



# The Burden of Chronic Diseases in Missouri: Progress and Challenges

by Shumei Yun, MD, Noaman Kayani, PhD, Sherri Homan, PhD, Jiaqing Li, MD, Arthur Pashi, PhD, David McBride, PhD & Janet Wilson, MEd

**Missouri's prevalence of smoking, physical inactivity, inadequate fruit and vegetable consumption, obesity, hypertension, high cholesterol and diabetes are all higher than the U.S. average.**



Shumei Yun, MD, PhD, (above) Noaman Kayani, PhD, Sherri Homan, PhD, FNP, RN, Jiaqing Li, MD, PhD, Arthur Pashi, PhD, David McBride, PhD & Janet Wilson, MEd, MPA are all with the Missouri Department of Health and Senior Services, Division of Community and Public Health, Office of Epidemiology, in Jefferson City. Contact: [Shumei.Yun@health.mo.gov](mailto:Shumei.Yun@health.mo.gov)

## Abstract

**Chronic diseases are the major causes of premature death, disability and loss of quality of life in Missouri. The prevalence of many chronic diseases, conditions and risk behaviors is greater in Missouri than the U.S. The medical costs for treating chronic diseases are a burden on the state's economy and will increase as the population ages. Prevention and control of chronic diseases is essential to the physical and economic health of Missourians.**

## Introduction

Chronic diseases are defined by the Centers for Disease Control and Prevention (CDC) as those diseases that are prolonged, do not resolve spontaneously, and for which a complete cure is rarely achieved.<sup>1</sup> According to the World Health Organization (WHO), chronic diseases such as cancer, heart disease and diabetes have reached global epidemic proportions and now cause more deaths than all other diseases combined.<sup>2</sup>

In the United States, almost one out of every two adults has at least one chronic illness, and more than one in four has multiple concurrent

chronic conditions. These diseases cause major limitations in daily living for almost one out of ten Americans or about 25 million people. They account for almost 70% of all deaths in the U.S., which is about 1.7 million each year. Chronic diseases are costly. More than 75% of health care spending is on people with chronic conditions. The burden that chronic disease places on our population and economy is particularly striking since most chronic diseases are preventable.

The objectives of this report are to describe the burden, trends, and disparities in chronic diseases in Missouri, identify progress in reducing the burden and disparities in the last decade, and highlight challenges ahead in chronic disease prevention and management.

## Data Sources

The prevalence of chronic diseases/conditions and risk factors was estimated using the Behavioral Risk Factor Surveillance System (BRFSS) data for 2000-10 and Missouri County Level Study data for 2011. Mortality, hospitalization, emergency room visit, and cancer incidence data were obtained from the Missouri Information for Community Assessment (MICA) for Missouri and from CDC WONDER for the nation.<sup>3</sup>

## Key Findings: Chronic Diseases and Risk Factors in Missouri

### *Death & Premature Death with Chronic Diseases as Underlying Causes*

In Missouri, chronic diseases are major causes of death. In 2010, 55,054 Missourians died and about 71% of the deaths were due to chronic diseases. Heart disease was the number one killer, accounting for 25.0% of all deaths; followed by cancer, 22.8%; chronic lower respiratory disease, 6.4%; cerebrovascular disease (stroke), 5.4%; and diabetes, 2.6%. In total, these five causes accounted for 62.2% of all deaths in Missouri in 2010 (See Figure 1).<sup>4</sup>

Chronic diseases are also major causes of premature death in Missouri. Deaths before the age of 65 are considered premature. In 2010, about 59% of premature deaths (14,827) were due to chronic diseases. Cancer was the number one cause of premature deaths, accounting for more than 26.2% of the premature deaths; followed by heart disease, accounting for about 19.9% (See Figure 2).<sup>4</sup>

The death rates for heart disease, cancer, stroke, and diabetes declined significantly in the last decade in Missouri among all four racial and gender groups: white men, white women, African-American men and African-American women. However, the death rates were higher in Missouri than in the U.S. African-Americans had higher death rates than whites for all chronic diseases except for chronic lower respiratory diseases.

