The Burden of Cardiovascular Disease in the District of Columbia

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1. Executive Summary

1.1. Cardiovascular Disease Burden

Cardiovascular disease (CVD) refers to a group of diseases that relate to the heart and blood vessels, and includes the following conditions: high blood pressure, peripheral vascular disease, coronary heart disease (CHD), heart failure, rheumatic heart disease, congenital heart disease, and other cardiomyopathies. Overall, they consist of conditions that affect the blood-pumping ability of the heart and the narrowing of essential vasculature that transports oxygenated blood from the heart to other parts of the body. Stroke, a cerebrovasular disease, is a disease of the blood vessels supplying the brain and is often considered alongside diseases of the heart. The chronic conditions of CVD can be associated with complications affecting the eyes, kidneys, brain, peripheral nerves, heart, and blood vessels.

According to the Centers for Disease Control and Prevention (CDC), heart disease is the leading cause of death in the nation, a major cause of illness and disability, and is estimated to cost the United States (U.S.) hundreds of billions of dollars annually in health care expenditures and lost productivity.[1] The American Heart Association reported, from 1999 to 2009, the CVD mortality rate declined by 33%, however, CVD still accounted for about 1 in 3 deaths in the nation.[2] Further, CVD takes the lives of more than 2,150 Americans each day, an average of 1 death every 40 seconds. During the same time, the number of stroke deaths declined by 23%, yet stroke remains a leading cause of disability in the U.S. Moreover, according to the 2010 National Hospital Discharge Survey, CVD was the leading diagnosis in hospitalizations nationwide.

Furthermore, CVD is the number one cause of death globally. An estimated 17.3 million people died from CVD in 2008, representing 30% of all global deaths. It is projected that mortalities due to CVD, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030.[3]

In 2010, there were 4,670 total deaths in the District of Columbia (DC or the District). Heart disease and stroke ranked as first and fourth among the ten leading causes of death. There were 1,300 deaths (28%) attributable to heart disease, and 194 deaths (4%) were from stroke. Overall, CVD accounts for nearly 1 in 3 deaths of District residents, and in 2010, DC reported the highest rates of avoidable deaths from heart disease, stroke and hypertensive disease in the U.S.[4] Additionally, heart disease is among the top reasons for hospitalization in DC. Although DC has a robust health care system, including extraordinary health insurance coverage, there are still major disparities that exist in the utilization of preventive care and CVD outcomes and risk factors.

1.2. Risk Factors

The most significant behavioral risk factors for CVD are unhealthy diet, physical inactivity, and tobacco use. These modifiable risk factors are responsible for approximately 80% of CHD and stroke. Reduction or prevention of CVD risk factors, especially cessation of tobacco use, increasing fruit and vegetable consumption in the diet, or participating in regular, moderate physical activity, has been shown to reduce the risk of CVD. In the District, 16% of adults are current smokers, 69% eat less than five servings of fruits vegetables per day, and 20% are not physically active.

Behavioral risk factors indirectly determine risk of CVD through mechanisms of elevating blood pressure, blood glucose, blood lipids (cholesterol), and body weight (i.e., causing overweight and obesity). Uncontrolled and undiagnosed hypertension led to startling high rates of heart attacks and strokes. One in four District adults has hypertension. For over a decade, the prevalence of obesity, high blood pressure, and high cholesterol have

increased among District residents. Among DC residents aged 18 years and older, 56% were overweight or obese, 26% had high blood pressure, 38% had high blood cholesterol, and 8% had diabetes. These risk factors can be identified in primary care facilities to lower risk of developing a heart attack, stroke, heart failure and other complications. Similarly, CVD risk can also be reduced by controlling hypertension, diabetes and elevated cholesterol through medication adherence, physical activity, and proper nutrition.

This report will present the burden of heart disease and stroke in the District of Columbia based on several available data sources. The tables and figures present trends and rates for prevalence of heart disease and stroke, morality rates, and prevalence of risk factors for CVD.

2. Introduction

2.1. Cardiovascular Disease Surveillance and the District of Columbia Cardiovascular Disease and Diabetes Prevention Program

Surveillance is the monitoring and tracking of health and disease conditions and is a critical tool that supports public health activities. CVD surveillance is vital to monitoring trends, identifying high-risk populations, monitoring quality of care and patient outcomes, setting priorities and developing strategies, identifying the economic and human cost of the diseases, and evaluating progress in prevention and control. The CDC developed a National Cardiovascular Disease Surveillance System in order to meet national and state level needs of CVD data and monitoring. The system was designed to integrate multiple indicators from many data sources in order to provide a comprehensive picture of the public health burden of CVD and its associated risk factors in the U.S. As part of a cooperative agreement with the 50 states, the District of Columbia, and the U.S. territories (American Samoa, Federated States of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, Puerto Rico, and the U.S. Virgin Islands), the CDC requires each area to conduct CVD surveillance within its jurisdictions.

In DC, CVD surveillance falls under the direction of the DC Department of Health (DOH), more specifically, the Cardiovascular Disease and Diabetes Prevention Program, formerly the Cardiovascular Health Program (CHP), which is housed in the Bureau of Cancer and Chronic Disease Prevention, within the Community Health Administration. The program was instituted with support from the CDC as part of the National Heart Disease and Stroke Prevention Program, a national project to help State Health Departments reduce the burden of CVD in their jurisdiction. The CHP's core functions were based on the collective objectives of *Healthy People 2010*, the CDC, the Essential Public Health Services (EPHS) and the executive offices of the District of Columbia as set forth by the Mayor:

1) To track the overall burden of cardiovascular disease,
2) To cultivate linkages between clinical health care and community education and support efforts;
3) To educate the public, healthcare providers, and other stakeholders to inform policy changes,
4) To reduce disparities in CVD, and
5) To evaluate, improve and expand existing programs.

In addition, DC DOH joined the Million Hearts™ Initiative, a national movement launched by the U.S. Department of Health and Human Services (HHS), in 2011, to prevent 1 million hearts attacks and strokes by 2017. The Million Hearts™ Initiative sets goals for blood pressure control throughout the nation as well as aims to prevent heart disease and stroke by use of Health Information Technology (i.e., Electronic Health Records), team-based clinical care, and coordinated patient engagement and self-management support. The initiative in the District calls for action among many assets in the health community including clinicians, pharmacists, insurers, retailers and employers, government, foundations, and advocacy groups.

2.2. Purpose of the Report

The purpose of the District of Columbia's *Cardiovascular Disease Surveillance Report* is to provide a comprehensive epidemiological description of CVD in the District of Columbia, including prevalence, risk factors, mortality, and District Ward-specific indicators. Data was analyzed from a variety of sources including the DC Behavioral Risk Factor Surveillance System (BRFSS), the State Center for Health Statistics (SCHS), and the Vital Records Department. The focus is on the following disease outcomes: heart attack (myocardial infarction; MI), coronary heart disease (CHD), and stroke (cerebrovascular disease). In addition, the report

examines CVD risk factors, including: obesity and overweight, smoking, physical inactivity, diet (fruit and vegetable intake), high blood pressure, high cholesterol, and diabetes.

The report includes data for years 2005 to 2010 and then 2011 because this was the most recent available data from the BRFSS that could be analyzed for trends. In 2011, new BRFSS survey methods were implemented to include data received from cell/mobile phone users, providing a broader reflection of the population's health status. Therefore, it is not advised to compare BRFSS data collected after 2010 to data collected prior to and during 2010. The 2011 data included in the Appendix of the report will serve as a baseline for future surveillance data as well as for monitoring and evaluation purposes. Corresponding years of population and mortality statistics were chosen to coincide with the trend and prevalence data for risk factors and diseases described in the report.

This report documents the burden of heart disease and stroke in DC to drive CHP planning, policy, and evaluation activities. It will also provide our community, clinical stakeholders, and partners with the data needed for effective CVD prevention and control activities. The intended target audience, including grant writers, policy makers, health care administrators and providers, researchers, DOH staff and its partners, will have access to the evidence reflecting the status of CVD within DC. National and local programs with interventions specifically targeting racial/ethnic groups, different age groups, gender, or Ward of residence would find specific data and trends on the District as well.

3. Demographics of the District of Columbia

This section of the report summarizes the demographics of the District of Columbia (DC). The 2010 U.S. Census estimated the DC total population was 601,723 (Table 3-1). The District's total population increased by nearly 30,000 (5.2%) from the year 2000. There were 12.3% fewer children and adolescents under age 18 years in 2010 compared to 2000. There were also declines in the population among adults aged 35 to 44 years (-8%) and 65 years and over (-1.6%), from 2000-2010. However, adults aged 25 to 34 years and 55 to 64 years had the largest population increases, 22.6% and 28.5%, respectively.

The District has a history of a dynamic demographic composition, with residents from diverse racial and ethnic backgrounds. In 2010, approximately 38.5% of residents were White, 50.7% were Black or African American, and 9.1% were Hispanic or Latino (Table 3-1). From 2000 to 2010, White, American Indian/Alaska Native, Asian, Hispanic/Latino population groups and persons from "Two or More Races" increased with a range of 21.4% to 38.6%, whereas the Black/African American and Native Hawaiian/Other Pacific Islander populations decreased 11.1% and 13.2%, respectively.

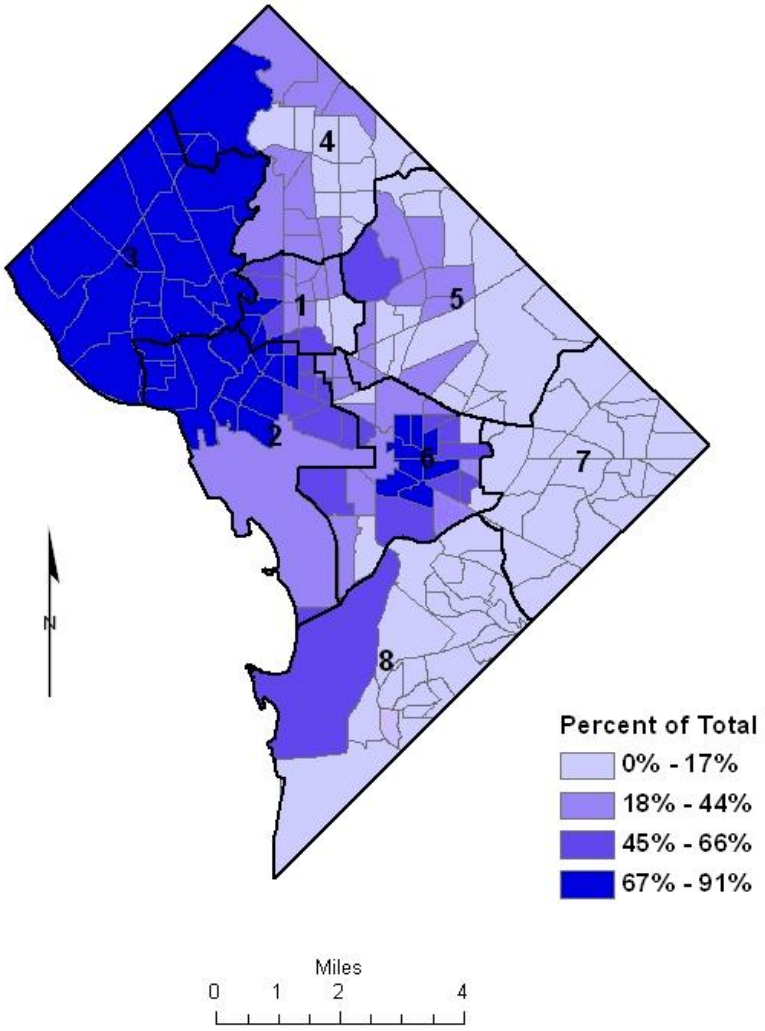
Table 3-1: Changes in the District Demographic Profile by Gender, Age, Race and Ethnicity, 2000 to 2010

Demographic Characteristics	2000		2010		2000-2010
	Number	Percent	Number	Percent	Percent Change
Total population	572,059	100	601,723	100	5.2
Gender					
Male	269,366	47.1	284,222	47.2	5.5
Female	302,693	52.9	317,501	52.8	4.9
Age Group					
Less than 18 years	114,992	20.1	100,815	16.8	-12.3
18 to 24 years	72,637	12.7	87,015	14.5	19.8
25 to 34 years	101,762	17.8	124,745	20.7	22.6
35 to 44 years	87,677	15.3	80,659	13.4	-8.0
45 to 54 years	75,310	13.2	75,703	12.6	0.5
55 to 64 years	49,783	8.7	63,977	10.6	28.5
65 years and over	69,898	12.2	68,809	11.4	-1.6
Race and Ethnicity					
White	176,101	30.8	231,471	38.5	31.4
Black or African American	343,312	60	305,125	50.7	-11.1
American Indian/Alaska Native	1,713	0.3	2,079	0.3	21.4
Asian	15,189	2.7	21,056	3.5	38.6
Native Hawaiian/ Other Pacific Islander	348	0.1	302	0.1	-13.2
Other Race	21,950	3.8	24,374	4.1	11.0
Two or more Races	13,446	2.4	17,316	2.9	28.8
Hispanic or Latino (of any race)	44,953	7.9	54,749	9.1	21.8

Source: U.S. Census Bureau, Census 2000 and 2010 Data retrieved from DC Office of Planning, Demographic and Housing Profiles 2000 and 2010.

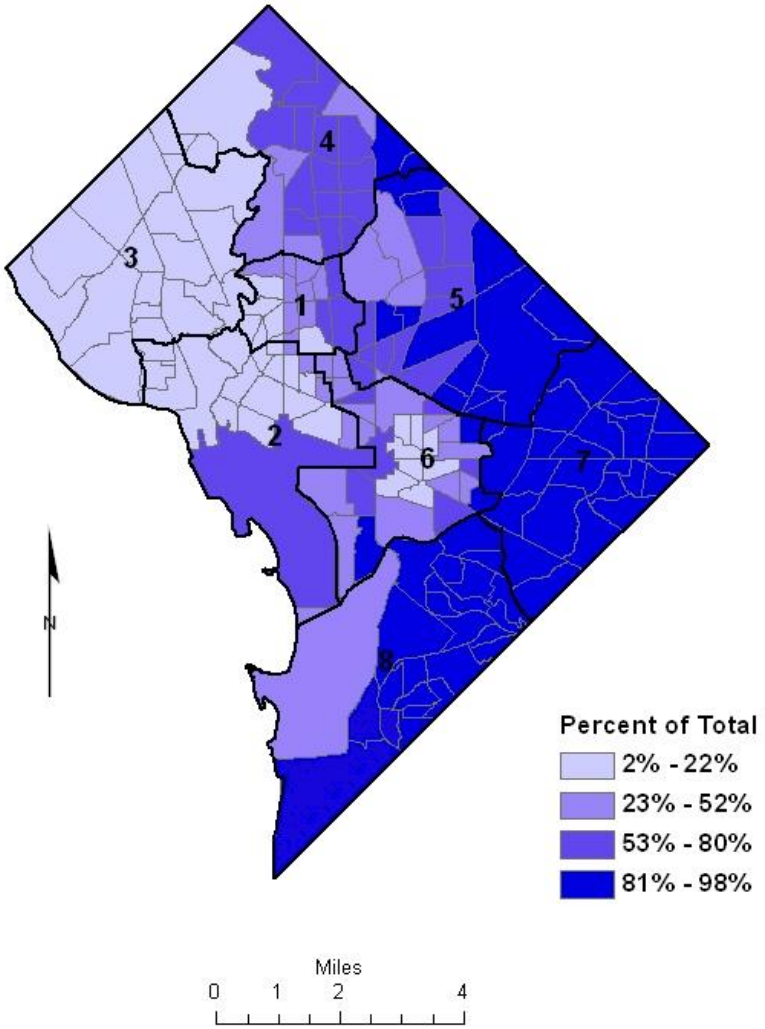
The District spans 63 square miles and is divided into eight Wards. Ward designations are geographic-political boundaries that change every 10 years. In 2010, new Ward boundaries were drawn, and Maps 3-1 through 3-4 reflect those changes accordingly. The following maps show the distribution of ethnic diversity across Ward boundaries and 2010 Census Tracts. Each map legend shows four classes of percentages of the population by race or ethnic group that were determined using the ArcGIS "natural breaks" algorithm, often called Jenks' optimization, which automatically clusters like values together. Not all of the maps use the same colors to represent the same quantities. Readers should be aware of this when comparing the maps with one another.

Map 3-1: Percent of White Population in DC Census Tracts, 2010 Population Estimates



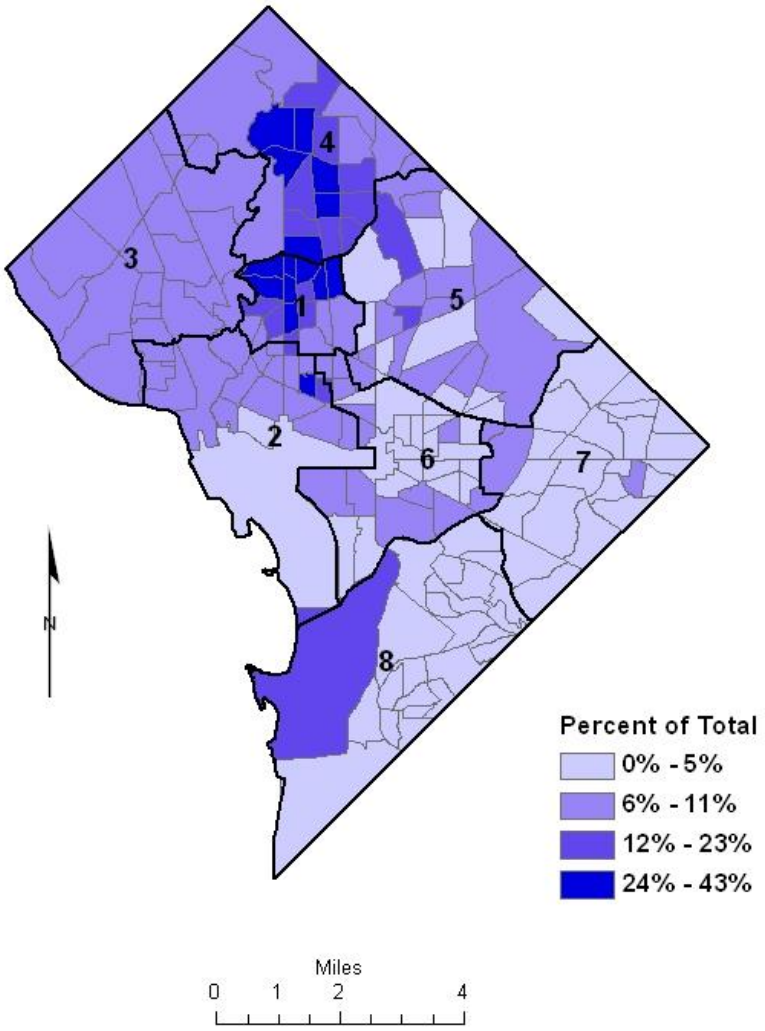
Shaded areas in Map 3-1 show percentages of 2010 Census Tract population who were White. The eight District Wards are labeled with a number in the center. In 2010, Ward 2 and Ward 3, which are located in the northwest section of DC, had the highest percent of population who were White. Ward 6 also had greater than 66% White population concentrated in the center. The census tract in Ward 8 with 45-66% White population includes a large military base.

Map 3-2: Percent of Black or African American Population in DC Census Tracts, 2010 Population Estimates



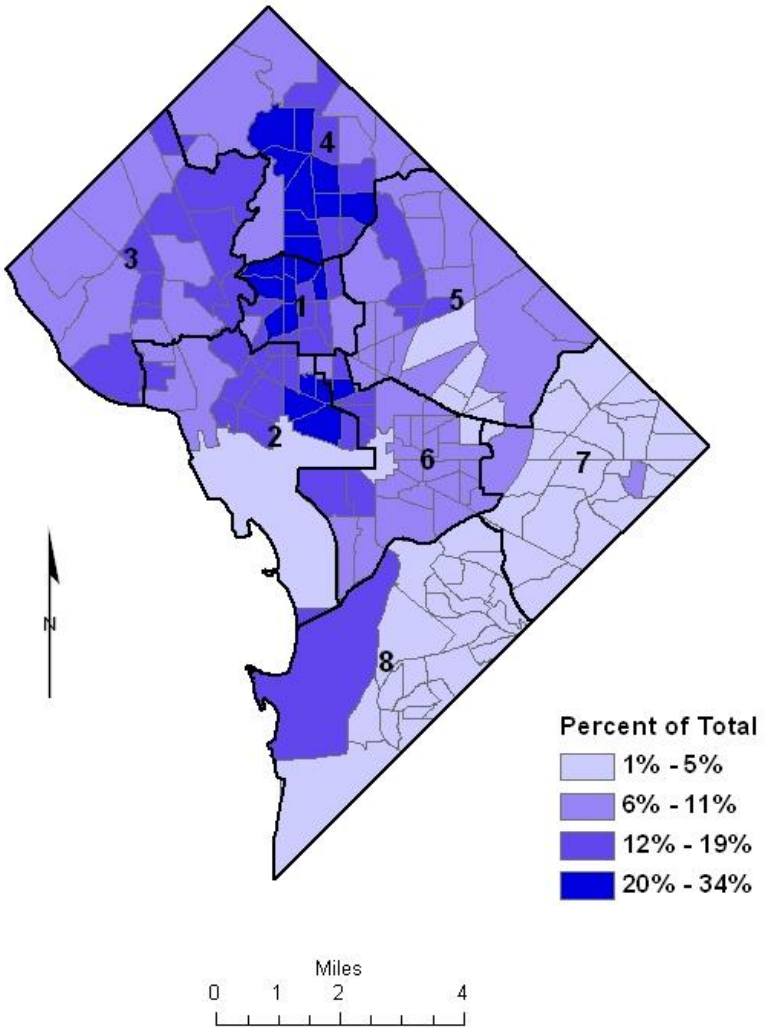
Shaded areas in Map 3-2 show percentages of 2010 Census Tract population who are Black or African American and Wards are labeled with a number in the center. In 2010, Wards 5, 7, and 8, which are located in the northeast and southeast sections of DC, had the highest proportion of Black or African American population. The population in most of Ward 5 is greater than 53% Black or African American, Ward 7 population is greater than 81% Black or African American, and Ward 8 is greater than 81% Black except for the part that includes a large military base, with only 23-52% Black or African American.

Map 3-3: Percent of Hispanic or Latino Population in DC Census Tracts, 2010 Population Estimates



Shaded areas in Map 3-3 show percentages of 2010 Census Tract population who were Hispanic or Latino, and Wards are labeled with a number in the center. In 2010, Ward 1 and Ward 4, located in the northwest section of DC, had the highest percent of population who were Hispanic or Latino. Several Census tracts of Ward 1 and Ward 4 had the highest concentration of Hispanic or Latino population in them, between 24%-43%.

Map 3-4: Percent of "Other Race" Population in DC Census Tracts, 2010 Population Estimates



Shaded areas in Map 3-4 show percentages of 2010 Census Tract population who are of "Other Race" populations, which include Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, as well as persons who were two or more races. Similarly to the previous maps, DC Wards are labeled with a number in the center. In 2010, Wards 1, 2, and 4, which are located in the northwest section of DC, had the highest percent of population who were of Other Races. Wards 1 and 4 had several census tracts with 20-34% Other Race population.

Table 3-2 shows the distribution of selected demographic and economic characteristics of the District by Ward. The population of each Ward remained relatively stable between 2000 and 2010, except for Ward 2 and Ward 6 that had population increases of approximately 14% and 11%, respectively. Further, Ward 2 and Ward 6 each had a high number of Census Tracts with high percentages of White population in 2010 (Map 3-1). The highest percentage of population aged less than 18 years lived in Ward 8. Ward 4 had the highest percent of adults greater than 65 years old. The 2005-2009 American Community Survey (ACS) 5-Year estimate for median household income in the District was $56,519. However, there were major disparities in income across ward boundaries (Table 3-2). The median household income was the lowest in Wards 5, 7, and 8, approximately 20%, 18%, and 45% lower than the District's overall median household income, respectively. Notably, these Wards correspond to those with the highest percentages of Black and African American population (Map 3-1). Furthermore, the District's 2005-2009 ACS 5-Year estimated unemployment rate was 6.1%, ranging from 2.4% in Ward 3 to 11.2% in Ward 7. These disparities in unemployment rates by Ward correlated with significantly different racial and ethnic populations, with Ward 3 and Ward 7 having high percentages of White versus Black/African American populations, respectively (Map 3-1 and 3-2).

Table 3-2: Demographic and Economic Characteristics for the District by Ward

Characteristics	District of Columbia	Ward							
		1	2	3	4	5	6	7	8
2000 Population[1]	572,059	73,364	68,869	73,718	75,179	71,440	68,035	70,527	70,927
2010 Population[1]	601,723	76,197	79,915	77,152	75,773	74,308	76,598	71,068	70,712
Age less than 18 years[2]	19.4%	15.6%	7.0%	16.3%	20.0%	19.9%	15.2%	27.2%	33.4%
Age 65 years and over[2]	11.8%	7.4%	9.3%	15.9%	16.3%	15.8%	9.6%	13.2%	6.3%
Median Household Income [2,3]	$56,519	$60,998	$76,592	$97,690	$60,642	$45,627	$73,190	$46,404	$31,188
Unemployment[2,4]	6.1%	5.4%	2.7%	2.4%	5.0%	8.1%	5.8%	11.2%	9.6%

1. U.S. Census Bureau, Census 2000 and 2010. Data retrieved from DC Office of Planning, Demographic and Housing Profiles 2000 and 2010.

2. U.S. Census Bureau, 2005-2009 American Community Survey, 5-Year estimates. Data retrieved from DC Office of Planning, Data by Wards; and are based on a sample and are subject to sampling variability.

3. Income and benefits data are in 2009 inflation-adjusted U.S. dollars.

4. Estimates are for the population 16 years and over. Employment and unemployment estimates may vary from the official labor force data released by the Bureau of Labor Statistics because of differences in survey design and data collection.

4. Cardiovascular Disease in the District of Columbia

This section of the report summarizes the Cardiovascular Health Program's (CHP's) CVD surveillance data to portray a comprehensive picture of the burden in the District of Columbia. It also provides baseline data to guide the development of targeted CVD intervention programs and policies. Implementing and evaluating the impact of CVD intervention programs in the District requires knowledge of the current CVD prevalence as well as partnerships with key stakeholders.

4.1. Measuring CVD Prevalence

The CVD prevalence among adult District of Columbia residents, aged 18 years or older, was estimated using the Behavioral Risk Factor Surveillance System (BRFSS) survey data. The BRFSS is a telephone health survey that uses random dialing and is conducted with adults in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa and Palau. It is a surveillance system developed to monitor state-level prevalence of the major behavioral risk factors among adults associated with premature morbidity and mortality. The survey uses standardized interviewing methods and a questionnaire that consists of three parts: core questions, optional modules, and state-added questions. Before 2010, the survey was only conducted with adults within households containing land line telephones in all states and territories. However, in 2010, new BRFSS survey methods were implemented to include data received from cell/mobile phone users, providing a broader reflection of the population's health status. The prevalence estimates provided in this report were determined through self-reported cases of CVD that were diagnosed by a health care professional. Therefore, the true prevalence of CVD may be underestimated.

