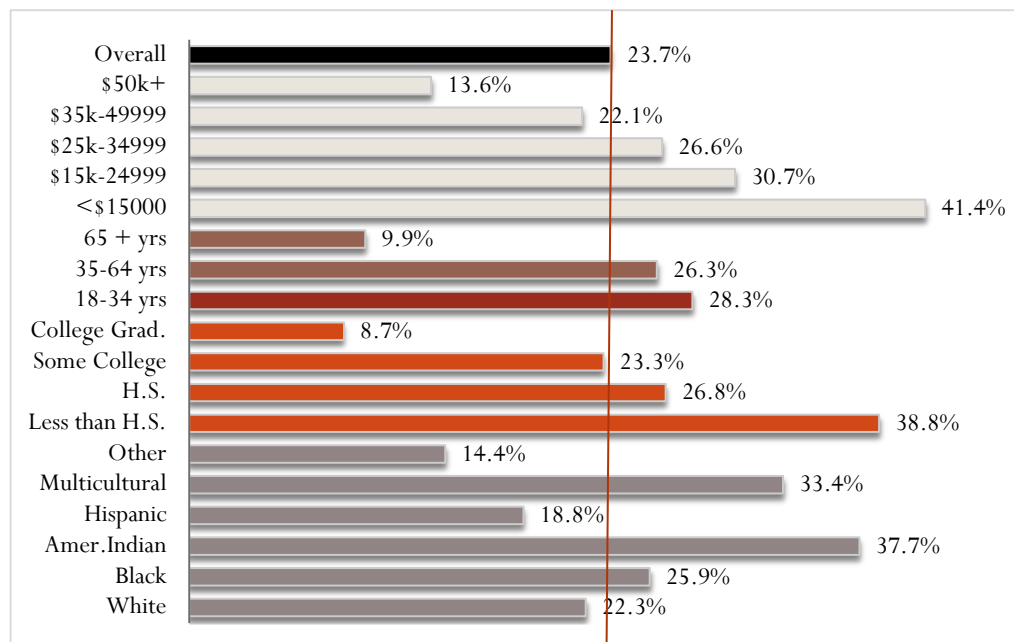


- Lowest rates of adult smokers were in Noble (15.6%), Payne (16.5%), Cleveland (17.6%), Rogers (17.7%), and Kingfisher (17.8%) counties.
- Counties with the highest rates were: Atoka (35.0%), Creek (35.5%), Adair (36%), Jefferson (37%), Alfalfa (37.8%), and Greer (43.0%).

The rates of current smokers were not statistically different between males (25.8%, 23.8-27.8%, 95% CI) and females (21.7%, 20.1%-23.4%). The rates of current smoker varied also by race, educational status, age, and income.

RATES OF CURRENT SMOKERS BY CHARACTERISTICS, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

- The rates of current smokers were markedly lower among those with higher income, 65 years and older, college graduates, and other race.
- As such, some rates were markedly higher, especially among American Indians and those with lower socio-economic status.



B. Clinical Care

Ever since the U.S. Surgeon General's first landmark report on smoking in 1964, the serious effects that smoking has on health continues to grow. Data from the 2013 Oklahoma Behavioral Risk Factor Surveillance Survey showed that even Oklahomans with health conditions caused or exacerbated by smoking struggle with addiction to tobacco.

*21.2% of adults who were told by a doctor that they had **diabetes** were current smokers.*

*24.9% of adults who were told by a doctor that they had **pre-diabetes** were current smokers.*

*23.4% of adults who reported having **high blood pressure** were current smokers.*

*20.9% of adults who were taking **medicine for high blood pressure** were current smokers.*

*21.9% of adults who were **cancer survivors** were current smokers.*

*32.8% of adults who were told they had a **heart attack** were current smokers.*

*23.5% of adults who had an **angina** diagnosis were current smokers.*

*31.0% of adults who were told by a doctor that they had a **stroke** were current smokers.*

*29.4% of adults with **asthma** were current smokers.*

*47.3% of adults with **chronic obstructive pulmonary disease, emphysema, or chronic bronchitis** were current smokers.*

Smoking causes an increased risk of death from lung cancer, chronic obstructive pulmonary disease, ischemic heart disease, stroke, and all causes combined.⁵⁵

Population-Based Cessation Service

The 2013 Behavioral Risk Factor Surveillance System found that 52.2% of current smokers in the U.S. quit smoking for at least one day during the past 12 months. As with other states, Oklahoma has provided a tobacco helpline for more than a decade to assist with quit attempts.

In Fiscal Year (FY) 14, the Oklahoma Tobacco Research Center at the University of Oklahoma Health Sciences Center evaluated the utilization, satisfaction levels, and effectiveness of the Oklahoma Tobacco Helpline. During the year, there were 24,982 total callers of which almost 24,000 tobacco users received services. There was a reported 29% decline in services provided from FY 2013. Conversely, fax referrals from health professionals to the Helpline increased 38% from FY 2013. Nearly 4,000 fax referrals were received by the Helpline.

Most (93%) of the tobacco users who enrolled in the multiple-call program received nicotine replacement therapy from the Helpline and nearly half (49%) of those who enrolled in the single-call program also received nicotine replacement therapy from the Helpline. In FY 2014, tobacco users from all 77 counties contacted the Helpline. Contact at seven months post intervention found:

- A single Helpline call plus two weeks of nicotine replacement therapy (available to tobacco users with health insurance) achieved 30-day quit rates of 21.4% (95% CI: 14.3-28.6%) and
- Of those who received the multiple-call intervention, 36.6% (95% CI: 31.9-41.3%) reported a 30-day abstinence.

C. Health Costs

Oklahomans spend approximately \$1.62 billion per year on smoking-related health costs.⁵⁶ The assessment focused on preventable hospitalizations for chronic obstructive pulmonary disease and angina.

Tobacco use is the primary cause of chronic obstructive pulmonary disease in the U.S. secondhand smoke was associated with a 10-43% increase in the risk of chronic obstructive pulmonary disease, according to the American Lung Association. Moreover, nearly all of the deaths from chronic lower respiratory disease were from chronic obstructive pulmonary disease.⁵⁷

Smoking, socioeconomic status, disease severity, and age are associated with higher hospital admissions. With access to high quality community and clinical care, hospitalizations from chronic obstructive pulmonary disease often are preventable. Geographic areas with high rates of hospital admissions also tend to have high rates for other diseases that require ongoing self-management and medical care.⁵⁸

Poorer health literacy is associated with greater COPD severity and higher likelihood of hospitalizations.⁵⁹

In Oklahoma, an estimated 10,187 hospitalization from chronic obstructive pulmonary disease could have been prevented in 2013, according to the MONAHRQ[®] web-based query. If 10% of the hospitalizations were prevented through outpatient care and community services, an estimated \$9,079,282 in cost savings could have been achieved.

COST SAVINGS BY PERCENT REDUCTION IN THE NUMBER OF CHRONIC PULMONARY DISEASE HOSPITALIZATIONS, OKLAHOMA, 2013.

10%	20	30%	40%	50%
\$9,079,282.29	\$18,158,564.54	\$27,237,846.88	\$36,317,129.12	\$45,396,411.41

Preventable hospitalizations from chronic obstructive pulmonary disease were generally higher in the southern portion of the state. While 71 counties experienced ten or more hospitalizations, risk-adjusted rates were highest in ten counties. Similarly, the ten counties with the largest number of hospitalizations stood apart from the others.

TOP TEN COUNTIES BY RATE AND BY NUMBER OF PREVENTABLE HOSPITALIZATIONS, OKLAHOMA, 2013.

County	Risk-Adjusted Rate/100,000	County	Number of Stays
Harmon	1,965.9	Oklahoma	1,811
Kiowa	1,759.9	Tulsa	1,557
Choctaw	1,527.8	Muskogee	285
Adair	1,473.1	Creek	278
Grant	1,194.4	Cleveland	266
Bryan	1,107.3	Bryan	250
Atoka	1,103.4	Pottawatomie	245
Pushmataha	1,025.2	Carter	241
Carter	1,001.3	Garfield	232
Marshall	994.2	Kay	217

Smoking has been associated with more hospitalizations among those with angina. Angina is chest pain that occurs when a narrowing or blockage of a coronary artery prevents sufficient oxygen-rich blood from reaching the heart muscle. Both stable and unstable angina are symptoms of potential coronary artery disease. Effective management of coronary artery disease reduces the occurrence of major cardiac events such as heart attacks, and may reduce hospital admission rates for angina. Individual risk factors associated with angina and higher hospital admissions included: smoking, high cholesterol, high blood pressure, diabetes, elderly age (over 70), and male gender. Population risk factors associated with angina and higher hospital admissions included:

- Access to care

Areas with high rates of angina admissions also tend to have high rates of admissions for other disease that require ongoing self-management and medical care. Combining emergency room and inpatient chart data may give a more accurate picture of the issues in the community.

- Lower socio-economic areas

Studies have found that low-income ZIP code areas have nearly 2-3 times the rate of angina hospitalizations than high-income ZIP code areas.⁶⁰

Preventable hospitalizations for angina without procedure were limited to 11 of Oklahoma’s 77 counties. The highest risk-adjusted rate of preventable hospitalization occurred in Latimer County, while the highest number of preventable hospitalizations for angina without procedure occurred in Oklahoma County.

PREVENTABLE HOSPITALIZATIONS AMONG THOSE WITH TEN OR MORE ADMISSIONS FOR ANGINA WITHOUT PROCEDURE, OKLAHOMA, 2013.

County	# of Stays	Risk-Adjusted Rate	Cost Saving by Percent Reduction in # of Stays				
			10%	20%	30%	40%	50%
Bryan	12	33.91	\$5,531.23	\$11,062.46	\$16,593.70	\$22,124.93	\$27,656.16
Carter	15	38.79	\$9,252.76	\$18,505.53	\$27,758.30	\$37,011.06	\$46,263.82
Latimer	25	253.77	\$17,662.55	\$35,325.10	\$52,987.65	\$70,650.20	\$88,312.75
Le Flore	14	33.05	\$6,393.03	\$12,786.06	\$19,179.09	\$25,572.12	\$31,965.15
Muskogee	15	26.27	\$12,010.50	\$24,021.00	\$36,031.50	\$48,042.00	\$60,052.50
Oklahoma	71	13.38	\$58,917.72	\$117,835.43	\$176,753.15	\$235,670.87	\$294,588.58
Ottawa	12	44.38	\$6,808.70	\$13,617.41	\$20,426.11	\$27,234.82	\$34,043.52
Payne	21	44.43	\$17,581.49	\$35,162.99	\$52,744.48	\$70,325.98	\$87,907.47
Pittsburg	12	28.96	\$6,443.76	\$12,887.52	\$19,331.28	\$25,775.04	\$32,218.80
Pottawatomie	11	19.9	\$7,468.68	\$14,937.36	\$22,406.04	\$29,874.72	\$37,343.40
Tulsa	46	10.18	\$35,140.00	\$70,280.00	\$105,419.99	\$140,559.99	\$175,699.99
Total	254	n.a.	\$183,210.42	\$366,420.86	\$549,631.29	\$732,841.73	\$916,052.14

The cost savings from reducing the number of preventable hospital stays ranged from \$183,210 for a 10% reduction to more than \$900,000 for a 50% reduction.

5. Obesity

With 32.5% of its residents obese, Oklahoma was the 6th most obese state in the nation in 2013 according to the Behavioral Risk Factor Surveillance System. Among Oklahoma's youth, 11.8% were obese according to the Youth Risk Behavior Survey in 2013. One-third of adult Oklahomans did not participate in leisure time physical activity in 2013.

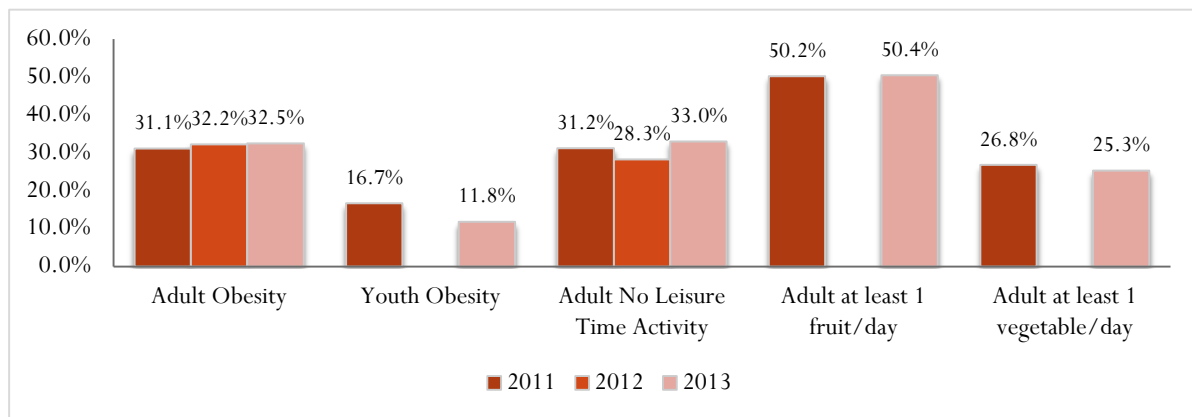
METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Obesity			
Adult Obesity	32.5% (2013)	29.4% (2013)	29.5%
Youth Obesity	11.8% High School (2013)	13.7% High School (2013)	10.6%
Adult No Leisure Time Activity	33.0% (2013)	26.3% (2013)	20.8%
Adult Fruit Consumption	49.6% at least 1/day (2013)	60.8% at least 1/day (2013)	50.0% at least 1/day
Adult Vegetable Consumption	1.5/day (2013)	1.6/day (2013)	2.1 per day
Food Desert/Food Availability	21.1% of population (2013)	12.3% of population (2013)	Under development

Over time, the rate of adult obesity has climbed; however, the 95% confidence intervals of the annual data overlap, meaning that there were no statistical differences between the 2011, 2012, and 2013 percentages of obesity:

- 2011: 31.1% (29.7-32.5%, 95% CI);
- 2012: 32.2% (30.8-33.6%, 95% CI); and
- 2013: 33.5% (31.2-33.9%, 95% CI).

There was a statistical difference between the youth obesity rates in 2011 (16.7%, 13.9-19.9%, 95% CI) and 2013 (11.8%, 10.0-14.0%, 95% CI). The 2011 and 2013 percentages of adults with no leisure time physical activity were not statistically different. Similarly, the fruit and vegetable consumption among adults remained steady from 2011 to 2013.

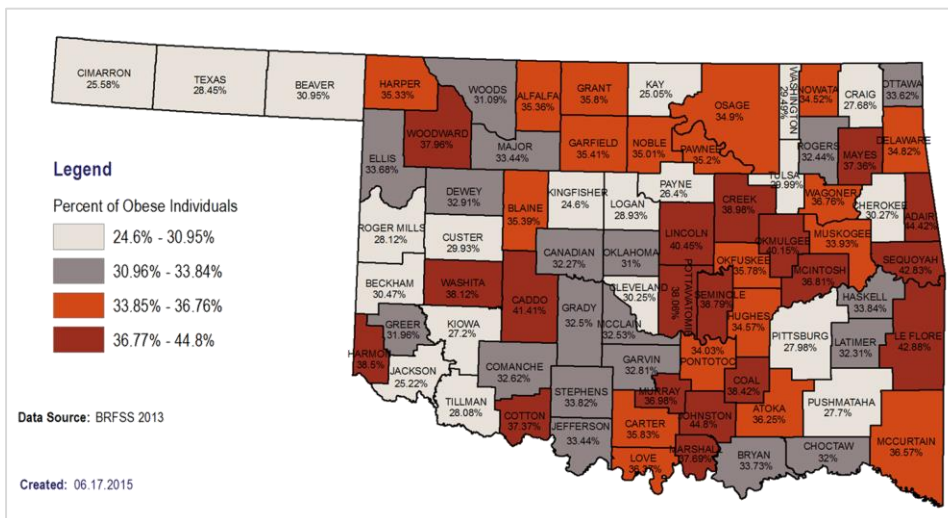
TRENDS IN HEALTH METRICS.



A. Population Health

The rate of obesity in Oklahoma has increased from 1 in 7 adults in 1995 to 1 in 3 adults in 2013. Kingfisher had the lowest rate (24.6%) and Johnston had the highest rate (44.8%) of adult obesity.

PERCENTAGE OF OBESE ADULTS BY COUNTY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.



- Twenty-two counties had an adult obesity rate lower than the state rate (31.1%).
- Eighteen counties had similar rates as the state rate (range 31.1-33.9%).
- Thirty-seven counties had adult obesity rates higher than the state rate (range 34.0-44.8%). Males (32.9%) and

males (32.2%) had similar rates of obesity. Those with incomes of \$75,000 or greater had lower obesity rates (31.3%, 28.5-34.3% 95% CI) than those with incomes less than \$15,000 (36.4%, 32.4-40.6%, 95% CI); however the rates were not statistically different. The rates of adult obesity varied by educational status. Those with less than a high school education (35.6%, 31.3-40.2, 95% CI) and those who were high school graduates (33.9%, 31.4-36.4%, 95% CI) had higher rates of obesity compared to those who were college graduates (28.3%, 26.1-30.6%, 95% CI). Adult obesity rates also varied by race and ethnicity. The 2013 obesity rates among adults by race/ethnicity were:

- 31.6% (30.1-33.2, 95% CI) among Whites;
- 35.8% (30.6-41.4, 95% CI) among Blacks;
- 34.4% (28.8-40.5, 95% CI) among Hispanics;
- 18.3% (10.0-31.0%, 95% CI) among Asians;
- 41.3% (35.1-47.7%, 95% CI) among American Indians; and
- 29.9% (24.7-35.7%, 95% CI) among those who reported two or more races.