### *Prevalence of Selected Chronic Diseases & Conditions*

A high percentage of Missouri adults had chronic diseases and conditions and the prevalence was higher in Missouri than in the U.S., except for vision impairment, which was slightly lower than that in the U.S. (See Table 1). In addition, about three in four Missouri adults (74.4%) had at least one of the 13 chronic diseases/conditions included in table 1; more than one in two (51.7%) had at least two chronic diseases/conditions, more than one in three (34.5%) had at least three, more than one in five (21.7%) had at least four, and more than one in eight(12.9%) had at least five.<sup>5</sup>

The percentage of people with chronic diseases/conditions was on the rise in Missouri in the last decade. The prevalence of obesity has increased on average at about one percentage point per year, hypertension 1.8 percentage points, diabetes 0.3 percentage points, and asthma 0.1 percentage points per year. African-

Americans had a significantly higher prevalence of obesity, hypertension, diabetes, and asthma than whites, but a significantly lower prevalence of high cholesterol.<sup>6</sup>

### *Emergency Room Visits*

When chronic diseases are not well managed and controlled, emergency room (ER) visits and hospitalizations are more likely. In Missouri during 2009, the age-adjusted ER visit rate per 1,000 population for heart disease was 12.8, 5.6 for COPD, and 5.1 for asthma. During the past decade, the ER visit rates increased significantly for heart disease and COPD, and decreased significantly for asthma in Missouri. African-Americans had significantly higher ER visit rates for all three diseases than whites.<sup>7</sup>

### *Hospitalizations*

In Missouri in 2009, the age-adjusted hospitalization rate per 10,000 population for heart disease was 136.8, for cancer 36.2, for osteoarthritis 29.3, for stroke 28.9, for COPD 23.9, for diabetes 17.4, and for asthma 13.5. These diseases led to more than \$6.0 billion in hospital charges, including more than \$3.6 billion in charges to Medicare and \$518 million in charges to Medicaid.<sup>8</sup>

From 2000 to 2009, the rates for heart disease and stroke declined significantly among white men and women, but not among African-American men and women. The age-adjusted hospitalization rates for asthma and diabetes increased significantly among African-American men and women. The rates for osteoarthritis increased significantly in Missouri for all four racial and gender groups. The hospitalization rates among African-Americans were significantly higher than among whites for heart disease, stroke, asthma, and diabetes, but lower than whites for osteoarthritis.<sup>9</sup>

### *Prevalence of Risk Behaviors*

Chronic diseases share the common risk behaviors of smoking, lack of physical activity, unhealthy diets and heavy drinking. Among Missouri adults in 2011, 23.0% were current smokers, 23.7% were physically inactive, 87.4% did not consume fruits and vegetables five or more times per day, and 7.3% were heavy drinkers as defined by females drinking more than one alcoholic drink per day and males drinking more than two drinks per day (See Table 1). The prevalence of physical inactivity was higher among African-Americans than among whites.<sup>4</sup> Overall, 88.0% of adults had at least one of the four risk behaviors, 41.8% had at least two, and 10.7% had at least three. The prevalence of these risk behaviors was higher in Missouri than in the U.S. (See Table 1).<sup>5</sup>

