

Cardiovascular Diseases

Cardiovascular diseases (CVD) affect an estimated 81.1 million adults (1 in 3) in the United States, 47% of whom are aged 65 years or more, and accounts for 34% of all deaths.1 Nearly 33% of CVD deaths occur before 75 years of age, which is the average life expectancy. For all major categories of CVD, men have higher age-adjusted death rates than women.² Table 10.1 provides a breakdown of CVD prevalence by race/ethnicity. Disparities in CVD risk in the United States are primarily related to socioeconomic status and less related race/ethnicity.3

The direct and indirect costs of CVD in the United States were estimated at \$503.2 billion in

2010. Hospital treatment for just 6 CVD conditions (coronary artery disease, heart attacks, congestive heart failure, irregular heartbeats, stroke, and chest pain with no determined cause) accounted for 17.6% of the money hospitals spent on patient care in 2006.⁴ Given various dynamics, such as the aging popu-

lation, obesity epidemic, underuse of prevention strategies, and suboptimal control of risk factors, the future burden of CVD could be exacerbated.^{5 6}

Of the different components of the rubric known as CVD, this report will address only heart disease, stroke, and hypertension. Blood pressure is a prevailing issue for these diseases. With respect to heart disease, low risk for coronary heart disease (CHD) is defined as blood pressure (BP) below 120/80 mm Hg, cholesterol below 200 mg/dL and the absence of current smoking. The lifetime risk of stroke among persons with BP less than 120/80 mm Hg is about half that for those with high blood pressure. But the stroke are considered as the stroke as the stroke are considered as the stroke are considered as the stroke are considered as the stroke as the stroke are considered as the

Table 10.1. Prevalence estimates for cardiovascular diseases in Americans

	White	Black	Hispanic	American Indian /Alaskan Native	Asian
Heart disease	12.1%	10.2%	8.1%	12.1%	5.2%
Coronary heart disease	6.5%	5.6%	5.7%	6.6%	2.9%
Hypertension	23.3%	31.8%	21.0%	25.3%	21.0%
Stroke	2.7%	3.6%	2.6%	3.9%	1.8%

(source: National Center for Health Statistics)

Heart Disease

Heart disease is typically thought of as CHD or coronary artery disease. Many conditions can affect the structures or function of the heart such as abnormal heart rhythms or arrhythmias, heart failure, valve disease, congenital heart disease, heart muscle disease (cardiomyopathy), pericardial disease, aorta disease, Marfan syndrome, and vascular disease (blood vessel disease). While mortality from congenital heart disease has declined among all race-ethnicities, disparities persist. Overall, and among infants, mortality from congenital heart disease is higher among non-Hispanic blacks than non-Hispanic whites. Infant mortality accounts for nearly half of all congenital heart disease mortality, while among those who survive the first year of life,

three quarters of deaths occur in adulthood.

According to National Health Interview Survey (NHIS) data, 12% of adults aged 18 years or more have some sort of heart disease, with 6% having CHD. Males have a higher prevalence of both heart disease and CHD than females. Prevalence increases with age and is inversely associated with educational attainment and socioeconomic status. Prevalence is highest in the Midwest and South regions of the country, and Missouri has one of the highest prevalence rates for heart disease in the nation. It has been reported that 1 in 100 black men and women will develop heart failure before 50 years of age. High blood pressure, obesity, and systolic dysfunction that present before a person is

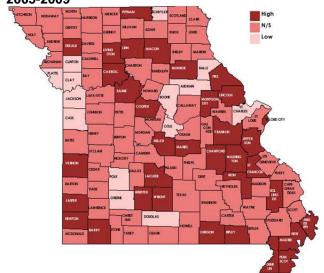


35 years of age are important antecedents that may be targets for the prevention of heart failure. 12 13 Also, a high serum cholesterol level indicates a potential increased risk for heart disease. Sixteen percent of adults aged 20 years or more have serum total cholesterol levels of at least 240 mg/dL. 14

In 2010, an estimated 785,000 Americans had a new coronary attack and approximately 470,000 had a recurrent attack. In addition, there are an estimated 195,000 silent myocardial infarctions that occur each year. Mortality from heart disease continues to decline for males and not females, 15 but the decline in mortality may be ending. 16 17 While heart disease and cancer are the top two causes of death in the nation, cancer has replaced heart disease as the leading cause of death among persons aged 85 years or fewer. In 2010, the estimated direct and indirect costs associated with heart diseases were \$316.4 billion.