The adult obesity rates among Blacks and American Indians were statistically different than the rate among Whites.

In 2013, 67.9% of adults in Oklahoma were either obese or overweight. Among Oklahoma’s youth, 27.1% were either obese or overweight. In addition to weight status, physical activity and nutrition play a role in state health.

INDICATORS OF WEIGHT STATUS, OKLAHOMA, 2013.⁶¹

Indicator	Data	95% CI	Year	Data Source
Adults who are obese	32.5%	(31.2-33.9)	2013	1
Adults who are overweight	35.4%	(34.0-36.8)	2013	1
High School-aged youth who are obese	11.8%	(10.0-14.0)	2013	2
High School-aged youth who are overweight	15.3%	(13.1-17.8)	2013	2

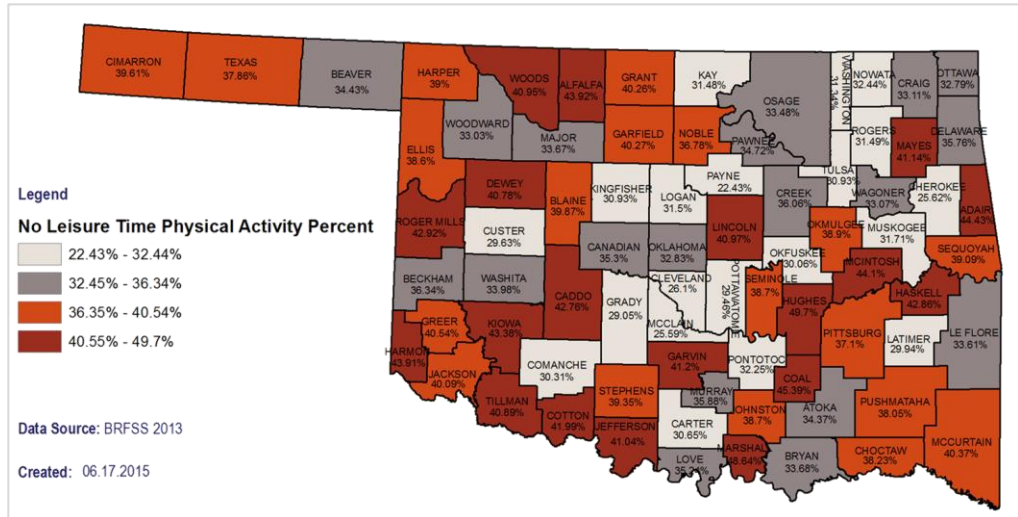
Date sources: 1=Behavioral Risk Factor Surveillance System, 2=Youth Risk Behavior Survey

Physical Activity

Physical activity can play a role in reversing or preventing health problems and help reduce the risk of premature death. Ranked 47th in the nation in 2013, 33% of Oklahomans reported no leisure time physical activity compared to a national average of 26.3%.⁶² According to the Oklahoma Health Improvement Plan, Healthy Oklahoma 2020, adults who engage each week in 150 minutes of moderate to vigorous intensity aerobic activity in bouts of at least 10 minutes experience improved health and fitness and reduced risk of several chronic diseases; yet, close to 23% of U.S. adults do not engage in any type of physical activity.

PERCENT OF NO LEISURE TIME PHYSICAL ACTIVITY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

• The 2013 Behavioral Risk Factor Surveillance System found that Dewey County had the highest rate of no leisure time physical activity (49.7%), while Murray County had the highest rate (22.4%).



Several indicators of physical activity were found in addition to the percentage of no leisure time activity.

INDICATORS OF PHYSICAL ACTIVITY, OKLAHOMA, 2013.⁶³

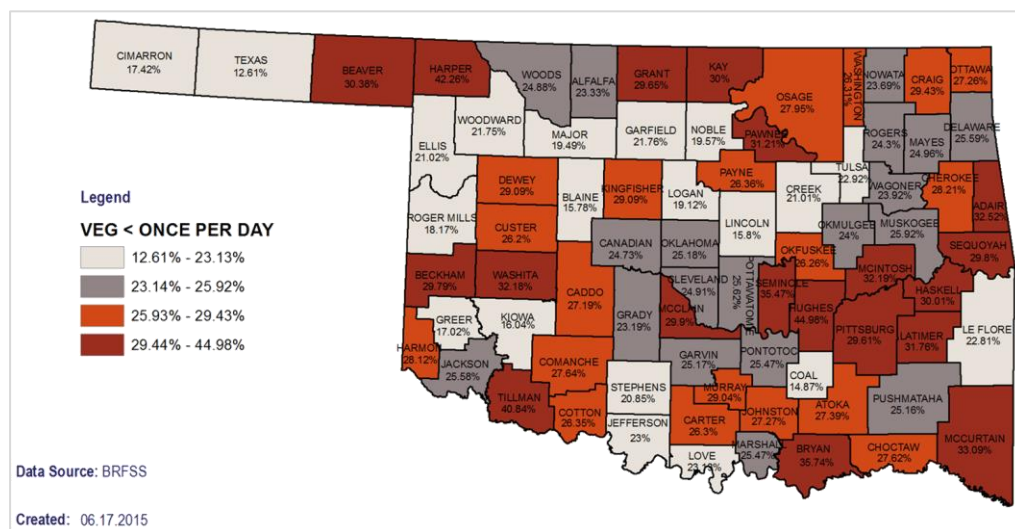
Indicator	Data	95% CI	Year	Data Source
Adults who engage in no leisure time physical activity	33.0%	(31.6-34.3)	2013	1
Adults aerobically active 150 minutes	43.9%	(42.5-45.4)	2013	1
Adults aerobically active 300 minutes	27.4%	(26.1-28.7)	2013	1
Adults meeting muscle strengthening guidelines	24.3%	(23.0-25.6)	2013	1
Adults meeting aerobic and muscle strengthening guidelines	15.8%	(14.7-17.0)	2013	1
Adolescents who are physically active daily	38.5%	(35.2-41.9)	2013	2
Adolescents who participate in daily physical education	32.2%	(27.6-37.1)	2013	2
Adults who usually walk or bike to work	2.1%	(1.9-2.2)	2009-2011	3

Fruit consumption among Oklahomans was lowest among those who had income less than \$15,000 (55.3%, 51.0-59.5%, 95% CI) or income of \$15,000-\$24,999 (53.6%, 50.1-57.1%, 95% CI) and was highest among those with incomes \$75,000 and more (46.0%, 42.8-49.2%, 95% CI). Females were more likely to eat at least one fruit daily (46.6%, 44.4-48.2%, 95% CI) compared to males (54.6, 52.3-56.9%, 95% CI). Those 65 years and older were more likely to consume fruit at least daily (40.5%, 38.3-42.8%, 95%CI) than other age groups.

Note: The Behavioral Risk Factor Surveillance System includes six questions about fruit and vegetable intake asked via a telephone survey, preceded by the following statement: "These next questions are about the fruits and vegetables you ate or drank during the last 30 days. Please think about all forms of fruits and vegetables including cooked or raw, fresh, frozen or canned. Please think about all meals, snacks, and food consumed at home and away from home." Respondents were asked to report consumption as times per day, week or month: 1) 100% PURE fruit juices; 2) fruit, including fresh, frozen, or canned fruit (not counting juice); 3) cooked or canned beans (not including long green beans); 4) dark green vegetables; 5) orange-colored vegetables; 6) other vegetables. Total daily fruit consumption was calculated based on responses to questions 1 and 2, and total daily vegetable consumption was based on questions 3-6.

Nationally, 22.4% (22.2-22.7%, 95% CI) of persons consumed vegetables less than one time daily in 2013. During the same period, 25.3% (23.9-26.7%, 95% CI) of Oklahomans consumed vegetables less than one time daily. This ranked Oklahoma among the bottom one-fifth of states for vegetable consumption.⁶⁶

PERCENT OF ADULTS WHO ATE AT LEAST ONE VEGETABLE A DAY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.



- Vegetable consumption at least once daily was lowest in Hughes County with a rate of 45.0%.
- Texas County had the best rate in the state at 12.6%.
- Nearly half of the counties (35, 45%) had vegetable consumption at a higher rate than the state rate.

Vegetable consumption was lowest among Blacks (37.8%, 32.1-43.9%, 95% CI) and American Indians (31.4%, 25.6-37.7%, 95% CI) not consuming at least one vegetable daily. Whites were more likely to consume at least a vegetable daily (24.0%, 22.5-25.6%, 95% CI). Those with the highest income (18.6%, 16.1-21.3%, 95% CI) were more likely to consume vegetables at least once daily compare to those with the incomes less than \$34,999:

- 36.9% (32.8-41.3%, 95% CI) among those with less than \$15,000 income,
- 31.6% (28.3-35.1%, 95% CI) among those with \$15,000-\$24,999 income, and
- 26.0% (22.0-30.4%, 95% CI) among those with \$25,000-\$34,999 income.

Less than one-quarter of females (22%, 20.6-24.0%, 95% CI) did not consume vegetables daily while nearly 30% of males did not consume vegetables daily (28.5%, 26.4-30.6%, 95%CI). Those who were 18-24 years of age reported less daily vegetable consumption (35.8%, 30.3-41.7%, 95% CI) than other age groups.

As with physical activity, there were other indicators of nutrition available for the state.

INDICATORS OF NUTRITION, OKLAHOMA, 2013.⁶⁷

Indicator	Data	95% CI	Year	Data Source
Adults who consume fruit < 1 time daily	50.4%	(48.9-51.8)	2013	1
Adults who consume vegetables < 1 time daily	25.3%	(23.9-26.7)	2013	1
Adolescents who consume fruit < 1 time daily	48.3%	(44.5-52.1)	2013	2
Adolescents who consume vegetables < 1 time daily	44.4%	(41.4-47.4)	2013	2
Adolescents who drank soda daily	31.3%	(27.6-35.1)	2013	2
Adolescents watching 3 or more hours of TV daily	31.9%	(28.2-35.9)	2013	2

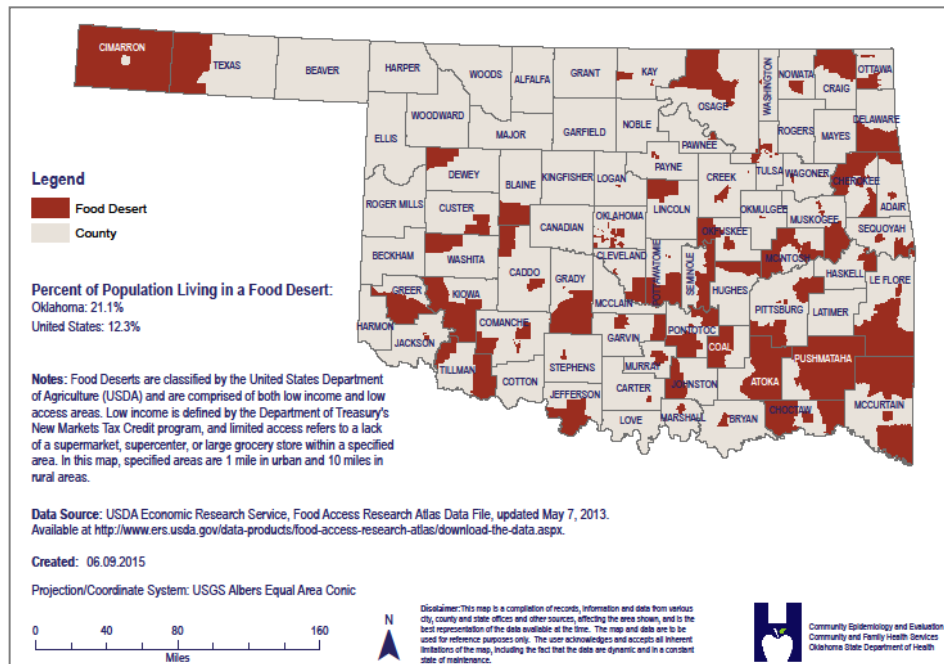
Date sources: 1=Behavioral Risk Factor Surveillance System, 2=Youth Risk Behavior Survey

Food Security

Food industry marketing, many fast food restaurants, and few grocery stores were identified as community factors that influence unhealthy food choices. In 2013, it was estimated that about 17% (654,640) of Oklahomans experienced a lack of access to food and uncertain availability of nutritiously adequate foods. For children, the situation is worse. Food insecurity among children is 26.0% (242,990 children). Nearly one-third (31%) are likely ineligible for federal nutrition programs (incomes above 185% of poverty).⁶⁸

PERCENT OF POPULATION RESIDING IN A FOOD DESERT, U.S. DEPARTMENT OF AGRICULTURE – FOOD ATLAS, OKLAHOMA, 2013.

- Food desert designations identify areas of low income and low food access.
- More than one in five Oklahomans (21.1%) lived within a food desert.
- Out of the 77 counties in Oklahoma, residents in 43 counties had to travel more than 10 miles to reach a full service grocery store in rural areas and more than a mile to a grocery store in urban areas.



There were several indicators that addressed access to food through policies or programs.

ACCESS TO FOOD INDICATORS, OKLAHOMA.

Indicator	Data	95% CI	Year	Data Source
Census tracts with healthier food retailers	51.1%	N/A	2011	1
State-level policy for healthier food retail	Yes	N/A	2001-2011	1
Farmers markets per 100,000 residents	1.9	N/A	2012	1
Farmers markets that accept SNAP benefits	14.1%	N/A	2012	1
Farmers markets that accept WIC coupons	N/A	N/A	2012	1
Number of Local Food Policy Councils	1	N/A	2012	2
Middle/high schools offer fruits/vegetables at celebrations	27.6%	N/A	2012	1
Cropland harvested for fruits and vegetables	0.3%	N/A	2007	1
State-level Food Policy Council	Yes	N/A	2012	2
State-level farm to school/preschool policy	Yes	N/A	2011	1
State child care regulations meet national standards: fruit	No	N/A	2011	1
State child care regulations meet national standards: vegetable	No	N/A	2011	1
Number of food hubs in each state	2	N/A	2012	1
States that authorize farmers to accept WIC CVV	Yes	N/A	2012	1

Data Sources: 1= State Indicator Report on Fruits and Vegetables and 2= Community Food Security Coalition.

Oklahoma has several state-level policies that many other states do not have:

- Oklahoma was one of 28 states with a state-level farm to school/pre-school policy (2011).
- Oklahoma was one of 27 states with a state-level Food Policy Council (2012).
- Oklahoma was among the 19 states that authorized farmers to accept WIC Cash Value Vouchers (2012).

Food insecurity is associated with increased risk of hypertension. This inverse relationship persists after controlling for socio-economic status, health insurance, marital status, tobacco use, and demographics.⁶⁹

B. Clinical Care

Overweight and obesity have been associated with increased risk of diabetes, hypertension, and other diseases.^{70,71} Those who were obese were more likely to have diabetes and prediabetes than those who were of normal weight. Persons who were overweight were more likely to have diabetes than those of normal weight; however, there was no statistical difference between the percentage of overweight and normal weight persons with prediabetes.

WEIGHT STATUS BY DIABETES DIAGNOSIS, OKLAHOMA BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.⁷²

Weight Status		Ever Told by Doctor You Have Diabetes			
		Yes	Yes, but Female During Pregnancy	No	No, Pre-Diabetes/Borderline Diabetes
Normal	%	5.7%	0.4%	93.0%	0.9%
	95% CI	(4.5-6.9%)	(0.2-0.7%)	(91.7-94.3%)	(0.6-1.2%)
Overweight	%	8.3%	0.4%	90.0%	1.3%
	95% CI	(7.2-9.3%)	(0.2-0.6%)	(88.8-91.2%)	(0.8-1.8%)
Obese	%	19.7%	0.8%	77.0%	2.4%
	95% CI	(17.9-21.5%)	(0.4-1.3%)	(75.1-79.0%)	(1.7-3.2%)
Total	%	11.2%	0.6%	86.8%	1.5%
	95% CI	(10.3-12.0%)	(0.4-0.7%)	(85.9-87.6%)	(1.2-1.8%)

Those with normal weight were less likely to have reported having high blood pressure. The percentages of those who reported high blood pressure increased among those who were overweight and increased again for those who were obese.