**Table 1****Prevalence of Selected Chronic Disease Indicators among Adults, Missouri and US, 2011**

Indicators	Missouri		US	
	Prevalence (%)	95% CI <sup>7</sup>	Prevalence (%)	95% CI
<b>Selected Chronic Diseases/conditions<sup>1</sup></b>				
High Cholesterol	39.7	38.6 - 40.7	38.5	38.2 - 38.8
Hypertension	34.3	33.5 - 35.2	31.5	31.3 - 31.8
Obesity <sup>2</sup>	30.2	29.3 - 31.0	27.4	27.2 - 27.7
Arthritis	29.4	28.6 - 30.2	24.9	24.6 - 25.1
Depressive Disorders	20.6	19.9 - 21.4	16.8	16.6 - 17.0
Vision Impairment <sup>3</sup>	18.5	17.8 - 19.2	19.4	19.2 - 19.6
Diabetes	10.7	10.1 - 11.2	9.8	9.6 - 9.9
Asthma	10.2	9.6 - 10.8	8.7	8.6 - 8.9
Cancer <sup>4</sup>	12.6	11.6 - 13.6	11.1	11.0 - 11.3
COPD	8.1	7.6 - 8.5	6.4	6.2 - 6.5
Heart Attack	5.4	5.0 - 5.8	4.3	4.2 - 4.4
Stroke	3.8	3.5 - 4.1	2.9	2.8 - 3.0
Kidney Disease	2.6	2.3 - 2.8	2.5	2.4 - 2.6
<b>Selected Risk Behaviors</b>				
Smoking	25.0	23.4 - 26.5	20.1	19.9 - 20.4
Physical Inactivity	28.4	26.8 - 30.0	25.4	25.2 - 25.7
F&V <5Times per Day <sup>5</sup>	85.9	84.7 - 87.2	82.8	82.6 - 83.1
Heavy Drinking <sup>4</sup>	7.3	6.2 - 8.3	6.6	6.5 - 6.8

<sup>1</sup>Ever been told by health professionals as having these diseases/conditions among adults age 18 or older, estimated using self-reported data collected through telephone interviews. These diseases/conditions were selected based on the burden of the diseases and availability of the data.

<sup>2</sup>Based on self-reported height and weight data collected through telephone interviews. Obesity is now classified as a disease by the American Medical Association.

<sup>3</sup>Vision impairment even after wearing glasses

<sup>4</sup>Both Missouri and US data are from the 2011 Behavioral Risk Factor Surveillance System (BRFSS).

<sup>5</sup>Fruit and vegetable consumption less than five times per day

<sup>6</sup>Defined as drinking more than one alcoholic drink per day for females and more than two drinks per day for males.

<sup>7</sup>Confidence interval

Data sources: The 2011 County-level study (CLS) data are used for Missouri. US data are from the 2011 BRFSS. The two data sources are comparable except for cancer.

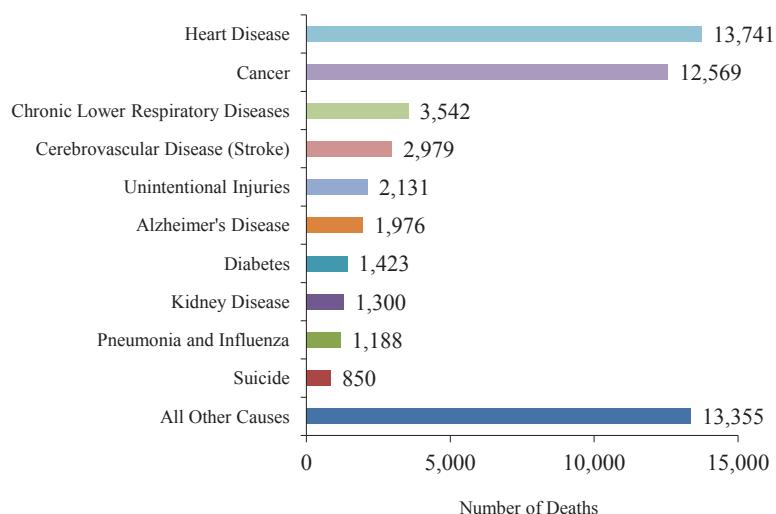
## Early Detection, Care & Self-management of Chronic Diseases in Missouri

### Screening & Early Detection

Screening and early detection are important for detecting diseases at an early and treatable stage. For cervical and colorectal cancers, screening is also a preventive measure. In 2010, 71.3% of women age 40

or older had a mammogram within the past two years in Missouri, compared to 75.2% in the U.S. About 80.1% of Missouri women age 18 or older had a Pap test within the past three years, compared to 81.3% in the U.S. The prevalence of ever having had a sigmoidoscopy or colonoscopy among adults age 50 or older was 65.2% in Missouri, the same as the U.S.<sup>6</sup>