Decreases in CHD mortality have been attributed almost equally to reductions in risk factors and to medical therapies. ¹⁸ Despite the attribution of half of the decline to reductions in risk factors, the

Figure 10.1. Age-adjusted heart disease death rates by county compared to Missouri average, 2005-2009



(source: Missouri Department of Health and Senior Services)

National Center for Health Statistics found no appreciable difference in the distribution of the 10-year risk for developing CHD. ¹⁹ This observation may have to do with individuals not truly making life-style changes in their behaviors, such as the implementation of a healthier diet. ²⁰ As a result, people with CHD have significantly poorer health-related quality of life compared to persons without CHD. Additionally, women with CHD have a lower quality of life compared to their male counterparts. ²¹

Among persons who experience heart attacks, those with chronic health conditions have decreased chances of surviving to hospital discharge, about 16% less for each chronic condition. Black heart attack patients have worse outcomes than their white counterparts, although most of the disparities can be attributed to patient characteristics present before admission. About 20% of black patients die within two years of a heart attack, compared to 9% of whites. Roughly 28% of blacks have severe chest pain, compared to 18% of whites. Also, black men and women are less likely to undergo procedures to unblock clogged coronary arteries.

Kansas City

Heart disease is the 2nd leading cause of death in Kansas City. The 4 counties in which the city is situated have age-adjusted death rates that are lower than the average for Missouri (Figure 10.1). The age-adjusted death rate for heart disease in Kansas City has declined more rapidly than that for Missouri (Figure 10.2).

In 2009, 709 Kansas City residents died from heart disease (Tables 10.2 and 10.3); the average age at time of death was 74.3 years and the median age was 78.0 years. Over 19% of all deaths among both men and women in 2009 were attributable to heart disease. Higher percentages of non-Hispanic black men and women died prematurely (younger than 65 years of age) from heart disease and CHD than their non-Hispanic white counterparts (Table 10.4). In Missouri, the indirect costs due to lost productivity from premature



Figure 10.2. Comparison of age-adjusted death rates from heart disease between Kansas City, MO, and Missouri, 1990-2009)

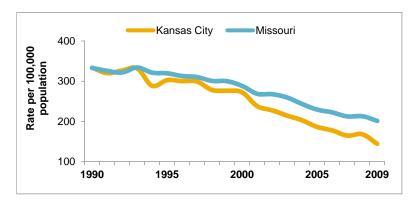


Table 10.2. Classification of deaths from heart disease, Kansas City, MO, 2009

Cause listed on death certificate	Deaths
Acute rheumatic fever and chronic rheumatic heart diseases	4
Hypertensive heart disease	11
Hypertensive heart and renal disease	46
Acute myocardial infarction	120
Atherosclerotic cardiovascular disease, so described	107
All other forms of chronic ischemic heart disease	171
Heart failure	59
Pulmonary heart disease & diseases of the pulmonary circulation	26
All other forms of heart disease	165
Total deaths from heart disease	709

deaths from heart disease are estimated at \$1.75 billion annually.²⁴

Nearly 75% of heart disease deaths occurred in the Jackson County portion of the city while 18% occurred in the Clay County portion and 9% occurred in the Platte County portion. The distribution of heart disease deaths by zip code for 2005-2009 is shown in Table 10.5. The death rate from heart disease declined as zip code level median family incomes rose (Figure 10.3).

In 2008, Kansas City residents made 1,148 visits to emergency departments because of heart disease and experienced 4,888 hospitalizations. The quality of hospital care for persons experiencing heart attacks or heart failure in Kansas City can be accessed at www.healthykansascity.org.