WEIGHT STATUS BY HYPERTENSION DIAGNOSIS, OKLAHOMA BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.⁷³

Weight Status		Reported High Blood Pressure	
		No	Yes
Normal	%	74.7%	25.3%
	95% CI	(72.7-76.7%)	(23.3-27.3%)
Overweight	%	63.5%	36.5%
	95% CI	(61.3-65.7%)	(34.3-38.7%)
Obese	%	48.2%	51.8%
	95% CI	(45.7-50.8%)	(49.2-54.3%)
Total	%	62.2%	37.8%
	95% CI	(60.8-63.5%)	(36.5-39.2%)

Among those with high blood pressure, those who were obese were more likely to be taking medication for hypertension compared to those of normal weight.

WEIGHT STATUS AND USE OF MEDICATION FOR HYPERTENSION, OKLAHOMA BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.⁷⁴

Weight		Taking Medicine for High Blood Pressure	
		Yes	No
Normal	%	74.6%	25.4%
	95% CI	(70.4-78.7%)	(21.3-29.6%)
Overweight	%	78.8%	21.2%
	95% CI	(75.7-82.0%)	(18.0-24.3%)
Obese	%	82.3%	17.7%
	95% CI	(79.6-85.0%)	(15.0-20.4%)
Total	%	79.4%	20.6%
	95% CI	(77.6-81.3%)	(18.7- 2.4%)

C. Health Care Cost

In the United States, obesity-related medical treatment costs between \$147 and \$210 billion a year, equivalent to nearly 10% of yearly medical spending.^{75 76} Medicare and Medicaid were responsible for 42% of those costs.

Moreover, obese people had 42% more in health care costs than healthy weight persons. Specific health care costs in Oklahoma were addressed within the Diabetes and Hypertension sections of the assessment.

6. Diabetes

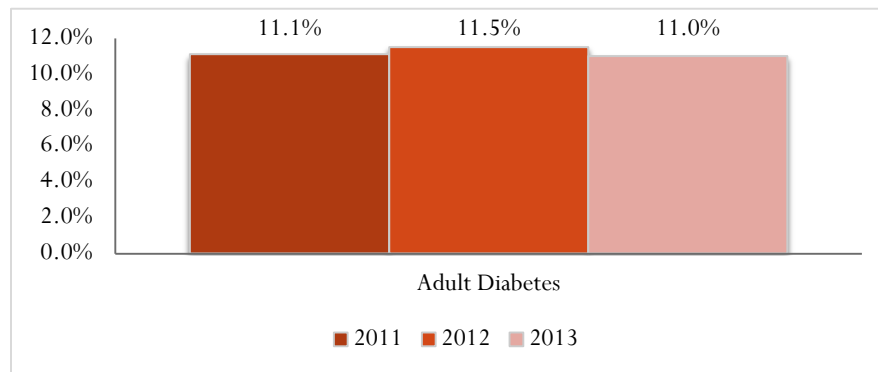
Diabetes includes a group of conditions in which the body does not produce and/or use insulin properly. Insulin is a hormone that is needed to store dietary sugar in a form that the body can utilize to obtain the energy it needs for daily life. Diabetes can have a wide range of short-term to long-term complications that may result in a hospitalization. Uncontrolled diabetes and short-term complications of diabetes can be life-threatening conditions, such as ketoacidosis, hyperosmolarity, and coma. Long-term complications from diabetes include kidney, nerve, and circulatory disorders. Diabetes is a risk factor for lower-limb amputation due to infection, nerve damage, and microvascular disease. High quality disease management and care has been shown to lead to reductions in almost all types of serious preventable hospitalizations.

METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Diabetes			
Adult Diabetes	11.0% (2013)	8.7% (2010)	9%

According to the 2014 National Diabetes Statistics Report, 29.1 million people (9.3% of the total population) had diabetes. Of those, more than one-quarter (27.8%) were undiagnosed, meaning eight million were unaware that they had diabetes.⁷⁷ Others suggest that one-third of those with Type 2 diabetes were undiagnosed.⁷⁸

In Oklahoma, the number of adults with diabetes grew steadily during the past decade. Approximately 313,800 Oklahomans aged 18 years and older have been diagnosed with diabetes, according to the 2013 Behavioral Risk Factor Surveillance System.

TREND IN HEALTH METRIC.



- The trend of adults with diabetes has remained steady over the past three years:
- In 2011, 11.1% (10.3-11.9%, 95% CI);
- In 2012, 11.5% (10.7-12.3%, 95% CI); and
- In 2013, 11.0% (10.3-11.8%, 95% CI).

Between 2005 and 2012, the death rate from diabetes decreased 38%. However, diabetes moved from the 7th leading cause of death in Oklahoma in 2012 to the 6th leading cause of death in 2013.

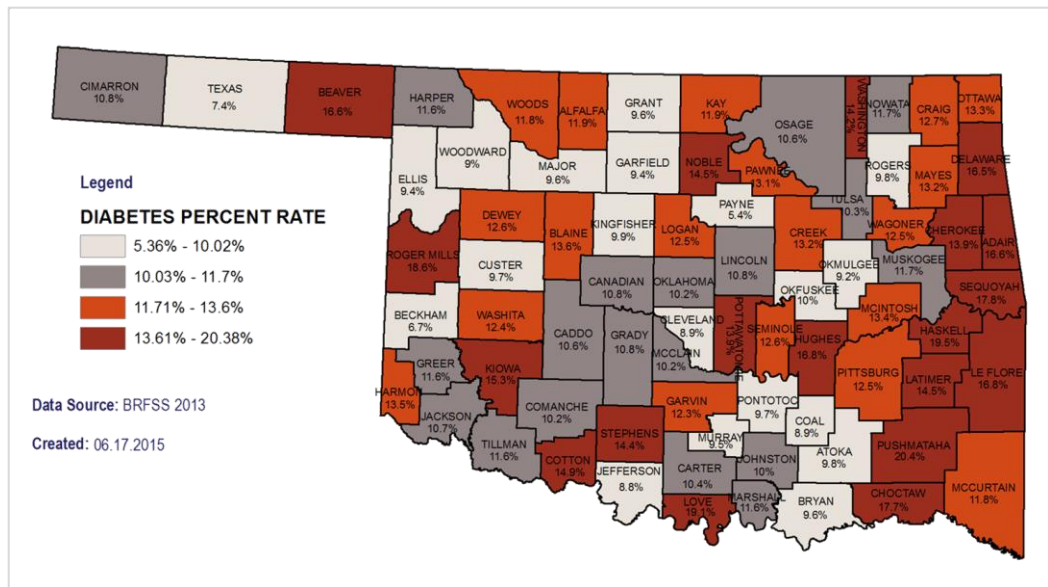
Diabetes is a major cause of renal failure, non-traumatic lower limb amputations, new cases of blindness, heart disease, and stroke.⁷⁹

A. Population Health

Over all the rate of adult diabetes in Oklahoma was 11.0% in 2013. However, the rates varied by geographic area.

RATE OF ADULT DIABETES BY COUNTY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

- Payne County had the lowest rate of adult diabetes (5.4%).
- Pushmataha County had the highest rate of adult diabetes (20.4%).
- The highest rates of diabetes were concentrated in southwest Oklahoma.



- See the Appendix for 2013 rates by county.

While males experienced a higher rate of adult diabetes (53.5%, 49.8-57.2%, 95% CI), the rate was not statistically different than the rate among females (46.5%, 42.8-50.2%, 95% CI). American Indian adults were most likely to report having been told they had diabetes (15.7%), followed closely by Blacks (15.2%). The rates of gestational diabetes and prediabetes were not statistically different by race/ethnicity.

ADULT DIABETES BY RACE AND ETHNICITY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.⁸⁰

Race/Ethnicity	Ever Told by Doctor You Have Diabetes			
	Yes	Yes, During Pregnancy	No	No, Pre-Diabetes/Borderline Diabetes
White	10.7%	0.6%	87.3%	1.4%
	95% CI (9.8-11.6%)	(0.4-0.8%)	(86.3-88.2%)	(1.1-1.7%)
Black	15.2%	*	82.4%	1.8%
	95% CI (11.5-18.9%)	n/a	(78.5-86.4%)	(0.5-3.0%)
American Indian	15.7%	0.9	81.5%	2.0%
	95% CI (12.1-19.2%)	(0.1-1.7%)	(77.5-85.5%)	(0.2-3.7%)
Other	10.9%	*	88.3%	*
	95% CI (3.0-18.8%)	n/a	(80.3-96.3%)	n/a
Multi-cultural	12.1%	*	85.4%	2.3%
	95% CI (8.8-15.4%)	n/a	(81.8-89.1%)	(0.6-4.0%)
Hispanic	6.4%	1.4%	91.3%	*
	95% CI (4.2-8.5%)	(0.2-2.5%)	(88.6-93.9%)	n/a
Total	11.1%	0.7%	86.8%	1.5%
	95% CI (10.3-11.9%)	(0.5-0.9%)	(85.9-87.6%)	(1.2-1.8%)

The rate of adult diabetes was highest among Oklahomans aged 65 years and older (22.4%) with approximately one out of five seniors diagnosed with diabetes. The rate of diabetes increased with age:

- 18-34 year olds: 2.3%, 1.2-3.4%, 95% CI;
- 35-64 year olds: 12.1%, 10.9-13.3%, 95% CI; and
- 65 years and older: 22.4%, 20.3-24.3%, 95% CI.

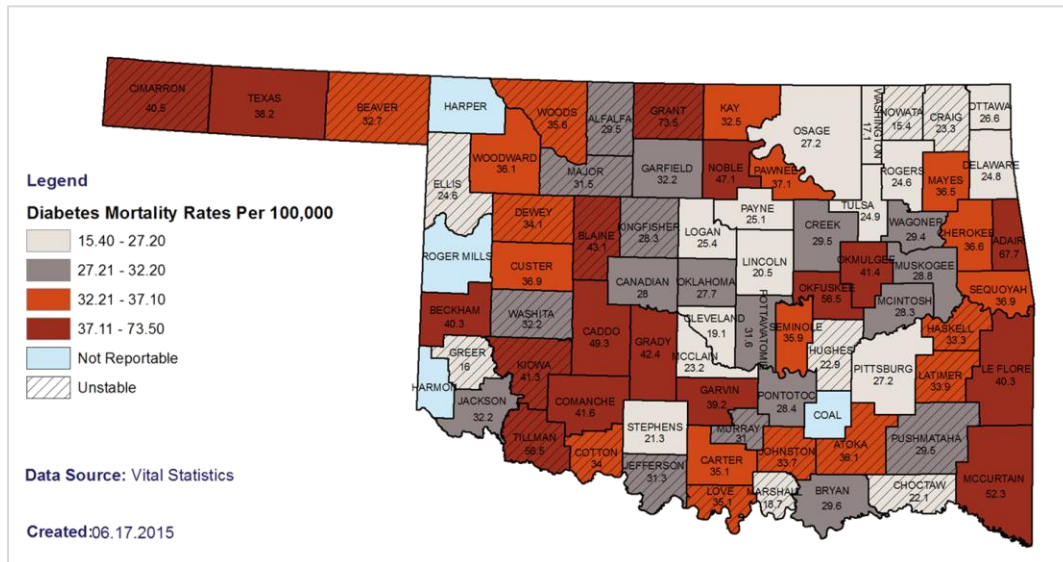
The rates of prediabetes were not statistically different between the three age groups. Those who had less than \$25,000 in household income had higher rates of diabetes compared to those with higher incomes:

- < \$15,000: 15.0% (12.6-17.4%, 95% CI);
- \$15,000-\$24,999: 14.9% (12.5-17.2%, 95% CI);
- \$25,000-\$49,000: 10.4% (9.0-11.8%, 95% CI);
- \$50,000-\$74,999: 9.9% (7.9-11.9%, 95%CI); and
- \$75,000 +: 7.9% (6.3-9.4%, 95% CI).

The inverse relationship between increased income and decreased rate of diabetes was also present among those aged 65 years and older. Among all who reported a diabetes diagnosis, 55.2% reported taking a course on how to manage their diabetes. The rate was not statistically different by age, income, or race.

When adjusted for the age differences in the population, counties in western Oklahoma had higher rates of death due to diabetes. Three years of data were used to stabilize the rates; however, some distinctions were needed within the county rate map. Striped, unstable counties, regardless of color, had annual rates that can drastically vary due to a small number of deaths (< 20). Blue-colored, not reportable counties had too few deaths (<5) to report data due to confidentiality.

AGE-ADJUSTED DIABETES MORTALITY BY COUNTY, OKLAHOMA, 2011-2013.



- Adair County had the highest stable rate of diabetes-related death (67.7%).
- Washington County had the lowest stable rate of diabetes-related death (17.1%).

B. Clinical Health

Diabetes is a dangerous disease as it can lead to heart disease, blindness, and kidney failure.

- Seventy-one percent (71.2%, 67.8-74.6%, 95% CI) of those with diabetes had also been told that they had high blood cholesterol compared to 36.1% (34.5-37.6%, 95% CI) of those who did not report diabetes.
- Reported high blood pressure among those with diabetes (78.7%, 75.3-82.0%, 95% CI) was higher than high blood pressure among those without reported diabetes (31.9%, 30.6-33.3%, 95% CI).
- Among those who reported diabetes, 51% also had a retinal eye exam within the past 12 months. The rates by gender, race/ethnicity, income, or insulin status were not statistically different.
- The rates of retinal exam were not statistically different between those who had previously been told that diabetes had affected their eyes or had retinopathy (57.3%, 45.9-68.7%, 95% CI) and those who had not been told (51.1%, 45.6-56.6%, 95% CI).
- Those with diabetes also had kidney disease (8.5%, 6.6-10.3%, 95% CI) at a higher rate than those who did not have diabetes (2.6%, 2.1-3.1%, 95% CI).

Among those who reported being told by a doctor they had diabetes:

- Half (50.7%, 45.8-55.7%, 95% CI) were between 45-54 years of age at the time of diagnosis.
- Nearly one-third (31.3%, 26.4-36.1%, 95% CI) were 20 to 44 years of age.
- Fewer were diagnosed at 65 years and older (15.6%, 12.6-18.6%, 95% CI) and before the age of 20 (2.3%, 0.7-4.0%, 95% CI). Among the population that reported being told by a doctor they had diabetes, nearly one-third (31.9%) used insulin. The rate of insulin used varied by age group.

The percentage of those who used insulin varied by age group. Additionally, American Indians who had diabetes diagnosis had a high rate of current smoking (30.2%).

INSULIN USE BY AGE GROUP, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Age Groups		Insulin Taking Status	
		Yes	No
18-34 years	%	*	*
	CI	n/a	n/a
35-64 years	%	34.1%	65.9%
	CI	(27.4-40.8%)	(59.2-72.6%)
65 years or older	%	28.4%	71.6%
	CI	(22.6-34.2%)	(65.8-77.4%)
Total	%	31.9%	68.1%
	CI	(27.3-36.5%)	(63.5-72.7%)

AMERICAN INDIANS WITH DIABETES DIAGNOSIS AND CURRENT SMOKER, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Told by Doctor You Have Diabetes		Currently Smoking	
		No	Yes
American Indian	%	69.8%	30.2%
	95% CI	(58.3-81.2%)	(18.8-41.7%)

Nearly 8 out of 10 who reported diabetes also reported being told by a doctor they had hypertension (78.7%, 75.3-82.0%, 95% CI). Similarly, 8 out of 10 American Indians with diabetes also reported having hypertension (85.5%, 76.6-94.5%, 95% CI).

C. Health Care Costs

While most of those who reported having diabetes had insurance (91%), 17% reported delaying medical care because of the cost. Individual risk factors associated with diabetes and higher hospital admissions include:

- Overweight
- Lower socio-economic status
 - One study found that two-thirds of admissions were due to cessation of insulin therapy - over half of the time for financial or other difficulties obtaining insulin.
- Access to care
 - A study found that uninsured patients had more than 2 times the risk of admission for diabetic ketoacidosis and coma than privately insured patients.
- Low HDL cholesterol or high triglycerides, high blood pressure
- Duration of disease
- Family history of diabetes
- Women who had gestational diabetes
- Age
- Race
 - Minorities (American Indians, Blacks, and Hispanics) have higher rates of diabetes, experience poorer glycemic control and more complications. It is unclear whether poor glycemic control arises from poor quality medical care, the non-compliance of patients, a lack of education, or a lack of access to care.

Population risk factors associated with diabetes and higher hospital admissions include:

- Access to care
 - Studies have found that areas with high rates of diabetes admissions also tend to have high rates of admissions for other disease conditions that require ongoing self-management and medical care. Areas with self-reported low access to care also reported higher hospital admissions for diabetes.
- Race
 - Minorities have higher rates of diabetes. Areas with higher minority populations may have higher rates of hospitalization.
- Systemic bias
 - Administrative coding by health facilities in certain areas may create a bias for hospitalization rates for diabetes.

In 2013, there were 6,980 inpatient hospital discharges with diabetes mellitus as the principle diagnosis. The total charges were nearly \$222 million and averaged \$31,776.09 per discharge. The inpatient stays accounted for a total of 35,810 days and averaged 5.13 days in length. The majority of the discharge status were discharged to home (67.5%), followed by discharged to home under care of home health (12.7%) or skilled nursing facility (5.7%). Those with Medicare had the most discharges.