**Figure 1**  
Leading Causes of Death in Missouri, 2010



## Chronic Diseases Care & Management

High quality medical care and management are important for people with chronic diseases. In 2011, among Missouri adults with diabetes, 73.5% had two or more hemoglobin A1C tests in the last year, significantly higher than the U.S. prevalence of 68.7%; 75.3% had their feet examined by a doctor in the last year compared to 74.5% in the U.S.; 68.8% had an annual dilated eye exam, slightly lower than the U.S. prevalence of 70.3%; 61.2% had a seasonal flu vaccination in the last year, significantly higher than the U.S. prevalence of 53.5%; and 57.4% ever had a pneumococcal vaccination, similar to the 58.2% in the U.S.<sup>5</sup>

## Self-Management of Chronic Diseases

When people develop a chronic disease, self-management is very important for preventing complications and exacerbations, and improving the quality of life. In 2011, among Missouri adults with diabetes, 56.3% had ever taken a diabetes self-management class to manage their diabetes, compared to the U.S. prevalence of 52.2%. Eleven percent (10.8) of Missouri adults with arthritis had ever taken a class to learn how to manage their arthritis compared to 12.5% in the U.S.<sup>5</sup>

Maintaining a healthy life style is especially important for people with chronic diseases in order to prevent complications. However, many people with chronic diseases continue to engage in risky behavior. In 2011, among adults with diabetes in Missouri, 19.0%

were current smokers, 42.4% were physically inactive, and 77.3% were not consuming fruits and vegetables five or more times per day. Among adults with arthritis, 38.4% were physically inactive. About one in four stroke survivors (26.1%), heart attack survivors (24.0%) or asthmatic adults (27.9%) were current smokers.<sup>5</sup>

## Social Determinants of Health & Chronic Diseases

The social determinants of health are the circumstances in which people are born, grow up, live, work, and age, as well as the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics. The WHO Commission on Social Determinants of Health concluded in 2008 that the social conditions are the single most important determinant of one's health status.<sup>10</sup>

## Income & Education

There is a positive association between income and health. Individuals in poverty have the worst health indicators, including the prevalence of chronic diseases, conditions, risk behaviors, preventive care practices, health care coverage, and living environments. In 2011, 15.8% or 920,118 Missourians lived in a family with a household income below poverty level (i.e. \$22,811 per year for a family of four in 2011).<sup>11</sup>

Education matters for health. In general, individuals with less education have more health problems and shorter life expectancies. In contrast, people with more years of education are likely to have longer and healthier lives. In 2011, a high proportion of Missouri adults with less than a high school education lived in an environment that was unsafe and lacked access to healthy foods. The proportion decreased as the education level increased. A similar pattern was observed for the prevalence of risk behaviors, lack of preventive care, poor general health, and chronic diseases and conditions.<sup>4</sup> In 2011, the proportion of Missouri adults aged 25 or older without a high school diploma was 31.4%, compared to 28.4% nationally.<sup>11</sup>

Income and education levels vary geographically in Missouri. Counties in the southeast region, especially those in the Bootheel area, have a higher proportion of

population living in poverty and/or without a high school diploma. Overall, the 2011 poverty rate was more than twice as high among African-Americans as among whites (39% vs. 15% in Missouri and 35% vs. 13% nationally).<sup>11</sup>