The following three questions were used to determine the prevalence of CVD:

Has a doctor, nurse or other health professional EVER told you that you had any of the following? For each, the response options were "Yes," "No," or "Not sure."

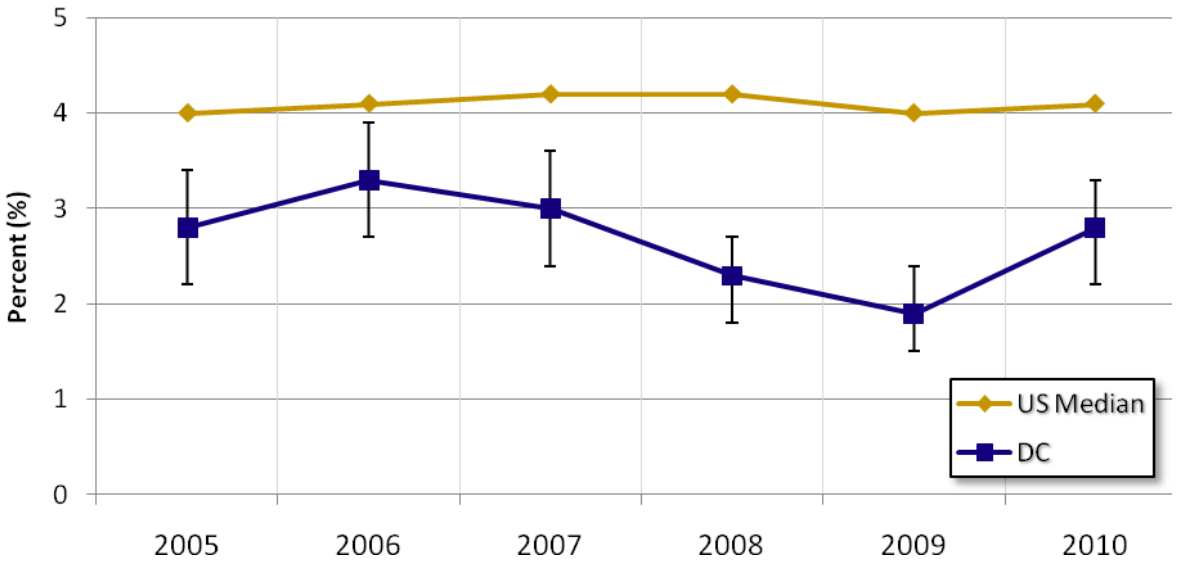
1. Ever told you had a heart attack, also called a myocardial infarction?
2. Ever told you had angina or coronary heart disease?
3. Ever told you had a stroke?

The prevalence for respondents who answered "Yes," was stratified by demographic or socioeconomic characteristics: gender, age group, race/ethnicity, education level, and household income. In this report, trend graphs for prevalence of CVD include data from 2005 to 2010, and prevalence of CVD was also compared by demographic and socioeconomic characteristics between 2005 and 2010. Additionally, In order to identify statistically significant differences between the stratified data 95 percent confidence intervals (95% CI) were calculated. In this report the words "significant" or "significantly" are used to indicate statistical significance at $p<0.05$. Comparisons between groups or years in this report are stated as significant based on non-overlapping 95% CI. Although this is not strictly speaking a statistical test, it is a commonly accepted way to compare estimates. It has been noted to be more conservative than formal statistical tests.[5]

4.2. Trends in CVD for the District Compared to the United States

Figure 4-1, shows the change in prevalence of heart attack (or myocardial infarction) from 2005 to 2010, and compares the percent of DC residents who had a heart attack with the U.S. Median percent of heart attacks for states that conducted the BRFSS survey. The error bars represent 95% CIs. Overall, DC had a lower percent of heart attacks than the U.S. Median. The U.S. Median was stable near 4% for all years shown. However, the prevalence of heart attack in DC increased from 2005 to 2006, and then decreased until 2009 before increasing again in 2010. The prevalence of heart attack in DC, in 2009 (1.9%) was significantly lower than in 2006 (3.3%). The prevalence of heart attacks for DC residents increased to 2.5% in 2010, but it was not a statistically significant increase and remained lower than the 2006 prevalence—a 15% decrease. Furthermore, the District's heart attack prevalence in 2010 was about 46% lower than the national rate.

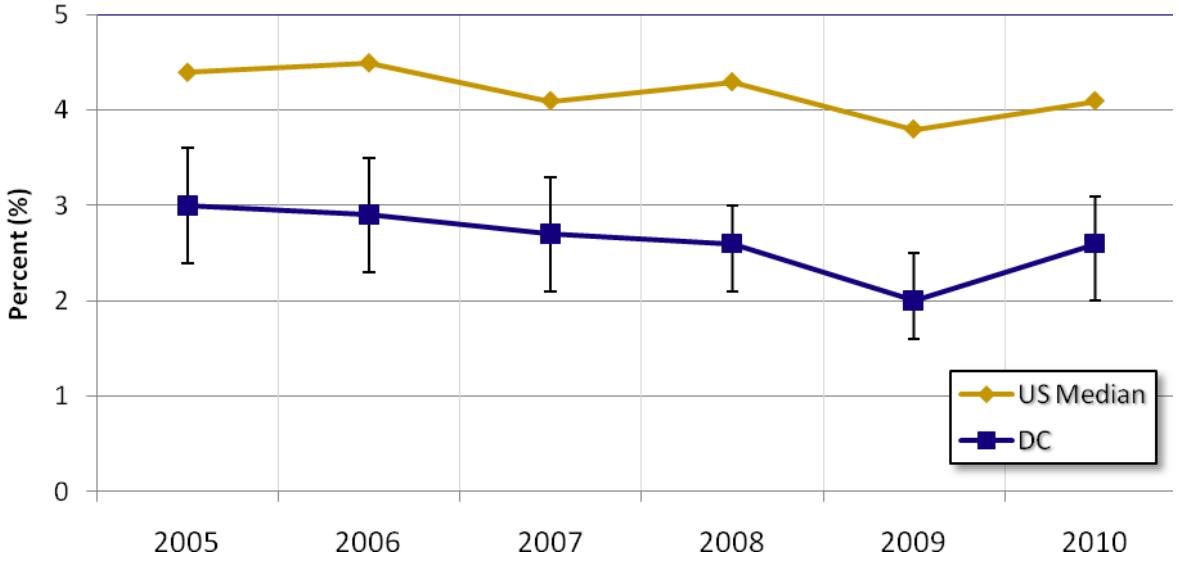
Figure 4-1: Prevalence of Heart Attack, District of Columbia and United States, 2005 – 2010



Source: 2005-2010 DC BRFSS, Center for Policy Planning and Evaluation (CPPE)

In Figure 4-2, the changes from 2005 to 2010 in prevalence of coronary heart disease (CHD) are shown as percent of DC residents and the US Median percent. The error bars represent 95% CIs. Similar to heart attacks, the prevalence of CHD among adult DC residents was lower than the US Median percent for all years. The U.S. Median percent of CHD overall decreased from 4.4% in 2005 to 4.1% in 2010. For the District, there was a downward trend in the prevalence of CHD from 2005 to 2009 (3% to 2%, respectively) and a slight increase in 2010 (2.6%). This was approximately a 33% decrease in the prevalence of CHD, yet it was not statistically significant. However, the District's CHD prevalence in 2010 was about 58% lower than the national rate.

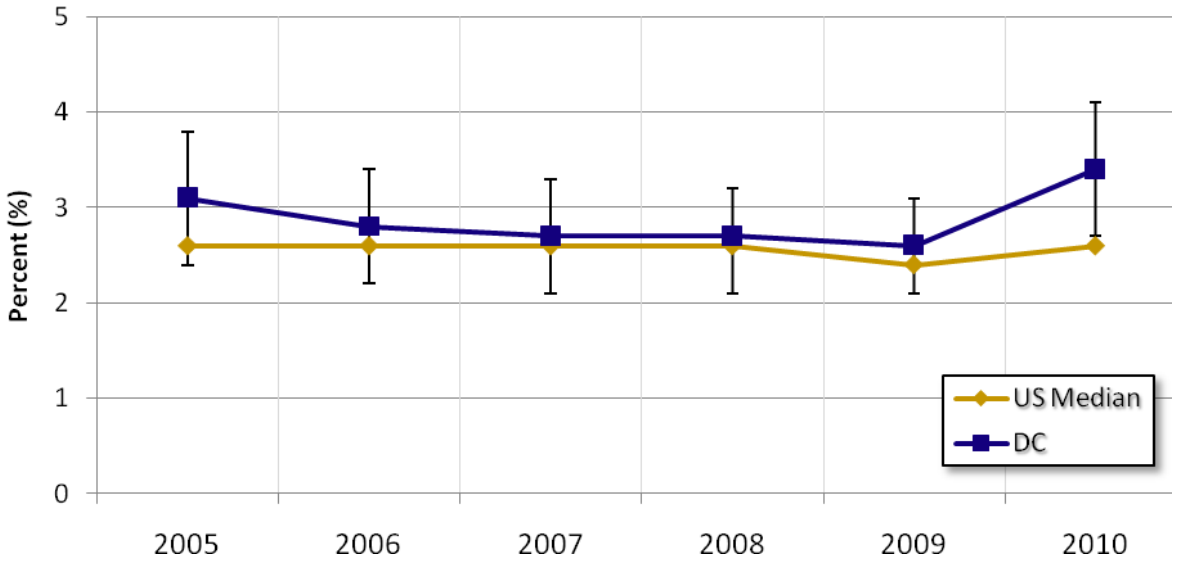
Figure 4-1: Prevalence of Coronary Heart Disease, District of Columbia and United States, 2005 – 2010



Source: 2005-2010 DC BRFSS, Center for Policy Planning and Evaluation (CPPE)

Figure 4-3, shows the changes in prevalence of stroke from 2005 to 2010, and compares the percent of District residents who had a stroke with the U.S. Median percent of strokes for states that conducted the BRFSS survey. Unlike heart attack and CHD, DC adult residents had a higher prevalence of stroke compared to the national rates. The U.S. Median percent remained at 2.6% from 2005 to 2010, except for a slight decrease to 2.4% in 2009. Although Figure 4-3 shows there were not significant differences between years, in stroke among District residents, similar to heart attack and CHD, the prevalence decreased from 2005 to 2009 (3.1% to 2.6%, respectively) and then increased in 2010 (3.4%). The increase in stroke prevalence was about 21% from 2006 to 2010. Additionally, the District's stroke prevalence in 2010 was 24% higher than the national rate.

Figure 4-3: Prevalence of Stroke, District of Columbia and United States, 2005 – 2010



Source: 2005-2010 DC BRFSS, Center for Policy Planning and Evaluation (CPPE)

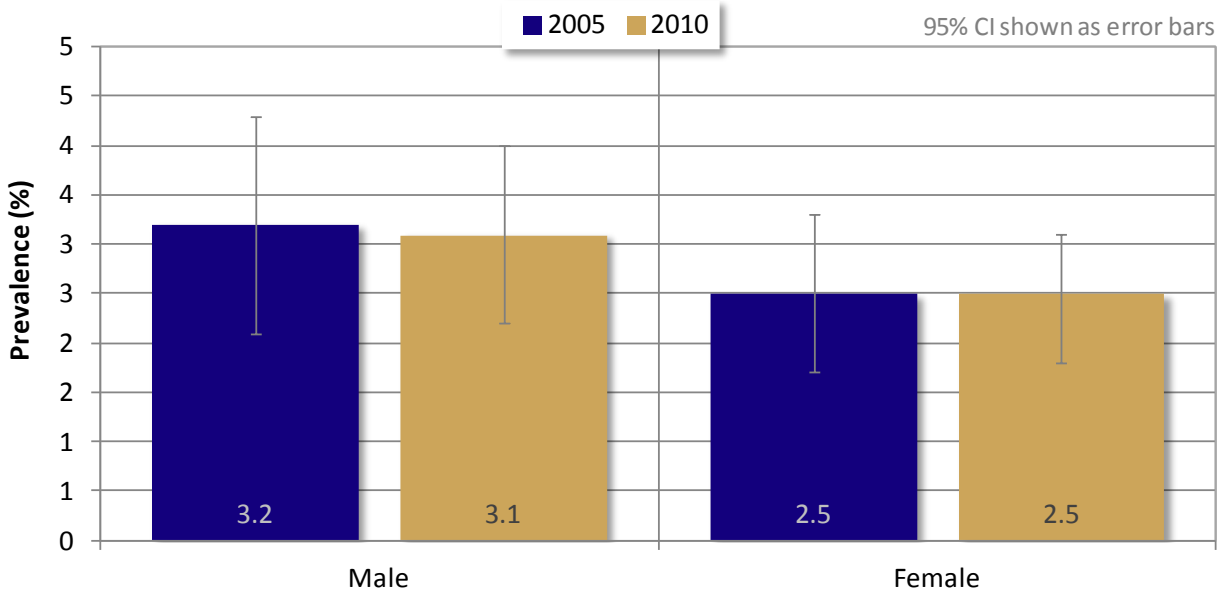
4.3. Prevalence of Heart Attack in the District

In 2010, the prevalence of heart attack among District adults was 2.8%. In 2010, the heart attack prevalence was 24% higher among male adults (3.1%) as compared to their female counterparts (2.5%; Figure 4-4). The 95% CIs, in

Figure 4-5: Prevalence of Heart Attack among adult residents by age group, DC, 2005 & 2010

, reveal the difference in the prevalence of heart attack by gender was not statistically significant. The figure also shows that there was no change in the prevalence of heart attack for either gender from 2005 to 2010.

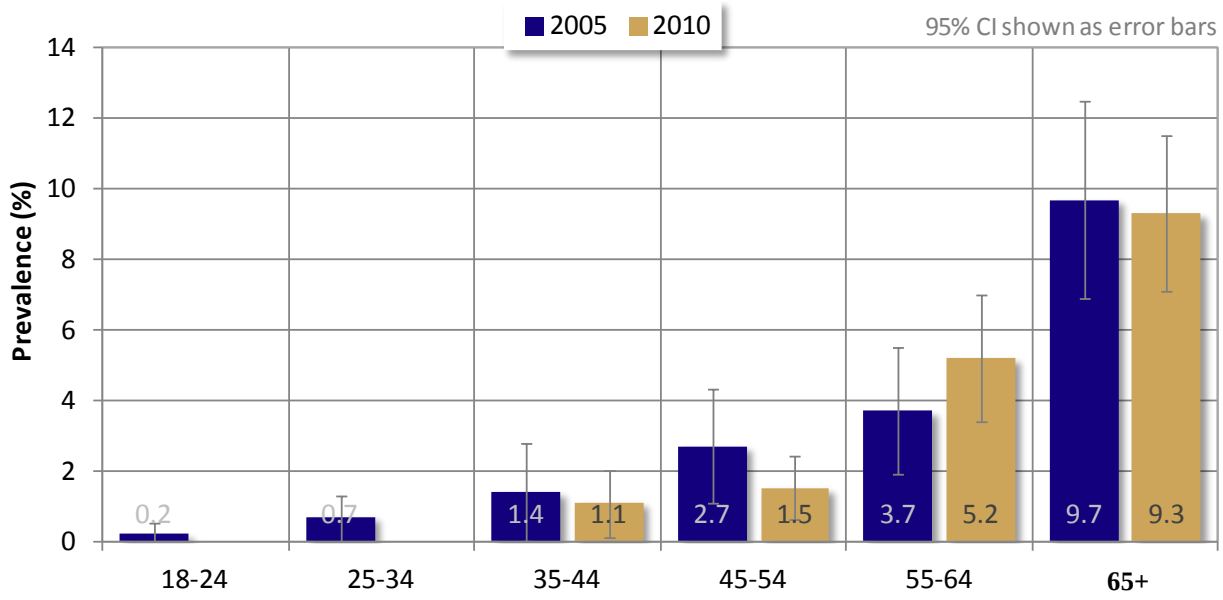
Figure 4-4: Prevalence of Heart Attack among adult residents by gender, DC, 2005 & 2010



In 2005, the District's prevalence of heart attack was 0.2% and 0.7% among DC residents aged 18 to 24 years and 25 to 34 years, respectively (Figure 4-5). However, in 2010, the prevalence estimate could not be calculated among the same age groups because either the unweighted sample size for the denominator was less than 50 or the confidence interval half width was greater than 10, consistent with BRFSS methods. Moreover, there were decreases in prevalence of heart attack from 2005 to 2010 among adults aged 55 to 64 years and 65 years and above. On the other hand, there was a 40% increase in prevalence of heart attacks among older residents, aged 55 to 64 years, from 2005-2010.

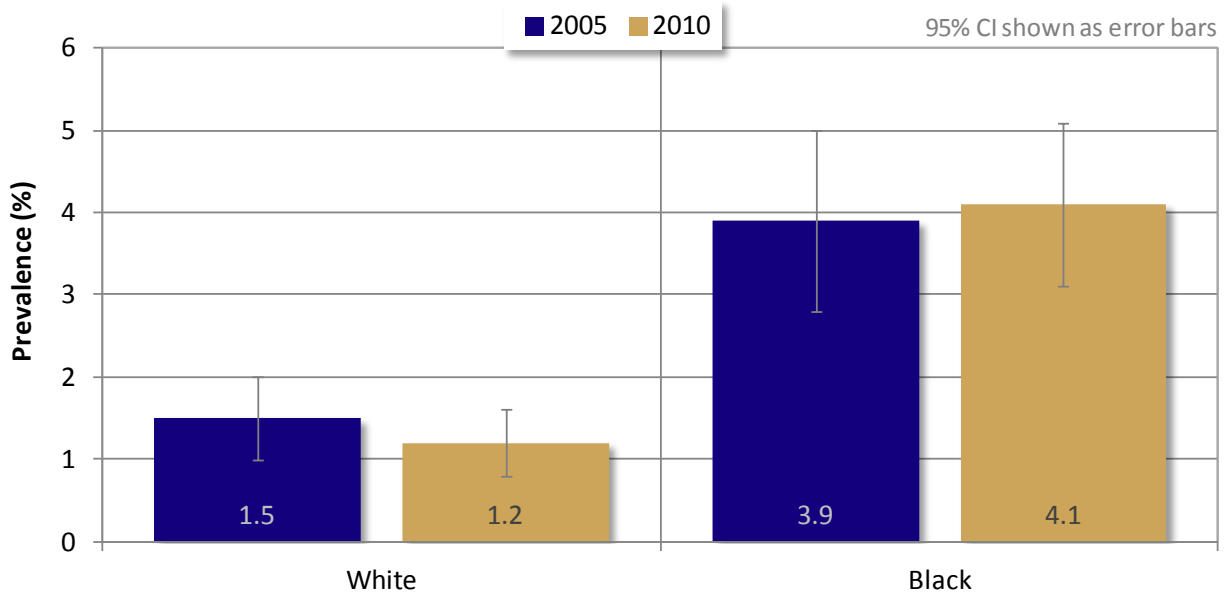
In 2010, the heart attack prevalence increased by increasing age group (Figure 4-5). The lowest heart attack prevalence was reported among residents 35 to 44 years (1.1%), and the highest prevalence reported among adults 65 years and older (9.3%). The prevalence of heart attacks among residents 65 years and older was significantly higher than the prevalence among all other age groups.

Figure 4-5: Prevalence of Heart Attack among adult residents by age group, DC, 2005 & 2010



The BRFSS survey sampled less than 10 persons, in 2005 and 2010, with Hispanic, "Other Race", and Multiracial identities. Small numbers of survey participants decrease the reliability and generalizability of heart attack prevalence estimates among these groups. Therefore, Figure 4-6 only has results for non-Hispanic Blacks and Whites. From 2005 to 2010, the prevalence of heart attacks among non-Hispanic White residents decreased by 20%. However, among non-Hispanic Black residents the prevalence of heart attacks increased by 5% during the same time period. In 2010, heart attack prevalence among non-Hispanic Black residents was higher compared to non-Hispanic White residents as shown in Figure 4-6. The heart attack prevalence among non-Hispanic Blacks (4.1%) was statistically significantly higher, over three times as high, than the prevalence among their White counterparts (1.2%).

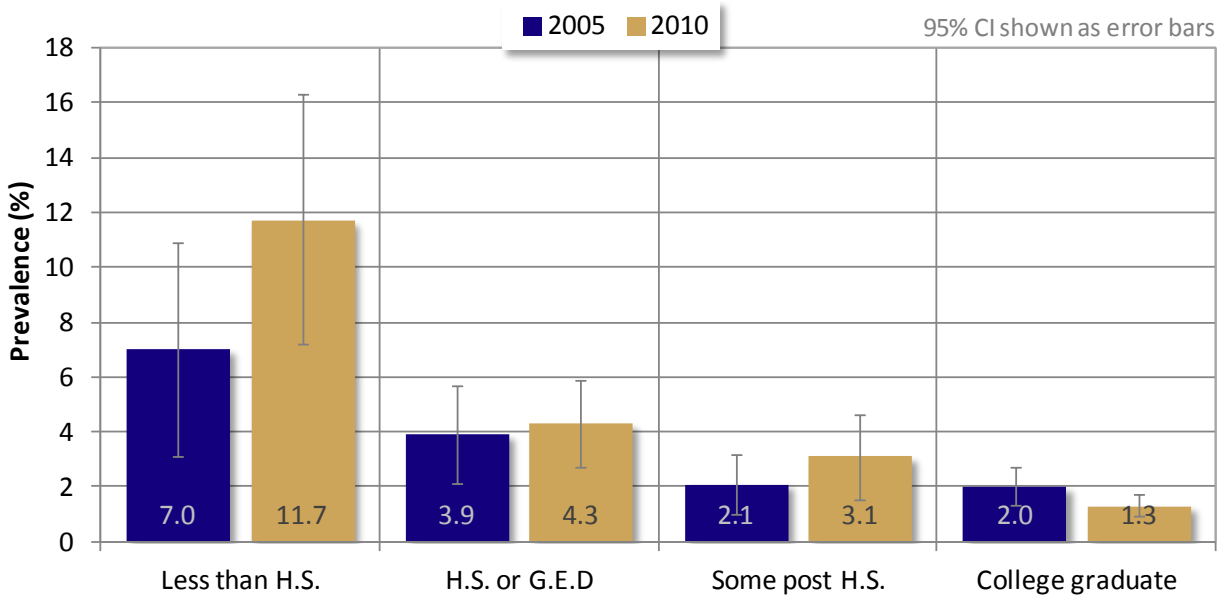
Figure 4-6: Prevalence of Heart Attack among adult residents by race, DC, 2005 & 2010



In this report, household income and respondent's highest education attainment, referred to as education level, was used to estimate socioeconomic status. Education level was divided into four categories: Less than high school, high school (graduate) or GED, some post high school, and college graduate. Figure 4-7 shows a decreasing trend in heart attack prevalence with increasing education level. Adult residents with less than a high school education had a significantly higher prevalence of heart attacks than all other counterparts with a higher education level. The heart attack prevalence rate was nine times higher among adult residents with less than a high school education as compared to those who graduated from college.

In 2005, the District's prevalence of heart attack among residents with less than a high school education was 7%, which increased by 67% in 2010 to a prevalence of 11.7% (Figure 4-7). Similarly, there was a 10% increase in prevalence among high school graduates/GED; and a 48% increase among residents with some post high school education from 2005 to 2010. However, the prevalence decreased by 35% in 2010 among college graduates.

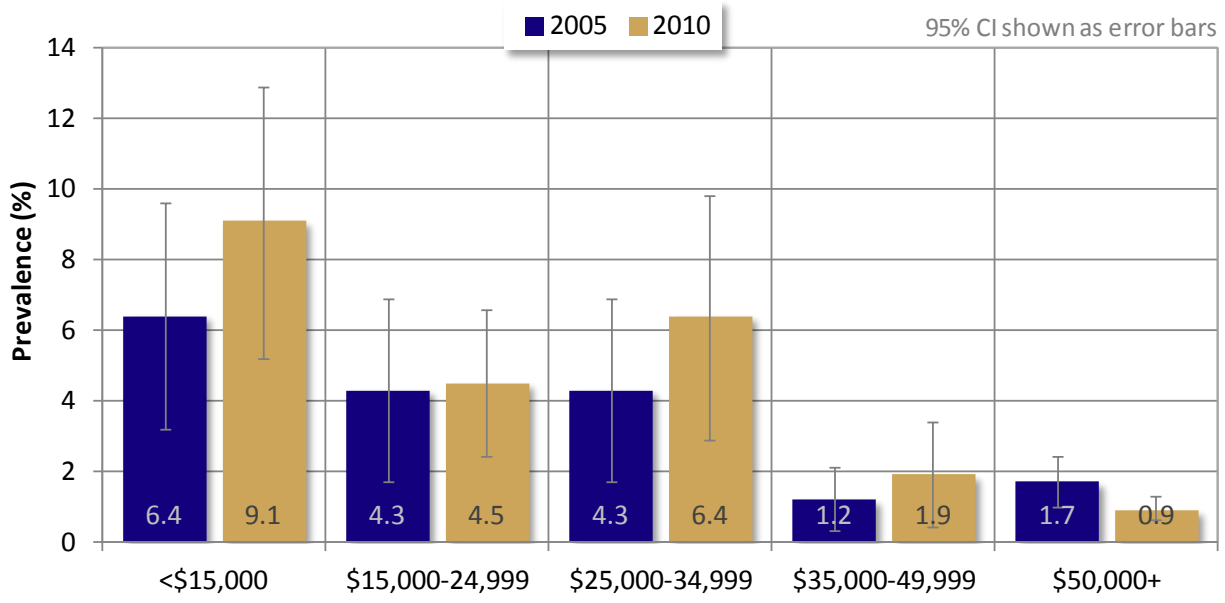
Figure 4-7: Prevalence of Heart Attack among adult residents by education level, DC, 2010



Household income was stratified into five categories as shown below in Figure 4-8. In 2005, the prevalence of heart attack among residents with a household income less than $15,000 was 6.4%. The prevalence among this same group increased by 42% in 2010 (Figure 4-8). There was an increase in prevalence observed among residents with a household income $25,000-34,999 and $35,000-49,999, 49% and 58% increases respectively. However, in 2010 the prevalence decreased by 47% among residents with a household income $50,000 and above, as compared to 2005.

In 2010, the prevalence rate of heart attacks was highest (9.1%) among adult residents with a household income less than $15,000. This rate was over 10 times higher than those with a household income above $50,000, and about five times higher than those with a household income between $35,000 and $49,999. These findings were statistically significant.