DIABETES MELLITUS HOSPITAL DISCHARGES BY PAYER GROUP, OKLAHOMA, 2013.⁸¹

Payer Group	Discharges	Total Length of Stay (days)	Average Length of Stay (days)	Total Charges	Average Charges
Commercial	1,313	5,542	4.22	\$35,424,759.00	\$26,980.01
Medicare	2,921	18,841	6.45	\$113,424,918.00	\$38,830.85
Medicaid	1,353	5,636	4.17	\$36,138,233.00	\$26,709.71
VA/Military	80	347	4.34	\$2,432,747.00	\$30,409.34

Payer Group	Discharges	Total Length of Stay (days)	Average Length of Stay (days)	Total Charges	Average Charges
Workers Comp.	*	*	*	*	*
Uninsured/Self-pay	1,104	4,390	3.98	\$28,959,653.00	\$26,231.57
Other payers	200	977	4.89	\$5,096,691.00	\$25,483.46

* Calculations suppressed due to small number of discharges (10 or Less)

Preventable Hospitalizations

Three categories of preventable hospitalizations were included in the assessment.

- Diabetes Short-Term Complication Admissions - short-term complications of diabetes mellitus include diabetic ketoacidosis, hyperosmolarity, and coma. These life-threatening emergencies arise when a patient experiences an excess of glucose (hyperglycemia) or insulin (hypoglycemia). Proper outpatient treatment and adherence to care may reduce the incidence of diabetic short-term complications, and lower rates represent better quality care.
- Diabetes Long-Term Complication Admission - long-term complications of diabetes mellitus include renal, eye, neurological, and circulatory disorders. Long-term complications occur at some time in the majority of patients with diabetes to some degree. Proper outpatient treatment and adherence to care may reduce the incidence of diabetic long-term complications, and lower rates represent better quality care.
- Lower-Extremity Amputation among Patients with Diabetes - diabetes is a major risk factor for lower-extremity amputation, which can be caused by infection, neuropathy, and microvascular disease. Proper and continued treatment and glucose control may reduce the incidence of lower-extremity amputation, and lower rates represent better quality care.

DIABETES-RELATED PREVENTABLE HOSPITALIZATIONS BY CONDITION, MONAHRQ®, OKLAHOMA, 2013.

Condition	# of Stays	Cost Savings by % Reduction in Number of Stay				
		10%	20%	30%	40%	50%
Short-term complications	2,214	\$1,875,913	\$3,751,826	\$5,627,739	\$7,503,652	\$9,379,565
Long-term complication	2,492	\$3,349,496	\$6,698,992	\$10,048,488	\$13,397,984	\$16,747,480
Lower limb amputation	299	\$874,978	\$1,749,958	\$2,624,937	\$3,499,916	\$4,374,895

*Cost savings are based on charges that have been adjusted to costs, using hospital-specific cost-to-charge ratios. Values based on 10 (numerator suppression value) or fewer discharges are suppressed to protect confidentiality of patients and are not included within the stays or cost reductions.

7. Hypertension

Hypertension or high blood pressure is a medical condition that occurs when excess force is exerted on the vessel walls as blood moves through the body. This condition is often without symptoms and has multiple causes. High blood pressure increases the risk for heart disease and stroke. High blood pressure is often controllable with appropriate use of drug therapy, medical care, and self-management. Having certain medical conditions, like diabetes or prehypertension, can increase your chances of developing high blood pressure.⁸² Unhealthy behaviors such as smoking, eating foods high in sodium and low in potassium, not getting enough physical activity, being obese, and drinking too much alcohol can also increase your risk for high blood pressure.

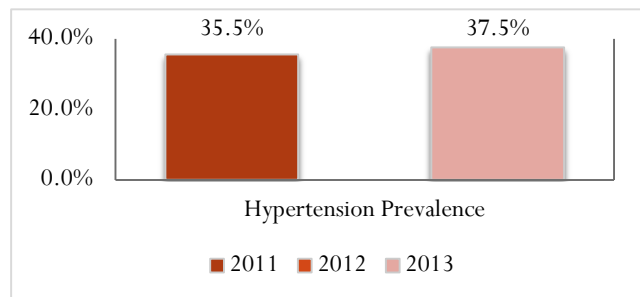
Also known as high blood pressure, hypertension can lead to heart attack, stroke, heart failure, and kidney disease.⁸³

METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Hypertension			
Adult Hypertension	37.5% (2013)	31.4% (2013)	36%
Heart Disease Deaths	9,703 (2013)	n.a.	8,204

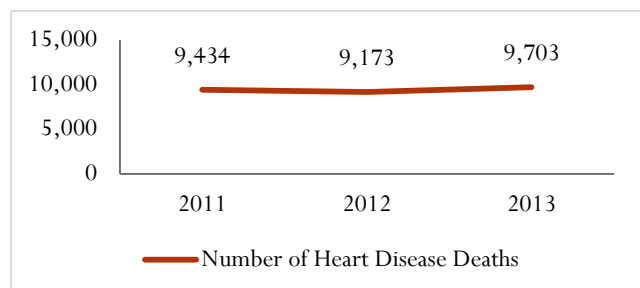
The 2011-2012 National Health and Nutrition Examination Survey (NHANES) found one in three U.S. adults (71 million people) had hypertension.⁸⁴ Among adults with hypertension, 82.7% were aware of their hypertension, 75.6% reported currently taking prescribed medication to lower their blood pressure, and 51.8% had their blood pressure controlled.⁸⁵ Nearly half of those with hypertension (48.2%) did not have their condition under control.⁸⁶ Among those with uncontrolled hypertension, 36.2% were not aware that they had hypertension.⁸⁷ Of the 35.8 million U.S. adults with uncontrolled hypertension, 89.4% reported having a usual source of health care and 85.2% reported having health insurance.⁸⁸

TRENDS IN HEALTH METRICS.

- The prevalence of hypertension in 2011 of 35.5% (34.2-36.8%, 95% CI) was not statistically different than the 2013 prevalence of 37.5% (36.2-38.8%, 95% CI).



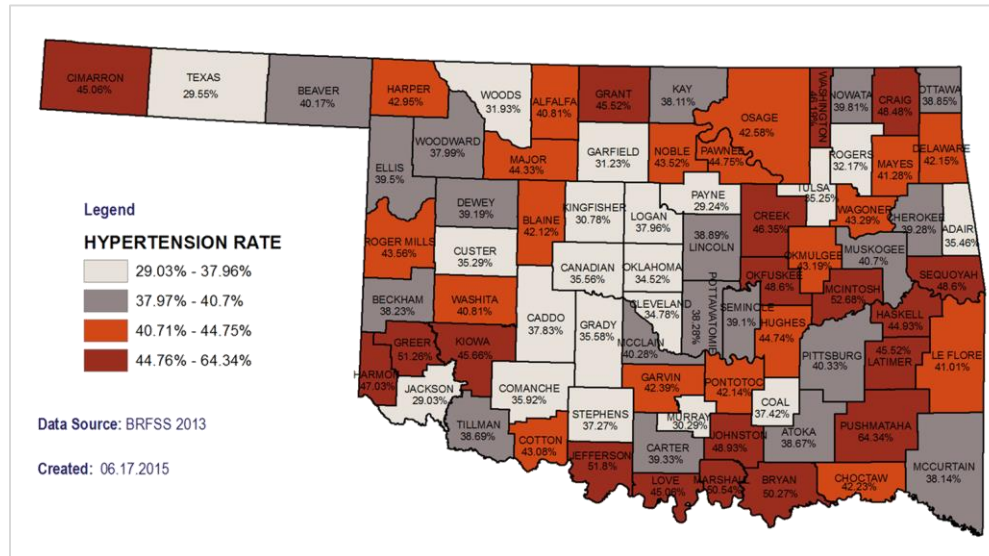
- While the number of heart disease-related deaths has increased from 2011 to 2013, the age-adjusted death rate decreased from 229.7 per 100,000 to 228.0 per 100,000 population during the same period.



A. Population Health

More than one-third of Oklahomans aged 18 years and older had hypertension in 2013. However, the rates varied by geographic area. As of 2013, more than half of the population 18 years and older had hypertension in Bryan, Marshall, Greer, Jefferson, McIntosh, and Pushmataha counties.

RATE OF HYPERTENSION BY COUNTY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.



- Jackson County had the lowest rate of hypertension (29.0%).
- Pushmataha County had the highest rate (64.3%).
- Only 18 counties had a rate lower than the state rate (37.5%).

Those who reported their race as Black were more likely to have reported having high blood pressure compared to the general population and all race/ethnicity populations.

HYPERTENSION BY RACE, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.⁸⁹

Race/Ethnicity	Reported High Blood Pressure	
	No	Yes
White	61.6%	38.4%
	CI (60.1-63.0%)	(37.0-39.9%)
Black	51.5%	48.5%
	CI (45.8-57.2%)	(42.8-54.2%)
American Indian	61.5%	38.5%
	CI (56.1-66.9%)	(33.1-43.9%)
Other	77.3%	22.7%
	CI (67.3-87.3%)	(12.7-32.7%)
Multi-cultural	60.5%	39.5%
	CI (54.6-66.4%)	(33.6-45.4%)
Hispanic	77.4%	22.6%
	CI (73.0-81.8%)	(18.2-27.0%)
Total	62.4%	37.6%
	CI (61.1-63.7%)	(36.3-38.9%)

Males (39.5%, 37.5-41.6%, 95% CI) were slightly more likely to report high blood pressure than females (35.6%, 34.0-37.3%, 95%CI); however, the rates were not statistically different. Those with incomes of \$75,000 or more (32.1%, 29.3-34.9%, 95%CI) were less likely to report having high blood pressure than all income categories. Those aged 65 and older were more likely to report having high blood pressure (65.6%, 63.5-67.7%, 95% CI) compared to those aged 35-64 years (41.6%, 39.8-43.4%, 95% CI) and those aged 18-34 years (14%, 11.8-16.1%, 95% CI).

B. Clinical Care

A blend of prescribed medication and lifestyle changes, such as dietary changes and tobacco cessation have been shown to control hypertension.⁹⁰

Nearly 80% (79.1%, 77.2-80.9%, 95% CI) of those who reported being told they had high blood pressure also reported taking medicine to control the hypertension. Among those who reported taking medicine for high blood pressure, more than one-quarter (26.5%, 24.6-28.4%, 95% CI) also reported being told they had diabetes.

The percentages of adult current smokers were not statistically different from the total population and those who were taking medications to control hypertension. However, the rate of current smoking was higher among those with a hypertension diagnosis and not taking medication (32.9%, 27.9-38.0%, 95% CI) compared to the total population 23.7% (22.4-25.0%, 95% CI). The percentages of current smokers among those who reported their race as Black were not statistically different among those who took medication for high blood pressure and the general population.

PERCENTAGE OF CURRENT SMOKERS AMONG THOSE WITH HYPERTENSION BY MEDICATION STATUS, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Taking Medicine For High Blood Pressure		Currently Smoking	
		No	Yes
Yes	%	79.1%	20.9%
	95% CI	(77.1-81.0%)	(19.0-22.9%)
No	%	67.1%	32.9%
	95% CI	(62.0-72.1%)	(27.9-38.0%)

Among the general population who reported they were advised by a doctor to reduce sodium/salt intake, 79.5% (76.2-82.8%, 95% CI) reported they watched their salt intake. Less than half (44.6%, 42.2-47.1%, 95% CI) of those who reported never being advised to reduce salt said they watched their salt intake.

Nearly a quarter (23.6%) of the population reported that they had been advised by a doctor to reduce sodium/salt intake. Those who had high blood pressure were four times more likely to report they had been told by a doctor to reduce their sodium/salt intake.

PERCENTAGE ADVISED TO REDUCE SODIUM/SALT INTAKE AMONG THOSE WITH HYPERTENSION DIAGNOSIS STATUS, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Reported High Blood Pressure		Ever Advised by Doctor to Reduce Sodium/Salt Intake	
		Yes	No
No	%	11.5%	88.5%
	95% CI	(9.8-13.1%)	(86.9-90.2%)
Yes	%	44.2%	55.8%
	95% CI	(41.3-47.2%)	(52.8-58.7%)

Of those who reported high blood pressure, 44.4% (42.3-46.5%, 95% CI) were also obese. The obesity rate among those who did not report high blood pressure was 25.2% (23.5-27.0%, 95% CI). However, the rates of obesity among those with high blood pressure were nearly identical among the total population and those who reported their race as Black.

C. Health Care Costs

Individual risk factors associated with high blood pressure and higher hospital admissions include:⁹¹

- Smoking
- Access to care
 - Studies have found that self-rated access to care explained nearly one-quarter of hospital admissions for hypertension.
- Sodium and salt intake
- Medication adherence
- Alcohol consumption
- Diabetes
- Gender
- Age

Population risk factors associated with hypertension and higher hospital admissions included:⁹²

- Lower socio-economic areas
 - Low-income zip codes had nearly 8 times more hypertension- related hospitalizations than high-income zip codes.

HOSPITAL DISCHARGES FOR HYPERTENSION WITH AND WITHOUT MAJOR COMPLICATION OR CO-MORBIDITY, OKLAHOMA, 2013.⁹³

Payer Group	Discharges	Total Length of Stay (Days)	Average Length of Stay (Days)	Total Charges	Average Charges
Commercial	290	651	2.24	\$4,879,814.00	\$16,826.94
Medicare	566	1,513	2.67	\$9,119,619.00	\$16,112.40
Medicaid	142	379	2.67	\$2,354,015.00	\$16,577.57
Veterans Affairs/Military	19	47	2.47	\$424,322.00	\$22,332.74
Uninsured/Self-pay	194	388	2.00	\$2,997,680.00	\$15,451.96
Other payers	23	71	3.09	\$440,640.00	\$19,158.26

Preventable Hospitalizations

Hypertension is a chronic condition that is often controllable in an outpatient setting with appropriate use of drug therapy. Proper outpatient treatment may reduce admissions for hypertension, and lower rates represent better quality care. There were an estimated 1,275 high blood pressure-related preventable hospitalizations in Oklahoma during 2013.

HIGH BLOOD PRESSURE-RELATED PREVENTABLE HOSPITALIZATIONS BY CONDITION, MONAHRQ®, OKLAHOMA, 2013.

Condition	# of Stays	10%	20%	30%	40%	50%
High Blood Pressure	1,275	\$911,428	\$1,822,857	\$2,734,286	\$3,645,714	\$4,557,143

*Cost savings are based on charges that have been adjusted to costs, using hospital-specific cost-to-charge ratios.

Values based on 10 (numerator suppression value) or fewer discharges are suppressed to protect confidentiality of patients and are not included within the stays or cost reductions.

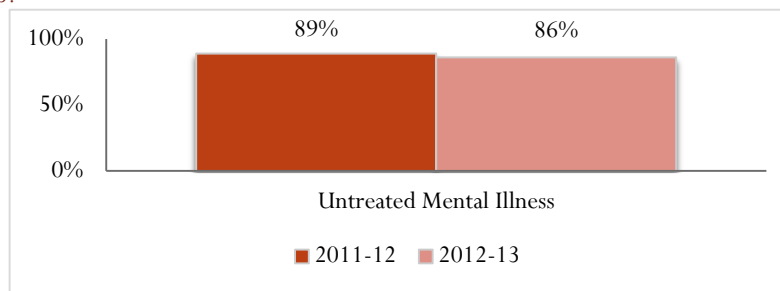
8. Behavioral Health

Mental health and substance abuse issues are among the pressing health concerns facing Oklahomans. In the past year, 21.9% of adults reported having a mental health issue and 12% reported experiencing a substance abuse issue, representing 700,000 to 950,000 Oklahomans living with diseases of the brain.⁹⁴ The life expectancy for people with untreated behavioral health diseases is significantly less than the general population, upwards of 25-30 years.⁹⁵

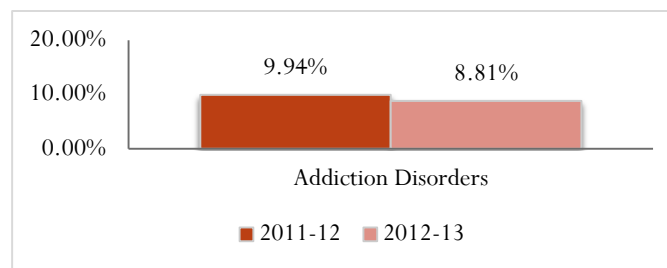
METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Behavioral Health			
Untreated Mental Illness	86% treatment gap (2012-13)	n.a.	76% gap
Addiction Disorders	8.81% (2012-13)	8.66% (2012-13)	7.8%
Suicide Deaths 18years and older	22.0 per 100,000 (2013)	16.5 per 100,000 (2013)	19.4 per 100,000

TRENDS IN HEALTH METRICS

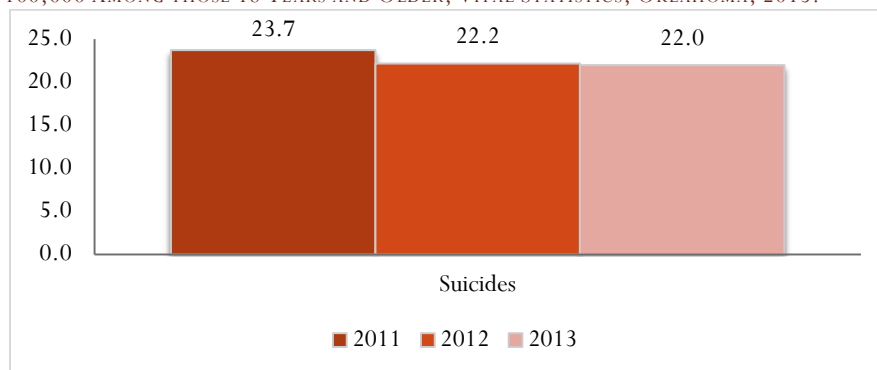
GAP IN THE PUBLIC SERVICE SECTOR, ANY MENTAL ILLNESS IN THE PAST YEAR, NATIONAL SURVEY ON DRUG USE AND HEALTH, OKLAHOMA, 2011-2013.