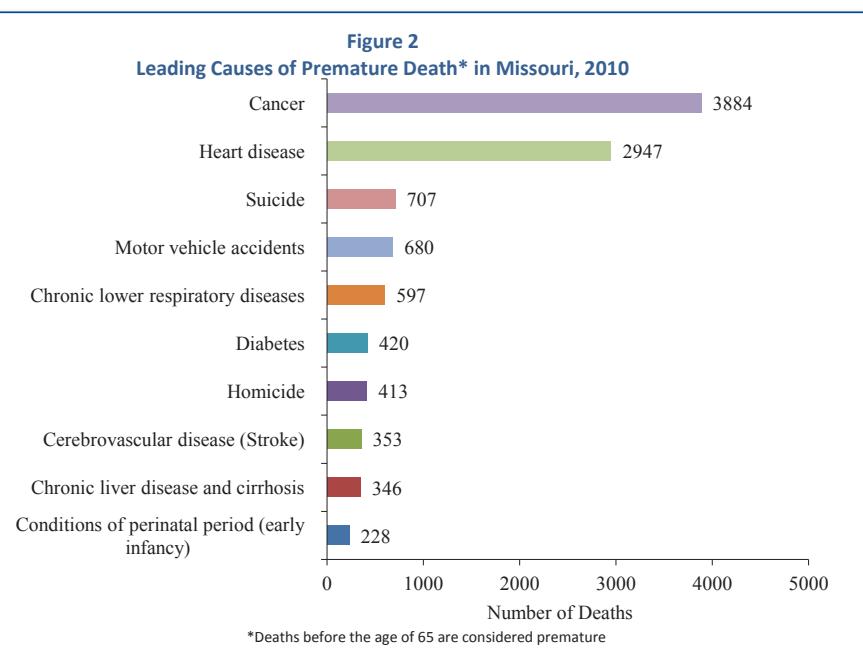
### **Urbanization**

It was estimated that about 56.1% of the Missouri adult population lived in urban core areas, 13.5% in sub-urban areas, 12.9% in large rural towns and 17.5% in small rural towns or isolated rural areas in 2010.<sup>5, 10</sup> Communities at different urbanization levels differ in their environmental, demographic, social and economic characteristics, and these characteristics greatly influence the magnitude and types of health problems communities face.

A higher proportion of Missouri adults living in a small town or isolated rural area lacked access to healthy foods in their neighborhood, had no health care coverage, did not meet cancer screening guidelines, engaged in risk behaviors, and had a higher prevalence of chronic diseases (arthritis, diabetes, COPD, cancer, and vision impairment) compared to residents living in other areas.<sup>5</sup> In contrast, a higher proportion of adults living in the urban core areas had asthma and also considered their neighborhood to be somewhat unsafe or extremely unsafe compared to adults living in other areas.

### **Sexual Orientation**

Lesbian, gay, bisexual, and transgender (LGBT) individuals are becoming more visible and acknowledged in society. Studies have found some significant health disparities between heterosexual and LGBT adults. It was estimated that about 0.8% of Missouri adult women were lesbian, 1.6% of men were gay, 0.7% of men and 1.1% of women were bisexual, and 0.1% were transgender individuals in 2011.<sup>5</sup> In Missouri, LGBT individuals were more likely than heterosexuals to smoke (32.1% vs. 23.1%), have a depressive disorder (36.9% vs. 20.1%), consider their



neighborhood to be somewhat or extremely unsafe (30.0% vs. 19.2%), and have activity limitations (34.5% vs. 23.1%).<sup>5</sup>

### **Progress in the Last Decade**

#### **Decreased Burden**

Significant progress has been made in Missouri in the last decade. The age-adjusted mortality rates decreased significantly from 2000 to 2009 for heart disease by 30%, all-cancer by 10.9% among men and by 6.2% among women, lung cancer among men by 10.1%, female breast cancer by 10.8%, prostate cancer among men by 25.4%, colorectal cancer by 17.2% among men and by 19.9% among women, cerebrovascular disease by 31.0% and diabetes by 20.3%.<sup>4</sup>

#### **Hospitalizations and Emergency Room Visits**

From 2000 to 2009, age-adjusted hospitalization rates decreased significantly in Missouri for heart disease by 18.7% and for cerebrovascular disease by 19.0%; age-adjusted asthma ER visit rates decreased by 5.6%.<sup>7, 9</sup>