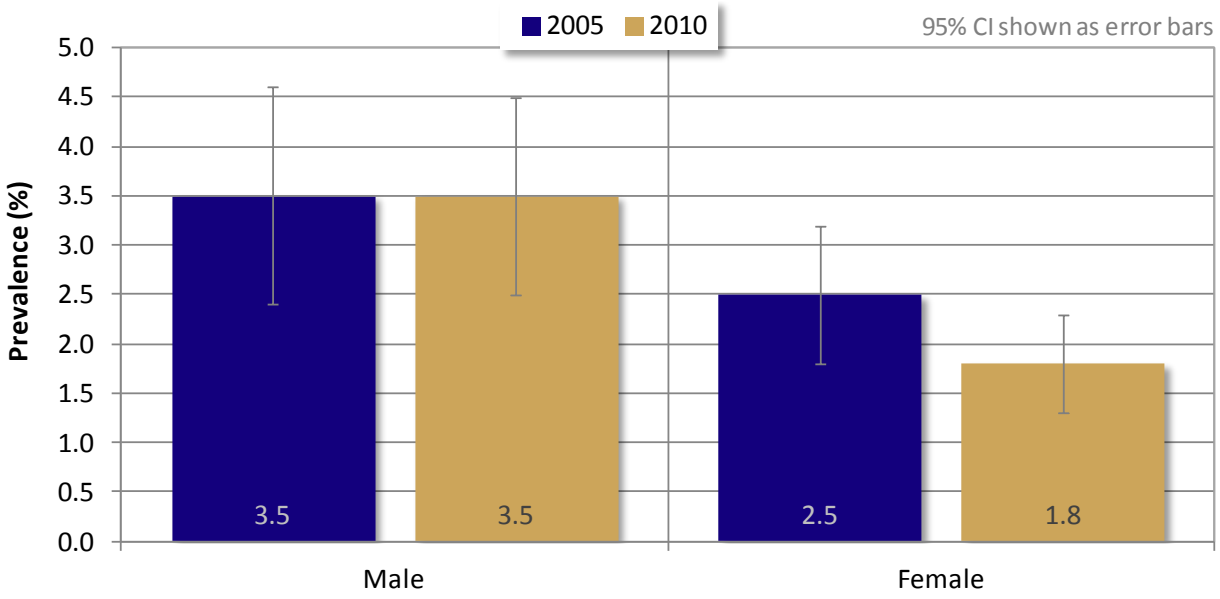
Figure 4-8: Prevalence of Heart Attack among adult residents by household income level, DC, 2010


2005
2010
95% CI shown as error bars
Prevalence (%)
14
12
10
8
6
4
2
0
6.4
9.1
4.3
4.5
4.3
6.4
1.2
1.9
1.7
0.9
<$15,000
$15,000-24,999
$25,000-34,999
$35,000-49,999
$50,000+

4.4. Coronary Heart Disease (CHD)

In 2010, the prevalence of CHD among all DC adult residents was 2.6% (Figure 4-2). The CHD prevalence was almost twice as high among adult males (3.5%) than among adult females (1.8%) counterparts (Figure 4-9). The CHD prevalence was a significantly higher in males in 2010, but there was not a significant difference in CHD prevalence between males and females in 2005. Further, the 2005 prevalence of CHD among female residents was 2.5% and decreased by 28% in 2010 (Figure 4-9). However, no change was observed among male residents from 2005 to 2010.

Figure 4-9: Prevalence of Coronary Heart Disease (CHD) among adult residents by gender, DC, 2005 & 2010



When comparing CHD data in 2010 to 2005, there were changes in the prevalence rates. In 2005, the prevalence of CHD was lowest among residents 25 to 34 years old, at 0.6% (Figure 4-10). There was a 47% and 16% decrease in CHD prevalence among residents 35 to 44 years and 45 to 54 years, respectively. Further, a 23 percent decrease in prevalence was observed among residents over 65 years in 2010 as compared to 2005. The only increase in prevalence was observed among residents 55 to 64 years old, an 18% increase.

Similar to the trend for heart attacks, CHD prevalence increased with increasing age group in 2010 (Figure 4-10). Residents aged 65 years and older had the highest prevalence rate (7.9%) and ages 35 to 44 years had the lowest. In 2010, the prevalence estimate could not be calculated among adults aged 18-34 years because either the unweighted sample size was less than 50 or the confidence interval was too wide, consistent with BRFSS methods. In 2010, the CHD prevalence rate of those aged 65 and above was almost eight times higher than the 35-44 age group and almost four times higher than the 45-54 age group. There was a statistically significant difference in the prevalence rate between residents above 65 years and residents who fall in age groups 35-44, and 45-54.

Figure 4-10: Prevalence of Coronary Heart Disease (CHD) among adult residents by age group, DC, 2005 & 2010

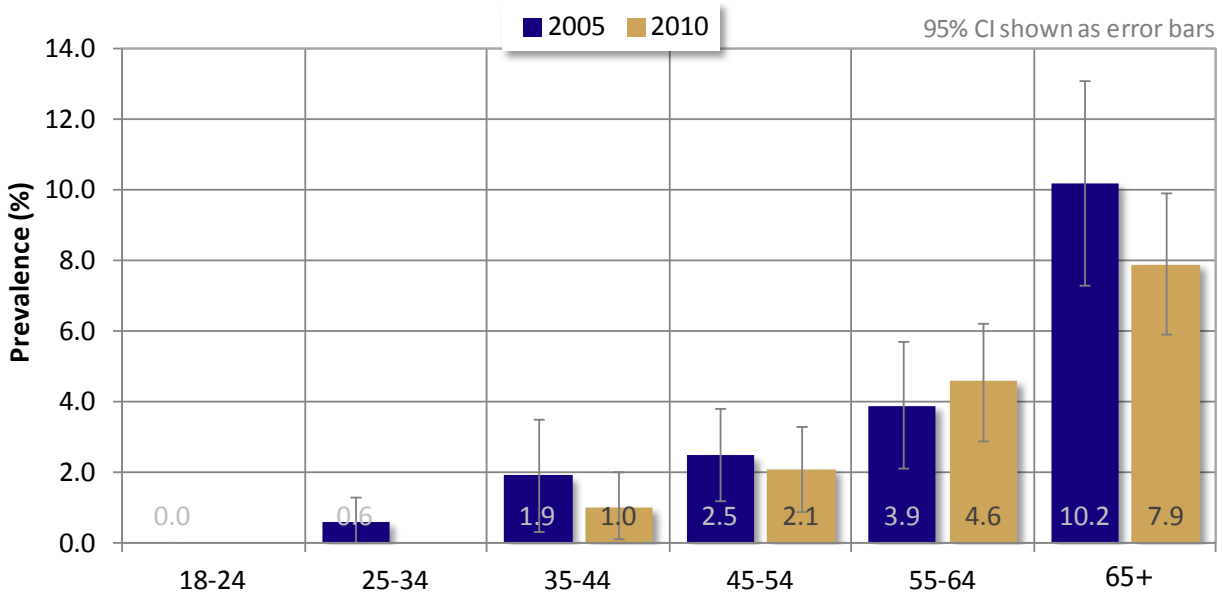


Figure 4-11 shows there was a decrease in the prevalence of CHD among both non-Hispanic White and non-Hispanic Black residents in 2010 as compared to 2005. There was a 22% decrease in prevalence among non-Hispanic Whites in 2010. However, there was a much lower percent decrease, of 10%, among non-Hispanic Black residents. In 2010, adult non-Hispanic Black residents had a 3.7% CHD prevalence rate, more than twice that of their non-Hispanic white counterparts (Figure 4-11). This was a statistically significant finding. The results for Hispanic, other, and multiracial categories were not presented because of small sample sizes.

Figure 4-11: Prevalence of Coronary Heart Disease (CHD) among adult residents by race, DC, 2005 & 2010.

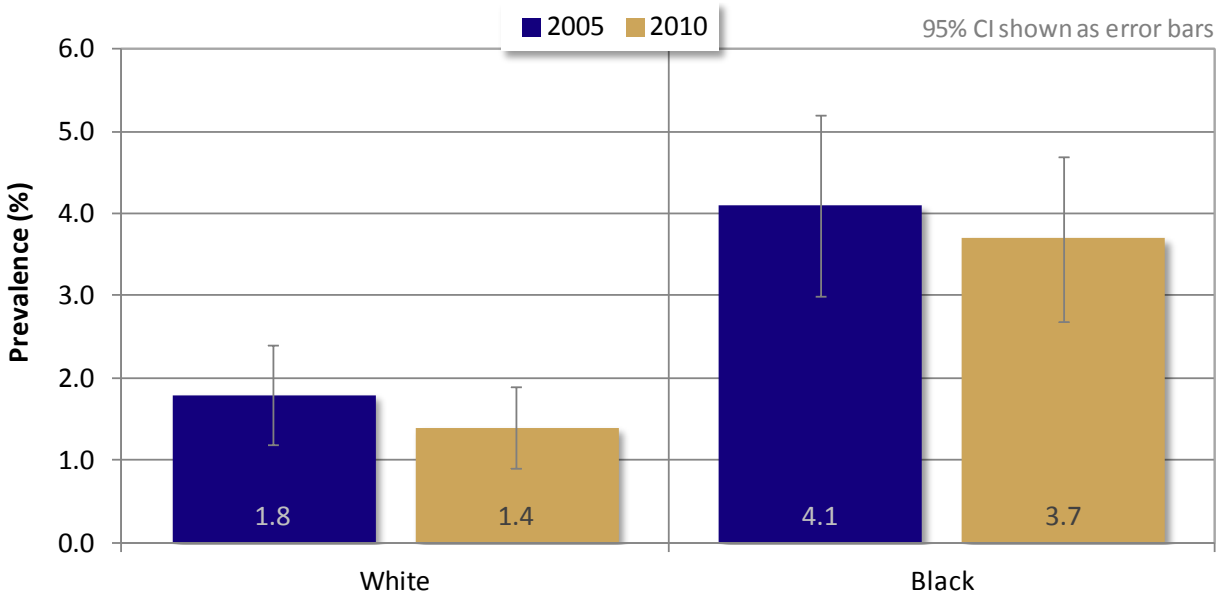


Figure 4-12 shows a decreasing trend of CHD prevalence with increasing education level. Further, between 2005 and 2010, the prevalence rate for CHD decreased for all education level groups except those with less than a high school degree. Adult residents with less than a high school education had a CHD prevalence rate of 9.4%, in 2010, about three times higher than those with a high school degree/GED, 3.4 times higher than residents with

some post high school education level, and 5.5 times higher than college graduates. These were all statistically significant differences.

Figure 4-12: Prevalence of Coronary Heart Disease (CHD) among adult residents by education level, DC, 2005 & 2010.

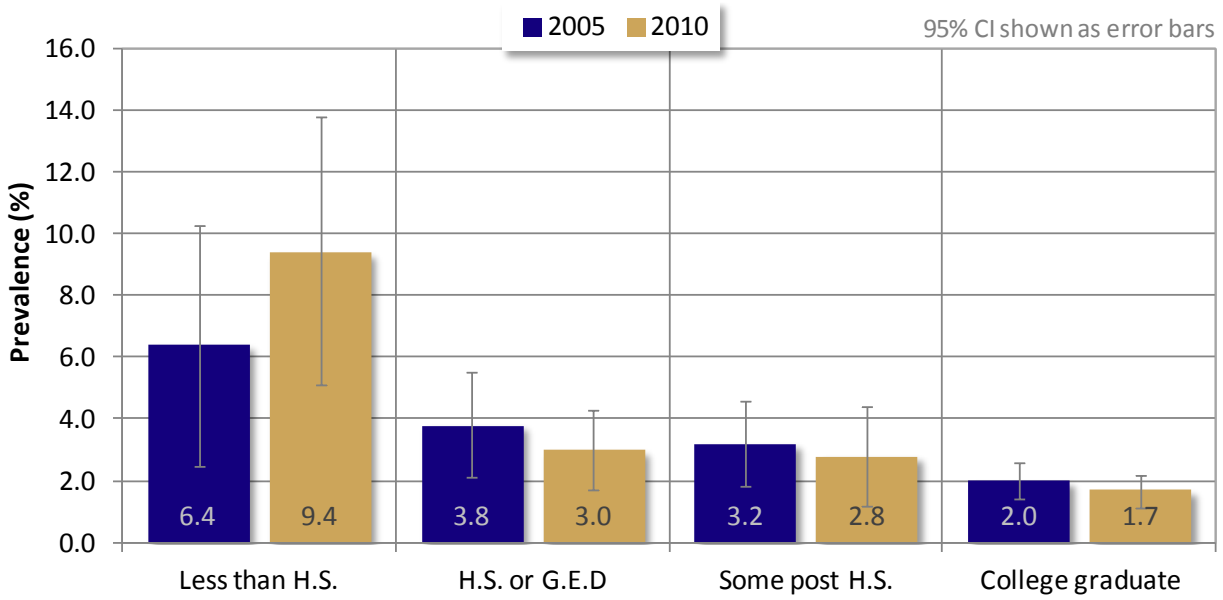
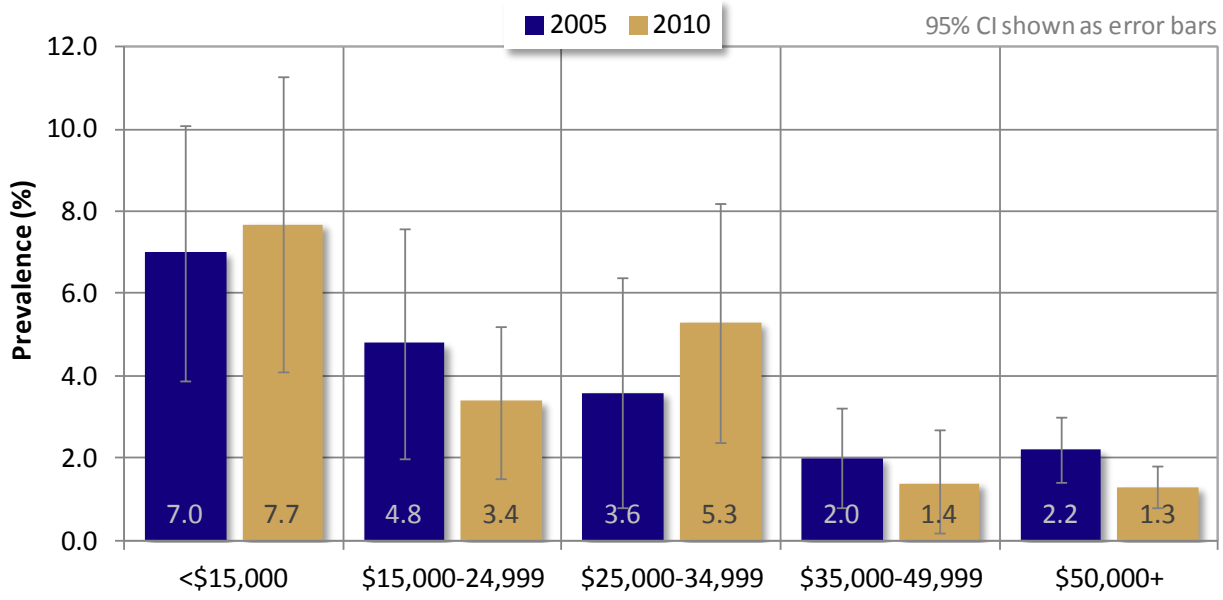


Figure 4-13 shows the CHD prevalence decreased among most income groups from 2005 to 2010. There was a 10% and 47% increase in CHD prevalence among residents with a household income less than $15,000 and $25,000 to $34,999, respectively. Residents with a household income $50,000 and above had approximately a 41% decrease in prevalence, the highest drop in CHD rate among all income groups. In 2010, the CHD prevalence rate was highest (7.7%) among residents with a household income less than $15,000. The CHD prevalence among the less than $15,000 household income group was about six times higher than the $35,000-$49,999 group, as well as those with $50,000 and higher. These finding were statistically significant.

Figure 4-2: Prevalence of Coronary Heart Disease (CHD) among adult residents by household income level, DC, 2005 & 2010.



4.5. Stroke

The prevalence of stroke among adult residents in 2010 was 3.4% (Figure 4-3). Men had a slightly lower rate than women; however these differences were not statistically significant (Figure 4-14). The prevalence rate of stroke among males was 2.9% in 2005 and increased by 14% in 2010. However, the percent increase among females was only 6%.

Figure 4-3: Prevalence of stroke among adult residents by gender, DC, 2005 & 2010

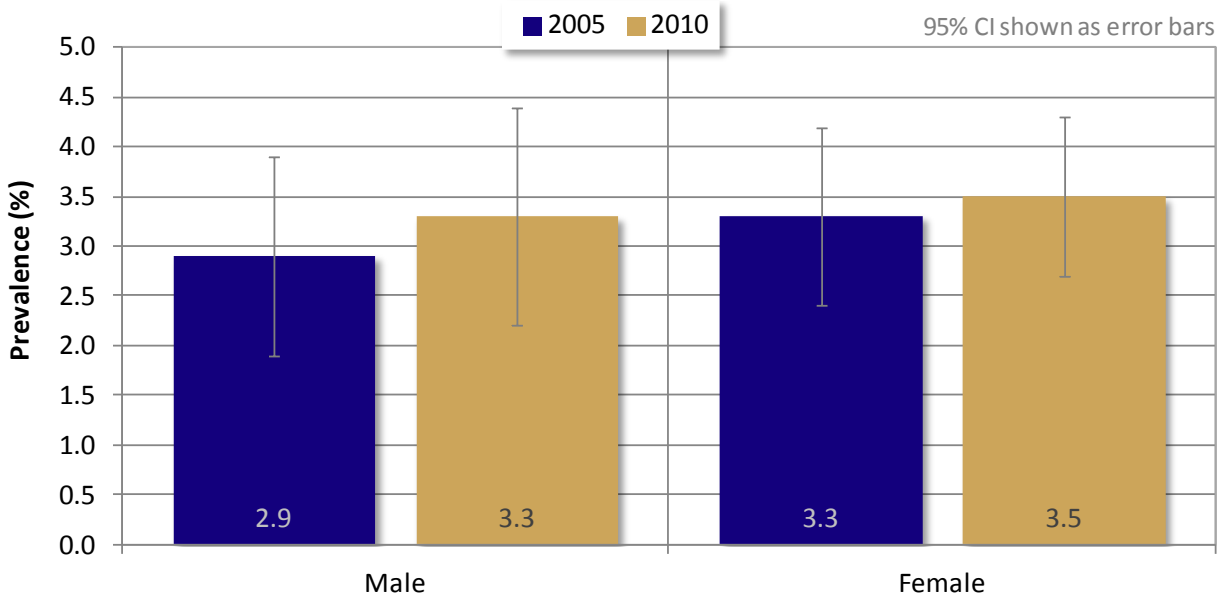
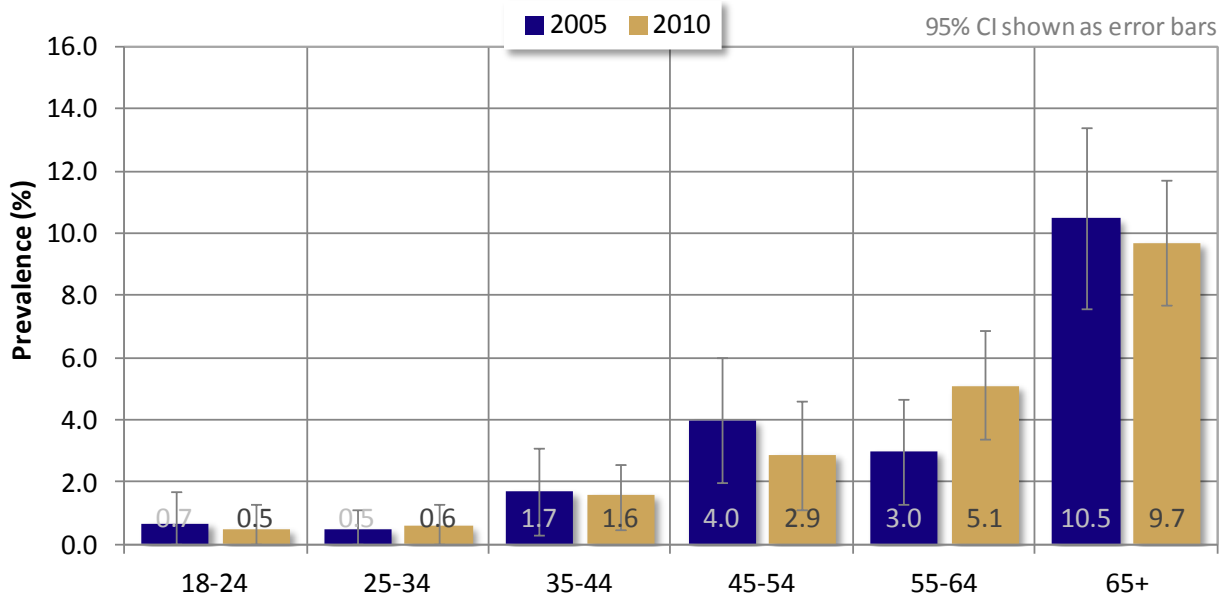


Figure 4-15

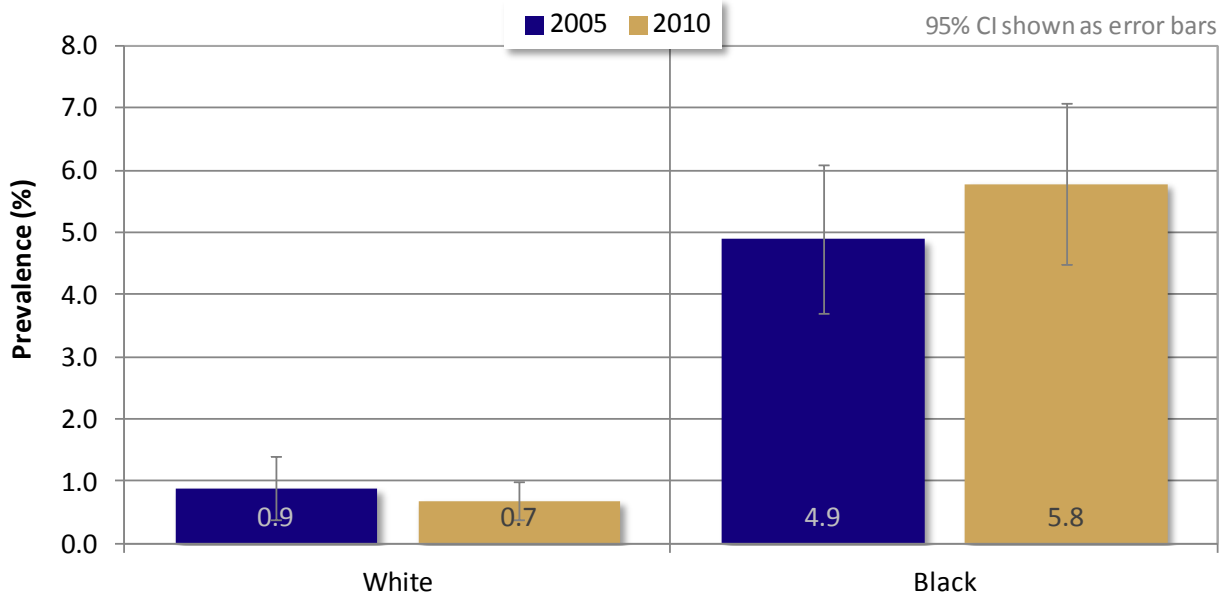
shows an increasing trend was observed in stroke prevalence with increasing age groups. In 2010, residents 65 years and older had the highest prevalence rate, 9.7%, and the 18-24 years-age group had the lowest, 0.5%. The stroke prevalence rate among residents 65 years and older was significantly higher than all other age groups. The stroke prevalence decreased by 28% between 2005 and 2010 among residents aged 45 to 54 years (Figure 4-15). In addition, there was an 8% decrease in stroke among residents aged 65 years and older. However, there was a 70% increase in prevalence among residents aged 55 to 64 years during that same time period.

Figure 4-4: Prevalence of stroke among adult residents by age group, DC, 2005 & 2010



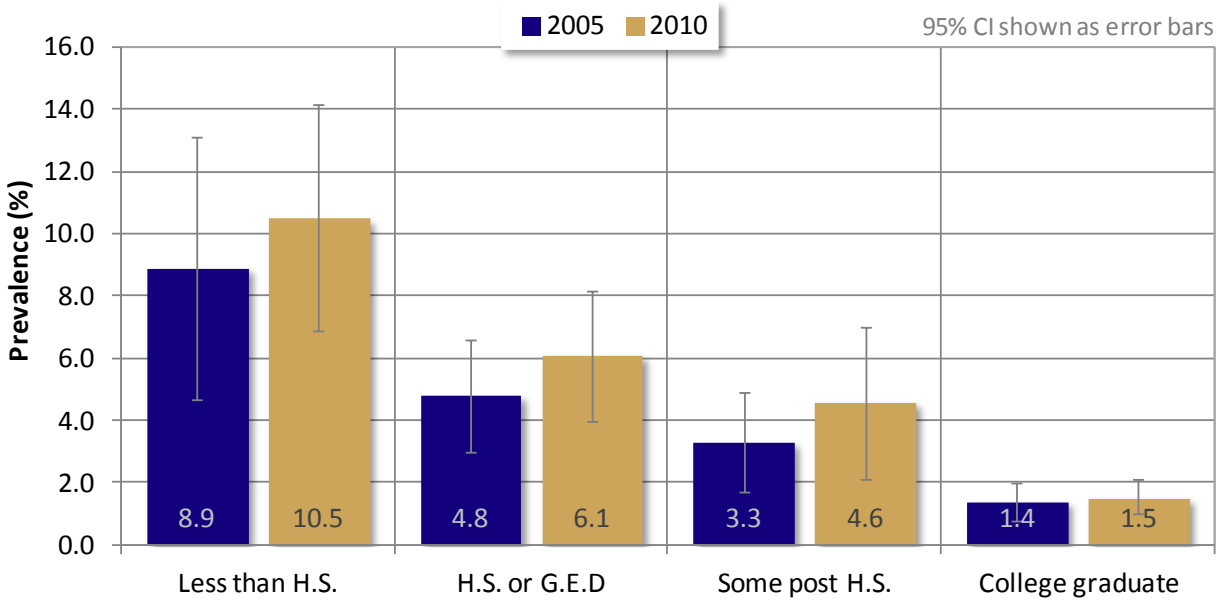
In 2010, adult non-Hispanic black residents had a stroke prevalence of 5.8%, which was more than eight times higher than the rates of non-Hispanic White counterparts (Figure 4-16). This was a statistically significant finding. The results for Hispanic, other and multiracial categories were not presented because of small sample size. Comparing stroke prevalence for 2005 and 2010 by race, there was a 22% decrease in prevalence among non-Hispanic White residents and 18% increase among non-Hispanic Black residents (Figure 4-16).

Figure 4-5: Prevalence of stroke among adult residents by race, DC, 2005 & 2010



When stroke data was stratified by education level, a distinct increasing trend, comparing 2005 to 2010, was observed. Figure 4-17 shows the highest percent increase (39%) in prevalence was among residents with some post high school education. While the lowest percent increase (7%) was among residents with college degrees. In 2010, residents with less than a high school education had the highest prevalence of stroke, 10.5%. Similar to heart attack and CHD prevalence, there was a decrease in stroke prevalence with increasing education level, with college graduates having the lowest rate of 1.5 percent. In 2010, residents with less than a high school education and those with high school degrees/GED had significantly higher stroke rates than residents with college degrees.