DEPENDENCE OR ABUSE OF ILLICIT DRUGS OR ALCOHOL IN THE PAST YEAR, NATIONAL SURVEY ON DRUG USE AND HEALTH, OKLAHOMA, 2011-2013.



SUICIDE RATE PER 100,000 AMONG THOSE 18 YEARS AND OLDER, VITAL STATISTICS, OKLAHOMA, 2013.



A. Population Health

Results from the 2013 National Survey on Drug Use and Health, 9.4 % of Americans aged 12 years and older (estimated 24.6 million) had used during the month an illicit drug, such as marijuana, cocaine, heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics used non-medically.⁹⁶ Eighty percent of those had used marijuana. Nearly one quarter (22.9%) of persons aged 12 years and older were binge alcohol users. This translates to about 60.1 million Americans.

Behavioral health conditions increase the risk for communicable and chronic diseases, unintentional and intentional injury, and shorter life expectancy.⁹⁷

Results from the administration of the 2011-2012 and 2012-2013 National Survey on Drug Use and Health shows that Oklahomans continue to experience mental illness or dependence on illicit drugs and alcohol. The findings also highlight a continued gap in public services.

NATIONAL AND STATE BEHAVIORAL HEALTH INDICATORS, NATIONAL SURVEY ON DRUG USE AND HEALTH, 2011-2013.⁹⁸

Measure	Area	2012-2013		2011-2012	
		Percentage	Gap in the Public Service Sector	Percentage	Gap in the Public Service Sector
Dependence or abuse of illicit drugs or alcohol in the past year - Table 20	National	8.66		8.46	
	Oklahoma	8.81	-87%	9.94	-89%
Serious mental illness in the past year – Table 23	National	4.14		3.98	
	Oklahoma	5.14	-67%	5.42	-67%
Any mental illness in the past year – Table 24	National	18.36		18.04	
	Oklahoma	20.55	-86%	22.21	-89%
Needing but not receiving treatment for illicit drug use in the past year – Table 21	National	2.31		2.21	
	Oklahoma	1.83		1.99	
Needing but not receiving treatment for alcohol use in the past year – Table 22	National	6.76		6.62	
	Oklahoma	7.07		8.45	

According to the 2013 Behavioral Risk Factor Surveillance System, 17.7% (15.9-19.6%, 95% CI) of Oklahoman males reported drinking five or more alcoholic drinks on one occasion. Additionally, 7.9% (6.8-9.0%, 95% CI) of females reported having four or more alcoholic drinks on one occasion. Oklahomans also reported using prescription drugs without having a prescription. The percentage of those reporting non-prescription use of prescription drugs

varied by educational status. Those with some college or college graduates reported were more likely to report using prescription drugs without prescription four or more times in the past 30 days.

PRESCRIPTION DRUG INTAKE WITHOUT PRESCRIPTION BY EDUCATION, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Education Levels	Prescription Drug Intake W/O Prescription In The Past 30 Days			
		0 Times	1 To 3 Times	4 Or More Times
Less than HS	%	81.2	*	8.1
	95% CI	(68.1-94.3%)	n/a	(0.0-16.3%)
High School	%	74.1	17.9	8.0
	95% CI	(64.9-83.3%)	(9.5-26.3%)	(3.1-13.0%)
Some College	%	78.6	10.7	10.6
	95% CI	(69.5-87.8%)	(2.9-18.5%)	(4.6-16.7%)
College	%	67.6	14.7	17.7
	95% CI	(55.9-79.4%)	(5.9-23.5%)	(7.7-27.6%)
Total	%	75.9	13.7	10.4
	95% CI	(70.7-81.2%)	(9.2-18.2%)	(7.0-13.7%)

In 2013, Oklahoma had the sixth highest unintentional poisoning mortality rate in the United States.⁹⁹ Unintentional poisoning is the leading cause of injury death for Oklahomans aged 25-64. Poisonings can be caused by many substances such as prescription drugs, illegal drugs, alcohol, carbon monoxide, chemicals, gases, and even water. The pattern of drug over dose deaths has shifted from illicit drugs (heroin, cocaine, methamphetamines, etc.) to prescription drugs during the late 1990's. In 1999, 127 Oklahomans dies of an unintentional poisoning; by 2010, 662 Oklahomans had died from unintentional poisoning.¹⁰⁰ In a five year period (2007-2011), 81% of the 3,200 unintentional poisoning deaths involved at least one prescription drug.¹⁰¹ Oklahoma also leads the nation in prescription painkiller sales per capita.¹⁰²

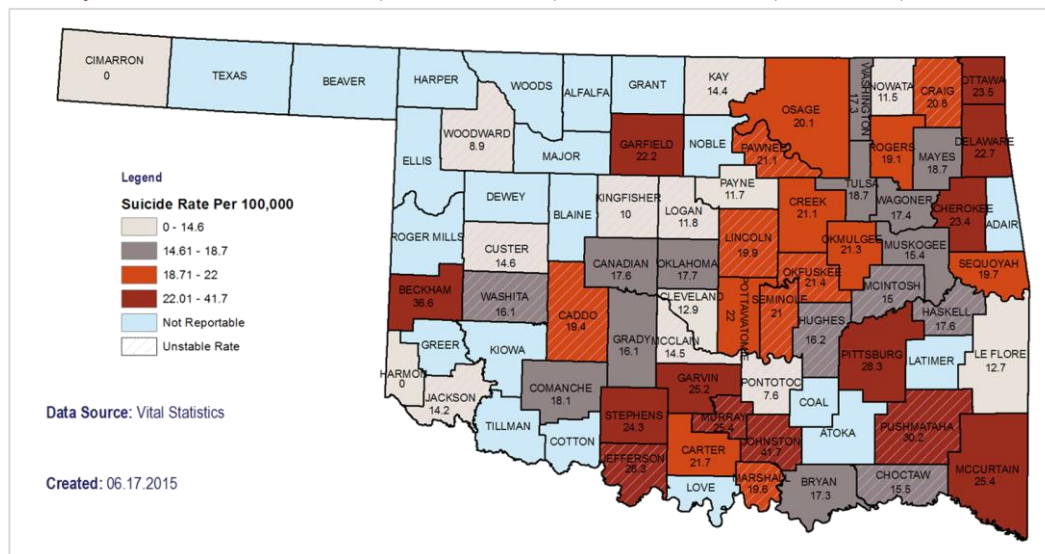
The 2013 Behavioral Risk Factor Surveillance System Survey results showed that nearly one-quarter (23.4%, 22.2-24.6%) of Oklahomans reported ever having a depressive disorder.

DEPRESSIVE DISORDER EVER BY RACE/ETHNICITY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, OKLAHOMA, 2013.

Race/Ethnicity	Ever Have Depressive Disorder		
	Yes	No	
White	%	24.1	75.9
	95% CI	(22.7-25.5%)	(74.5-77.3%)
Black	%	17.7	82.3
	95% CI	(13.4-22.0%)	(78.0-86.6%)
American Indian	%	25.6	74.4
	95% CI	(20.0-31.1%)	(68.9-80.0%)
Other	%	11.5	88.5
	95% CI	(3.5-19.4%)	(80.6-96.5%)
Multi-Cultural	%	31.1	68.9
	95% CI	(25.4-36.9%)	(63.1-74.6%)
Hispanic	%	19.2	80.8
	95% CI	(14.7-23.7%)	(76.3-85.3%)
Total	%	23.4	76.6
	95% CI	(22.2-24.6%)	(75.4-77.8%)

Oklahoma is one of 18 states that participate in the National Violent Death Reporting System. The Oklahoma Violent Death Reporting System (OK-VDRS) collects data on homicides, suicides, deaths due to unintentional firearm injury, legal intervention, or terrorism. Deaths of undetermined manner/intent are also included in the reporting system. Suicide was the most common manner of violent death accounting for 3,836 deaths during 2004 to 2010, or an average of 548 deaths per year (average annual rate = 15.1 per 100,000 population).¹⁰³ The rate of suicide increased from 14.1 per 100,000 population in 2004 to 16.9 per 100,000 population in 2010. From 2004-2010, 79% of suicide victims were male and 21% were female. In 2% (86) of the suicide deaths, victims killed at least one other person before taking their own life resulting in 102 homicides.¹⁰⁴ Males 85 years of age and older had the highest suicide rate among all age groups. Among females, those aged 35-54 years were at greatest risk for suicide. White males and American Indian males had the highest rates of suicide, 25.5 and 20.1 per 100,000, respectively. Firearms were used in 60% of the suicide deaths, hanging/ strangulation in 19%, poisoning in 16%, and other/unknown methods were used in 5% of suicides. A substantial number of suicides were associated with a current depressed mood, intimate partner problem, mental health problem, physical health problem, or crisis in the past two weeks. Circumstances associated with suicide varied by age. Physical health problems were more often associated with suicide among persons 65 years and older while intimate partner problems were more often associated with suicides of persons less than 65 years of age. Almost 20% of the suicide victims had a history of suicide attempts. Lastly, nearly 25% of suicide victims had served in the U.S. Armed Forces.¹⁰⁵

AGE-ADJUSTED SUICIDE RATES PER 100,000 POPULATION, 18 YEARS AND OLDER, OKLAHOMA, 2011-2013.



- The highest stable rate of suicide was in Beckham County (36.6).
- The lowest stable rate was in Payne County (11.7).
- Cimarron and Harmon counties had no reported suicides.

Additional information on potential contributors and behavioral risk factors for children and adults are included within the County Health Rankings maps located in the Overall Health section and data table in the Appendix.

B. Clinical Care

In 2010, 10,374 eligible facilities responded to the National Mental Health Services Survey (N-MHSS) and reported a 1-day census of 3,186,636 clients enrolled in mental health treatment.¹⁰⁶ More than two-thirds of facilities were operated by private nonprofit entities, about 10% were operated by private for-profit entities, and the remaining were operated by federal, state, local, or tribal governments. The majority (60.8%) of mental health facilities were outpatient or day treatment or partial hospitalization facilities. Of the facilities, 88% accepted Medicaid, 84% accepted client/patient fees, and 78.4% accepted private insurance. Approximately 70% of the facilities also accepted Medicare and state mental health agency funds.¹⁰⁷

C. Health Costs

Hospitalizations Involving Mental and Substance Use Disorders (M/SUDs) Among Adults, U.S., 2012

Nationally, nearly 1.8 million inpatient stays were primarily for M/SUDs (6.7 % of all stays).

Compared with non-M/SUD stays, on average M/SUD stays were longer (6.6 days vs. 4.8 days for non-M/SUD stays) but had lower total costs (\$6,300 vs. \$12,600). Longer stays for M/SUD diagnoses were attributable primarily to stays for MD diagnoses (8.3 days).

Mood disorders was the most common primary MD diagnosis (741,950 stays), and alcohol-related disorders was the most common SUD diagnosis (335,790 stays).

Among stays with a primary MD or SUD diagnosis, 14% lacked insurance, more than two times greater than among stays without M/SUD diagnoses (6%).

Public government payers covered more than half (56%) of all inpatient stays with a primary MD or SUD, Medicare was the most common payer for stays involving MD diagnoses only (37%). Medicaid was the most common payer for SUD diagnoses only (29%).

HCUP Statistical Brief # 191, June 2015

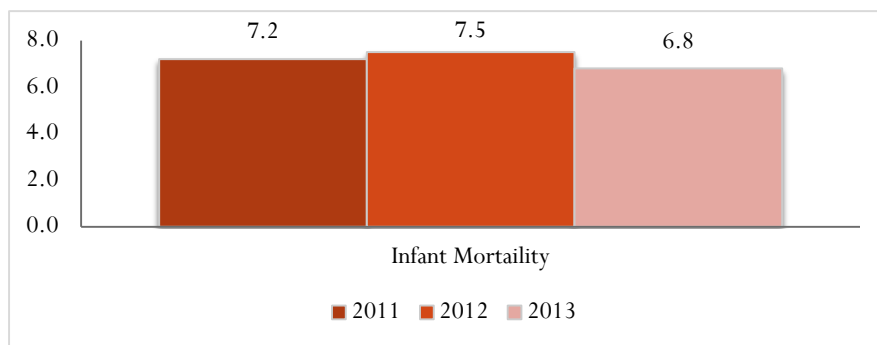
9. Children's Health

Oklahoma ranks poorly for many key indicators of maternal and child health which will have long-term consequences for the state's health.

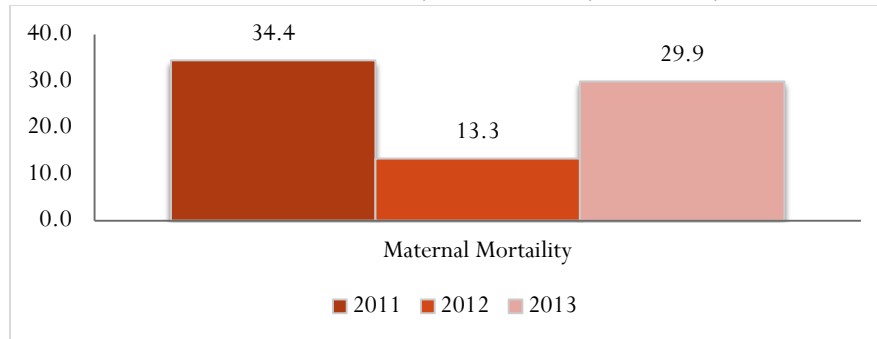
METRIC	OKLAHOMA	UNITED STATES	2020 STATE TARGET
Children's Health			
Infant Mortality	6.8 per 1,000 live births (2013)	6.0 per 1000 live births (2013)	6.4 per 1,000 live births
Maternal Mortality All ages, 1 yr. rate	29.9 per 100,000 live births (2013)	17.8 per 100,000 live births (2011)	26.2 per 100,000 live births
Injury Deaths Among 0-17 years	14.4 per 100,000 (2013)	7.4 per 100,000 (2013)	13.9 per 100,000

TRENDS IN HEALTH METRICS

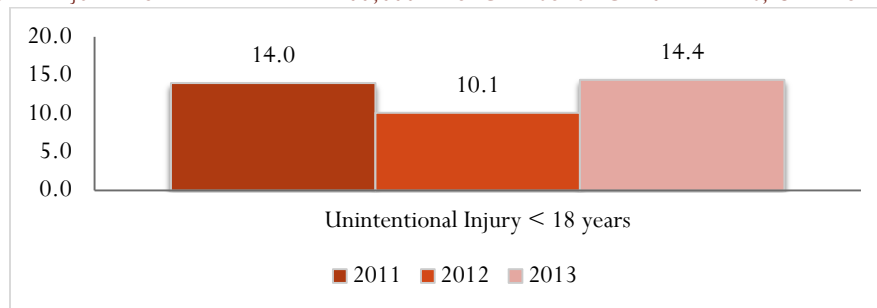
INFANT MORTALITY RATE PER 1,000 LIVE BIRTHS, OKLAHOMA, 2011-2013.



MATERNAL MORTALITY RATE PER 100,000 LIVE BIRTHS, OKLAHOMA, 2011-2013.



UNINTENTIONAL INJURY MORTALITY RATE PER 100,000 AMONG PERSONS AGED 0-17 YEARS, OKLAHOMA, 2011-2013.