#### **Cancer Incidence**

From 2000 to 2008, the age-adjusted incidence rates decreased significantly in Missouri for all-cancer

# SCIENCE OF MEDICINE

by 7.8% among men and by 2.0% among women; for lung cancer by 11.5% among men; for colorectal cancer by 22.1% among white men, by 22.8% among white women, and by 17.6% among African-American men; and for cervical cancer by 28.3%.<sup>13</sup>

## *Prevalence of Chronic Diseases & Conditions*

There has been little to no progress during the last decade in reducing the prevalence of chronic diseases and conditions. In fact the prevalence has increased for most chronic diseases and conditions.

## *Prevalence of Risk Behaviors*

From 2000 to 2010 among adult Missourians, the prevalence of smoking decreased by 22.1%, the percentage of adults not meeting CDC's physical activity recommendations decreased by 17.2%, and the prevalence of heavy drinking among African-American men decreased by 90.8%.<sup>6</sup> From 2001 to 2009, the prevalence of smoking among high school students decreased by 37.6% and from 2003 to 2011, it decreased by 38.6% among middle school students.<sup>14</sup>

## *Improvement in Cancer Screening & Chronic Disease Care and Self-Management*

From 2001 to 2010, the prevalence of ever having had a sigmoidoscopy or colonoscopy among adults age 50 years or older increased by 51.6%; the percentage of adults with diabetes who have ever attended a diabetes self-management class increased by 33.0%; the percentage of African-American men with diabetes who had a flu shot in the last year increased by 453.0% and the percentage who had ever had a pneumococcal vaccination increased by 273.1%.<sup>6</sup>

## *Reduced Disparities*

From 2000 to 2009, racial disparities declined in age-adjusted rates for diabetes mortality, all-cancer mortality, lung cancer mortality among men, breast cancer mortality among women, lung cancer incidence among men and cervical cancer incidence among women.<sup>6</sup>

## **Challenges Ahead**

Missouri faces tremendous challenges in chronic disease prevention and control. The burden of chronic diseases in Missouri is likely to grow as the population ages and the prevalence of obesity and associated chronic conditions increase. In addition, there are substantial racial/ethnic and socioeconomic disparities in Missouri. Minorities and people of lower socioeconomic status

are disproportionately affected by chronic diseases. Furthermore, funding for chronic disease prevention and control is limited.

## *Aging Population*

The rapid aging of the population is among the major public health challenges faced in chronic disease prevention and control as older adults are disproportionately affected by chronic diseases, which are associated with disability, diminished quality of life, and increased costs for health care and long-term care. In Missouri in 2011, about 95% of seniors age 65 and older had at least one of the 13 aforementioned chronic diseases or conditions, more than 80% had at least two, and about 65% had at least three.

The proportion of seniors in Missouri's population was 13.5% in 2000 and increased to 14.0% in 2010. As the first baby boomers turned 65 in 2011, it began a period of even faster growth of the senior population. It is estimated that by 2030, Missouri's senior population will increase to 21.0%.<sup>15</sup> In addition, the proportion of senior population in Missouri has been and will be continuously higher than the nation overall.

## *High & Increasing Burden*

Compared to the U.S. overall, Missouri has a higher burden of almost all chronic diseases, conditions, and risk behaviors. Missouri's prevalence of smoking, physical inactivity, inadequate fruit and vegetable consumption, obesity, hypertension, high cholesterol and diabetes are all higher than the U.S. Furthermore, the prevalence of obesity, hypertension and diabetes are increasing significantly over time in Missouri, and at a faster pace than the U.S. Without effective chronic disease prevention and control interventions, the high prevalence of risk factors and chronic conditions will likely lead to increases in emergency room visits, hospitalizations, medical care spending, disabilities, poor quality of life, lost productivity and deaths.