Table 10.3. Crude mortality rates per 10,000 population for heart disease and coronary heart disease, Kansas City, MO, 2009

	2000 Population	Heart	disease	Coronar dise	•
	Population	Deaths	Rate	Deaths	Rate
All					
Total ¹	441,545	698	15.8	443	10.0
White, non-Hispanic	254,471	458	18.0	285	11.2
Black, non-Hispanic	136,921	220	16.1	142	10.3
Hispanic	30,604	13	4.2	11	3.6
Asian	8,182	7	8.6	5	6.1
Male					
Total	213,141	351	16.5	254	11.9
White, non-Hispanic	124,252	235	18.9	169	13.6
Black, non-Hispanic	62,779	105	16.7	75	11.9
Hispanic	16,454	8	4.9	8	4.9
Asian	4,069	3	7.4	2	4.9
Female					
Total	228,404	347	15.2	189	8.3
White, non-Hispanic	130,219	223	17.1	116	8.9
Black, non-Hispanic	74,142	115	15.5	67	9.0
Hispanic	14,150	5	3.5	3	2.1
Asian	4,113	4	9.7	3	7.3



Table 10.4. Age distribution of deaths from heart disease (HD) and from coronary heart disease (CHD), Kansas City, MO, 2005-2009

Age	White, non- e Hispanic		Black, non- Hispanic		Hispanic		Asian		Native American	
(years)	HD	CHD	HD	CHD	HD	CHD	HD	CHD	HD	CHD
<1	1	0	1	1	0	0	1	0	0	0
1-4	1	0	1	0	1	0	0	0	0	0
5-14	2	0	0	0	0	0	0	0	0	0
15-24	2	0	6	1	1	0	0	0	0	0
25-34	14	5	20	6	2	2	1	0	0	0
35-44	45	29	57	29	4	2	2	2	0	0
45-54	183	150	151	103	5	4	0	0	1	1
55-64	305	243	205	146	11	9	3	2	2	2
65-74	328	244	229	158	16	14	6	6	2	2
75-84	716	462	326	218	24	16	3	2	2	1
<u>></u> 85	970	561	249	171	19	9	5	2	4	2
Not listed	3	3	0	0	0	0	0	0	0	0
Total	2,570	1,697	1,245	833	83	56	21	14	11	8

Table 10.5. Deaths due to heart disease among Kansas City, MO, residents by zip code, 2005-2009

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Zip				White, non-	Black, non-	Zip				White, non-	Black, non-
code	Deaths	Male	Female	Hispanic	Hispanic	code	Deaths	Male	Female	Hispanic	Hispanic
64101	1	1	0	1	0	64134	155	89	66	100	53
64102	1	1	0	0	1	64136	18	7	11	14	4
64105	22	13	9	13	7	64137	75	37	38	48	26
64106	52	28	24	29	21	64138	93	46	47	66	26
64108	53	28	25	15	20	64139	32	6	26	29	3
64109	133	72	61	38	93	64145	117	39	78	106	11
64110	122	58	64	35	85	64146	16	10	6	15	1
64111	184	95	89	138	35	64147	0	0	0	0	0
64112	50	18	32	44	3	64149	1	0	1	1	0
64113	64	39	25	59	2	64151	125	63	62	122	1
64114	340	154	186	319	18	64152	27	17	10	24	2
64116	91	42	49	84	3	64153	33	15	18	32	0
64117	113	55	58	109	3	64154	91	37	54	85	2
64118	112	63	49	103	4	64155	125	51	71	119	2
64119	122	74	48	112	6	64156	8	6	2	8	0
64120	3	2	1	2	0	64157	30	12	18	27	0
64123	86	48	38	79	2	64158	7	5	2	7	0
64124	91	46	45	77	7	64160	0	0	0	0	0
64125	18	14	4	18	0	64161	0	0	0	0	0
64126	60	31	29	48	9	64163	0	0	0	0	0
64127	195	96	99	72	117	64164	1	1	0	1	0
64128	177	82	95	15	158	64165	0	0	0	0	0
64129	90	50	40	63	24	64166	1	1	0	1	0
64130	323	178	145	36	284	64167	0	0	0	0	0
64131	194	107	87	109	83	64192	0	0	0	0	0
64132	135	76	59	27	106	All others ¹	8	4	4	6	2
64133	137	73	64	114	21	Total	3,932	1,993	1,939	2,570	1,245

¹ Zip codes 64121, 64141, 64148, 64168, 64171, 64172, 64179, 64188, 64190, 64191, 64195, 64196, and 64199 are associated with post office box numbers; zip codes 64144, 64170, 64180, 64183, 64184, 64185, 64187, 64193, 64194, 64197, 64198, 64944, and 64999 are associated with unique entities, and zip codes 64012, 64030, 64079, and 64081 are associated with Belton, Grandview, Platte City, and Lee's Summit, respectively.