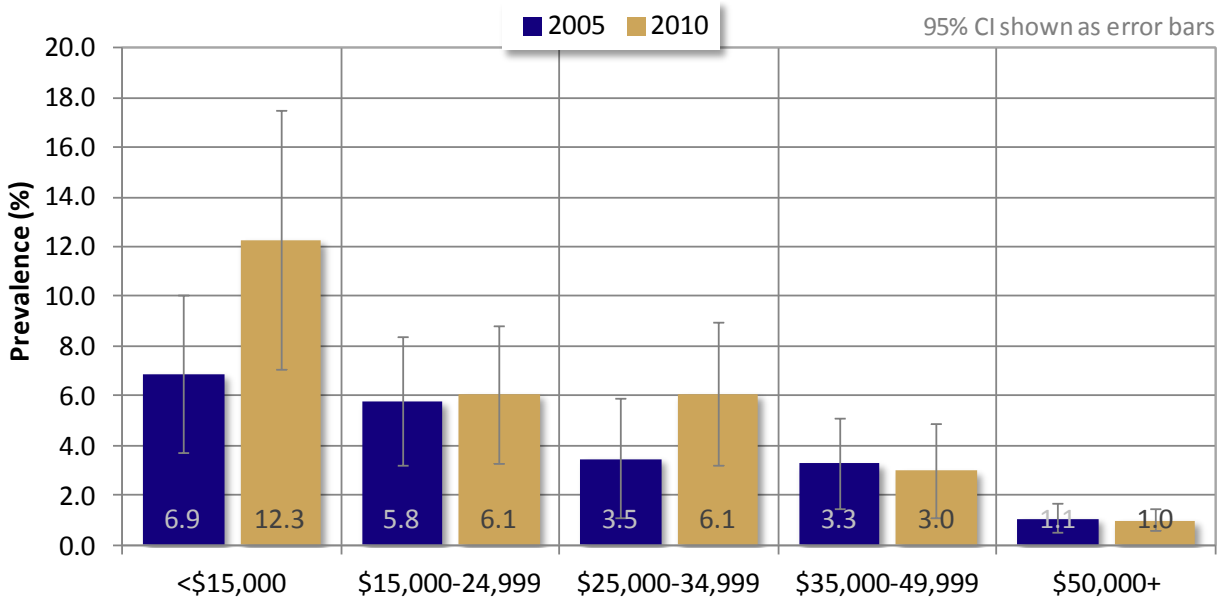
Figure 4-6: Prevalence of stroke among adult residents by education level, DC, 2005 & 2010



When 2010 stroke data was stratified by household income, the trend was similar to the trend observed with education level (Figure 4-18). There was a decreasing trend of stroke prevalence with increasing household income. In 2010, the stroke prevalence was 12.3% among residents with a household income less than $15,000, the highest rate among all household income groups. The stroke rate for residents with household income less than $15,000 was 12 times higher than residents with a household income $50,000 and higher; and four times higher than residents with a household income between $34,000 and $49,999. These findings were statistically significant.

The prevalence of stroke in 2010 increased among three household income groups as compared to the prevalence in 2005. The prevalence rate among residents with less than $15,000 household income increased by 78% in 2010 (Figure 4-18). Similarly, residents with household income $25,000 to $34,999 experienced a 74% increase in the prevalence of stroke in 2010. While, there was a five percent increase in prevalence among residents with $15,000 to $24,999 household income. Residents with household income of $35,000 to $49,999 and $50,000 above had a slight decrease in prevalence, both a nine percent decrease.

Figure 4-7: Prevalence of stroke among adult residents by household income level, DC, 2005 & 2010



5. Prevalence of CVD Risk Factors

This section of the report summarizes the distribution of CVD risk factors in the District of Columbia by demographic and socioeconomic indicators – gender, race, age group, education level, and household income. Risk factors are traits and lifestyle-habits that increase the risk of a disease. Extensive clinical and population-based studies have identified a number of risk factors for CVD. In this report, we examine seven selected risk factors: overweight/obesity, smoking, high blood pressure, high cholesterol, physical inactivity, diet (i.e., low fruits and vegetable consumption), and diabetes. The more risk factors a person has, the higher the chances are that he or she will develop CVD. Most of these CVD risk factors can be modified, treated or controlled. By reducing individual or population level risk factors, cardiovascular events and complications can be prevented.

The prevalence of selected CVD risk factors in District of Columbia residents, aged 18 years or older, was estimated using the BRFSS data. Data from 2005 was compared to 2009 and 2010 data to determine percent change in the risk factors. Several questions on the BRFSS questionnaire are asked only every other year, for example high blood pressure, high cholesterol and fruit/vegetable consumption questions were asked in 2009, whereas overweight/obesity, smoking, physical inactivity, and diabetes were asked about annually and in 2010.

The following questions were used to determine the prevalence of each indicated CVD risk factor:

Overweight and Obesity:	About how much do you weigh without shoes? About how tall are you without shoes?
Smoking:	Have you smoked at least 100 cigarettes in your entire life? Do you now smoke cigarettes every day, some days, or not at all?
High Blood pressure:	"Have you ever been told by a doctor, nurse or other health professional that you have high blood pressure?"
High Cholesterol:	"Have you ever been told by a doctor, nurse or other health professional that your blood cholesterol is high?"
Physical Inactivity:	"During the past month, other than your regular job, did you participate in any physical activity or exercise such as running, calisthenics, golf, gardening or walking for exercise?"
Low Fruit and Vegetable:	Not counting juice, how often do you eat fruit? Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?
Diabetes:	"Have you ever been told by a doctor, nurse or other health professional that you have diabetes?"

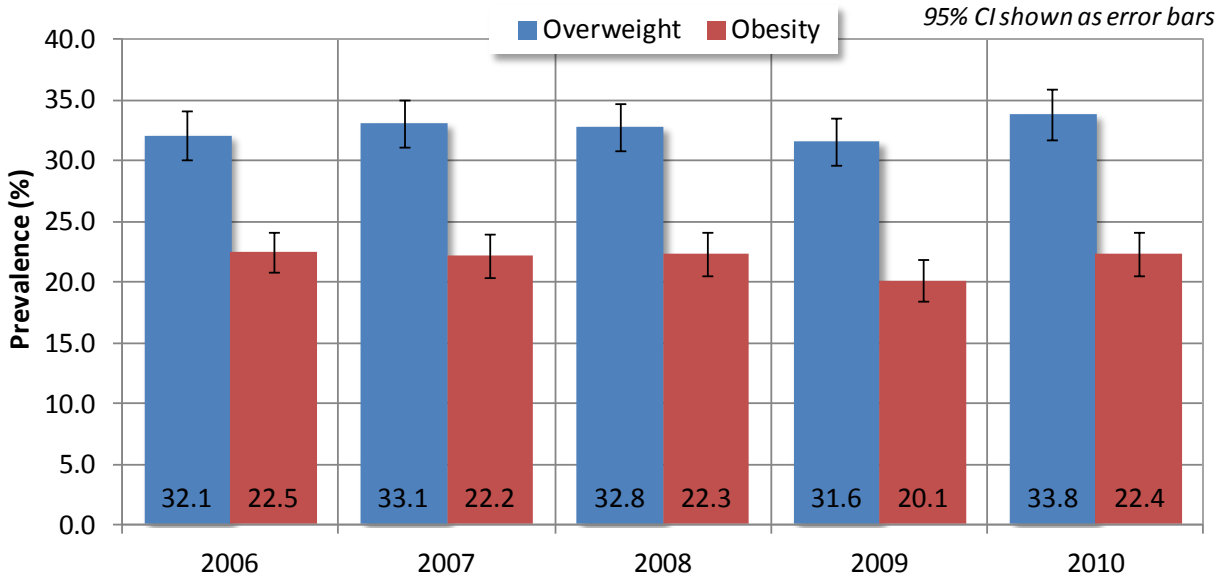
For questions with "Yes" and "No" answers, the prevalence for respondents who answered "Yes," was examined by demographic and socioeconomic characteristics. Overweight and obesity were determined by calculating Body Mass Index (BMI), which is a function of respondents reported weight (in kilograms) divided by reported height (in meters; squared). "Overweight" is equal to a BMI of 25−29 and "Obesity" is a BMI greater than or equal to 30. Further, "Current Smoker" is a calculated variable equal to residents who smoked at least 100 cigarettes in their life and now smoke every day or some days. Additionally, "Low Fruit and Vegetable Consumption" was determined by adults who have consumed fruits and vegetables less than five times per day. Similar to the previous section in this report, statistically significant differences between groups were established using 95% CIs. Differences between groups or years are stated as "significant" based on non-overlapping 95% CIs.

5.1. Overweight and Obesity

Obesity refers to characteristics of body size, composition, and appearance, including overweight, fatness, and fat distribution, for example, central or abdominal obesity.[6] Obesity has been defined as excess weight or body fat with health consequences, however being overweight can also lead to consequential poor health outcomes. A generally accepted method of measuring overweight and obesity is Body Mass Index (BMI). BMI is a common measure expressing the relationship of weight-to-height, calculated as a person's body weight in kilograms divided by the square of his or her height in meters: BMI=wt(kg)/ht(m^2). Categories of BMI are defined as underweight (BMI<18.5 kg/m^2), normal weight (BMI=18.5-24.9 kg/m^2), overweight (BMI=25.0-29.9 kg/m^2), and obesity (BMI≥30.0 kg/m^2). According to the National Institutes of Health (NIH), all adults with a BMI of 25 or more (i.e. overweight or obese) are considered at risk for disability and premature.[7] Obesity contributes to atherosclerosis and hypertension, and therefore, is an indirect determinant of CVD. In addition, being overweight or obese is often associated with poorer functional limitations leading to restricted physical activity.

The prevalence of overweight among the District's adult residents did not significantly change from 2006 to 2010. The prevalence was 32.1 percent in 2006 and 33.8 percent in 2010, a 5 percent increase (Figure 5-1). Similarly, there is no significant difference in obesity rates from years 2006 to 2010. However, the rate of overweight was consistently higher than the rate of obesity for all five years.

Figure 5-1: Prevalence of overweight and obesity among adult residents, DC, 2006-2010



In 2010, the rate of overweight residents was significantly higher (60% higher) among male residents as compared to their female counterparts (Figure 5-2). However, the obesity rate was 29% lower among male residents as compared to their female counterparts. This finding was statistically significant. The rate of overweight and obesity were similar among females while, the rate of overweight was more than two times higher among males as compared to obesity.

Figure 5-2: Prevalence of overweight and obesity among adult residents by gender, DC, 2010

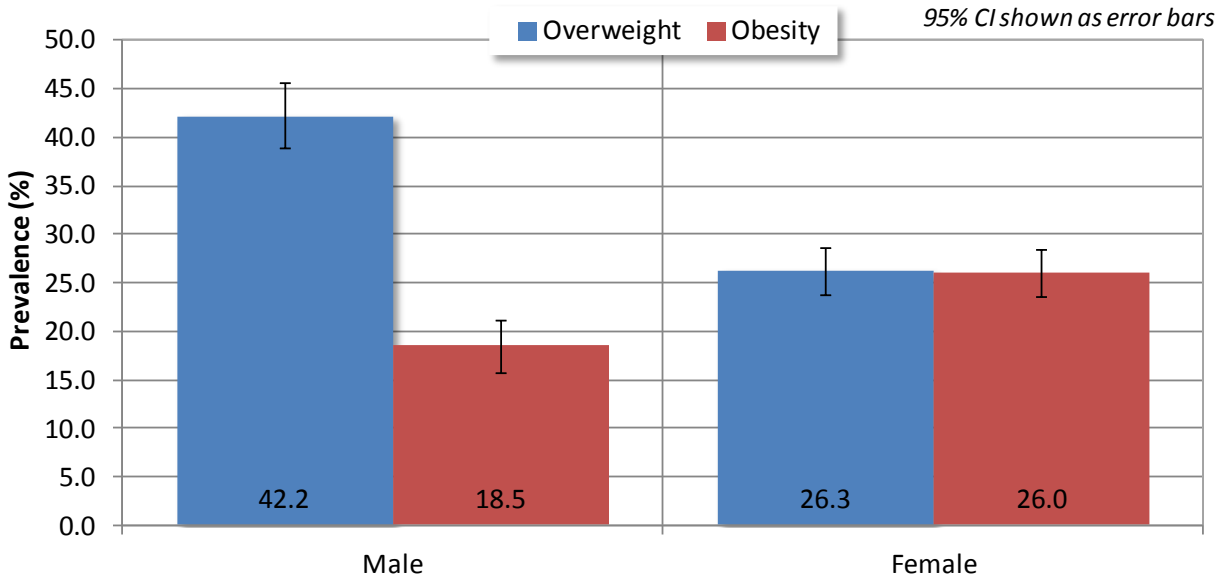
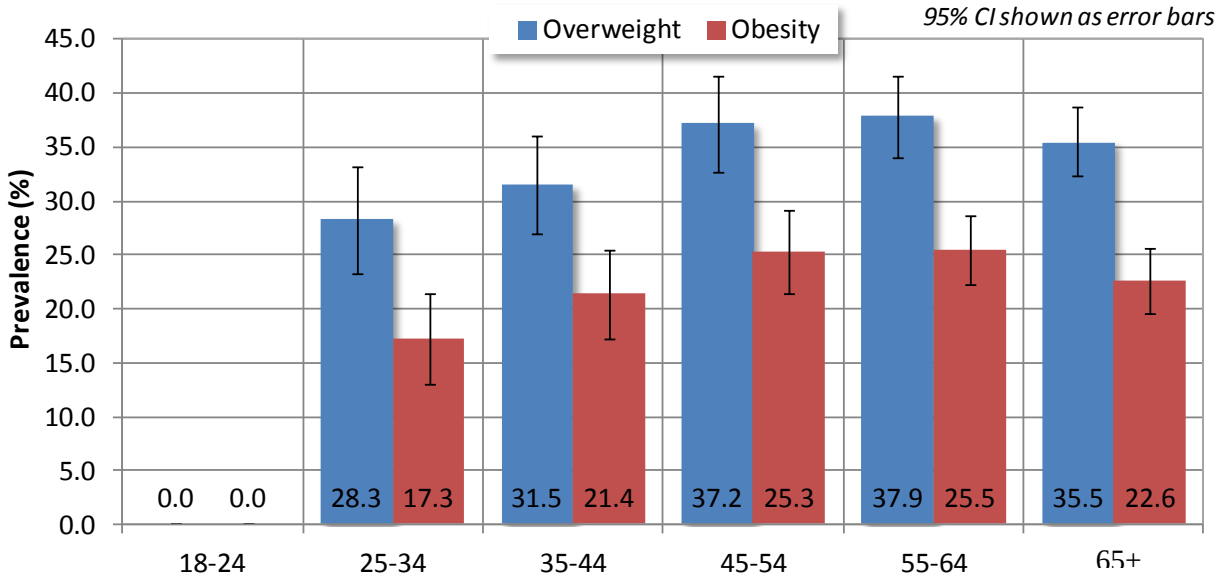


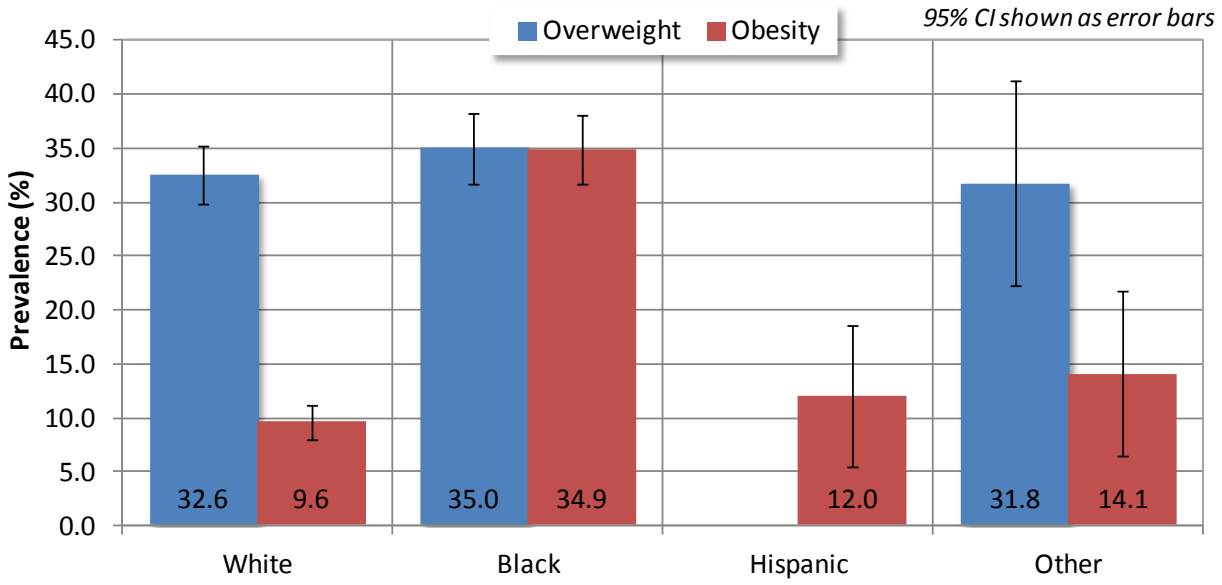
Figure 5-3 shows the prevalence of overweight and obesity stratified by age group. The rate of overweight and obesity by age have a similar trend. The rates increase with increasing age group up to age group 55-64, the rate slightly decreases among age group 65 and older. However, the data shows no statistically significant difference in the rate of overweight or obesity across age group. The prevalence of overweight and obese among residents 18 to 24 years were not reported because the sample size was less than 50.

Figure 5-3: Prevalence of overweight and obesity among adult residents by age group, DC, 2010



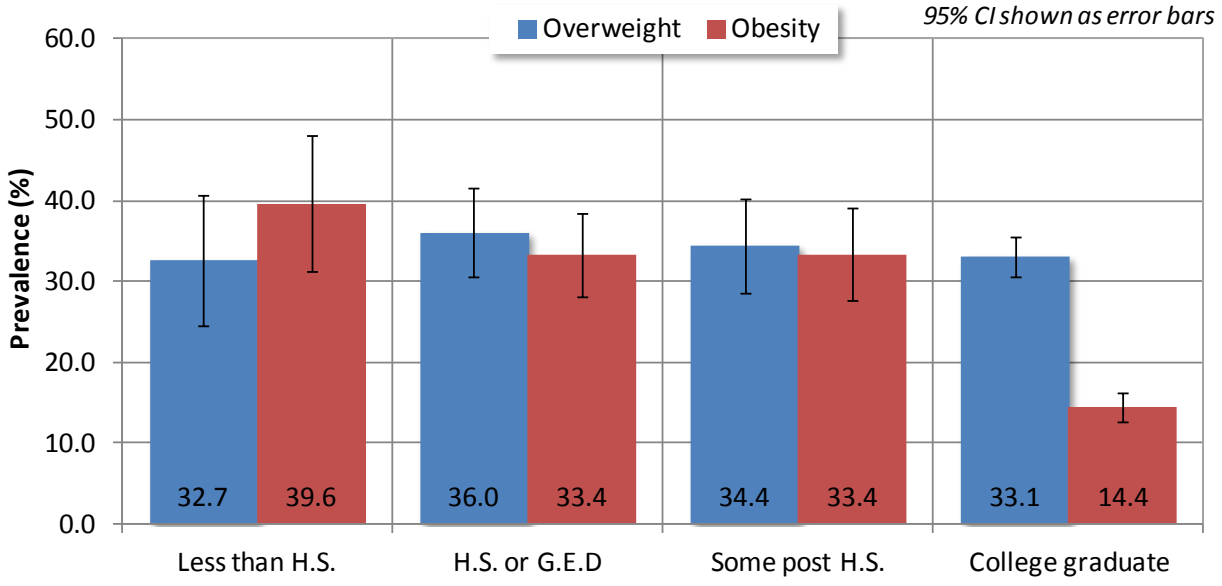
In 2010, non-Hispanic White residents had an overweight rate of 32.6 percent and non-Hispanic Black residents had a rate of 35% (Figure5-4). The overweight prevalence rate was not statistically different between white and black residents. However, the rate of obesity between these two races is significantly different. The rate of obesity was approximately four times higher among non-Hispanic Black (34.9%) residents than their White (9.6%) counterparts.

Figure 5-4: Prevalence of overweight and obesity among adult residents by race, DC, 2010



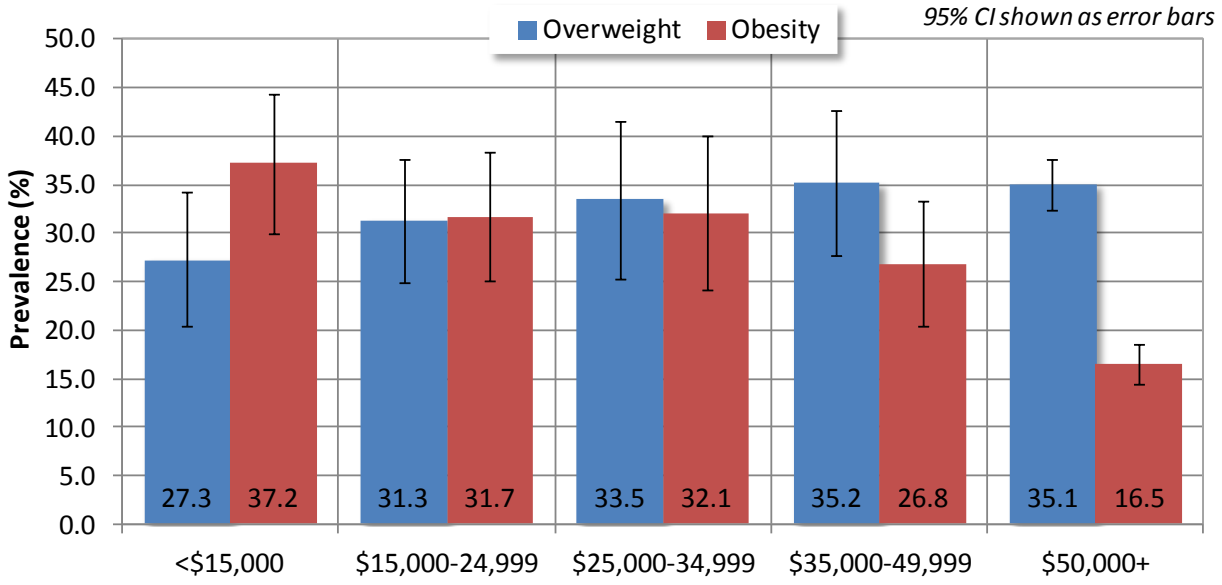
In 2010, there was no statistically significant difference in the rate of overweight by education level (Figure 5-5). However, the rate of obesity was significantly lower among college graduates as compared to all other education category. The rate of obesity was three times higher among residents with less than a high school education as compared to college graduates.

Figure 5-5: Prevalence of overweight and obesity among adult residents by education level, DC, 2010



Similar to the findings for education level shown above, in 2010, there was not a statistically significant difference in the prevalence of overweight across household income. However, the rate of obesity among residents with a household income of $50,000 and above was significantly lower than all other household categories (Figure 5-6). Residents with a household income less than $15,000 have the highest obesity rate which is twice the rate of residents with a household income of $50,000 and over.

Figure 5-6: Prevalence of overweight among adult residents by household income level, DC, 2010

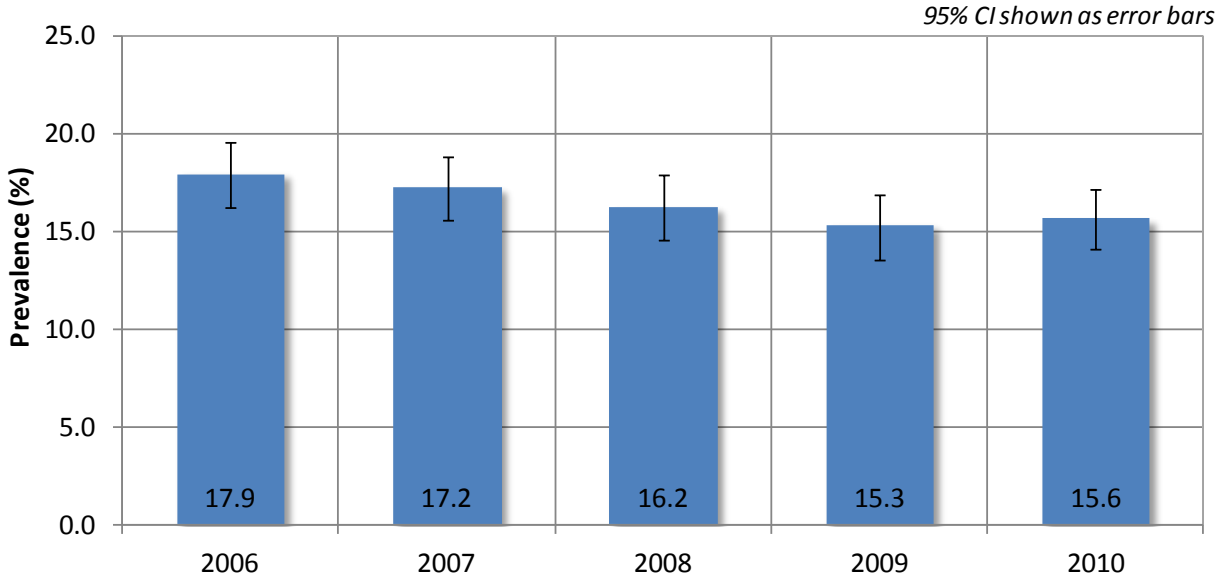


5.2. Smoking

Smoking remains the leading preventable cause of death and has a negative impact on a person's health at all stages of life. In the blood, cigarette related chemicals contribute to the development of arteriosclerosis. Arteriosclerosis is a progressive hardening of the arteries caused by the deposit of fatty plaques and the scarring and thickening of the artery wall. Inflammation of the artery wall and the development of blood clots can obstruct blood flow and cause heart disease and/or strokes. Therefore, cigarette smoking is a major risk factor for CHD and stroke. The risk of heart attack for smokers is more than twice that of nonsmokers. In fact, cigarette smoking is the leading risk factor for sudden cardiac death of all types in both men and women: smokers have two to four times the risk of nonsmokers. Also, cigarette smoking acts with other risk factors, greatly increasing the risk for CHD. Smoking related CHD may contribute to congestive heart failure as well as abdominal aortic aneurysms. The risk of stroke decreases steadily after smoking cessation. According to the World Health Organization (WHO), one year after quitting, the risk of CHD decreases by 50%. Within 15 years, the relative risk of dying from CHD for an ex-smoker approaches that of a long-time (lifetime) nonsmoker.