## *Racial/Ethnic & Socioeconomic Disparities*

There are substantial racial/ethnic and socioeconomic disparities, and in certain cases, the disparities are increasing in Missouri. Minorities and people of lower socioeconomic status have a higher burden of most chronic diseases, conditions, and risk behaviors. Currently a relatively limited number of evidence-based interventions have been identified to address the social determinants of health. However, economic development, political will, and well-coordinated efforts from multiple sectors are crucial



Chronic diseases share the common risk behaviors of smoking, lack of physical activity, unhealthy diets and heavy drinking.

elements for reducing health disparities and improving overall population health. Unfortunately, these conditions are hard to attain and many are out of the control of public health professionals.

## Conclusion

The health and economic burden of chronic diseases is tremendous in Missouri, and it is likely to grow as the population ages and the prevalence of obesity and associated conditions increases. Adequate funding is needed to effectively address the challenges of reducing the burden and disparities of chronic diseases among Missouri residents. Evidence has shown that chronic disease prevention is cost effective.<sup>16</sup> Investing in chronic disease prevention is not only the economically smart thing to do; it is the right thing to do.

## References

1. Centers for Diseases Control and Prevention. Chronic Diseases. Available at: <http://www.cdc.gov/chronicdisease/resources/publications/aag/chronic.htm>.
2. United Nations. Sixty-sixth General Assembly Plenary. Available at: <http://www.un.org/News/Press/docs/2011/ga11138.doc.htm>.
3. CDC WONDER. Available at: <http://wonder.cdc.gov/>.
4. Missouri Information for Community Assessment (Death MICA) 2000-10, Bureau of Health Care Analysis & Data Dissemination, Missouri Department of Health and Senior Services.
5. Missouri County-level Study 2011, Office of Epidemiology, Missouri Department of Health and Senior Services and Missouri Foundation For Health.
6. Missouri Behavioral Risk Factor Surveillance System 2000-10, Office of Epidemiology, Missouri Department of Health and Senior Services.
7. Missouri Information for Community Assessment (Emergency Room Visits MICA) 2000-10, Bureau of Health Care Analysis & Data Dissemination, Missouri Department of Health and Senior Services.
8. Missouri Information for Community Assessment (Hospital Discharge, Charges and Days of Care MICA) 2000-10, Bureau of Health Care Analysis & Data Dissemination, Missouri Department of Health and Senior Services.
9. Missouri Information for Community Assessment (Hospitalization MICA) 2000-10, Bureau of Health Care Analysis & Data Dissemination, Missouri Department of Health and Senior Services.
10. World Health Organization. Social Determinants of Health. Available at: [http://www.who.int/social\\_determinants/en/](http://www.who.int/social_determinants/en/).
11. The Henry J. Kaiser Family Foundation, State Health Facts: Poverty Rate by Race/Ethnicity, Data Source: Census Bureau's March 2011 and 2012 Current Population Survey (CPS: Annual Social and Economic Supplements). <http://kff.org/other/state-indicator/poverty-rate-by-raceethnicity/#>.
12. Rural Health Research Center. RUCA. Available at: <http://depts.washington.edu/uwrucu/ruca-data.php>.
13. Missouri Cancer Registry and Research Center 2000-10, Missouri Department of Health and Senior Services and the University of Missouri.
14. Missouri Youth Tobacco Survey 2001-2011, Missouri Department of Health and Senior Services.
15. Office of Administration. Population Projections. Available at: <http://content.oa.mo.gov/budget-planning/demographic-information/population-projections>.
16. Prevention for a healthier America: investments in disease prevention yield significant savings, stronger communities [Internet]. Washington, D.C.: Trust for America's Health; 2008. Available from: [www.healthyamericans.org/reports/prevention08](http://www.healthyamericans.org/reports/prevention08).

## Disclosure

This document was supported by Cooperative Agreement Number #3U58DP001976-04W1 between the Centers for Disease Control and Prevention (CDC) and the Missouri Department of Health and Senior Services. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the CDC. Authors would like to thank Bert Malone, Belinda Heimericks, and Cherri Baysinger for comments and suggestions.

MM