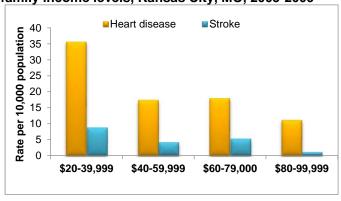
Stroke

Stroke is a cerebrovascular accident that results in the sudden death of a portion of the brain. Symptoms vary depending on the area of the brain affected. The two major types of stroke are ischemic and hemorrhagic strokes. Ischemic strokes account for approximately 87% of all strokes and are caused by blockage due to a blood clot (thrombus), a wandering blood clot (embolus), or narrowing of the artery due to atherosclerotic plaque. Transient ischemic attacks (TIA) exhibit symptoms similar to ischemic strokes, but are transient in nature. This variety of stroke occurs with the thrombus or embolus quickly dislodging, allowing restored blood flow. Typically a TIA does not result in lasting neurological impairment or deficits. Hemorrhagic strokes account for 13% of all strokes and are caused by intracerebral or subarachnoid hemorrhaging. The severity of hemorrhagic stroke is dependent on the location and amount of bleeding.

Each year, approximately 795,000 people in the United States experience a new or recurrent stroke (610,000 new and 185,000 recurrent). Nationally, there is regional variation in stroke mortality, hospitalization, and recurrent stroke.²⁵ An estimated 4 million persons are survivors of stroke and 15-30% of stroke survivors are permanently disabled.²⁶ Stroke accounts for approximately 1 in every 18 deaths in the United States and, when considered separately from other cardiovascular diseases, stroke is the 3rd leading cause of death in the nation.²⁷ Both stroke death rates and the actual number of stroke deaths have been declining. While greater declines have been seen among men, the disparity between the sexes has almost closed. More women die from stroke each year than men, but this due to the larger number of elderly women in the population.

According to the Centers for Disease Control and Prevention (CDC), stroke-related hospitalizations among Americans younger than 45 years of age, particularly teenage boys and men younger than 34 years old, rose dramatically between 1994

Figure 10.3. Annualized heart disease and stroke death rates per 10,000 population by zip code median family income levels, Kansas City, MO, 2005-2009



and 2007, but fell among older persons. Stroke numbers declined by 25% in men and by 29% in women aged 45 years or more. The number of hospitalizations for ischemic stroke rose 51% in boys and men aged between 15 and 34 years, but only 17% among girls and women of the same age. Among men and women aged between 35 and 44 years old, there was a 47% increase in hospitalizations for men and a 36% increase for women.

Individuals aged between 45 and 64 years who experience a hemorrhagic stroke are 3-5 times more likely to die within a month of the event than persons who experience an ischemic stroke.²⁸ Approximately 53% of stroke deaths occur out of the hospital. The proportion of pre-transport deaths increases with age and is higher among females. whites, and non-Hispanics.²⁹ Nearly 40% of stroke patients do not use emergency medical services for transport to hospitals and may not arrive in time for thrombolytic therapy for ischemic strokes.³⁰ Blacks and Hispanics have the highest proportion of deaths that occur in emergency department. Asians have the highest proportion of post-transport deaths that occur in a hospital. In 2010, the direct and indirect costs of stroke in the United States were estimated at \$73.7 billion.

Based on 2008 NHIS data, 2.6% of adults



aged 18 years or more have experienced a stroke. The prevalence was found to be higher among males, among older populations, and in the South. Prevalence was inversely associated with educational attainment, as well as income and poverty status. Blacks have a higher incidence of stroke and more severe strokes than whites.31 Among stroke survivors, blacks experience greater activity limitations than whites.³² It has been reported that middle aged women in the United States have had a tripling in incident strokes, which are attributable to the obesity epidemic.33 High body mass index (BMI) also has been linked to strokes in men.34 Pre-stroke physical functioning and symptoms of depression are important factors that influenced recovery. Women have lower recovery of activities of daily living and physical function.³⁵