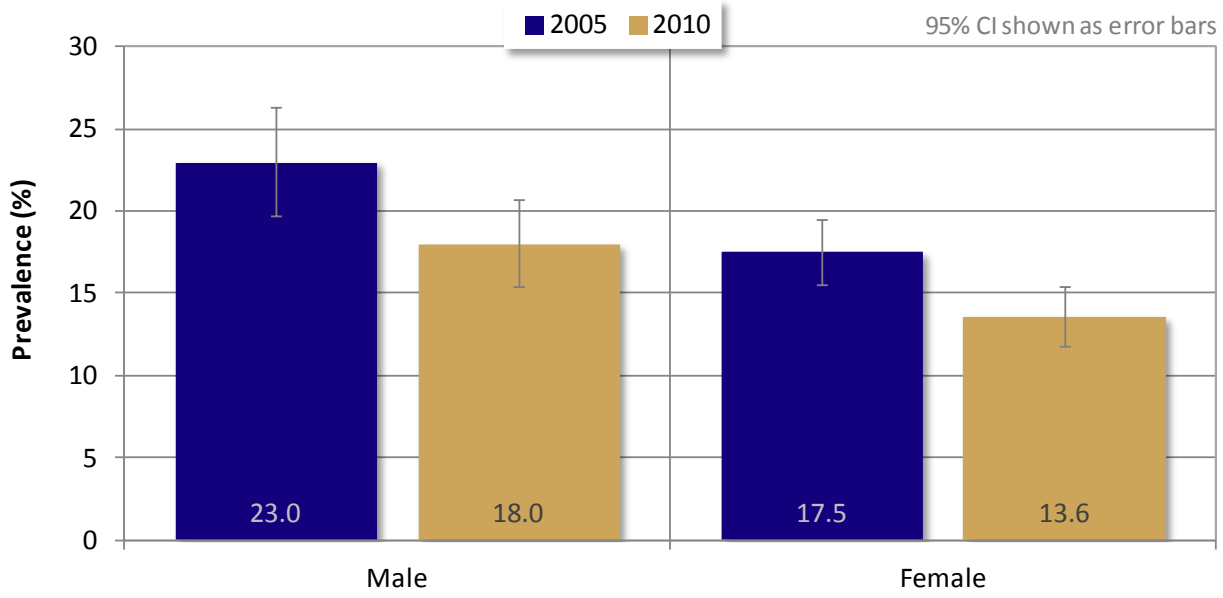
In the District, the proportion of adults who currently smoke did not significantly change from 2006 to 2010. In 2006, the prevalence of smoking was 17.9% and by 2010 the rate had decreased by approximately 13% to 15.6% (Figure 5-7).

Figure 5-7: Prevalence of smoking among adult residents, DC, 2006-2010



In 2010, the prevalence of smoking among adult male residents was 18%, 32% higher than their female counterparts (13.6%; Figure 5-8). This finding was statistically significant. In both male and female residents, there was a 22% decrease in the prevalence of smoking from 2005 to 2010 (Figure 4-25).

Figure 5-8: Prevalence of smoking among adult residents by gender, DC, 2005 & 2010.



In 2010, the prevalence of smoking was highest among adult residents 45-54 years (21.9%; Figure 5-9). The prevalence was lowest among residents 65 years and over (10.3%).The prevalence rate was significantly higher among 45-54 as compared to age groups: 65 and older, 55-64, 35-44, and 25-34. There was a decrease in smoking prevalence across all age groups from 2005 to 2010. The highest percent decrease in prevalence was among residents 18 to 24 years. While, the lowest percent decrease was among adults over 64 years.

Figure 5-9: Prevalence of smoking among adult residents by age group, DC, 2005 & 2010.

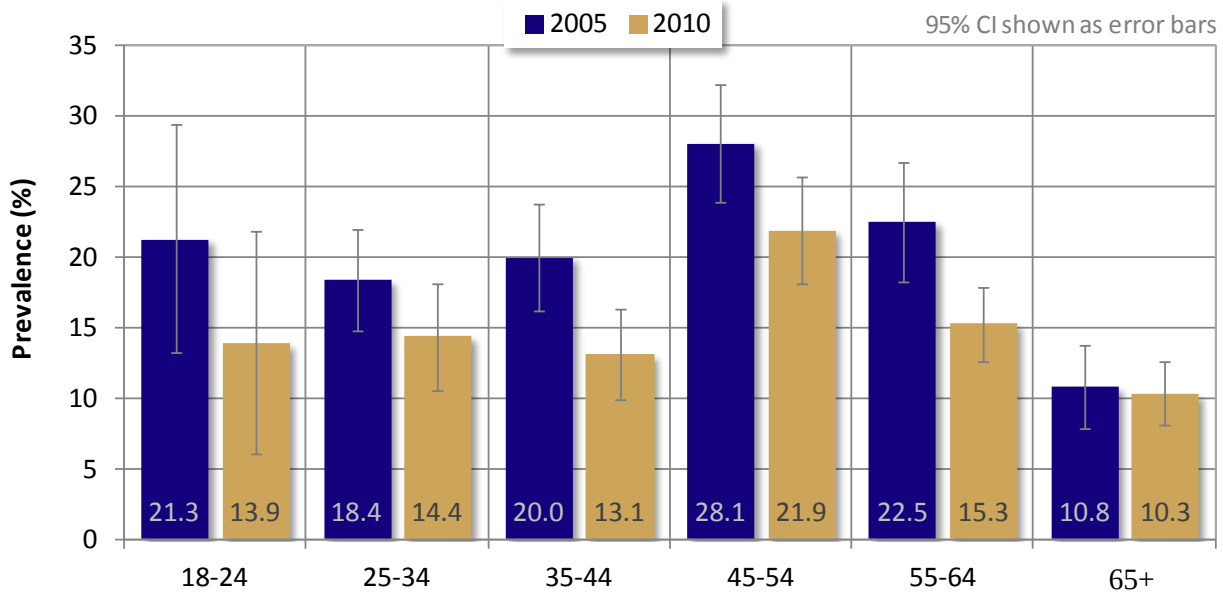


Figure 5-10 shows that non-Hispanic Black residents had the highest prevalence of smoking (21.5%) among all race groups. The non-Hispanic Black smoking rate was significantly higher (more than two times) than their white counterparts (9.1%). Hispanic residents had a smoking prevalence of 16.8%, which was not significantly lower than non-Hispanic Blacks or significantly higher than non-Hispanic Whites. The 95% CI for the Hispanic data was wide most likely due to a small sample size. This is also true for the "Other" race category.

There was a decrease in smoking prevalence among all race categories from 2005 to 2010. Non-Hispanic White residents had the highest percent decrease (-33%) in prevalence; while non-Hispanic Black residents had a nine percent decrease in smoking prevalence during that time period.

Figure 5-10: Prevalence of smoking among adult residents by race, DC, 2005 & 2010.

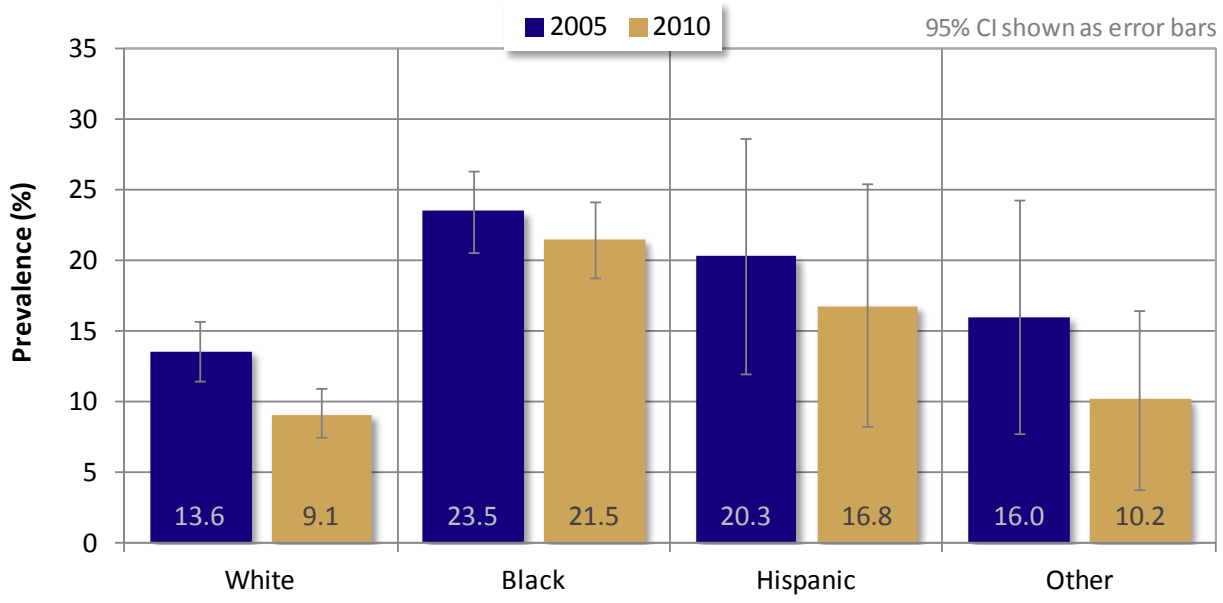
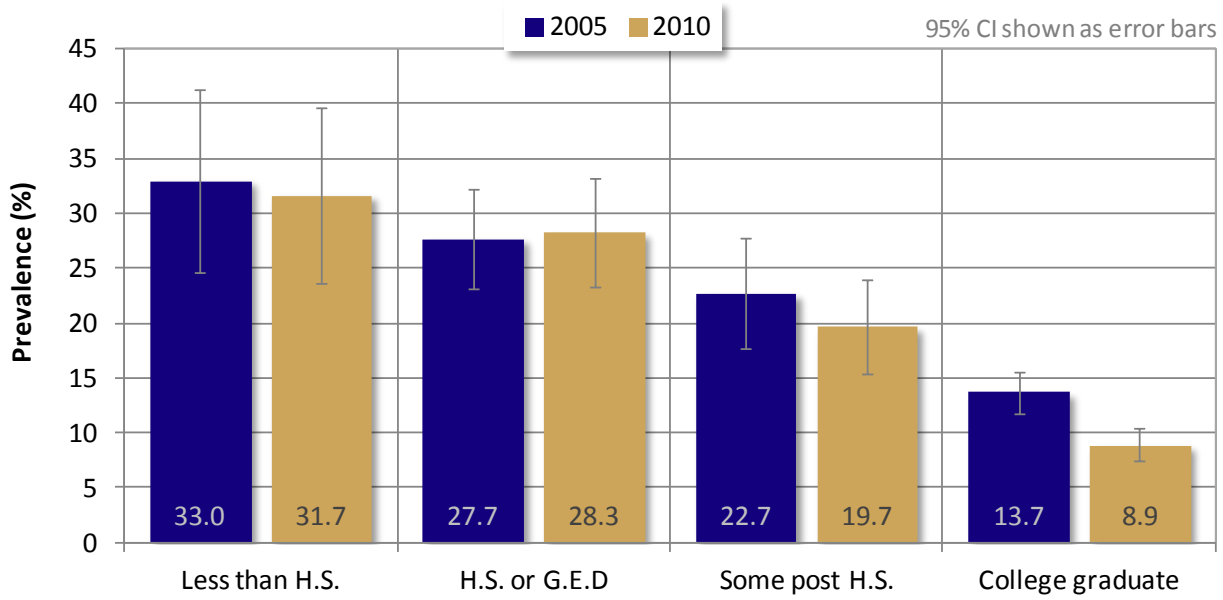


Figure 5-11 shows a distinct trend of smoking prevalence stratified by education level for year 2010. Smoking prevalence among adult residents decreases with increasing education level. Residents with less than high school education have the highest smoking prevalence (31.7%) and college graduates have the lowest rate (8.9%). In 2010, the prevalence of smoking was approximately four times higher among residents with less than a high school education as compared to their counterparts with a college degree. The smoking rate among college graduates was significantly lower than all other education groups.

Both 2005 and 2010 data follow a similar decreasing trend. There was a decrease in smoking prevalence from 2005 to 2010 across all education strata except in one – residents with a high school degree/GED (+2%). The highest percent decrease was observed among residents with a college degree (-35%).

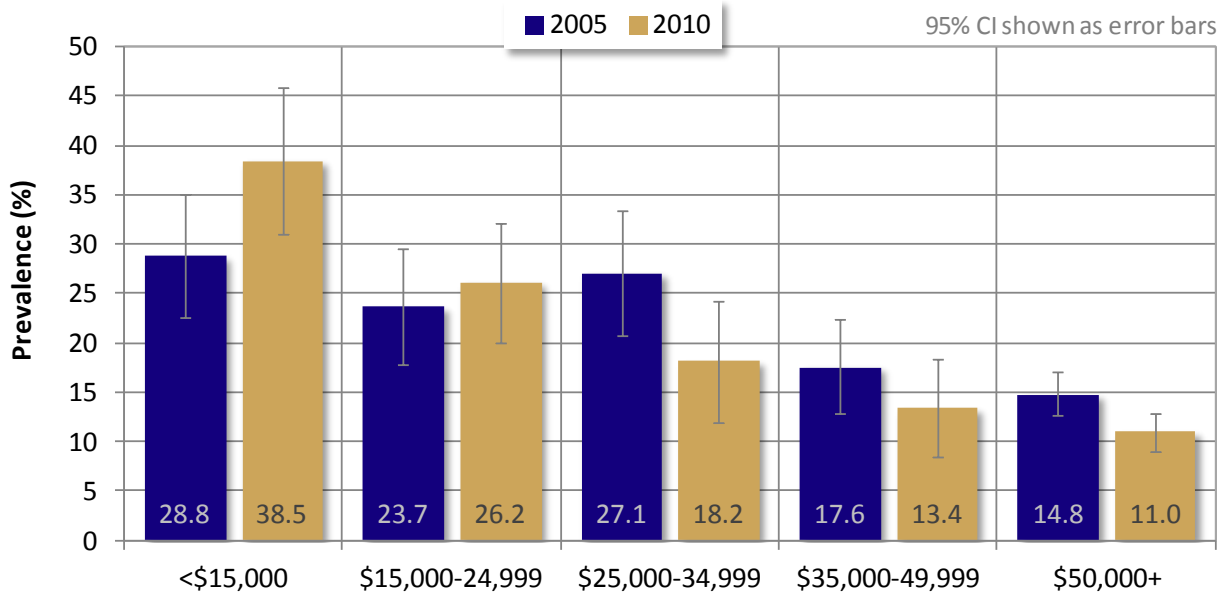
Figure 5-11: Prevalence of smoking among adult residents by education level, DC, 2005 & 2010.



In 2010, smoking prevalence by household income has a similar trend as observed with education level (Figure 5-12). Residents with less than $15,000 have the highest prevalence of smoking; and the rate decreased with increase in household income. Thus, residents with a household income of $50,000 and higher had the lowest prevalence of smoking in 2010. The smoking prevalence among residents with an income of $50,000 and higher (11%) was significantly lower than residents with a household income of less than $15,000 (38.5%) and those between $15,000 and $24,999 (26.2%).

Figure 5-12 shows smoking prevalence rates increased from 2005 to 2010 among residents with a household income less than $15,000 (+34%) and those between $15,000 to $24,999 (+11%). Among all other income strata smoking prevalence decreased in 2010. The highest percent decrease in prevalence was observed among residents with household income of $25,000 to $34,999 (-33%).

Figure 5-12: Prevalence of smoking among adult residents by household income level, DC, 2005 & 2010

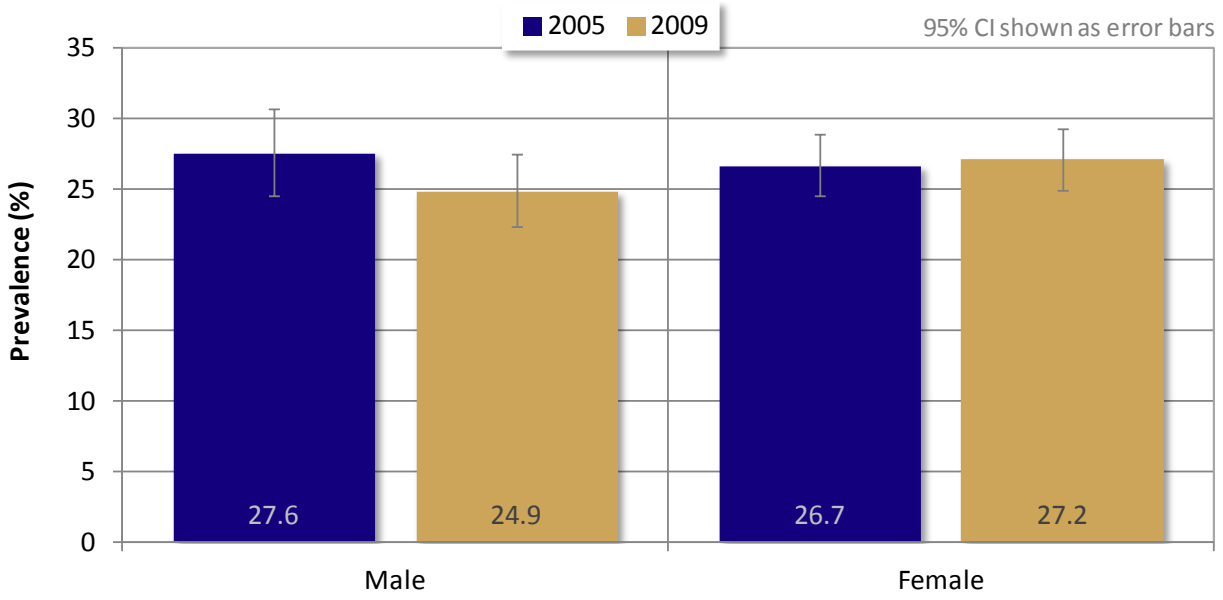


5.3. High Blood Pressure

High blood pressure (HBP), or hypertension, is considered both a cardiovascular condition and as a major risk factor for atherosclerosis, CHD, stroke, and heart failure. In adults, HBP is defined as a systolic pressure of 140mm Hg or higher and/or diastolic pressure of 90 mm Hg or higher for an extended time. A systolic pressure of 120 to 139 mm Hg or a diastolic pressure of 80 to 89 mm Hg is considered "pre-hypertension" and should be monitored carefully. HBP is called "the silent killer" because many people can have HBP for years without their knowledge. HBP is a major modifiable risk factor for heart disease and stroke. Adults should be aware that having their blood pressure checked regularly is an important first step in identifying and controlling HBP. Medications to reduce blood pressure levels among people with high blood pressure can reduce their risk for heart disease, stroke, and other coronary events. A 12 to 13 point reduction in blood pressure among people with high blood pressure can reduce the risk of heart attacks by 21%, strokes by 37% and total CVD deaths by 25%.

The prevalence of HBP among District adult men in 2009 was 24.9%; and among women it was 27.2% (Figure 5-13). The HBP prevalence among men was eight percent lower than those of their female counterparts. The difference in rates by gender was not statistically significant. From 2005 to 2009, a 10% decrease in HBP prevalence was observed among adult male residents; while a two percent increase was observed among women (Figure 5-13).

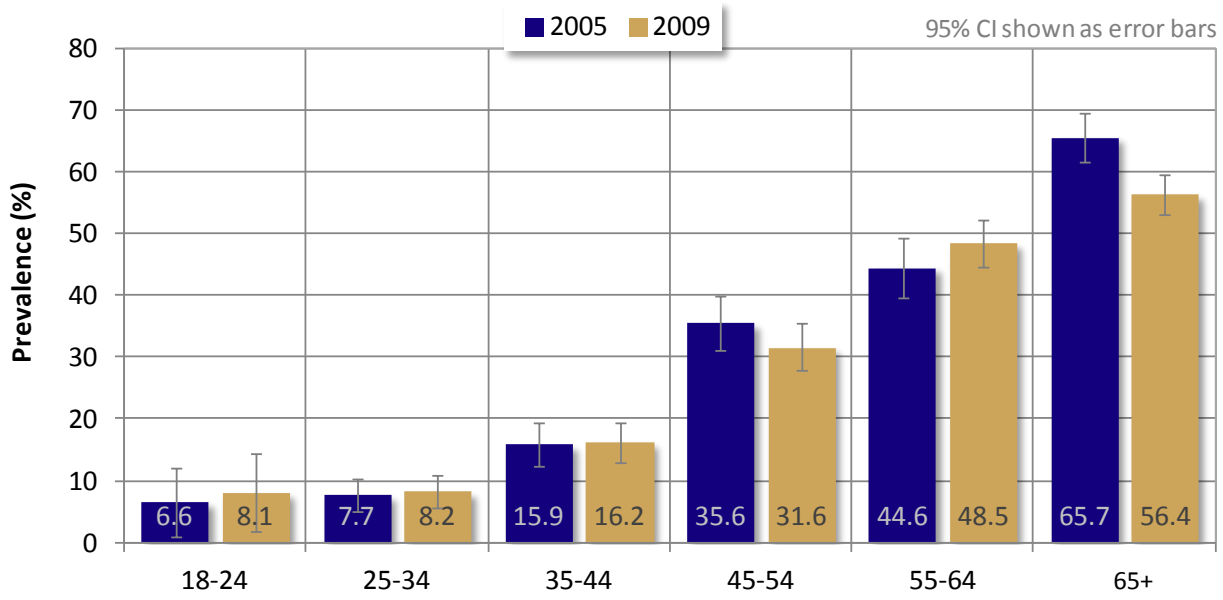
Figure 5-13: Prevalence of high blood pressure among adult residents by gender, DC, 2005 & 2009.



The prevalence of HBP was analyzed by age group (Figure 5-14). The findings show an increasing trend of HBP prevalence with increasing age group. In 2010, residents 65 years and older had the highest prevalence (56.4%) and residents 18 to 24 years had the lowest (8.1%). The HBP prevalence among residents 65 years and older was significantly higher than all other age groups.

From 2005 to 2009, a decrease in HBP prevalence was observed among two age groups: 65 and older, and 45-54 years. Residents 65 years and older had the highest percent decrease in HBP prevalence of 14%. Residents 18 to 24 years had a 23% increase in HBP prevalence during the same time period. All other age groups had a slight increase in HBP (<10%).

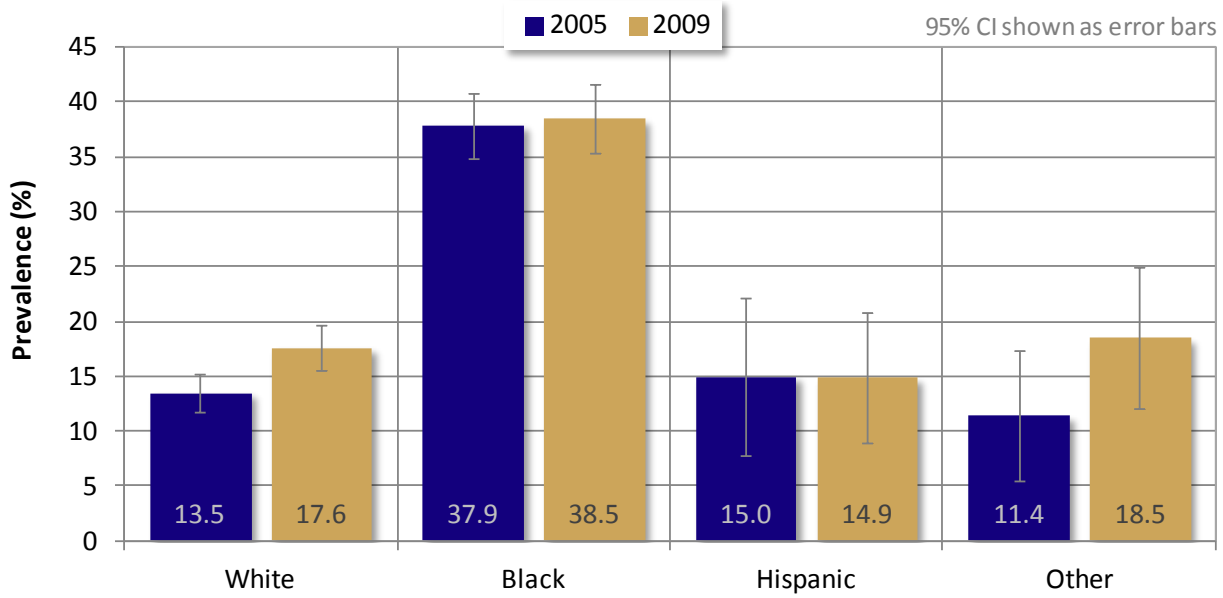
Figure 5-14: Prevalence of high blood pressure among adult residents by age group, DC, 2005 & 2009.



In 2009, non-Hispanic Black adult residents had the highest HBP prevalence (38.5%). Residents of Hispanic origin had the lowest prevalence (14.9%). The prevalence of HBP was about two times higher among non-Hispanic Black residents than their White counterparts and almost three times higher than Hispanic residents. These differences in HBP prevalence by race were statistically significant.

There was a 30% increase in HBP prevalence among non-Hispanic White residents from 2005 to 2009. In contrast, there was a two percent increase in prevalence among non-Hispanic black residents during the same time period. Figure 5-15 shows a 62% increase in HBP among residents who reported their race as "other" in 2009. However, the percent change in prevalence was negligible among the Hispanic population.

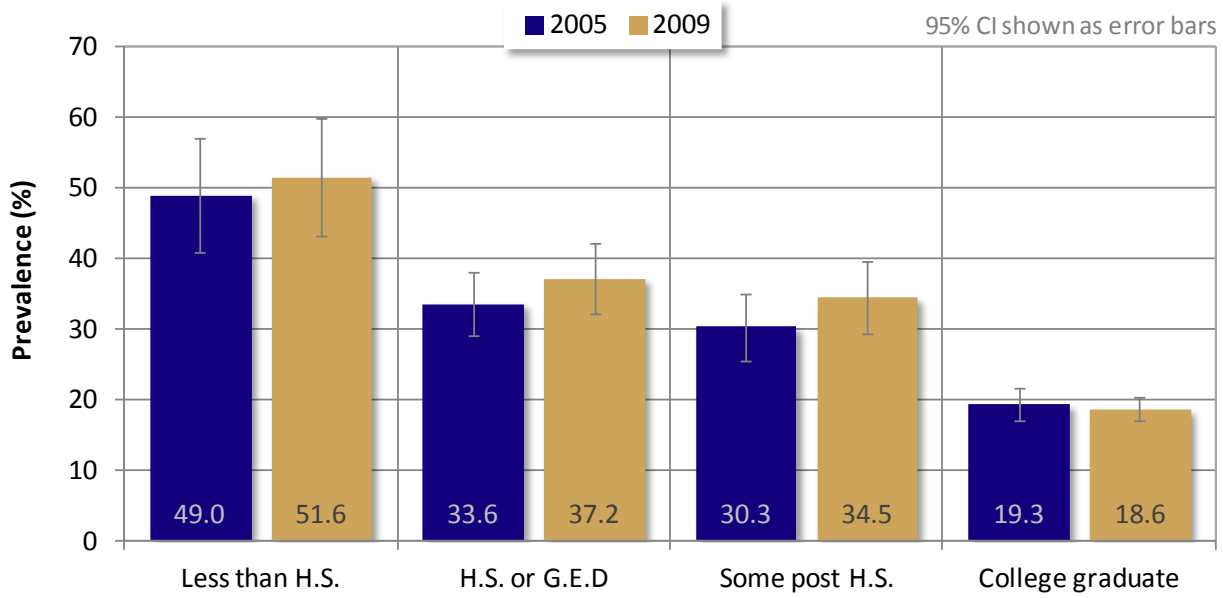
Figure 5-15: Prevalence of high blood pressure among adult residents by race, DC, 2005 & 2009.