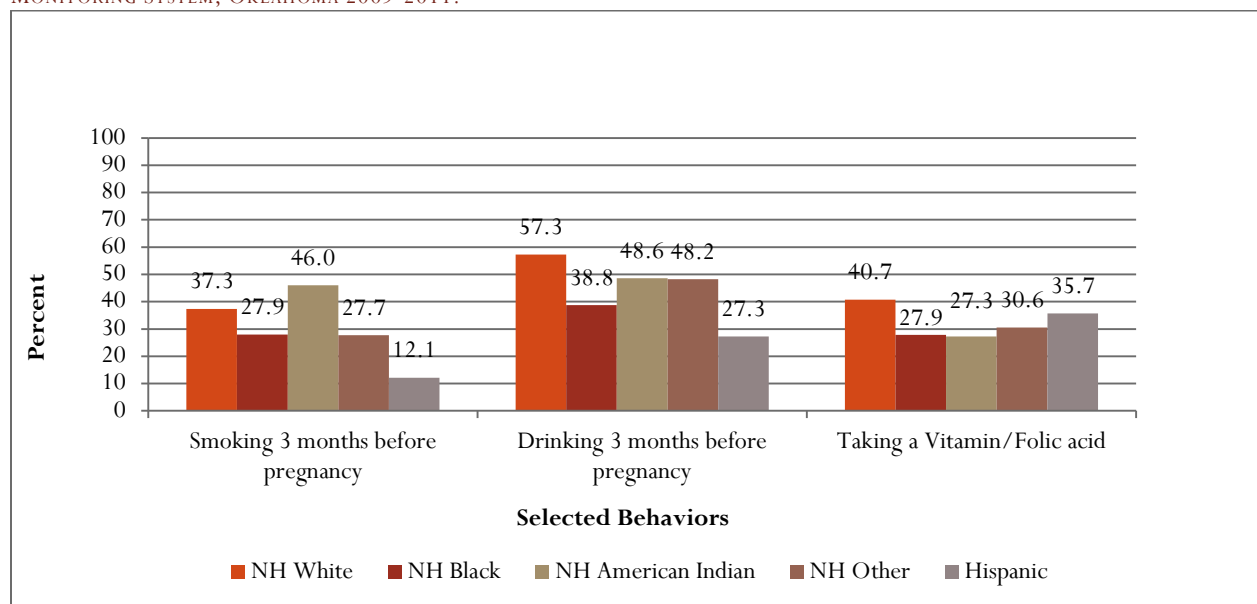
A. Population Health

According to the Bureau of Health Resources and Services Administration (HRSA), the life course approach to conceptualizing healthcare needs and services evolved from research documenting the important role early life events play in shaping an individual's health trajectory. Research suggests that birth outcomes in the United States appear to act less as indicators of poor healthcare and health behaviors, and more as indicators of deeper disparities among women of different social classes and ethnicities.^{108,109}

Preconception Health and Racial Disparities, 2009-2011. PRAMS gram, June 2015 in press.

- Significant differences in preconception health persisted across racial and ethnic groups.
- Non-Hispanic American Indian mothers had the highest rates of smoking three months before pregnancy (46.0%) compared to non-Hispanic Black (27.9%), White (37.3%) and Hispanic (12.1%) mothers.
- Non-Hispanic White mothers reported the highest rates of alcohol use before pregnancy (57.3%) compared to all other mothers.
- Pre-pregnancy folic acid/multivitamin use was lowest among the non-Hispanic Black and non-Hispanic American Indian mothers (27.9% and 27.3%, respectively).
- Non-Hispanic Black mothers had significantly lower odds of smoking or drinking before pregnancy, when compared to white mothers, when controlling for demographic characteristics.
- Non-Hispanic Black, Non-Hispanic American Indian, and Hispanic mothers were more likely to have been treated or checked for diabetes prior to pregnancy when compared to white mothers.
- Non-Hispanic Black mothers were twice as likely as white mothers to have been checked or treated for high blood pressure prior to pregnancy.

SELECTED MATERNAL BEHAVIORS PRIOR TO PREGNANCY BY MATERNAL RACE/ETHNICITY, PREGNANCY RISK ASSESSMENT MONITORING SYSTEM, OKLAHOMA 2009-2011.¹¹⁰



Therefore, the infant mortality rate (IMR) is an important indicator of the health of the state and associated with maternal health, quality of and access to health care, community services, and socioeconomic conditions.¹¹¹ The leading causes of infant

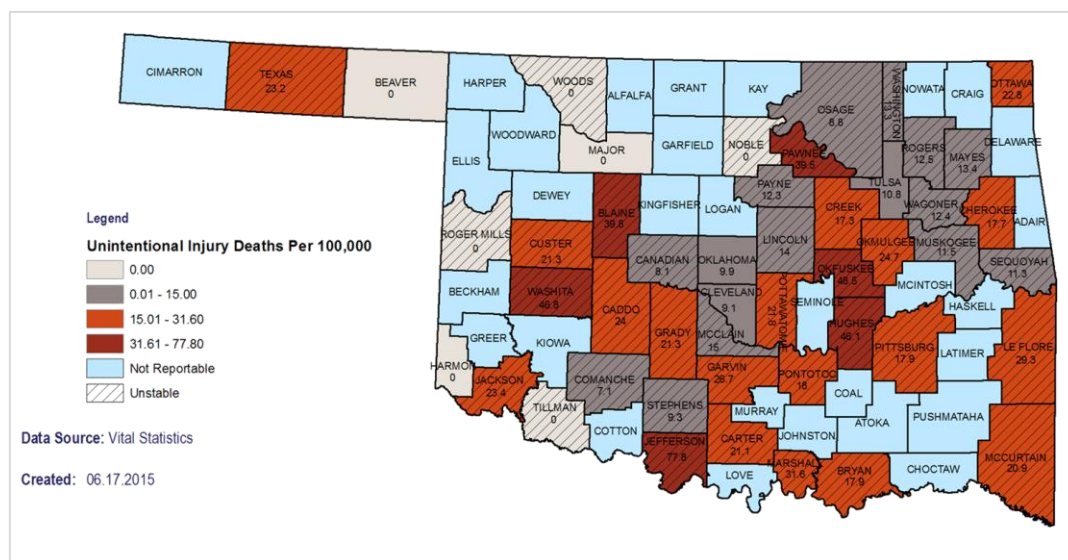
MATERNAL MORTALITY RATIO PER 100,000 LIVE BIRTHS, ALL AGES BY SINGLE AND MULTI-YEAR ROLLING AVERAGES, OKLAHOMA, 2004-2013.

Year of Birth	1-Year	2-Year	3- Year	5-Year
2004	25.33			
2005	40.53	32.97	29.27	
2006	22.21	31.18	26.72	26.594
2007	18.16	20.16	22.579	31.08
2008	27.38	22.75	31.02	30.18
2009	47.66	37.49	36.90	32.60
2010	35.68	41.74	39.35	31.76
2011	34.43	35.067	27.80	<u>32.30</u>
2012	13.26	23.80	<u>25.88</u>	
2013	<u>29.97</u>	<u>21.67</u>		

CDC WONDER (NCHS Def: A34, O00-O95, O98-O99)

Nearly half (48.5%) of the unintentional injury deaths among children 0-17 years of age were motor vehicle-related. The next leading cause of death was drowning at 16.9%. Male children aged 0-17 years (16.50/ 100,000) were more likely to die from an unintentional injury than females of the same age group (12.12 per100,000). Unintentional injury deaths were relatively few, so multiple years of data were used to create a county level map. Five years of data were used to stabilize the rates; however, some distinctions were needed within the county rate map. Striped, unstable counties, regardless of color, had annual rates that drastically varied due to small number of deaths (< 20). Blue-colored, not reportable counties had too few deaths (<5) to report data due to confidentiality.

UNINTENTIONAL INJURY MORTALITY RATE PER 100,000, CHILDREN AGED 0-17 YEARS BY COUNTY, OKLAHOMA, 2009-2013.



- Several counties reported zero deaths from 2009-2013.
- Tulsa County had the highest stable rate at 10.8.

American Indian children had the highest rate of unintentional injury death and White children had the highest number of deaths. Teenagers (32.3) followed by children less than five years of age (19.6) had the highest rates of unintentional injury death among the four age groups.

UNINTENTIONAL INJURY DEATHS AND RATES PER 100,000 BY RACE AMONG CHILDREN AGED 0-17 YEARS, OKLAHOMA, 2013.

Race	Number of Deaths	Population	Crude Rate
White	91	681,894	13.35
Black	12*	107,820	11.13*
Am Indian/AK Native	32	134,146	23.85
Asian/Pac Islander	---	23,167	---

* Rates based on 20 or fewer deaths may be unstable. Use with caution.

UNINTENTIONAL INJURY DEATHS AND RATES PER 100,000 BY RACE AMONG CHILDREN AGED 1-19 YEARS, OKLAHOMA, 2013.

Age Group in Years	Number of Deaths	Population	Crude Rate
00-04	52	264,479	19.66
05-09	28	268,844	10.41
10-14	14*	261,248	5.36*
15-19	83	256,391	32.37
Total	177	1,050,962	16.84

* Rates based on 20 or fewer deaths may be unstable. Use with caution.

B. Clinical Care

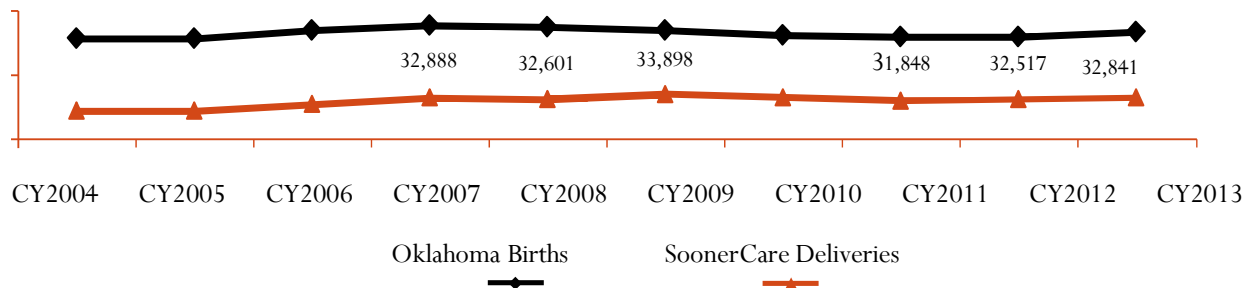
Having no health insurance coverage or experiencing gaps or shifts in coverage were identified as barriers to receiving preventive health services and treatment for health problems that could affect pregnancy and newborn health. One study showed that private insurance coverage declined from the month prior to pregnancy to the time periods during pregnancy to at delivery. This decrease was not statistically different. However, the rates of uninsured and Medicaid coverage shifted dramatically between the periods of the month prior to pregnancy to during pregnancy.

PREVALENCE OF WOMEN WITH PRIVATE HEALTH INSURANCE COVERAGE, MEDICAID HEALTH INSURANCE COVERAGE, OR NO HEALTH INSURANCE COVERAGE FROM THE MONTH BEFORE PREGNANCY TO THE TIME OF DELIVERY, OKLAHOMA AND U.S., PREGNANCY RISK ASSESSMENT MONITORING SYSTEM, 2009.¹¹⁵

Time Period/ Coverage	Oklahoma		United States	
	%	95% CI	%	95% CI
Month Prior to Pregnancy				
Private Insurance	48.7%	(45.0–52.4%)	59.9%	(59.1–60.8%)
Medicaid	15.0%	(12.2–17.9%)	16.6%	(16.0–17.3%)
Uninsured	36.2%	(32.6–39.9%)	23.4%	(22.6–24.2%)
During Pregnancy				
Private Insurance	44.2%	(40.6–47.9%)	56.9%	(56.1–57.8%)
Medicaid	52.3%	(48.6–56.0%)	40.1%	(39.2–40.9%)
Uninsured	3.4%	(2.1–4.8%)	3.0%	(2.6–3.4%)
At Delivery				
Private Insurance	42.1%	(38.5–45.8%)	54.6%	(53.8–55.5%)
Medicaid	55.4%	(51.7–59.1%)	43.9%	(43.0–44.7%)
Uninsured	2.5%	(1.3–3.7%)	1.5%	(1.3–1.7%)

During 2013, SoonerCare (Oklahoma’s Medicaid program) covered 61.6% of the deliveries in Oklahoma. During the past decade the percentage of deliveries covered by SoonerCare has varied from a high of 63.5% in calendar year (CY) 2009 to a low of 56.0% in CY 2005. In CY 2013, the percentage of deliveries covered by SoonerCare was 61.6%

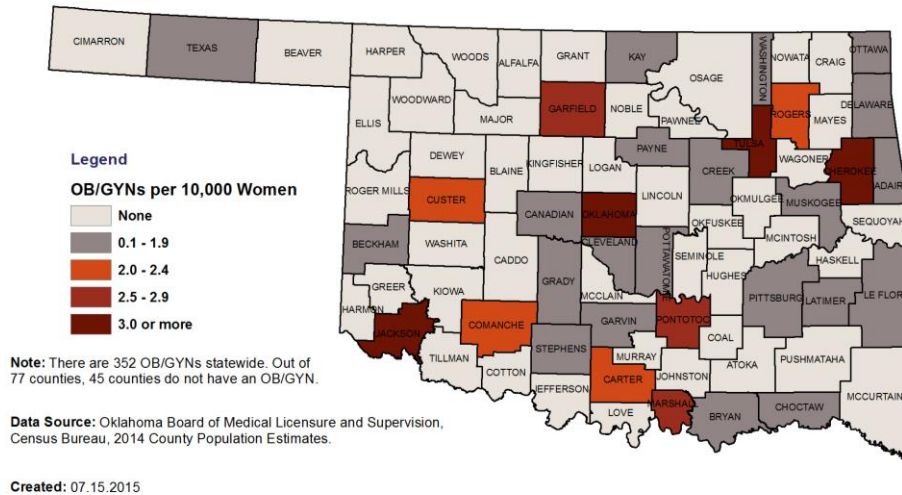
OKLAHOMA BIRTHS^B AND SOONERCARE DELIVERIES^A BY CALENDAR YEAR.



Delivery refers to a paid claim with a delivery code.

In March 2015, the U.S. Congress introduced legislation to create HSPA, aka Health Professional Shortage Area, designation for maternity care. While the new designation has yet to be implemented, many Oklahoma women drive more than an hour to reach prenatal care.

OBSTETRICIANS AND GYNECOLOGISTS (OB/GYNs) PER 10,000 WOMEN, OKLAHOMA, 2014.



- Oklahoma, Tulsa, Cherokee, and Jackson counties had the highest rates of OB/GYNs per 10,000 women.
- More than half (58%) of Oklahoma counties did not have an OB/GYN.
- Many OB/GYNs travel to provide care.

A review of the chronic health factors found that Black mothers were more likely to have been checked or treated for high blood pressure and diabetes and more likely to have talked with a health care provider about a family medical history than White mothers. American Indian mothers were more likely to have been checked/treated for diabetes but less likely to have been checked or treated for depression than White mothers.

ADJUSTED* RISK RATIO TO DETERMINE RACIAL/ETHNIC DISPARITIES IN SELECTED PRE-PREGNANCY CHRONIC HEALTH FACTORS, PREGNANCY RISK ASSESSMENT MONITORING SYSTEM, OKLAHOMA 2009-2011.

Maternal Race, Adjusted Risk Ratio, (95% C.I.)					
Chronic Health Conditions	White	Black	American Indian	Other	Hispanic
Checked/treated for high blood pressure	Ref	2.3 (1.5 - 3.7)	1.3 (0.8 - 2.1)	1.0 (0.5 - 1.8)	1.0 (0.6 - 1.6)
Checked/treated for diabetes	Ref	2.4 (1.3 - 4.3)	3.0 (1.9 - 4.8)	0.6 (0.3 - 1.3)	2.1 (1.3 - 3.4)
Checked/treated for depression	Ref	0.6 (0.3 - 1.0)	0.5 (0.3 - 0.8)	0.9 (0.6 - 1.3)	0.4 (0.2 - 0.6)
Talked to provider about family medical history	Ref	1.5 (1.1 - 2.0)	1.0 (0.8 - 1.4)	1.0 (0.7 - 1.4)	0.9 (0.7 - 1.3)
Taking prescription drugs	Ref	0.8 (0.5 - 1.1)	0.8 (0.6 - 1.2)	0.7 (0.5 - 1.0)	0.5 (0.3 - 0.8)

*Adjusted for age, income, marital status, education, and insurance. Bolded numbers indicate significant differences compared to others.

Some differences, such as those for smoking and alcohol use prior to pregnancy were lower or the same among the populations most at risk for infant and maternal mortality when compared to White mothers. Limitations for this study include social desirability bias for some questions, such as those relating to tobacco and alcohol use; lack of knowledge about whether the mother visited a doctor prior to pregnancy; no information on why the mothers were checked or treated and who provided the check or treatment for diabetes and blood pressure; and, racism as a stressor is not evaluated by PRAMS and may be an important contributor to the disparities and poor health outcomes in Oklahoma.

C. Health Costs

Even the best health care during pregnancy cannot overcome poor health conditions and risk factors that existed prior to conception. Infants may be low birth weight because of inadequate intrauterine growth or premature birth. Risk factors include sociodemographic and behavioral characteristics, such as low income and tobacco use during pregnancy. Proper preventive care may reduce incidence of low birth weight, and lower rates represent better quality care.

COST SAVING FROM REDUCTION IN PREVENTABLE HOSPITAL STAYS AMONG LOW BIRTH WEIGHT INFANTS, MONAHRQ®, OKLAHOMA, 2013.

Low Birthweight Babies	Costs Savings by Percentage Reduction in Stays				
# of Stays	10%	20%	30%	40%	50%
2,899	\$7,812,900	\$15,625,800	\$23,438,700	\$31,251,600	\$39,064,500

*Cost savings are based on charges that have been adjusted to costs, using hospital-specific cost-to-charge ratios.