While blood pressure regulation is para-

mount as a modifiable risk factor for stroke prevention, 36 many other risk factors also have been reported. Among postmenopausal women, those who sleep more than 9 hours a night are reported to be at increased risk of stroke. Texposure to cigarette smoke also is a risk factor. Moderate smoking has been associated with a 4.3 times higher risk of stroke in young women while heavy smoking carried a 9.1 times greater risk. Smoking cessation has been associated with significant reductions in the risk of stroke and myocardial

infarction, but simply reducing the number of cigarettes smoked does not sig-

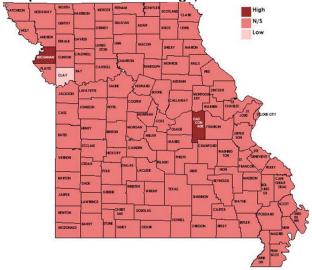
nificantly reduce either risk.³⁹ In addition, non-smokers married to smokers have a 42% greater risk of stroke com-

pared to non-smokers married to non-smokers.⁴⁰

Kansas City

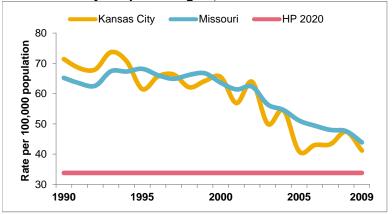
Stroke is the 4th leading cause of death in Kansas City behind cancer, heart disease, and chronic lower respiratory diseases. In comparison to

Figure 10.4. Age-adjusted stroke death rates compared to Missouri average, 2005-2009



(source: Missouri Department of Health and Senior Services)

Figure 10.5. Comparisons of age-adjusted death rates from stroke between Kansas City, Missouri, the state of Missouri, and the *Healthy People 2020* goal, 1990-2009



the average age-adjusted stroke death rate for Missouri, only Clay County's rate was significantly lower (Figure 10.4). Despite declining trends in age-adjusted death rates for stroke, neither Missouri nor Kansas City has achieved the *Health People 2020* objective of 33.8 deaths per 100,000 population (Figure 10.5).

In 2009, 197 Kansas City residents died



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from strokes; 76 men (age-adjusted death rate 41.2) and 121 women (age-adjusted death rate 41.7). Among men, stroke was the 7th leading cause of death while it was the 4th leading cause among women. Non-Hispanic whites were 61% of the decedents, non-Hispanic blacks 35%, and Hispanics 3%. Among the non-Hispanic whites, stroke was the 6th leading cause of death. It was also the 4th

leading cause of death for non-Hispanic blacks, and the 5th leading cause among Hispanics.

During 2005-2009, 18.9% of persons who died from stroke died prematurely (Table 10.6). Based on these data, non-Hispanic blacks were 2.8 times more likely to die prematurely than non-Hispanic whites (30.9% and 11.2%, respectively).

Table 10.6. Deaths from stroke by age for selected racial/ethnic groups. Kansas City. MO. 2005-2009

Age		White, non-	Black, non-			Native
(years)	Deaths	Hispanic	Hispanic	Hispanic	Asian	American
<1	1	0	1	0	0	0
1-4	1	1	0	0	0	0
5-14	1	0	0	0	0	0
15-24	0	0	0	0	0	0
25-34	7	3	4	0	0	0
35-44	24	8	13	3	0	0
45-54	59	20	34	3	2	0
55-64	94	38	50	5	0	1
65-74	139	72	63	3	0	1
75-84	335	231	92	9	2	0
<u>></u> 85	332	250	75	6	0	1
Not listed	1	0	1	0	0	0
Total	994	623	333	29	4	3

The distribution of stroke deaths by zip code for that time frame is shown in Table 10.7.

In 2008, there were 284 emergency department visits and 1,370 hospital admissions for stroke. By age group, stroke did not appear in the top 10 leading causes for hospitalization for persons younger than 55 years old.



Table 10.7. Deaths due to stroke among Kansas City, MO, residents by zip code, 2005-2009