When HBP data was stratified by socioeconomic indicators, education level and household income, showed a similar decreasing trend. In 2009, the prevalence of HBP decreased with increasing education level (Figure 5-16) and increasing household income (Figure 5-17). In 2009, residents with less than a high school education had the highest HBP prevalence (51.6%); while, college graduates had the lowest prevalence rate (18.6%). The difference in HBP prevalence between residents with less than a high school education and all other education levels was statistically significant.

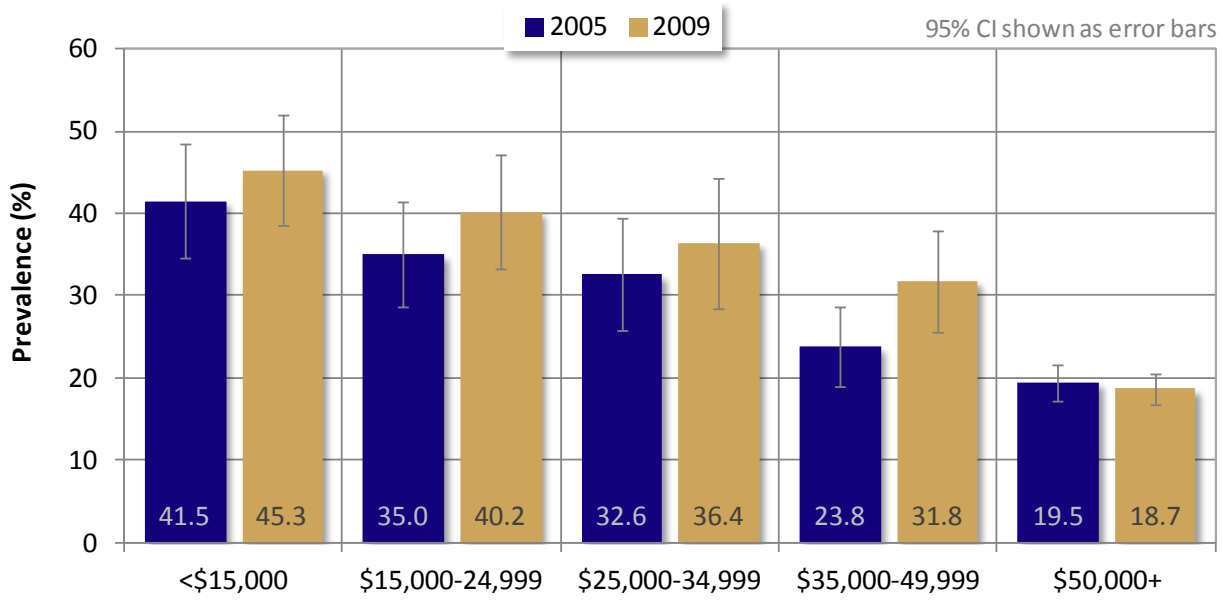
Figure 5-16 shows that from 2005 to 2009 there was an increase in HBP prevalence among all education strata except college graduates. The highest percent increase in prevalence was observed among residents with some post high school education (+14%); while college graduates experienced a slight decrease of prevalence (-4%).

Figure 5-16: Prevalence of high blood pressure among adult residents by education level, DC, 2005 & 2009.



Residents with a household income less than $15,000 had the highest prevalence of HBP (45.3%), which was more than two times higher than those with a household income of $50,000 and above (Figure 5-17). Residents with a household income of $50,000 and above had the lowest HBP. Figure 5-17 shows, in 2009, the HBP prevalence for residents with a household income of $50,000 and above was significantly lower than every other household income group. Similar to education data, there was an increase in HBP prevalence from 2005 to 2009 among all strata except one – residents with a household income of $50,000 and above. The highest percent change in prevalence was observed among residents with a household income of $35,000 to $49,999 – a 34% increase. In contrast, the lowest percent increase was among residents with a household income less than $15,000 – a nine percent increase. Residents with a household income above $50,000 experienced a four percent decrease in HBP prevalence from 2005 to 2009.

Figure 5-17: Prevalence of high blood pressure among adult residents by household income level, DC, 2005 & 2009.



5.4. High Cholesterol

High cholesterol refers to elevated total cholesterol concentrations. Low levels of low density lipoprotein (LDL-cholesterol), or "bad" cholesterol, and high levels of high density lipoprotein (HDL-cholesterol), or "good" cholesterol, are considered optimal. The standard definition of high blood cholesterol is a value above 200 mg/dl, although many doctors are now citing 180 mg/dl as the maximum. Approximately 105 million Americans have a total cholesterol level of 200mg/dl or higher, which is considered above optimal levels.

High blood cholesterol is one of the major independent risk factors for heart disease and stroke. It has no symptoms, and many people have it without knowing. Controlling cholesterol is critical to reducing the health and economic burden of heart disease and stroke. Current guidelines recommend that all adults have their blood cholesterol levels checked at least once every five years.[8] Over 80% of those who have high blood cholesterol do not have it under control. A 10% decrease in total cholesterol levels may reduce the incidence of CHD by about 30%. The risk of CHD rises as blood cholesterol levels increase. When other risk factors (such as high blood pressure and tobacco smoking) are present, the risk increases even more.

In 2009, the prevalence of high cholesterol among District men was 36% and among women, 33.3%. Figure 5-18 shows that the difference in prevalence of high cholesterol by gender in 2009 was not statistically significant. There was no change in the prevalence of high cholesterol among male residents from 2005 to 2009. However, there was a 19% increase in prevalence among female residents during the same time period.

Figure 5-18: Prevalence of high cholesterol among adult residents by gender, DC, 2005 & 2009.

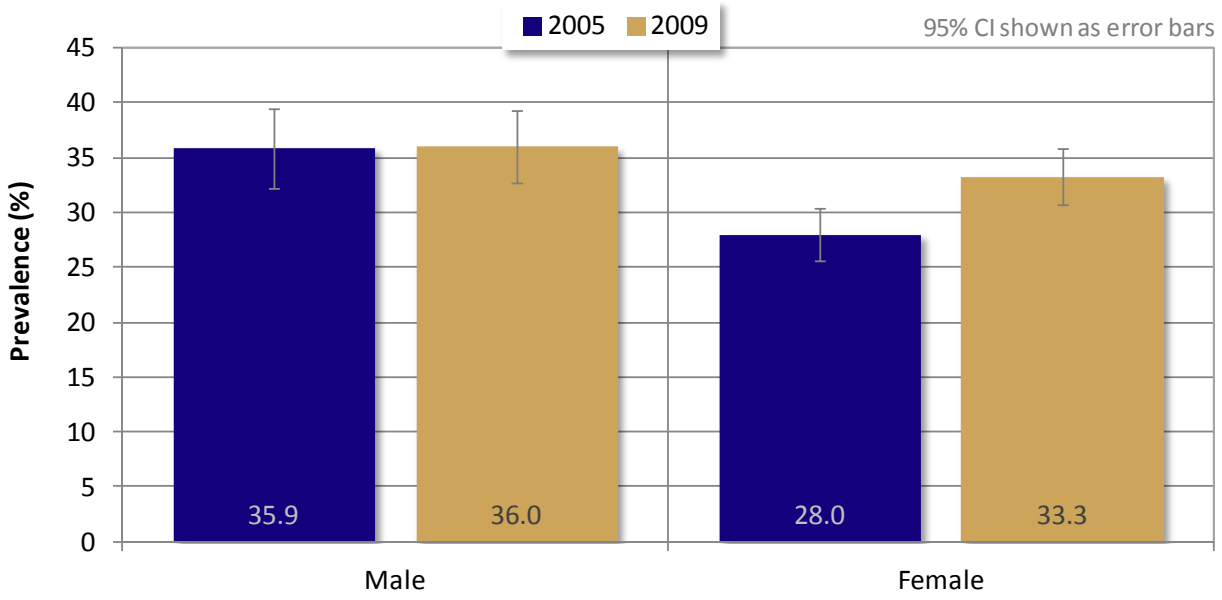
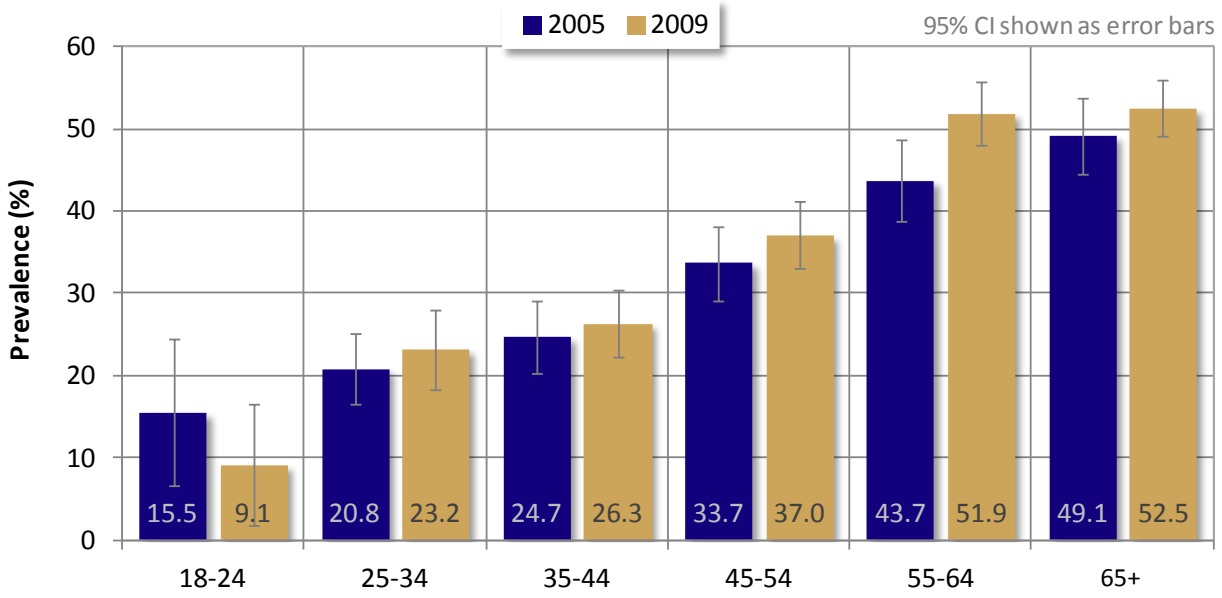


Figure 5-19 shows an increasing trend of high cholesterol prevalence by increasing age group. Younger adults tend to have a lower prevalence rate of high cholesterol as compared to older adults. In 2009, residents 65 years and older had a prevalence rate of 52.5%, about six times higher than residents 18 to 24 years (9.1%). In 2009, the prevalence of high cholesterol among residents 65 years and older, and 55 to 64 years was significantly higher than all other age categories.

From 2005 to 2009, there was an increase in the prevalence of high cholesterol among all age groups except among residents 18 to 24 years. A 41% decrease in prevalence was observed among young adults 18 to 24 years. Residents 55 to 64 years had the highest percent increase in prevalence of 19%.

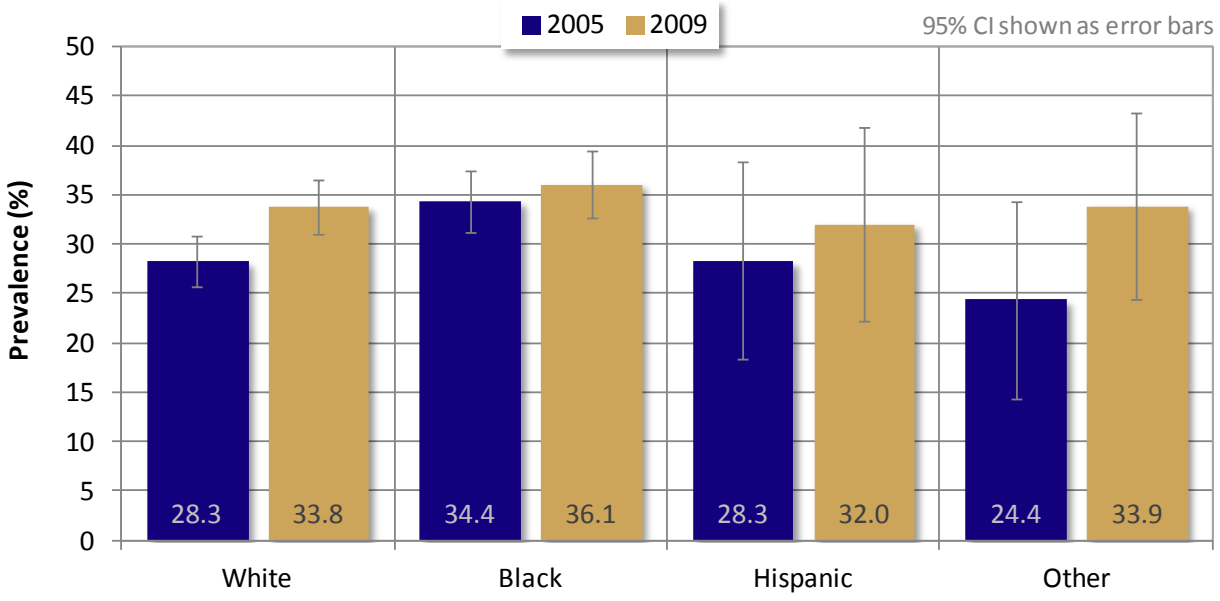
Figure 5-19: Prevalence of high cholesterol among adult residents by age group, DC, 2005 & 2009.



In 2009, non-Hispanic Black residents had the highest prevalence of high cholesterol (36.1%) followed by non-Hispanic White (33.8%) and Hispanic (32%) residents (Figure 5-20). The difference in the prevalence of high cholesterol by race was not statistically significant in 2009.

From 2005 to 2009, there was an increase in high cholesterol prevalence across all race categories. Non-Hispanic White residents had a 19% increase in prevalence of high cholesterol, which was approximately four times higher than the percent increase observed among non-Hispanic Black residents. During this same time period, there was a 13% increase in prevalence among Hispanic residents and 39% increase among 'others'.

Figure 5-20: Prevalence of high cholesterol among adult residents by race, DC, 2005 & 2009.



When data on high cholesterol was stratified by education level, a statistically significant difference in prevalence was observed across two education categories. In 2009, adult residents with less than a high school education level had the highest prevalence of high cholesterol (46.5%) and resident with some post high school education had the lowest (32.1%; Figure 5-21). In 2009, there was a statistically significant difference in high cholesterol rates between those with less than high school education and those with some post high school; a 45% higher prevalence. Similarly, the prevalence of high cholesterol was significantly higher (+38%) among residents less than high school as compared to residents with college degrees.

Across all education strata there was an increase in prevalence of high cholesterol from 2005 to 2009. There was a 19% increase in prevalence among college graduates during this time period, the highest percent increase across all strata. Similarly, residents with less than a high school education had a 15% increase in prevalence. There was negligible increase (<1%) in high cholesterol rate among the other two categories.

Figure 5-21: Prevalence of high cholesterol among adult residents by education level, DC, 2005 & 2009.

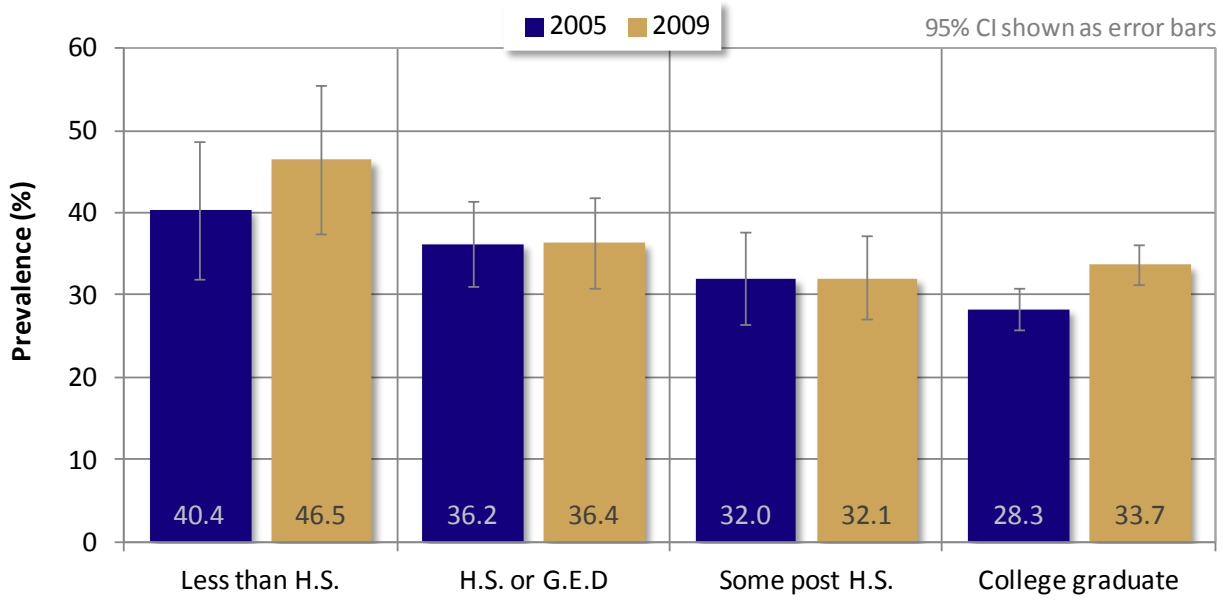
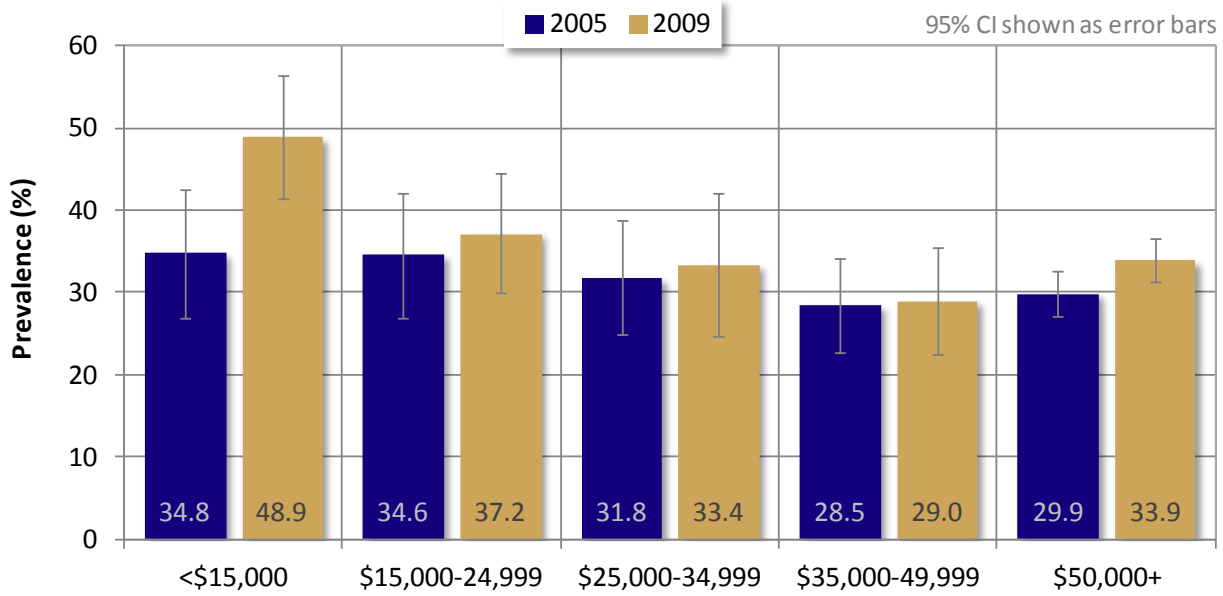


Figure 5-22 shows that during 2009, residents with household incomes less than $15,000 had the highest rate (48.9%) and those with household incomes between $35,000 and $49,999 had the lowest (29%; Figure 5-22). In 2009, the prevalence of high cholesterol among residents with household incomes less than $15,000 was 69% higher than those with household incomes between $35,000 and $49,999; and 44% higher than those with household incomes of $50,000 and above. These differences were statistically significant.

There was an increase in high cholesterol prevalence from 2005 to 2009 across all income strata. However, the prevalence increase was highest (41%) among residents with household incomes less than $15,000. Residents with household incomes of $50,000 and above had 13% increase in prevalence during the same time period. The other three income categories had negligible (less than 10 percent) increase in high cholesterol prevalence from 2005 to 2009.

Figure 5-22: Prevalence of high cholesterol among adult residents by household income level, DC, 2005 & 2009.



5.5. Physical Inactivity

Lack of physical activity or regular exercise is a risk factor for heart disease, stroke, obesity, and other risk factors for CVD. Regular, moderate-to-vigorous exercise is important to reduce the risk of CVD, by helping to control weight, high blood cholesterol, and diabetes, as well as helping lower blood pressure in some people. For most healthy people, the American Heart Association recommends 30 to 60 minutes of physical activity on most days of the week to condition the heart and lungs. Moderate activities such as walking, gardening, housework and dancing for at least 30 minutes on most days can help strengthen the heart. For the purposes of this report, *physical inactivity* means that adults 18 years and older did not participate in any leisure time physical activity (i.e., physical activity that was not performed at ones job) in the past month.

In 2010, 23.6% of female residents did not participate in any physical activity in the past month, which was 48% higher physical inactivity than their male counterparts (15.9%; Figure 5-23). This difference was statistically significant. From 2005 to 2010, there was a decrease in the prevalence of physical inactivity among both male (17%) and female (7%) residents, with a lower percent decrease observed among female adults.

Figure 5-23: Prevalence of physical inactivity among adult residents by gender, DC, 2005 & 2010

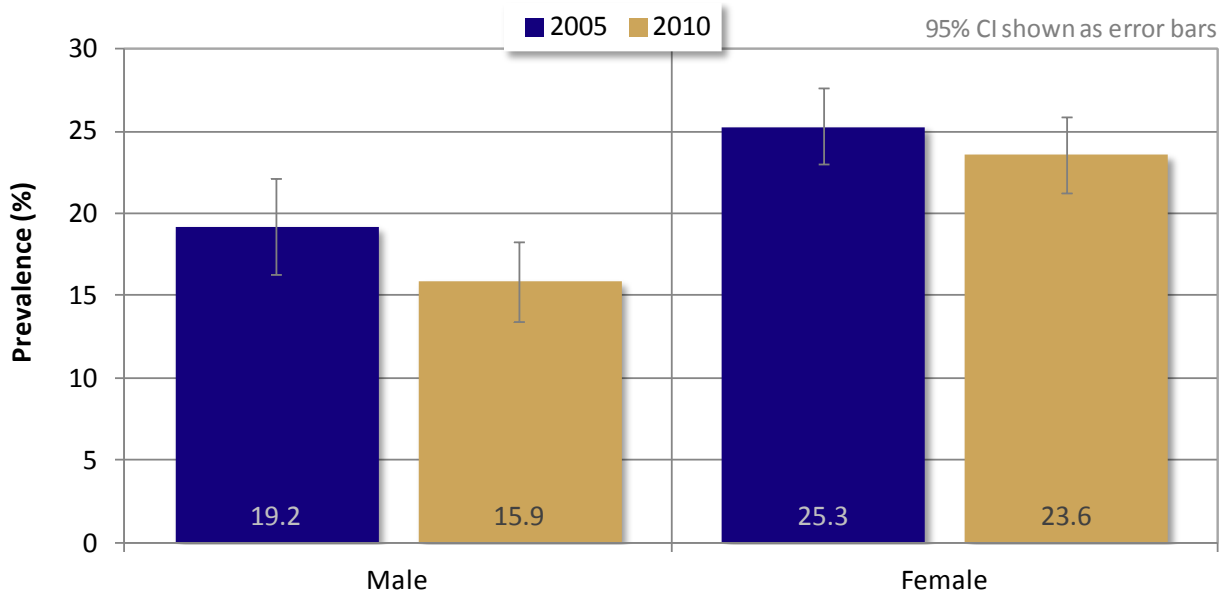
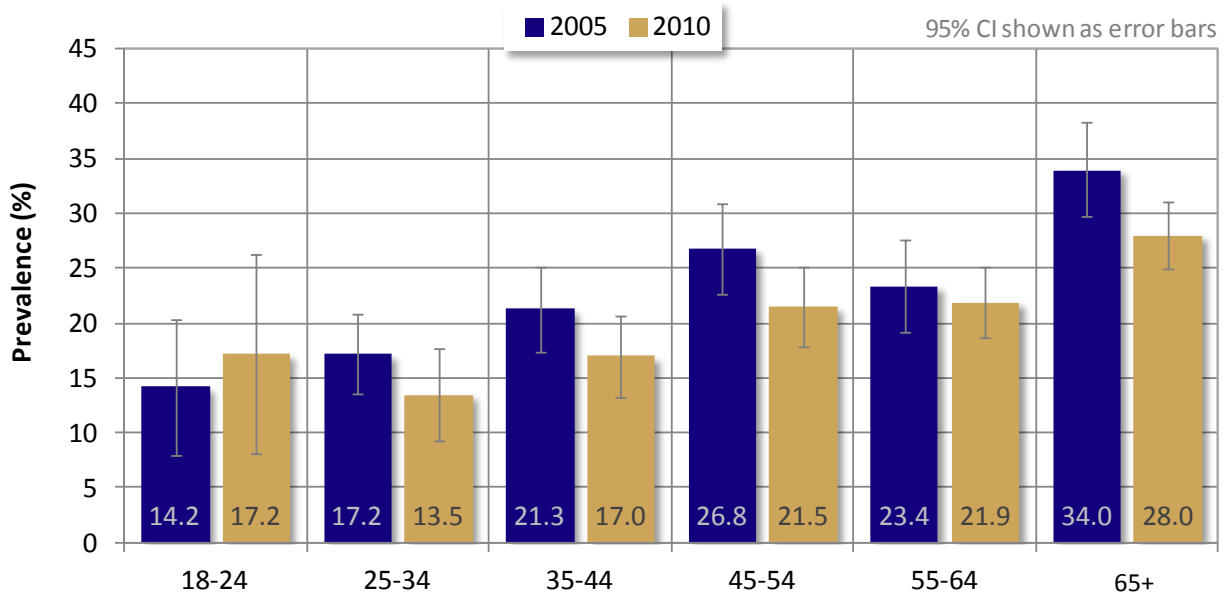


Figure 5-24 shows that older residents had a higher prevalence of physical inactivity, or, in other words, were less likely to participate in any physical activity in the past month. In 2010, residents 65 years and over had the highest rate (28%) and residents 25 to 34 years have the lowest rate (13.5%) of physical inactivity. The prevalence of physical inactivity was significantly higher among older residents (65+ years) than residents 25 to 34 years and 35 to 44 years.

A decrease in prevalence of physical inactivity was observed from year 2005 to 2010 across all age groups except among residents 18 to 24 years (Figure 5-24). There was a 21% percent increase in prevalence of physical inactivity among young adults 18 to 24 years during this period. Conversely, residents between ages 25 and 54 years had approximately 20 to 22 percent decrease in prevalence of physical inactivity; while 55 to 64 year olds had a slight decrease (-6%) in prevalence. Older residents, over the age of 65, had an 18% decrease in physical inactivity from 2005 to 2010. These results show that more adults were engaging in physical activity in 2010 compared to 2005, especially older adults.