10. Appendices

- A. Comparison of Ranking Indicators
- B. Oklahoma Report, America's Health Ranking[®], 2014
- C. Oklahoma and U.S. Measures, County Health Rankings Data
- D. County Level Risk Factors and Chronic Diseases among Persons 18 Years and Older, Oklahoma Behavioral Risk Factor Surveillance System, 2013
- E. County Level Mortality by Cause and Years, Oklahoma Vital Statistics
- F. Data Sources and Methods

A. Comparison of Ranking Indicators

America's Health Ranking®	County Health Rankings	State Health System Performance Scorecard
Adult obesity	Adult obesity	Adults ages 18-64 who are obese (BMI >=30)
Adult smoking	Adult smoking	Adults who smoke
Poor physical health days	Poor physical health days	Adults ages 18-64 who report fair/poor health or activity limitations
Lack of health insurance	Uninsured	Adults ages 19-64 uninsured
Premature death	Premature death	Years of potential life lost before age 75
Preventable Hospitalizations	Prevent Hospital stays	Hospital admissions for ambulatory care-sensitive conditions per 1,000 beneficiaries by age group
Air pollution	Air pollution - particulate matter	
Children in poverty	Children in poverty	
Dentists	Dentists	
Diabetes	Diabetic monitoring	
Excessive drinking	Excessive drinking	
High school graduation	High school graduation	
Income Disparity	Income inequality	
Low Birthweight	Low birthweight	
Physical Inactivity	Physical inactivity	
Poor Mental health Days	Poor Mental Health Days	
Primary Care Physicians	Primary Care Physicians	
Chlamydia	Sexually transmitted infections	
Teen Birth Rate	Teen Births	
Unemployment Rate, Annual	Unemployment	
Violent Crime	Violent Crime	
Obesity youth		Children ages 10-17 who are overweight or obese
Infant mortality		Infant mortality
Suicide		Suicide deaths
Dental visit, annual		Adults without a dental visit in past year
Teeth Extractions		Percent of adults ages 18-64 who have lost six or more teeth because of tooth decay, infection, or gum disease
Immunizations - children immunizations - DTAP immunization MCV4		Children ages 19-35 months who received all recommended doses of seven key vaccines

LEGEND

All 3 Rankings share similar indicators
County Health Rankings and America's Health Rankings share similar indicators
America's Health Ranking and Health System Scorecard share similar indicators
Unique indicator to Ranking

America's Health Ranking®

County Health Rankings

State Health System Performance Scorecard

America's Health Ranking®	County Health Rankings	State Health System Performance Scorecard
Binge Drinking	Access to exercise opportunities	Adults age 50 and older who received recommended screening and preventive care
Cancer Deaths	Alcohol-impaired driving deaths	Adults who went without care because of cost in past year
Cardiovascular Deaths	Children in single-parent households	Adults with usual source of care
Cholesterol Check	Drinking water violations	At-risk adults without a routine doctor visit in the past 2 years
Colorectal Cancer Screening	Driving alone to work	Breast cancer deaths per 100,000 female population
Disparity in health Status	Food environment index	Children 0-18 uninsured
Drug Deaths	Injury deaths	Children with a medical and dental preventive care visit
Fruits	Long commute - driving alone	Children with a medical home
Heart Attack	Mammography screening	Children with emotional/behavioral/development problems who received needed mental health care
Heart Disease	Mental health providers	Colorectal cancer deaths per 100,000 population
High Blood Pressure	Poor or Fair Health	High-risk nursing home residents with pressure sores
High Cholesterol	Severe housing problems	Home health patients also enrolled in Medicare with a hospital admission.
High Health Status	Social Associations	Home health patients who get better at walking or moving around
Immunizations - Adolescent	Some college	Home health patients whose wounds improved or healed after an operation
Immunizations – HPV		Hospital admissions for pediatric asthma, per 100,000 children
Income Disparity Ratio		Hospitalized patients given information about what to do during their recovery at home
Infectious Disease		Hospitalized patients who reported hospital staff always managed pain well, responded when need help to get to bathroom or pressed call button, and explained medicines and side effects.
Insufficient Sleep		Individuals under age 65 with high out-of-pocket medical costs relative to their annual household income
Median Household Income		Long-stay nursing home residents hospitalized within a six-month period.
Occupational Fatalities		Long-stay nursing home residents with an antipsychotic medication
Personal Income, Per Capita		Medicare 30-day hospital readmissions, rate per 1,000 beneficiaries
Pertussis		Medicare beneficiaries with dementia, hip/pelvic fracture, or chronic renal failure who received a prescription drug that is contraindicated for that condition
Physical Activity		Medicare Beneficiaries who received at least one drug that should be avoided in the elderly
Preterm Birth		Medicare fee-for-service patients whose health provider always listens, explains, shows respect, and spends enough time with them
Public Health Funding		Mortality amenable to health care, deaths per 100,000 population
Salmonella		Potentially avoidable emergency department visits among Medicare Beneficiaries, per 1,000 beneficiaries
Stroke		Risk-adjusted 30 day mortality - Medicare beneficiaries hospitalized for heart attack, heart failure, or pneumonia
Underemployment Rate		Short-stay nursing home residents readmitted within 30 days of hospital discharge to nursing home

**America's Health
Ranking[®]**

County Health Rankings

State Health System Performance Scorecard

Vegetables

Total Medicare (parts a & b) reimbursements per enrollee

Youth Smoking

Total single premium per enrolled employee at private-sector establishments that offer health insurance

B. Oklahoma Report, America's Health Rankings®, 2014

Indicators	State Value	State Rank	# 1 State
Behaviors			
Smoking (Percent of adult population)	23.7	45	10.3
Binge Drinking (Percent of adult population)	12.7	7	9.6
Drug Deaths (Deaths per 100,000 population)	19.8	45	3.0
Obesity (Percent of adult population)	32.5	44	21.3
Physical Inactivity (Percent of adult population)	31.1	47	16.2
High School Graduation (Percent of incoming ninth graders)	79.0	30	93.0
Community & Environment			
Violent Crime (Offenses per 100,000 population)	469	41	123
Occupational Fatalities (Deaths per 100,000 workers)	7.1	44	2.2
Infectious Disease (Combined score Chlamydia, Pertussis, Salmonella*)	-0.07	25	-0.9
Chlamydia (Cases per 100,000 population)	444.2	27	233.0
Pertussis (Cases per 100,000 population)	4.1	6	1.6
Salmonella (Cases per 100,000 population)	20.1	39	6.8
Children in Poverty (Percent of children)	17.8	26	9.2
Air Pollution (Micrograms of fine particles per cubic meter)	9.7	33	4.9
Policy			
Lack of Health Insurance (Percent of population)	18.0	44	3.8
Public Health Funding (Dollars per person)	\$79	24	\$219
Immunization—Children (Percent aged 19 to 35 months)	62.7	47	82.1
Immunization—Adolescents (Percent aged 13 to 17 years)	59.9	39	81.3
Clinical Care			
Low Birthweight (Percent of live births)	8.0	24	5.7
Primary Care Physicians (Number per 100,000 population)	84.8	48	324.6
Dentists (Number per 100,000 population)	50.2	37	107.6
Preventable Hospitalizations (Number per 1,000 Medicare beneficiaries)	71.4	42	28.2
ALL DETERMINANTS	-0.44	45	0.71
OUTCOMES			
Diabetes (Percent of adult population)	11.0	39	6.5
Poor Mental Health Days (Days in previous 30 days)	4.3	44	2.5
Poor Physical Health Days (Days in previous 30 days)	4.4	42	2.8
Disparity in Health Status (Percent difference by education level**)	32.1	38	15.5
Infant Mortality (Deaths per 1,000 live births)	7.4	43	4.2
Cardiovascular Deaths (Deaths per 100,000 population)	322.0	48	184.7
Cancer Deaths (Deaths per 100,000 population)	214.1	45	145.7
Premature Deaths (Years lost per 100,000 population)	9,654	46	5,345
ALL OUTCOMES	-0.30	47	0.34
OVERALL	-0.74	46	0.91

*Negative score denotes less than US average, positive score indicates more than US average.

**Difference in the percentage of adults aged 25 and older with vs without a high school education who report their health is very good or excellent.

C. Oklahoma and U.S. Measures, County Health Rankings Data

Measure	Description	US Median	State Overall	State Min.	State Max.	Source/Years
Health Outcomes						
Premature death	Years of Potential Life Lost Rate	7681	9121	5365	15374	NCHS-Mortality/ 2010-2012
Poor or fair health	Percent of adults that report fair or poor health	17%	19%	10%	30%	BRFSS/2006-2012
Poor physical health days	Average # of physically unhealthy days reported in past 30 days	3.7	4.3	2.2	7.0	BRFSS/2006-2012
Poor mental health days	Average # of mentally unhealthy days reported in past 30 days	3.5	4.2	1.9	6.7	BRFSS/2006-2012
Low birthweight	% of live births with low birthweight (<2500 grams)	8%	8.3%	4.8%	9.9%	BRFSS/2006-2012
Health Factors						
Health Behaviors						
Adult smoking	% of adults who are current smokers	21%	24%	14%	39%	BRFSS/2006-2012
Adult obesity	% of adults that report a BMI ≥ 30	31%	32%	28%	38%	CDC Diabetes Interactive Atlas/2011
Food environment index	Index of factors that contribute to a healthy food environment, (0-10)	7.0	6.7	4.5	8.2	USDA Food Environment Atlas/2012
Physical inactivity	% of adults aged 20 and over reporting no leisure-time physical activity	27%	30%	23%	41%	CDC Diabetes Interactive Atlas/2011
Access to exercise opportunities	% of population with adequate access to locations for physical activity	65%	72%	0%	93%	Delorme data, ESRI, Census/2010 & 2013
Excessive drinking	% of adults reporting binge or heavy drinking	16%	13%	7%	21%	BRFSS/2006-2012
Alcohol-impaired driving deaths	% of driving deaths with alcohol involvement	31%	33%	0%	63%	FARS/2009-2013
Sexually transmitted infections	# of newly diagnosed chlamydia cases per 100,000 population	291	442	125	776	CDC/2012
Teen births	# of births per 1,000 female population ages 15-19	41	54	22	95	NCHS Natality/2006-2012

Measure	Description	US Median	State Overall	State Min.	State Max.	Source/Years
Clinical Care						
Uninsured	% of population under age 65 without health insurance	17%	21%	15%	29%	SAHIE/2012
Primary care physicians	Ratio of population to primary care physicians	2015:1	1567:1	14555:1	821:1	AMA/2012
Dentists	Ratio of population to dentists	2670:1	1805:1	12377:1	999:1	Area Health Resource File/2013
Mental health providers	Ratio of population to mental health providers	1128:1	285:1	6432:1	101:1	CMS/2014
Preventable hospital stays	# of hospital stays for ambulatory-care sensitive conditions per 1,000 Medicare enrollees	65.3	71	28	250	Dartmouth Atlas/2012
Diabetic monitoring	% of diabetic Medicare enrollees ages 65-75 that receive HbA1c monitoring	85%	78%	45%	89%	Dartmouth Atlas/2012
Mammography	% of female Medicare enrollees ages 67-69 that receive mammography screening	61%	55.3%	37.8%	66.2%	Dartmouth Atlas/2012
Social and Economic Factors						
High school education	% of ninth-grade cohort that graduates in four years	85%	78%	27%	100%	Data.gov/2011-2012
Some college	% of adults ages 25-44 with some post-secondary education	56%	58.4%	38.0	70.1	ACS/2009-2013
Unemployment	% of population aged 16 and older unemployed but seeking work	7%	5.4%	2.6%	9.6%	BLS/2013
Children in poverty	% of children under age 18 in poverty	24%	24%	11%	41%	SAIPE/2013
Income inequity	Ratio of household income at the 80th percentile to income at the 20th percentile	4.4	4.6	3.4	6.2	ACS/2009-2013
Children in single-parent households	% of children that live in a household headed by single parent	31%	34%	17%	49%	ACS/2009-2013
Social associations	# of membership associations per 10,000 population	12.6	11.8	5.5	29.4	Community Business Patterns/2012
Violent crime	# of reported violent crime offenses per 100,000 population	199	468	18	991	Uniform Crime Reporting/2010-2012
Injury deaths	# of deaths due to injury per 100,000	73.8	86	60	158	CDC WONDER/2008-12

Measure	Description	US Median	State Overall	State Min.	State Max.	Source/Years
Physical Environment						
Air pollution- particulate matter	Average daily density of fine particulate matter in micrograms per cubic meter (PM2.5)	11.9	10.3	9.3	12.0	CDC WONDER/ 2011
Drinking water violations	% of population potentially exposed to water exceeding a violation limit during the past year	1.0%	23%	0%	96%	Safe Drinking Water Information System/FY2013-2014
Severe housing problems	% of households with overcrowding, high housing costs, or lack of kitchen or plumbing facilities	14%	14%	5%	22%	CHAS/2007-2011
Driving alone to work	% of workforce that drives alone to work	80%	82%	72%	88%	ACS/2009-2013
Long-commute- driving alone	Among workers who commute in their car alone, % commuting > 30 minutes	29%	25%	9%	49%	ACS/2009-2013

ACS=American Community Survey; AMA=American Medical Association; BLS=Bureau of Labor Statistics; BRFSS=Behavioral Risk Factor Surveillance System, CDC= Centers for Disease Control and Prevention; CHAS=Comprehensive Housing Affordability Strategy data; CMS=Centers for Medicare and Medicaid Services; FARS = Fatality Analysis Reporting System; SAHIE = U.S. Census, Small Area Health Insurance Estimates; SAIPE=Small Area Income and Poverty Estimates; NCHS=National Center for Health Statistics; USDA= United States Department of Agriculture.

D. County Level Risk Factors and Chronic Diseases among Persons 18 Years and Older, Oklahoma Behavioral Risk Factor Surveillance System, 2013

County of residence	% Smokers	% Obesity	% No leisure time activity	% At least 1 fruit per day	% At least 1 vegetable per day	% Told had diabetes	% Told had hypertension
Adair	36.0%	44.4%	44.4%	65.7%	32.5%	16.6%	35.5%
Alfalfa	37.8%	35.4%	43.9%	55.3%	23.3%	11.9%	40.8%
Atoka	35.0%	36.3%	34.4%	52.1%	27.4%	9.8%	38.7%
Beaver	20.9%	31.0%	34.4%	52.1%	30.4%	16.6%	40.2%
Beckham	25.4%	30.5%	36.3%	55.6%	29.8%	6.7%	38.2%
Blaine	19.9%	35.4%	39.9%	46.6%	15.8%	13.6%	42.1%
Bryan	21.6%	33.7%	33.7%	60.3%	35.7%	9.6%	50.3%
Caddo	29.7%	41.4%	42.8%	52.1%	27.2%	10.6%	37.8%
Canadian	20.2%	32.3%	35.3%	49.7%	24.7%	10.8%	35.6%
Carter	31.3%	35.8%	30.7%	46.6%	26.3%	10.4%	39.3%
Cherokee	22.8%	30.3%	25.6%	52.5%	28.2%	13.9%	39.3%
Choctaw	27.5%	32.0%	38.2%	51.7%	27.6%	17.7%	42.2%
Cimarron	25.6%	25.6%	39.6%	59.4%	17.4%	10.8%	45.1%
Cleveland	17.6%	30.3%	26.1%	47.3%	24.9%	8.9%	34.8%
Coal	28.7%	38.4%	45.4%	51.8%	14.9%	8.9%	37.4%
Comanche	25.5%	32.6%	30.3%	53.4%	27.6%	10.2%	35.9%
Cotton	32.8%	37.4%	42.0%	53.0%	26.3%	14.9%	43.1%
Craig	23.5%	27.7%	33.1%	62.5%	29.4%	12.7%	48.5%
Creek	35.5%	39.0%	36.1%	51.3%	21.0%	13.2%	46.3%

County of residence	% Smokers	% Obesity	% No leisure time activity	% At least 1 fruit per day	% At least 1 vegetable per day	% Told had diabetes	% Told had hypertension
Custer	25.4%	29.9%	29.6%	53.6%	26.2%	9.7%	35.3%
Delaware	29.7%	34.8%	35.8%	52.6%	25.6%	16.5%	42.1%
Dewey	24.4%	32.9%	40.8%	52.7%	29.1%	12.6%	39.2%
Ellis	27.0%	33.7%	38.6%	57.0%	21.0%	9.4%	39.5%
Garfield	25.5%	35.4%	40.3%	47.3%	21.8%	9.4%	31.2%
Garvin	23.8%	32.8%	41.2%	58.5%	25.2	12.3%	42.4%
Grady	28.0%	32.5%	29.1%	59.4%	23.2%	10.8%	35.6%
Grant	18.5%	35.8%	40.3%	61.2%	29.6%	9.6%	45.5%
Greer	43.0%	32.0%	40.5%	58.6%	17.0%	11.6%	51.3%
Harmon	25.8%	38.5%	43.9%	49.5%	28.1%	13.5%	47.0%
Harper	20.0%	35.3%	39.0%	64.8%	42.3%	11.6%	42.9%
Haskell	22.3%	33.8%	42.9%	45.3%	30.0%	19.5%	44.9%
Hughes	33.7%	34.6%	49.7%	59.2%	45.0%	16.8%	44.7%
Jackson	20.3%	25.2%	40.1%	54.5%	25.6%	10.7%	29.0%
Jefferson	37.0%	33.4%	41.0%	45.3%	23.0%	8.8%	51.8%
Johnston	29.7%	44.8%	38.7%	52.9%	27.3%	10.0%	48.9%
Kay	21.9%	25.1%	31.5%	55.0%	30.0%	11.9%	38.1%
Kingfisher	17.8%	24.6%	30.9%	49.2%	29.1%	9.9%	30.8%
Kiowa	25.3%	27.2%	43.4%	48.6%	16.0%	15.3%	45.7%
Latimer	23.6%	32.3%	29.9%	48.0%	31.8%	14.5%	45.5%