Zip				White, non-	Black, non-	Zip				White, non-	Black, non-
code	Deaths	Male	Female	Hispanic	Hispanic	code	Deaths	Male	Female	Hispanic	Hispanic
64101	1	0	1	1	0	64134	35	14	21	18	17
64102	0	0	0	0	0	64136	2	1	1	2	0
64105	7	3	4	5	2	64137	17	6	11	14	3
64106	13	4	9	4	7	64138	24	6	18	16	7
64108	17	8	9	1	8	64139	10	2	8	10	0
64109	32	16	16	9	23	64145	39	11	28	32	6
64110	28	13	15	6	20	64146	1	0	1	1	0
64111	40	17	23	24	14	64147	0	0	0	0	0
64112	13	4	9	12	1	64149	2	2	0	2	0
64113	7	4	3	7	0	64151	42	16	26	39	2
64114	109	36	73	98	10	64152	6	3	3	5	1
64116	7	2	5	7	0	64153	5	1	4	5	0
64117	14	7	7	13	1	64154	26	8	18	25	1
64118	23	10	13	20	2	64155	44	13	31	43	0
64119	29	15	14	26	2	64156	1	0	1	1	0
64120	2	1	1	2	0	64157	5	1	4	5	0
64123	26	11	15	24	1	64158	1	0	1	1	0
64124	24	12	12	17	2	64160	0	0	0	0	0
64125	2	1	1	2	0	64161	0	0	0	0	0
64126	17	12	5	11	2	64163	1	0	1	1	0
64127	36	16	20	10	23	64164	0	0	0	0	0
64128	41	19	22	4	37	64165	0	0	0	0	0
64129	19	11	8	9	9	64166	0	0	0	0	0
64130	83	27	56	10	73	64167	0	0	0	0	0
64131	66	28	38	40	25	64192	0	0	0	0	0
64132	39	15	24	7	31	All others ¹	2	0	2	2	0
64133	36	13	23	32	4	Total	994	388	606	623	334

¹ Zip codes 64121, 64141, 64148, 64168, 64171, 64172, 64179, 64188, 64190, 64191, 64195, 64196, and 64199 are associated with post office box numbers; zip codes 64144, 64170, 64180, 64183, 64184, 64185, 64187, 64193, 64194, 64197, 64198, 64944, and 64999 are associated with unique entities, and zip codes 64012, 64030, 64079, and 64081 are associated with Belton, Grandview, Platte City, and Lee's Summit, respectively.

Hypertension

Hypertension is a health condition brought on by high blood pressure generally defined as systolic blood pressure of at least 140 mm Hg or diastolic blood pressure of at least 90 mm Hg. It is a major modifiable risk factor for many diseases, such as heart disease, stroke, damage to blood vessels, aortic dissection, kidney damage and failure, and vision loss. Conversely, favorable blood pressure levels are associated with a greater probability of survival to age 85 as well as increased longevity without major co-morbidities.41 On average, average global population systolic blood pressure has decreased slightly since 1980, but trends vary significantly across regions and countries. Systolic blood pressure is highest in low-income and middle-income countries.42

High blood pressure is viewed as an im-

portant public health challenge due to its high prevalence and strong association with CVD and premature death. Economically, high blood pressure is 5th among the top 15 health care problems accounting for the rise in medical care costs in the United States. It is the most frequent chronic condition resulting in doctor and hospital outpatient visits. Hospitalizations for high blood pressure are more prevalent among blacks and Hispanics. Hypertensive diseases are estimated to have cost the nation \$76.6 billion in 2010.

Blood pressure itself can be affected by many factors such as genetics, diet, and lifestyle.⁴⁷ "Essential" high blood pressure comprises over 95% of all cases and has no identifiable cause. "Secondary" hypertension is high blood pressure caused by other disorders or factors such as tumors, kidney





disorders, or medication use (such as oral contraceptives. A 12-13 point reduction in blood pressure among people with high blood pressure can reduce heart attacks by 21%, strokes by 37% and total CVD deaths by 25%. ⁴⁸

Usually, persons with high blood pressure have no symptoms, but very high and dangerously high (termed malignant) blood pressure generally is associated with symptoms such as severe headache, confusion, tiredness, and vision changes. According to NHANES findingsl, 78% of persons with high blood pressure were aware of their condition. This awareness varied by age, sex, and race/ethnicity. Only 6.6% of persons with high blood pressure claim to have never been told of their condition. Half of all individuals with hypertension have it under control. There is a significantly lower degree of control among younger individuals than middleaged individuals and older adults. This trend is also seen among Hispanic versus white individuals.