Figure 5-24: Prevalence of physical inactivity among adult residents by age group, DC, 2005 & 2010



In 2010, the prevalence of physical inactivity was highest among non-Hispanic Black residents (28%), and lowest among non-Hispanic White residents (Figure 5-25). In other words, non-Hispanic White adults were more physically active in the past month compared to non-Hispanic Black adults. The prevalence of physical inactivity was three times higher among non-Hispanic Black residents as compared to their White counterparts. This finding was statistically significant. Further, the rate of physical inactivity among Hispanic resident was 21%, in 2010.

From 2005 to 2010, there was a 10% decrease in the prevalence of physical inactivity among non-Hispanic Black residents, that is, the percent of non-Hispanic Black adults who reported being physically active in 2010, increased from 2005. In contrast, there was a nine percent increase in prevalence among non-Hispanic White residents during the same time period. A five percent increase was observed among Hispanic residents while residents that indicated 'Other' as a race had a 16% increase in the rate of physical inactivity.

Figure 5-25: Prevalence of physical inactivity among adult residents by race, DC, 2005 & 2010.

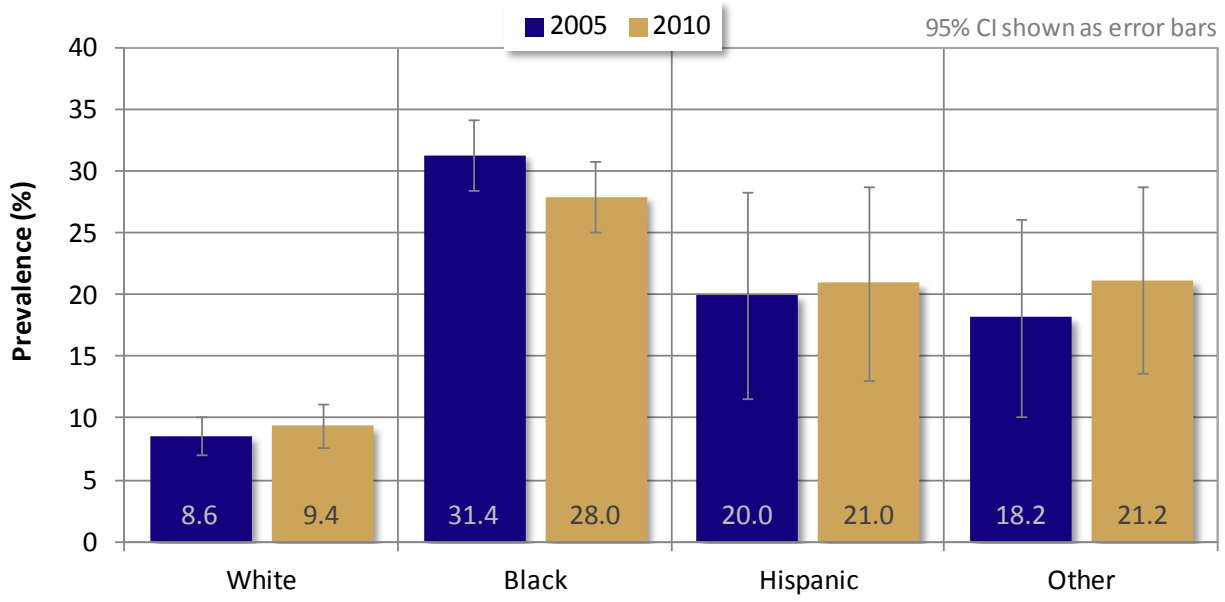
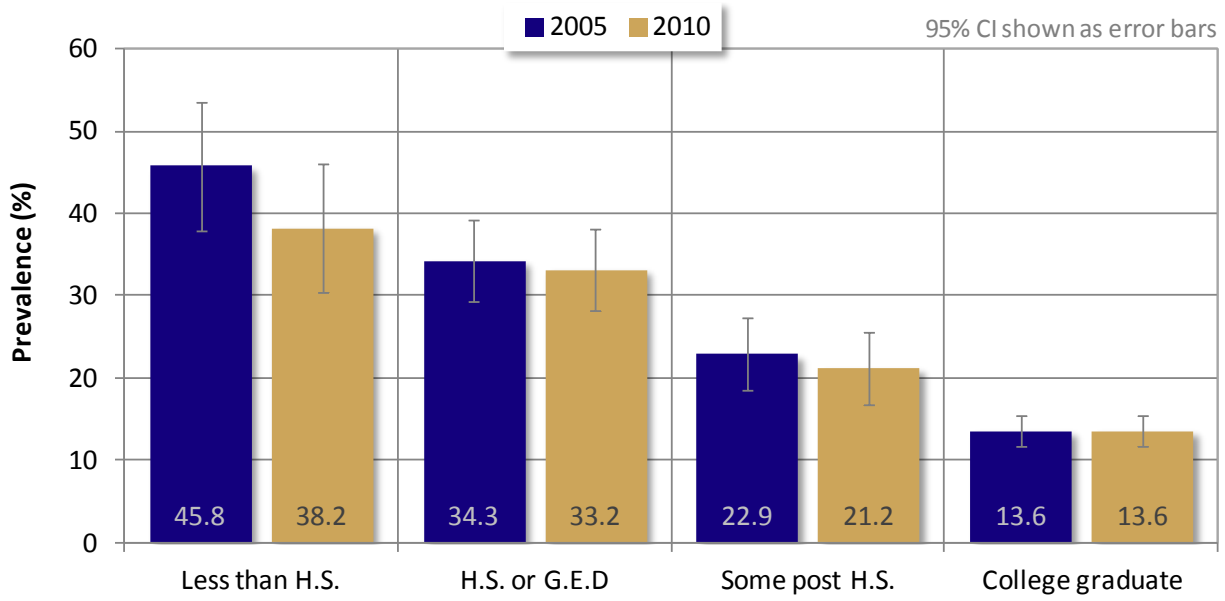


Figure 5-26 shows a decreasing trend in physical inactivity with an increase in education level. In 2010, 38.2% of residents with less than a high school education were physically inactive, the highest rate of physical inactivity. College graduates had the lowest prevalence of physical inactivity (13.6%), or were more likely, compared to adults of lower education levels, to engage in physical activity. In 2010, the rate of physical inactivity was significantly higher (+80%) among residents with less than high school education as compared to residents with some post high school education. Similarly, the prevalence was about three times higher among residents with less than a high school education compared to college graduates, and this finding was statistically significant.

From 2005 to 2010, there was a 17% decrease in the prevalence of physical inactivity reported among residents with less than a high school education, which was the highest percent decrease across all education strata. In other words, there was an increase in the percent of adults with less than high school education to participate in physical activity outside of their job. Negligible changes in prevalence were observed among all other strata, with no change reported among residents with college degrees.

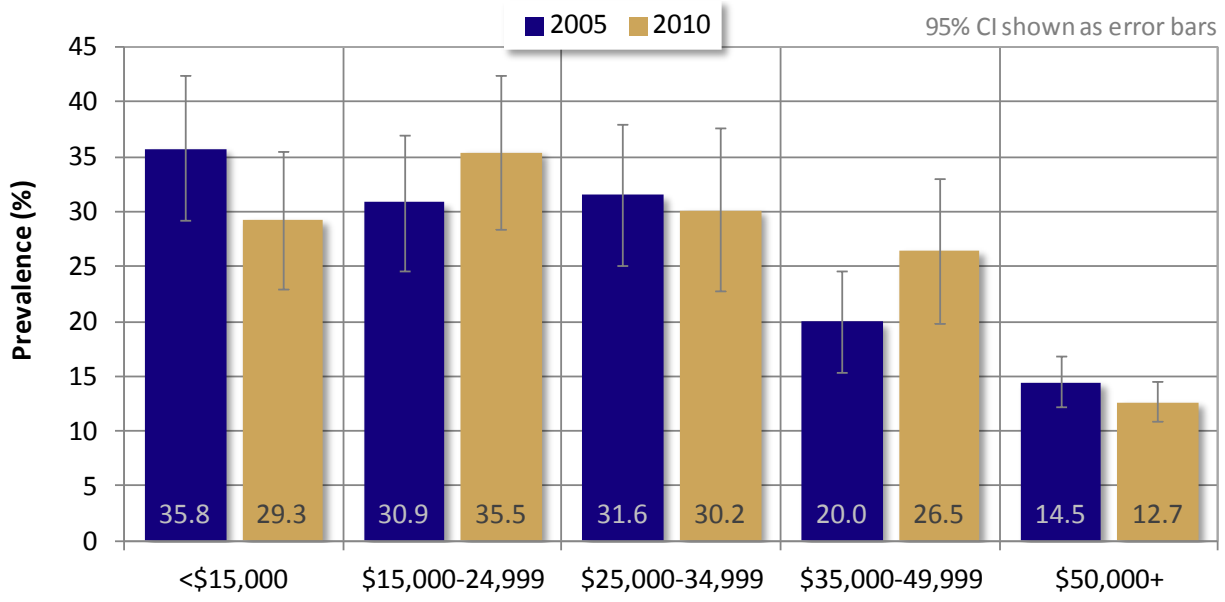
Figure 5-26: Prevalence of physical inactivity among adult residents by education level, DC, 2005 & 2010.



In 2010, 35.5% of adults with a household income between $15,000 and $24,999 did not participate in any physical activity in the previous month, whereas only 12.7% of adults with a household income of $50,000 and above did not participate in physical activity in the past month (Figure 5-27). Residents with household incomes of $50,000 and above had a significantly lower rate of physical inactivity as compared to all other household income categories during the years examined.

From 2005 to 2010, there was a decrease in the prevalence of physical inactivity among three income strata: less than $15,000 (-18%), $25,000-34,999 (-4%), and $50,000 and above (-12%). There was a 33 and 15 percent increase in prevalence of physical inactivity among residents with household incomes of $15,000 to $24,999 and $35,000 to 49,999, respectively. The lowest and highest income categories increased engagement in physical activity, but the middle income groups increased physical inactivity and risk of CVD.

Figure 5-27: Prevalence of physical inactivity among adult residents by household income level, DC, 2005 & 2010.



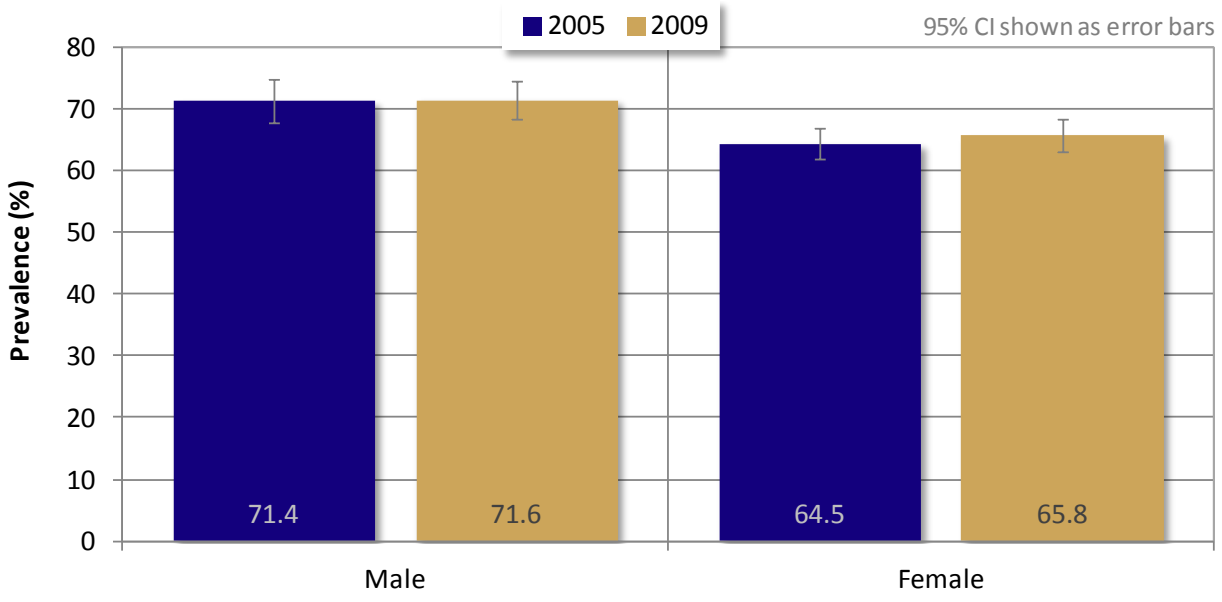
5.6. Diet: Low Fruit and Vegetable Consumption

Diets high in fruits and vegetables can protect against CVD—especially CHD—by lowering adverse risk factors such as high blood pressure, high cholesterol, and overweight/obesity.[9,10] Whole fruits and raw or minimally processed fruit and vegetables provide fiber and a combination of multiple nutritional factors that may synergistically offer cardiovascular health benefits.[11] Further, nutrients, such as vitamins and minerals, in fruit and vegetables may affect inflammation and oxidative stress, insulin sensitivity, and blood pressure. Therefore, diets low in fruit and vegetables are a risk factor for CVD, and have health consequences, but changing dietary habits can be effective in managing risk factors and preventing CVD. The United States Department of Agriculture (USDA), Dietary Guidelines for Americans, 2010, noted that average fruit and vegetable consumption in the U.S. is well below the recommended daily total of 2-6 cups.[12]

The following results show fruit and vegetable intake of District adult residents surveyed in 2005 and 2009 stratified by demographic variables. 'Low fruit and vegetable intake/consumption' or 'poor diet' means intake of fruits and vegetables less than five times per day.

In 2009, 72% of male and 66% of female residents reported consuming fruits and vegetables less than five times per day (Figure 5-28). There was no statistically significant difference in the intake of fruits and vegetables by gender. In other words, a quarter to one third of residents did not eat adequate amounts of fruit and vegetables on a daily basis to maintain cardiovascular health or prevent CVD. Consumption of fruit and vegetables did not significantly change between 2005 and 2009 for either gender group.

Figure 5-28: Prevalence of low fruit and vegetable intake among adult residents by gender, DC, 2005 & 2009.



When 2009 data was stratified by age group, adult residents 18 to 24 years had the highest (77.5%) prevalence of poor fruit and vegetable intake (Figure 5-29).. The only statistically significant difference in fruit and vegetable intake was among age groups 18-24 (77.5%) and 65 and older (64.4%). A significantly higher percentage of residents 18 to 24 years had low fruit and vegetable intake per day as compared to residents 65 years and older.

Figure 5-29: Prevalence of low fruit and vegetable intake among adult residents by age group, DC, 2005 & 2009.

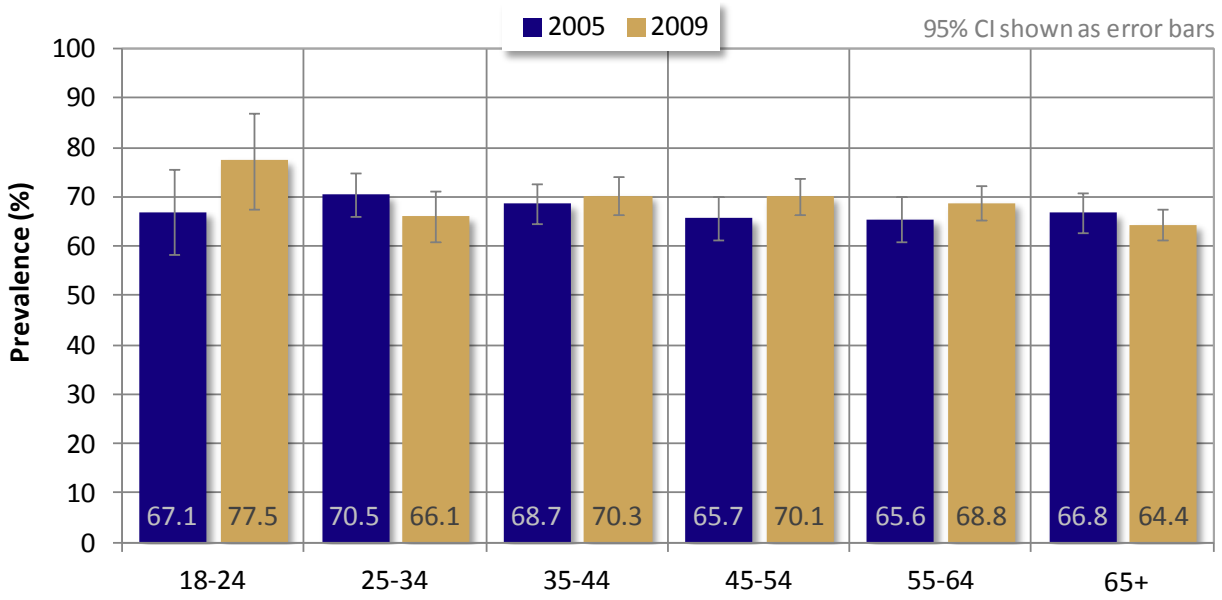
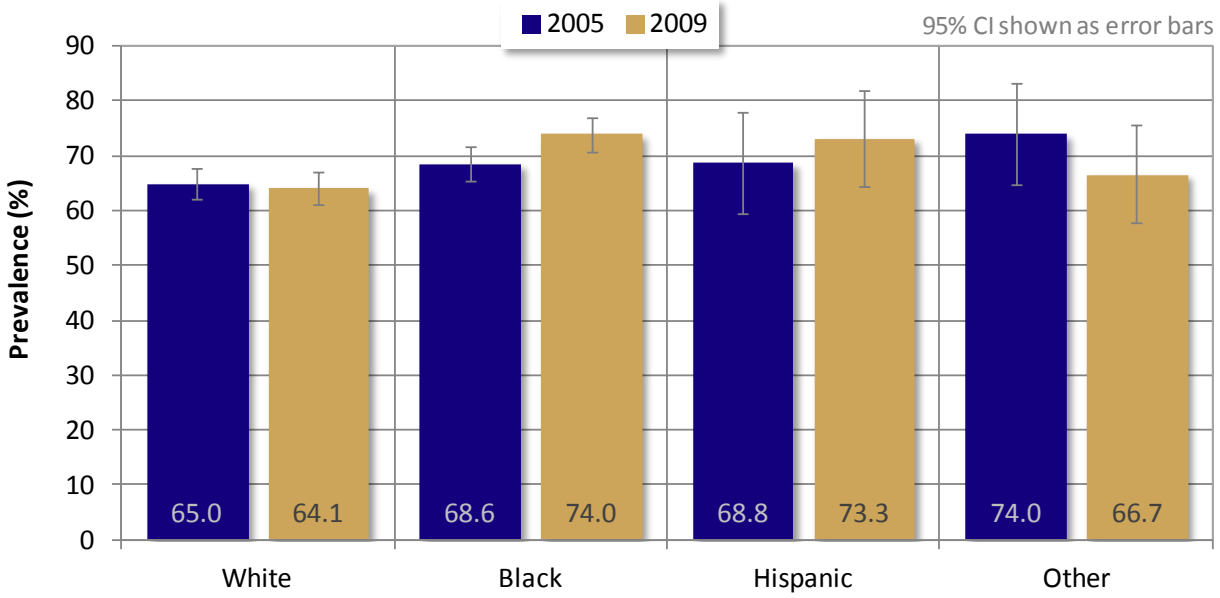


Figure 5-30 shows the prevalence of fruit and vegetable intake stratified by race. Although all race and ethnic groups had low fruit and vegetable intake, non-Hispanic Black residents (74%) had the highest prevalence of poor diet in 2009. Hispanics had the second highest rate (73.3%).There was a statistically significant difference in the prevalence rate among non-Hispanic Black and non-Hispanic White residents. Non-Hispanic Black residents had a 15% higher prevalence than their non-Hispanic White counterparts.

Figure 5-30: Prevalence of low fruit and vegetable intake among adult residents by race, DC, 2005 & 2009.



Residents with a college degree (65%) had the lowest prevalence of poor fruit and vegetable diet (Figure 5-31). The prevalence among residents with less than a high school education (77.6%) and those with a high school degree/GED (77.2%) was very similar and thus were not statistically significant. However, residents with less than a high school education and those with a high school degree/GED had a significantly higher (19%) prevalence of poor fruit and vegetable intake as compared to residents with college degrees.

Figure 5-31: Prevalence of low fruit and vegetable intake among adult residents by education level, DC, 2005 & 2009.

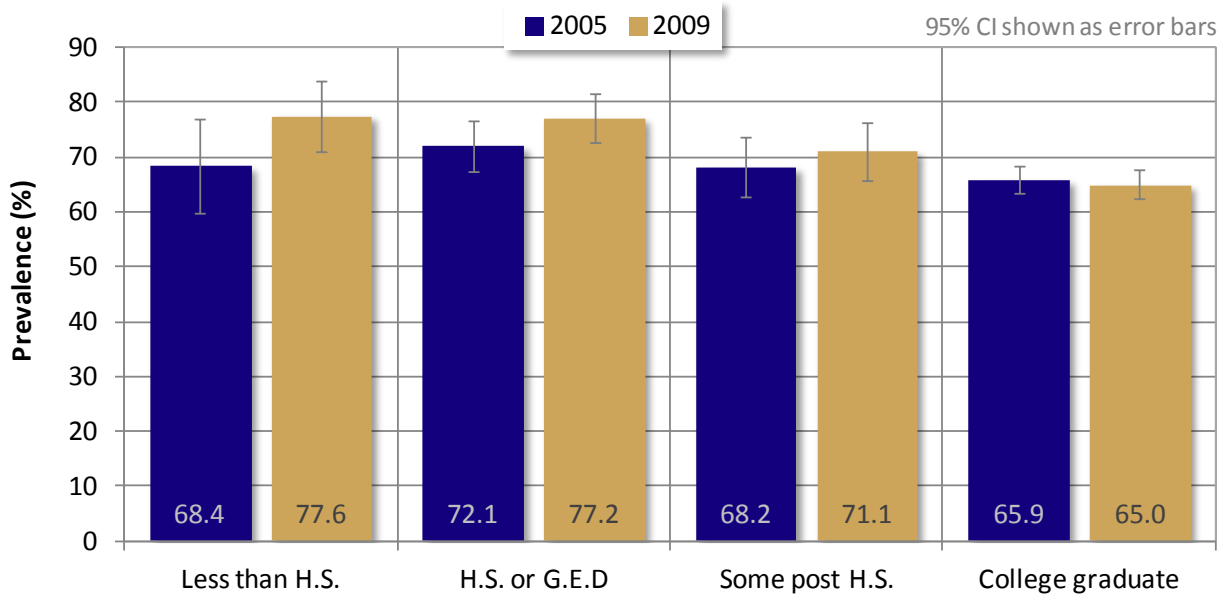
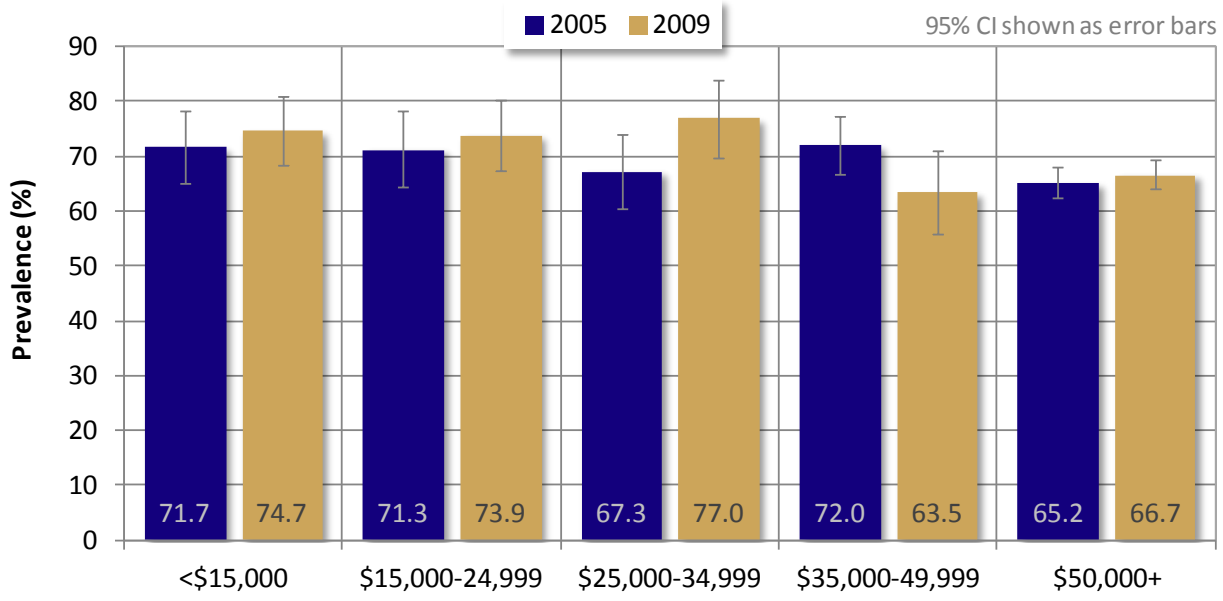


Figure 5-32 shows the results from prevalence of fruit and vegetable diet by household income in 2009. The prevalence for residents with a household income less than $15,000 (74.7%), $15,000-24,999 (73.9%), and $25,000-34,999 (77%) were very similar and thus not statistically significant. Residents with household incomes $35,000-49,999 (63.5%) and above $50,000 (66.7%) had a lower prevalence rate than all other income groups. Residents with household incomes of $25,000-34,999 had a significantly higher (15%) prevalence as compared to residents with household income above $50,000.

Figure 5-32: Prevalence of low fruit and vegetable intake among adult residents by household income level, DC, 2005 & 2009.