County of residence	% Smokers	% Obesity	% No leisure time activity	% At least 1 fruit per day	% At least 1 vegetable per day	% Told had diabetes	% Told had hypertension
Leflore	26.6%	42.9%	33.6%	50.7%	22.8%	16.8%	41.0%
Lincoln	29.0%	40.5%	41.0%	54.7%	15.8%	10.8%	38.9%
Logan	20.0%	28.9%	31.5%	45.0%	19.1%	12.5%	38.0%
Love	30.3%	36.4%	35.2%	56.0%	23.1%	19.1%	45.1%
McClain	21.8%	32.5%	25.6%	51.0%	29.9%	10.2%	40.3%
McCurtain	27.8%	36.6%	40.4%	58.6%	33.1%	11.8%	38.1%
McIntosh	29.4%	36.8%	44.1%	51.2%	32.2%	13.4%	52.7%
Major	22.4%	33.4%	33.7%	49.0%	19.5%	9.6%	44.3%
Marshall	22.5%	37.7%	48.6%	49.1%	25.5%	11.6%	50.5%
Mayes	28.4%	37.4%	41.1%	57.7%	25.0%	13.2%	41.3%
Murray	33.5%	37.0%	35.9%	52.3%	29.0%	9.5%	30.3%
Muskogee	33.9%	33.9%	31.7%	49.0%	25.9%	11.7%	40.7%
Noble	15.6%	35.0%	36.8%	55.9%	19.6%	14.5%	43.5%
Nowata	18.4%	34.5%	32.4%	54.6%	23.7%	11.7%	39.8%
Okfuskee	33.8%	35.8%	30.1%	56.8%	26.3%	10.0%	48.6%
Oklahoma	22.3%	31.0%	32.8%	48.6%	25.2%	10.2%	34.5%
Okmulgee	27.8%	40.2%	38.9%	45.9%	24.0%	9.2%	43.2%
Osage	27.9%	34.9%	33.5%	56.3%	27.9%	10.6%	42.6%
Ottawa	31.1%	33.6%	32.8%	62.1%	27.3%	13.3%	38.8%
Pawnee	22.4%	35.2%	34.7%	58.1%	31.2%	13.1%	44.8%

County of residence	% Smokers	% Obesity	% No leisure time activity	% At least 1 fruit per day	% At least 1 vegetable per day	% Told had diabetes	% Told had hypertension
Payne	16.5%	26.4%	22.4%	45.3%	26.4%	5.4%	29.2%
Pittsburg	29.3%	28.0%	37.1%	57.0%	29.6%	12.5%	40.3%
Pontotoc	25.0%	34.0%	32.2%	43.4%	25.5%	9.7%	42.1%
Pottawatomie	26.6%	38.1%	29.5%	48.5%	25.6%	13.9%	38.3%
Pushmataha	33.4%	27.7%	38.0%	58.1%	25.2%	20.4%	64.3%
Roger Mills	19.8%	28.1%	42.9%	56.2%	18.2%	18.6%	43.6%
Rogers	17.7%	32.4%	31.5%	49.3%	24.3%	9.8%	32.2%
Seminole	24.5%	38.8%	38.7%	58.1%	35.5%	12.6%	39.1%
Sequoyah	30.9%	42.8%	39.1%	61.9%	29.8%	17.8%	48.6%
Stephens	26.9%	33.8%	39.3%	48.4%	20.8%	14.4%	37.3%
Texas	20.2%	28.5%	37.9%	43.3%	12.6%	7.4%	29.6%
Tillman	25.7%	28.1%	40.9%	62.0%	40.8%	11.6%	38.7%
Tulsa	20.9%	30.0%	30.9%	47.9%	22.9%	10.3%	35.3%
Wagoner	23.4%	36.8%	33.1%	46.9%	23.9%	12.5%	43.3%
Washington	23.7%	29.5%	31.3%	49.1%	26.3%	14.2%	46.2%
Washita	27.4%	38.1%	34.0%	54.5%	32.2%	12.4%	40.8%
Woods	24.1%	31.1%	40.9%	47.3%	24.9%	11.8%	31.9%
Woodward	27.9%	38.0%	33.0%	47.4%	21.8%	9.0%	38.0%

E. County Level Mortality by Cause and Years, Oklahoma Vital Statistics


County of residence	Suicide, age-adjusted rate per 100,000 population, 2011-2013	Infant deaths per 1,000 live births, 2009 -2013	Unintentional injury, age-adjusted rate per 100,000 population less than 18 years, 2009-2013	Diabetes, age-adjusted rate per 100,000 population, 2011 - 2013
Adair	*	12.6	*	67.7
Alfalfa	*	*	*	29.5
Atoka	*	7.3	*	36.1
Beaver	*	*	0	32.7
Beckham	36.6	9.9	*	40.3
Blaine	*	15.3	39.8	43.1
Bryan	17.3	5.1	17.9	29.6
Caddo	19.4	9.9	24	49.3
Canadian	17.6	5.4	8.1	28
Carter	21.7	5.8	21.1	35.1
Cherokee	23.4	7.3	17.7	36.6
Choctaw	15.5	7.6	*	22.1
Cimarron	0	0	*	40.5
Cleveland	12.9	5	9.1	19.1
Coal	*	*	*	*
Comanche	18.1	9.1	7.1	41.6

County of residence	Suicide, age-adjusted rate per 100,000 population, 2011-2013	Infant deaths per 1,000 live births, 2009 -2013	Unintentional injury, age-adjusted rate per 100,000 population less than 18 years, 2009-2013	Diabetes, age-adjusted rate per 100,000 population, 2011 - 2013
Cotton	*	*	*	34
Craig	20.8	6.9	*	23.3
Creek	21.1	8.8	17.3	29.5
Custer	14.6	6.2	21.3	36.9
Delaware	22.7	6.7	*	24.8
Dewey	*	*	*	34.1
Ellis	*	0	*	24.6
Garfield	22.2	7.6	*	32.2
Garvin	25.2	6.9	26.7	39.2
Grady	16.1	5.8	21.3	42.4
Grant	*	19.3	*	73.5
Greer	*	*	*	16
Harmon	0	*	0	*
Harper	*	*	*	*
Haskell	17.6	8.3	*	33.3
Hughes	16.2	6.7	46.1	22.9
Jackson	14.2	9	23.4	32.2

County of residence	Suicide, age-adjusted rate per 100,000 population, 2011-2013	Infant deaths per 1,000 live births, 2009 -2013	Unintentional injury, age-adjusted rate per 100,000 population less than 18 years, 2009-2013	Diabetes, age-adjusted rate per 100,000 population, 2011 - 2013
Jefferson	28.3	*	77.8	31.3
Johnston	41.7	8.6	*	33.7
Kay	14.4	7.9	*	32.5
Kingfisher	10	*	*	28.3
Kiowa	*	10.9	*	41.3
Latimer	*	0	*	33.9
Leflore	12.7	4.1	29.3	40.3
Lincoln	19.9	8.1	14	20.5
Logan	11.8	6.9	*	25.4
Love	*	*	*	35.1
McClain	14.5	10.7	15	23.2
McCurtain	25.4	9.9	20.9	52.3
McIntosh	15	13.4	*	28.3
Major	*	18.8	0	31.5
Marshall	19.6	7.3	31.6	18.7
Mayes	18.7	7	13.4	36.5
Murray	25.4	12.5	*	31

County of residence	Suicide, age-adjusted rate per 100,000 population, 2011-2013	Infant deaths per 1,000 live births, 2009 -2013	Unintentional injury, age-adjusted rate per 100,000 population less than 18 years, 2009-2013	Diabetes, age-adjusted rate per 100,000 population, 2011 - 2013
Muskogee	15.4	6.1	11.5	28.8
Noble	*	11.4	0	47.1
Nowata	11.5	8.6	*	15.4
Okfuskee	21.4	9.3	48.5	56.5
Oklahoma	17.7	8	9.9	27.7
Okmulgee	21.3	7.8	24.7	41.4
Osage	20.1	8	8.8	27.2
Ottawa	23.5	10.3	22.8	26.6
Pawnee	21.1	5.2	39.5	37.1
Payne	11.7	4.8	12.3	25.1
Pittsburg	28.3	5.5	17.9	27.2
Pontotoc	7.6	6.5	18	28.4
Pottawatomie	22	8.7	21.8	31.6
Pushmataha	30.2	7.5	*	29.5
Roger Mills	*	*	0	*
Rogers	19.1	7.4	12.5	24.6
Seminole	21	7.7	*	35.9

County of residence	Suicide, age-adjusted rate per 100,000 population, 2011-2013	Infant deaths per 1,000 live births, 2009 -2013	Unintentional injury, age-adjusted rate per 100,000 population less than 18 years, 2009-2013	Diabetes, age-adjusted rate per 100,000 population, 2011 - 2013
Sequoyah	19.7	5.6	11.3	36.9
Stephens	24.3	8.4	9.3	21.3
Texas	*	9.6	23.2	38.2
Tillman	*	9.7	0	56.5
Tulsa	18.7	7.2	10.8	24.9
Wagoner	17.4	6.3	12.4	29.4
Washington	17.3	6.7	13.3	17.1
Washita	16.1	8.3	46.8	32.2
Woods	*	*	0	35.6
Woodward	8.9	8.4	*	36.1

Note:* = When there are too few cases (<5), data are not shown to protect confidentiality.  Colored fields indicate unstable rates, meaning that the rates drastically vary year to year due to the small number of cases (< 20). Age-adjusted rates are used to control for differences in age distribution of the populations between counties so that the county rates are comparable.

F. Data Sources and Methods

METRICS	DATA SOURCES
America's Health Ranking®	United Health Foundation, America's Health Rankings, 2014. Retrieved from www.americashealthrankings.org/ .
Commonwealth Fund State Health System Performance Scorecard	The Commonwealth Fund, Health System Performance Scorecard, 2014. Retrieved from http://datacenter.commonwealthfund.org/#ind=1/sc=1
Adult Smoking Prevalence	Oklahoma State Department of Health (OSDH), Center for Health Statistics, Health Care Information, Behavioral Risk Factor Surveillance System (BRFSS) 2013, on Oklahoma Statistics on Health Available for Everyone (OK2SHARE). Retrieved from www.health.ok.gov/ok2share . Centers for Disease Control and Prevention (CDC), BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Youth Smoking Prevalence	OSDH, Center for the Advancement of Wellness, Youth Tobacco Survey 2013.
Adult Obesity	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013, on OK2SHARE. Retrieved from www.health.ok.gov/ok2share . CDC, BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Youth Obesity	OSDH, Maternal and Child Health Service (MCH), MCH Assessment, Youth Risk Behavior Surveillance System 2013, on OK2SHARE. Retrieved from www.health.ok.gov/ok2share .
Adult No Leisure Time Activity	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013, on OK2SHARE. Retrieved from www.health.ok.gov/ok2share . CDC, BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Adult Fruit Consumption	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013. CDC, BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Adult Vegetable Consumption	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013.
Food Desert/Food Availability	United States Department of Agriculture (USDA), Economic Research Service, Food Research Atlas. Retrieved from www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx .
Adult Diabetes	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013. CDC BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Adult Hypertension	OSDH, Center for Health Statistics, Health Care Information, BRFSS 2013. CDC, BRFSS Prevalence and Trends Data, 2013. Retrieved from www.cdc.gov/brfss/brfssprevalence/ .
Untreated Mental Illness	Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. (September 4, 2014). <i>The NSDUH Report: Substance Use and Mental Health Estimates from the 2013 National Survey on Drug Use and Health: Any Mental Illness in the Past Year – Table 24</i> , Rockville, MD.
Addiction Disorders	Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. (September 4, 2014). <i>The NSDUH Report: Substance Use and Mental Health Estimates from the 2013 National Survey on Drug Use and Health: Dependence or Abuse of Illicit Drugs or Alcohol in the Past Year - Table 20</i> , Rockville, MD.
Suicide Deaths 18 years and older	OSDH, Center for Health Statistics, Health Care Information, Vital Statistics 2013. CDC Web-based Injury Statistics Query and Reporting System

METRICS	DATA SOURCES
	(WISQARS), Mortality, 2013. Retrieved from http://wonder.cdc.gov/ .
Infant Mortality	Vital Statistics 2013. CDC Wide-ranging Online Data for Epidemiological Research (WONDER, Infant Deaths, 2013. Retrieved from http://wonder.cdc.gov/ .
Maternal Mortality All ages, 1 yr. rate	Vital Statistics 2013. CDC WONDER, Mortality, 2013. Retrieved from http://wonder.cdc.gov/ .
Injury Deaths Among 0-17 years	OSDH, Center for Health Statistics, Health Care Information, Vital Statistics 2013. CDC WISQARS, Mortality, 2013. Retrieved from http://wonder.cdc.gov/ .

Limitations

Mortality-specific data concerns:

- *Age*
There is a worsening trend related to advancing age given the natural risk of dying as age increases.
- *Race/Mortality*
Race is not self-reported on Death Certificates, and as such is subject to racial misclassification. Oklahoma linkage studies with Indian Health Services indicate one-third of American Indian deaths in Oklahoma are classified as white. Consequently, often American Indian mortality rates are based on numerators that have been undercounted. Certain causes of death that typically are included in American Indian studies, such as diabetes, tend to have more accurate coding, but will still be under represented. *Hispanics Death Rates*. There may be a cultural effect resulting in uncharacteristically low cause of death rates. This may be due to the immigrant population returning to their country of birth prior to death. This will underestimate the overall rate of death generally, but particularly among that migrant population group.
- *County-level infant mortality rates*
National and state-level mortality data were taken from the Centers for Disease Control and Prevention (CDC) WONDER web-based data query system and reflect the five year period from 2009-2013.
- *Deaths from heart disease*
Heart disease-related deaths were identified by ICD-10 codes: 100-109, 111, 113, and 120-151.

Data sources and related issues:

Sources for a number of health indicators were the Behavioral Risk Factor Surveillance System, Youth Risk Behavior Survey, and Youth Tobacco Survey. Survey data are subject to sampling error. As a result, responses obtained from the selected sample may differ from the targeted population from which the sample is drawn. Margin of error in sample estimates exist and may impact the distribution of survey responses. Year-on-year differences may also occur. Rather than representing real changes in the population, yearly fluctuation may indicate sampling error. Confidence intervals calculated at 95% are used to account for the variation in survey methodology. Meaning, 95 times out of a 100 samples, the percentage will be within the range specified. If ranges of the same variable overlap, or contain the same percentage, then the percentages are not statistically different.

The maps were generated using Behavioral Risk Factor Surveillance System data that represents modeled estimates for all of the counties.

Age-adjusted rates using the 2000 US Standard Population were reported (exception: infant mortality).

The source of maternal health data was the Pregnancy Risk Assessment Monitoring System (PRAMS). PRAMS is an ongoing, population-based study designed to collect information about maternal behaviors and experiences before, during, and after pregnancy. Monthly, PRAMS sampled between 200 to 250 recent mothers taken from the Oklahoma live birth registry. Mothers were mailed up to three questionnaires seeking their participation. Follow-up phone interviews for non-respondents were conducted. A systematic stratified sampling design was used to yield sample sizes sufficient to generate population estimates for groups considered at risk for adverse pregnancy outcomes. Information included in the birth registry is used to develop analysis weights that adjust for probability of selection and non-response.

When few events occur in a given county or among a demographic group, the resulting rate is considered unstable or unreliable due to its large relative standard error. This is also the case when making estimates about the population using sample sizes smaller than 50 (as is the case with the BRFSS data). Thus, data for each indicator may not be available for every demographic and county.

The tables that show the number and rate of preventable hospitalizations for the health condition and the cost savings associated with preventing a percentage of the hospitalizations by county or state were limited. Counties with 10 or fewer discharges are not included in the tables to protect the confidentiality of patients. The data system excludes hospitalizations:

- Transferred from another hospital,
- Transferred from a skilled nursing facility or intermediate care facility,
- Transferred from another health care facility in another State, and
- Hospitalizations in Tribal Nation, Indian Health Service, or Veterans facilities.

11. Endnotes

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