An estimated 74,500,000 adults in the United States have high blood pressure. Nationally, the age-adjusted prevalence of high blood pressure has varied only slightly between 28% and 30% since 1999.⁵¹ While the prevalence of high blood pressure has remained unchanged, the percentages of U.S. adults who are aware of their condition, who are taking medication to lower their blood pressure, and who their blood pressure controlled, all have increased in recent years.⁵² High blood pressure prevalence increases with age and is inversely correlated with educational attainment and poverty status. Among adults younger than 45 years of age, a higher percentage of men have high blood pressure than women. For individuals between 45 and 64 years of age, the percentages by sex are similar. After that age group, a much higher percentage of women have high blood pressure than men.⁵³ High blood pressure in children reversed its downward trend 10 years after the increase in the prevalence of childhood obesity, with non-Hispanic blacks and Hispanics, particularly males, having higher prevalence than non-Hispanic whites.

Blacks, regardless of ethnicity, have the highest high blood pressure prevalence.⁵⁴ In fact,

the prevalence of high blood pressure in blacks in the United States is among the highest in the world and is increasing. Compared to whites, blacks develop high blood pressure earlier in life, and their average blood pressure is much higher. Consequently, blacks have higher rates of nonfatal and fatal strokes, death due to heart disease, and a 4.2 times greater rate of end-stage kidney disease.

In addition to high blood pressure there is prehypertension (pre-high blood pressure) which affects about 37% of persons aged 20 years or more. Pre-hypertension is defined as either untreated systolic blood pressure between 120 and 139 mm Hg or untreated diastolic blood pressure between 80 and 89 mm Hg. There is also residual high blood pressure which is a systolic pressure of 140 mm Hg or higher despite treatment. From a baseline blood pressure of 115/75 mm Hg, the risk of CVD doubles with each higher increment of 20/10 mm Hg.

Pre-hypertension is associated with elevated relative and absolute risks for CVD outcomes across the age spectrum.55 Compared to normal blood pressure, pre-hypertension is associated with a 1.5 to 2-fold risk for major CVD events, such as myocardial infarction and coronary artery disease, but not stroke.56 People with pre-hypertension are more likely than those with normal blood pressure to have above-normal cholesterol levels, overweight/obesity, and diabetes, but less likely to be current smokers. Persons with pre-hypertension are 1.7 times more likely to have 1 or more of these adverse risk factors for heart disease and stroke than were those with normal blood pressure.⁵⁷ Men have a higher ageadjusted prevalence of pre-hypertension than women. Non-Hispanic blacks between the ages of 20 and 39 years have a higher prevalence of prehypertension than whites and Hispanics, but their prevalence is lower at older ages because of a higher prevalence of high blood pressure.

High blood pressure is controllable with treatment and requires lifelong monitoring with possible periodic adjustments to treatment. Recently, it has been suggested that guidelines for treating people with high blood pressure need to be revised. From NHANES data, 68% of persons with high



blood pressure were treated with antihypertensive medication. Only 64% of these individuals (or 44% overall) had successfully controlled their blood pressure, meaning that 56% of persons with high blood pressure did not have it controlled. Substantial ethnic differences in high blood pressure control exist.⁵⁹

Kansas City

In 2009, 32 city residents died (8 men and 24 women) from high blood pressure. Of those who died, 12 were non-Hispanic blacks, 18 were non-Hispanic whites, and 2 were Hispanic. The age-

Figure 10.6. Age-adjusted death rates from hypertension, Kansas City, MO, and Missouri, 1990-2009

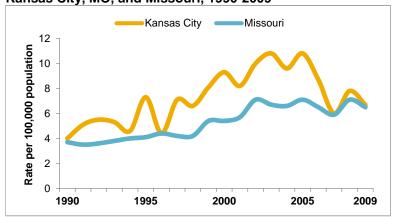
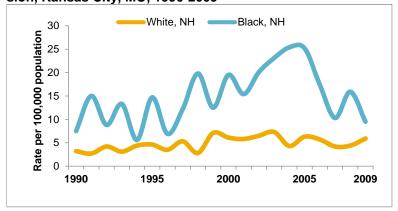


Figure 10.7. Age-adjusted death rates by race for hypertension, Kansas City, MO, 1990-2009



adjusted death rates from high blood pressure for Kansas City and Missouri have been increasing. Kansas City's rate, however, has been volatile due to the small number of high blood pressure deaths each year (Figures 10.6 and 10.7). Of the counties in which Kansas City is situated, only Jackson County has a higher age-adjusted death rate for hypertension than the state average (Figure 10.8).

According to the 2009 Missouri BRFSS data, 29.2% of Missourians have high blood pressure (30.9% of males; 27.6% of females). Additionally, the 2007 Missouri County-Level Study found a prevalence of 19.6% statewide and prevalence of 17.3%, 18.0%, and 15.7%, in Clay, Jackson, and Platte

counties, respectively. These rates were not statistically different from the statewide prevalence rate. The most recent data for Kansas City come from the 2004 Health Assessment Survey (commissioned by the Kansas City Health Department). This survey reported that 29.5% of respondents suffered from high blood pressure (www.kcmo.org/health).

High blood pressure and prehypertension prevalence of 6.9%-24.6% and 8.6%, respectively, have been reported among adolescents, with higher prevalence reported among the overweight and obese. 61 62 In Kansas City, the Score 1 for Health project examined school-aged children between the ages of 5 and 13 years using National Heart, Lung, and Blood Institute criteria for elevated blood pressure. 63 While the incidence of blood pressure referrals was not high across the Score 1 population (1.5%), it did increase as children got older and heavier. It occurred disproportionally among children who were obese. The likelihood of a child having elevated blood pressure was nearly 13 times higher for overweight or obese children than normal weight children.



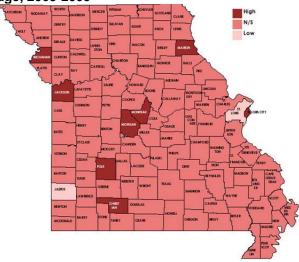
Risk Factors

Certain modifiable risk factors, including high blood pressure, high cholesterol, diabetes, tobacco use, obesity, and lack of exercise are the main targets for primary and secondary prevention of heart disease and stroke. 64 65 Improving diet and lifestyle are critical components of the American Heart Association's strategy for CVD risk reduction in the general population. This strategy includes reduction of daily salt intake. 66 67 All forms of tobacco use (smoking, chewing, and inhalation of second hand smoke) should be discouraged to prevent CVD.68 69 A report by Britain's Medical Research Council found that lower intelligence quotient scores were associated with higher rates of heart disease and death and was more important than any other risk factor except smoking.70 There is concern, however, that interventions to reduce CVD will widen health disparities between advantaged and disadvantaged groups.71 The lack of health insurance is a significant barrier to both screening for, as well as treatment of, conditions such as high blood pressure and high cholesterol.^{72 73}

A substantial proportion of the population has multiple risk factors, increasing their likelihood of heart disease and stroke. The Nationally, blacks and Native Americans had the highest prevalence of multiple risk factors, 48.7% and 45.7%, respectively, followed by Hispanics (39.6%), whites (35.5%), and Asians (25.9%). There are no differences between men and women, but differences exist by income and educational attainment. A recent study reported no difference in traditional risk factors for CVD mortality among blacks and whites of the same sex. In Missouri, 38.9% of persons surveyed had multiple risk factors.

Modest reductions in major risk factors for heart disease can lead to gains in life-years 4 times higher than cardiovascular treatments.⁷⁷ Except for diabetes, CVD risk factors have declined considerably over the past 40 years among adults with different BMI.⁷⁸ Although obese persons have more risk factor than lean persons, the levels of these risk fac-

Figure 10.8. Comparison of age-adjusted essential hypertension death rates to Missouri average, 2005-2009



(source: Missouri Department of Health and Senior Services)

tors are much lower than in previous decades.

According to the National Centers for Health Statistics, about 30% of adults (33% of women vs. 26% of men) have adopted at least 6 primary lifestyle modifications to reduce CVD risk. Persons aged 60 years or more and persons with the highest incomes were more likely to embrace such lifestyle modifications.

High blood cholesterol is a major modifiable risk factor for atherosclerotic CVD. ⁸⁰ For example, the plaque buildup in the neck arteries of obese children or those with high cholesterol is similar to levels in middle-aged adults. This is sometimes referred to as "vascular age," which is approximately 45 years in middle-aged adults. ⁸¹ Obese children who have high triglycerides are the most likely to have prematurely aging arteries.

Diabetes is a major risk factor influencing survival among persons with CVD. The risk of dying from CVD-related causes for diabetics is twice that for non-diabetics. 82 83 Among diabetics who suffer a heart attack, keeping their blood sugar levels under control influences their chances of dying. 84

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