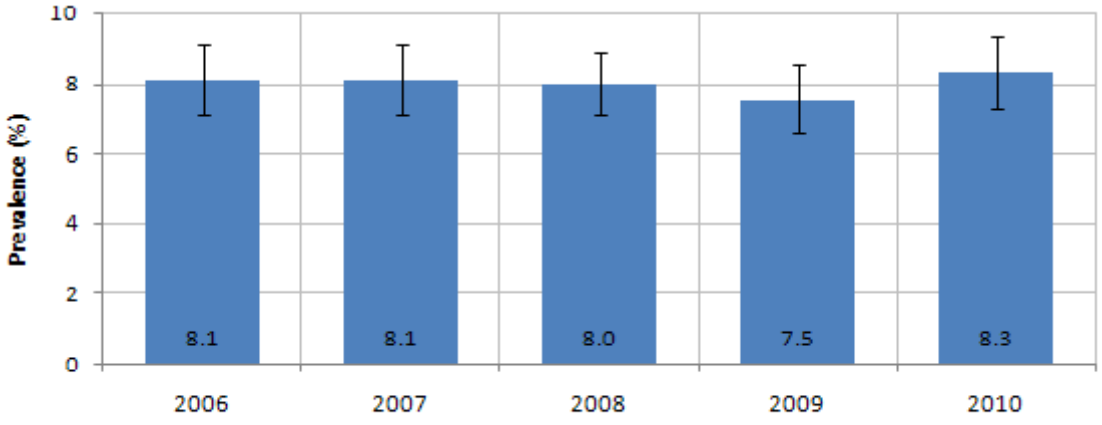


5.7. Diabetes

Diabetes is a group of metabolic diseases that are characterized by increased blood sugar or glucose, also known as hyperglycemia. Increased levels of glucose in the blood are caused by defects in either insulin secretion from the pancreas or deficient insulin action. Insulin is a hormone that helps cells intake glucose, where it is converted into energy. Type 1 diabetes is associated with deficiency in insulin secretion and accounts for approximately 5−10 percent of those affected by diabetes. Type 2 diabetes accounts for 90−95 percent of diabetes diagnoses and is associated with resistance to insulin action. Gestational diabetes refers to abnormal blood glucose levels beginning or first recognized during pregnancy—it occurs in nearly seven percent of all pregnancies. There are severe long term consequences of hyperglycemia and diabetes, including loss of vision, kidney failure, risk of foot ulcers, amputations, and risk of CVD. Patients with diabetes often also have other CVD risk factors including obesity or increased abdominal fat, physical inactivity, hypertension, and high cholesterol. Glucose control, weight management, and exercise can reduce risks for progression of diabetes and CVD, as well as complications from long term exposure to risk factors.[13]

The prevalence of diabetes among the District's adult residents did not significantly change from 2006 to 2010. There was a slight decline in 2008 and 2009, but there was an overall increase in prevalence of diabetes during these years. The prevalence was 8.1% in 2006 and 8.3% in 2010, a 2.5% increase (Figure 5-33).

Figure 5-33: Prevalence of diabetes among adult residents, DC, 2006-2010



In 2005 and 2010, the prevalence of diabetes in DC residents was higher among females (7.6 and 9.1 percent, respectively) than males (6.4 and 7.6 percent, respectively; Figure 5-34). The prevalence of diabetes increased for both males and females. In females there was a 21.6% increase in diabetes between 2005 and 2010. Similarly, diabetes in males increased but at a lower rate of 18.8% over the same time period.

Figure 5-34: Prevalence of Diabetes among adult residents by Gender, DC, 2005 & 2010

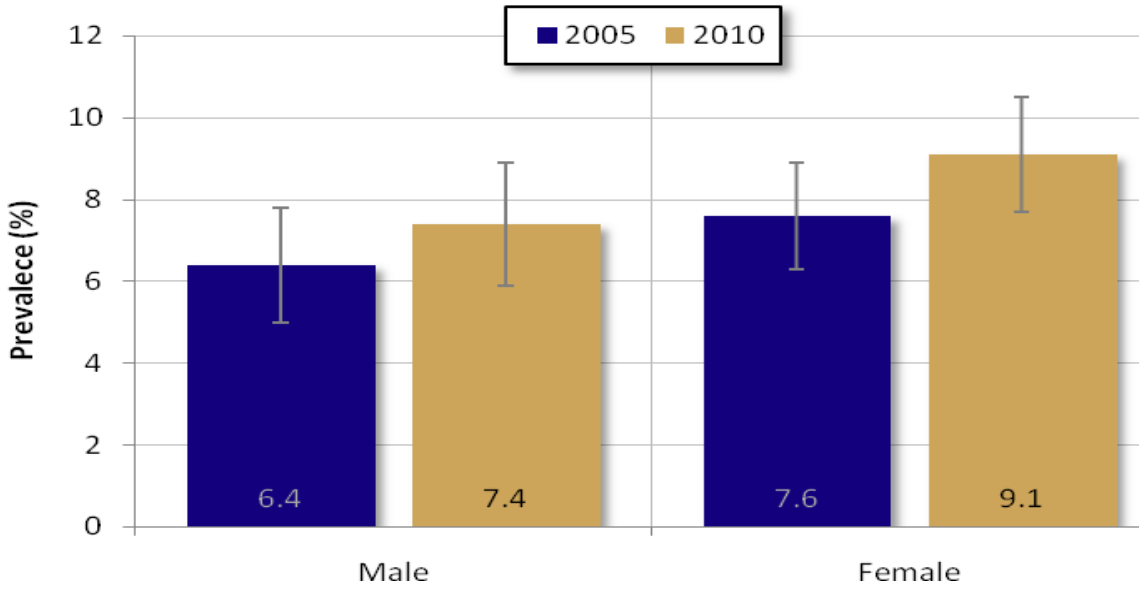
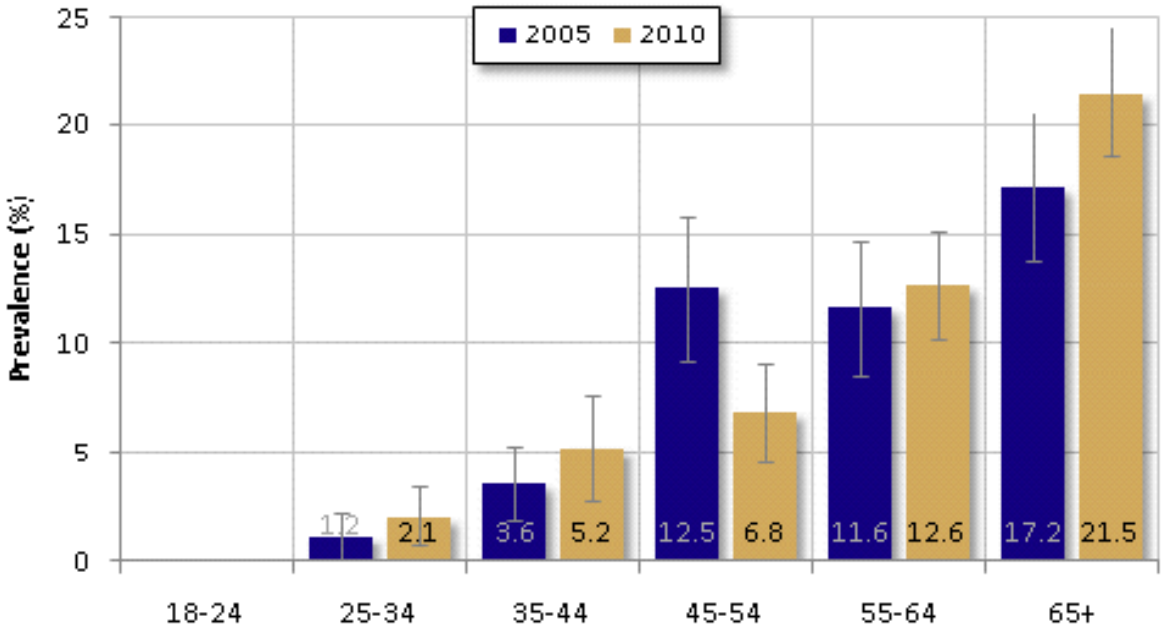


Figure 5-35 shows the prevalence of diabetes by age group. The prevalence of diabetes among residents 18 to 24 years is not reported because a small sample size produced unreliable prevalence estimates. The rate of diabetes increased with age in both 2005 and 2010. In 2005, diabetes was significantly more prevalent among those aged 45-54 years (12.5%) compared to 35-44 years (3.6%). Also, residents in the three oldest age groups had significantly higher rates of diabetes than the age groups 25-34 and 35-44 years. In 2010, residents aged 55-64 and 65+ years had significantly higher rates of diabetes than all younger age groups.

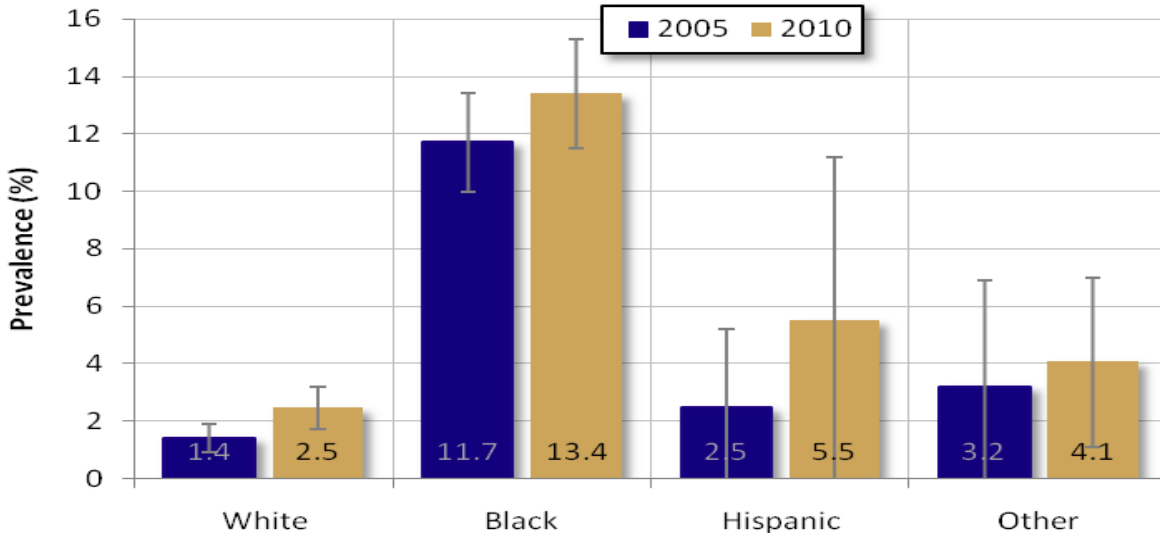
Between 2005 and 2010, there was an increase in diabetes prevalence for all age groups reported, except those aged 45-54 years. Further, from 2005 to 2010, residents aged 45-54 years had a 46.5% decrease in diabetes.

Figure 5-35: Prevalence of Diabetes among adult residents by age group, DC, 2005 & 2010



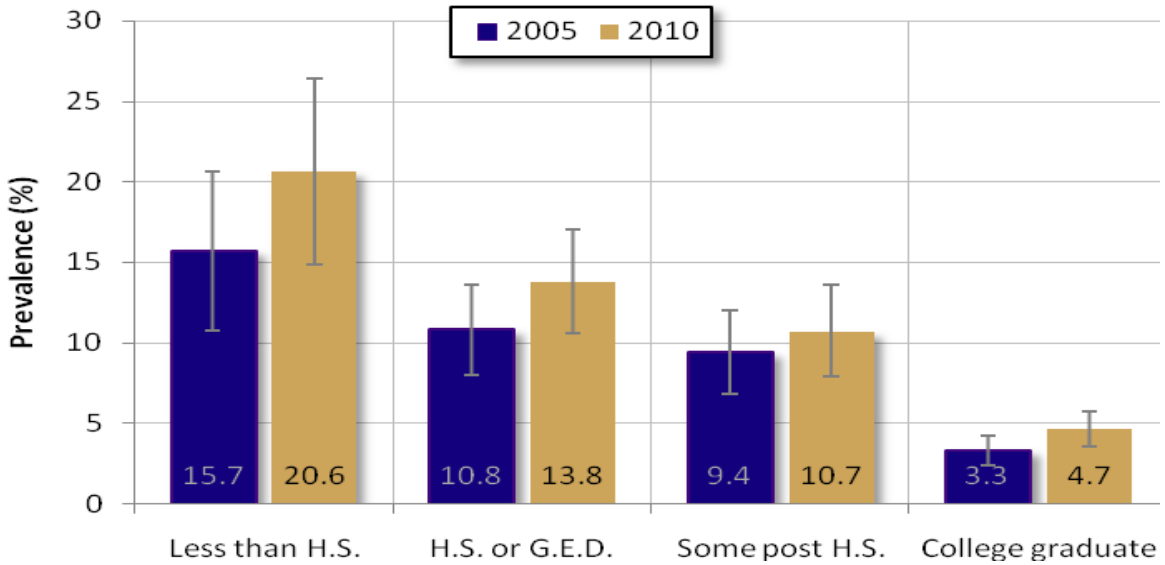
In 2005, 1.4% of non-Hispanic White residents, 11.7% of non-Hispanic Black residents, 2.5% of Hispanic residents, and 3.2% of residents of other race groups had diabetes (Figure 5-36). In 2010, all resident race groups had an increased rate of diabetes. The non-Hispanic Black prevalence of diabetes was statistically significantly higher than all other race groups within each year. The very large error bars for Hispanics, in Figure 5-36, can be explained by few Hispanic residents were sampled by Behavioral Risk Factors Surveillance System (BFRSS).

Figure 5-36: Prevalence of Diabetes among adult residents by race, DC, 2005 & 2010



In 2005 and 2010, the rate of diabetes decreased with increased education level (Figure 5-37). College graduates had statistically significantly lower rates of diabetes than all other education levels in both years. However, from 2005 to 2010 there was an increase in diabetes prevalence for all education levels. Moreover, the highest rate of increase in diabetes was among college graduates, which was 42.4%. Similarly, diabetes increased for residents with less than a high school education 31.2%, a High School diploma or G.E.D. 27.8%, and some post high school education 13.8 %.

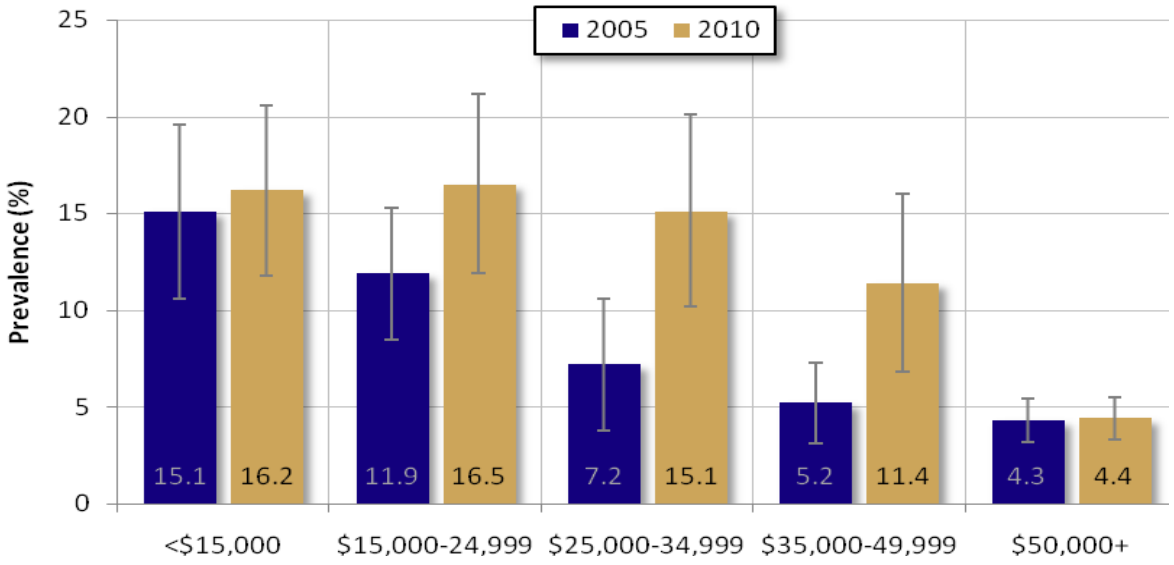
Figure 5-37: Prevalence of Diabetes among adult residents by education level, DC, 2005 & 2010



In 2005, the rate of diabetes decreased with increasing household income levels (Figure 5-38). Also, residents with a household income level $50,000+ had statistically significantly lower diabetes prevalence than both residents with a household income less than $15,000 and $15,000 to $24,000. In 2010, there was a similar decreasing trend for diabetes prevalence with increasing household income levels, except the highest diabetes rate was among residents with a household income $15,000 to $24,000 (16.5%). Similarly, in 2010, residents with a household income level $50,000+ had statistically significantly lower diabetes prevalence than all other residents.

Between 2005 and 2010, diabetes increased among all household income levels (Figure 5-38). The respective percent increases corresponding to the household income levels in Figure 5-38 were, 7%, 38.7%, 110%, 119%, and 2%, respectively. Most notable, in the household income levels $25,000 to $34,999 and $35,000 to $49,999, the prevalence of diabetes more than doubled between 2005 and 2010.

Figure 5-38: Prevalence of Diabetes among adult residents by household income level, DC, 2005 & 2010



6. Cardiovascular Disease Mortality

This section of the report summarizes age-adjusted leading causes of mortality in the District of Columbia for years 2005 and 2010, as well as trends in mortality from heart disease and cerebrovascular disease, or stroke, for years 2005-2010. The data was obtained from the District of Columbia State Center for Health Statistics, Vital Records Division and was analyzed for trends in differences between national and District data. Further, 2010 mortality data was stratified by demographic variables (i.e., gender, race, and ethnicity) to assess differences in mortality rates of the leading causes and identify high risk groups.

6.1. Leading Causes of Death

Table 6-1 and Table 6-2 show the ten leading causes of death in the District compared to the United States for 2005 and 2010, respectively. Heart disease was the number one leading cause of death in DC and the U.S. in 2005, and it remained the leading cause of death in 2010. Stroke was the third leading cause for DC and the U.S. in 2005, but dropped to the fourth leading cause of death in 2010 for both areas. It may also be noted that diabetes was among the leading causes of death for DC and the U.S. in 2005 (sixth) and in 2010 (sixth and seventh, respectively).

Table 6-1: Age-Adjusted Death Rates by Ten Leading Causes: District of Columbia and United States, 2005

	District of Columbia		United States	
Rank[1]	Cause of Death	Rate*	Cause of Death	Rate*
1	**Heart Disease**	**258.1**	**Heart Disease**	**211.1**
2	Malignant Neoplasms (Cancer)	197.1	Malignant Neoplasms (Cancer)	183.8
3	**Cerebrovascular Diseases (Stroke)**	**39.2**	**Cerebrovascular Diseases (Stroke)**	**46.6**
4	HIV/AIDS	35.9	Chronic Lower Respiratory Diseases	43.2
5	Accidents	34.6	Accidents	39.1
6	Diabetes	32.9	Diabetes	24.6
7	Homicide/Assault	28.4	Alzheimer's Disease	22.9
8	Chronic Lower Respiratory Diseases	23.2	Influenza and Pneumonia	20.3
9	Septicemia	22.0	Nephritis, Nephrotic syndrome, Nephrosis	14.3
10	Alzheimer's Disease	18.5	Septicemia	11.2

Sources: (1) 2005 Mortality Report; Department of Health, Center for Policy, Planning, and Epidemiology, State Center for Health Statistics. September 2008. (2) National Center for Health Statistics, 2008.[14]

[1] Rank of the leading causes of death based on number of deaths from the list of 113 Selected Causes of Death.

* Age-Adjusted rates per 100,000 U.S. standard population based on 2010 census.

In 2010, heart disease was the number one leading cause of death (239.7 per 100,000) among District residents, followed by cancer (193.0 per 100,000; (Table 6-2). Similarly, the number one leading cause of death nationally was heart disease (178.5 per 100,000) followed by cancer (172.5 per 100,000). In 2010, the age-adjusted mortality rate of heart disease in the District was approximately 34% higher than that of the national rate. In 2010, Cerebrovascular disease (stroke) was the fourth leading cause of death in the District (35.5 per 100,000) and the nation (39 per 100,000; Table 6-2).

Table 6-2: Age-Adjusted Death Rates by Ten Leading Causes: District of Columbia and United States, 2010

	District of Columbia		United States	
Rank[1]	Cause of Death	Rate*	Cause of Death	Rate*
1	Heart Disease	221.4	Heart Disease	179.1
2	Malignant Neoplasms (Cancer)	177.1	Malignant Neoplasms (Cancer)	172.8
3	Accidents	34.9	Chronic Lower Respiratory	42.2
4	Cerebrovascular Diseases (Stroke)	32.4	Cerebrovascular Diseases (Stroke)	39.1
5	Chronic Lower Respiratory	25.5	Accidents	38.0
6	Diabetes	24.9	Alzheimer's Disease	25.1
7	HIV/AIDS	20.4	Diabetes	20.8
8	Alzheimer's Disease	18.7	Nephritis, Nephrotic Syndrome & Nephrosis	15.3
9	Homicide/Assault	17.1	Influenza/Pneumonia[2]	15.1
10	Influenza and Pneumonia	16.7	Suicide	12.1

Sources: (1) Data Management and Analysis Division, Center for Policy, Planning and Evaluation, DC Department of Health, 2012

[1]Rank of the leading causes of death based on number of deaths from the list of 113 Selected Causes of Death.

[2]New code J09 (Influenza due to identified avian influenza virus) was added to the category in 2007.

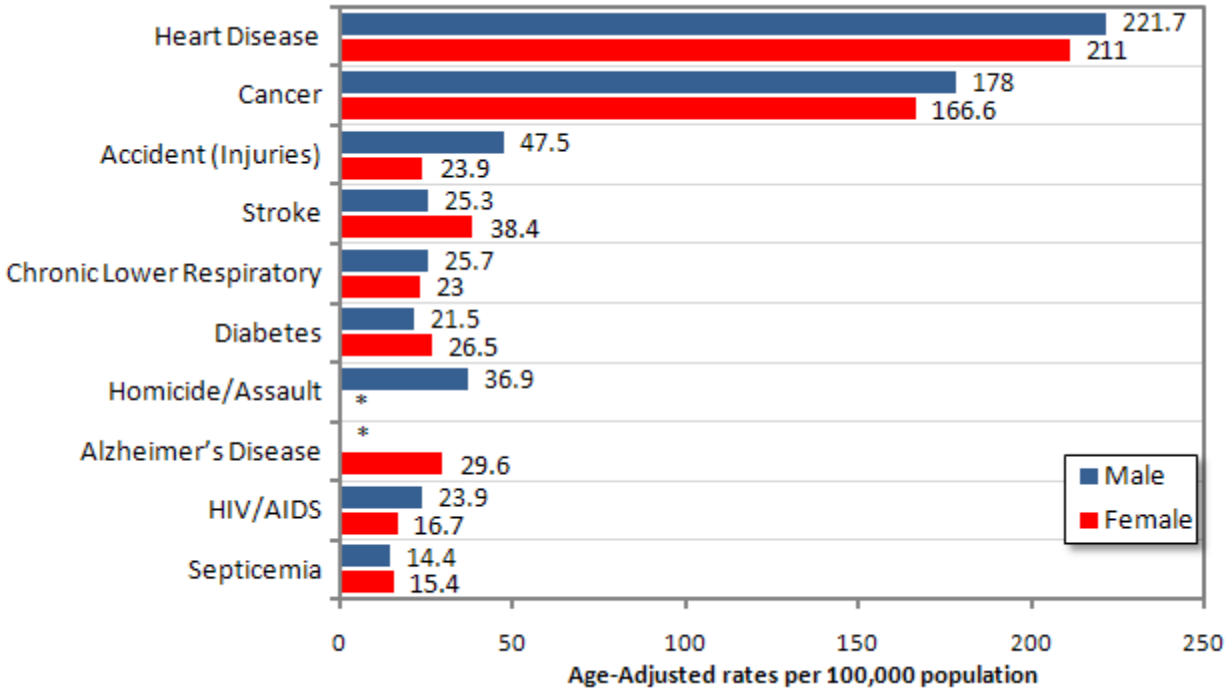
Note: Data are subject to sampling and random variation.

*Age-Adjusted rates per 100,000 U.S. standard population based on 2010 census.

6.2. Leading Causes of Death by Gender, Race and Ethnicity

Figure 6-1 shows the age-adjusted death rates in the District for selected causes of mortality by gender. The selected causes of death in the figure are the ten leading causes of death for the overall population and ranked according to the number of deaths in the total 2010 DC population. In 2010, the age-adjusted mortality rate of heart disease among male (221.7 per 100,000) and female (211 per 100,000) residents was comparable. The death rate due to stroke was more than 51% higher among female residents as compared to their male counterparts. The asterisks (*) in Figure 6-1, denote that Homicide/Assault was not a top ten leading cause of death among females, and similarly, Alzheimer's Disease was not among the ten leading causes of death among males.

Figure 6-1: Age-Adjusted Death Rates by Ten Leading Causes of Death, by Gender: DC, 2010



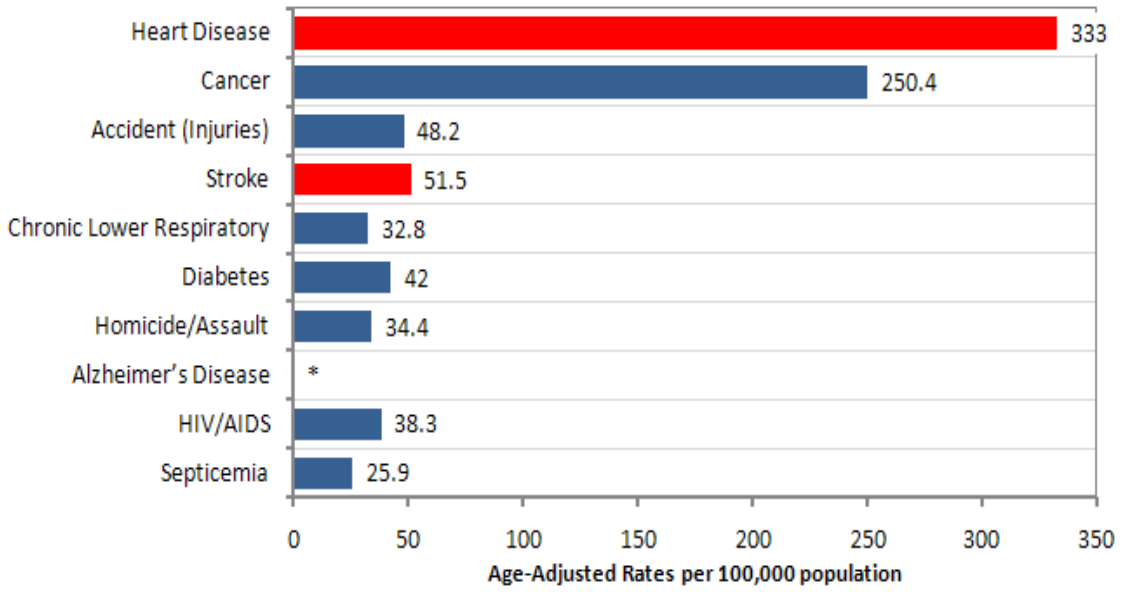
Source: Data Management and Analysis Division, Center for Policy, Planning and Evaluation, DC Department of Health.

Figure 6-2 and Figure 6-3 show the age-adjusted death rates in the District for selected causes of mortality by race. The selected causes of death in the figures are the ten leading causes of death for the overall population and rankings correspond to the number of deaths in the total 2010 DC population. However, an asterisks (*) in either figure in the place of a bar denotes that the disease or condition was not a top ten leading cause of death among that race group. Additionally, the bars for Heart disease and stroke are highlighted in red for the following figures (Figure 6-2 to Figure 6-4).

In 2010, the highest age-adjusted rate of heart disease death was among Black or African American, District residents, 333 per 100,000 (Figure 6-2); approximately three times higher than their White counterparts, 116.6 per 100,000 (Figure 6-3). Although, in 2010, heart disease was the leading cause of death for both Blacks and Whites. Further, the age-adjusted mortality rate of heart disease among black residents was 39 percent higher than the District's total age-adjusted heart disease mortality rate and 87% higher than the national age-adjusted heart disease mortality rate (Table 6-2).

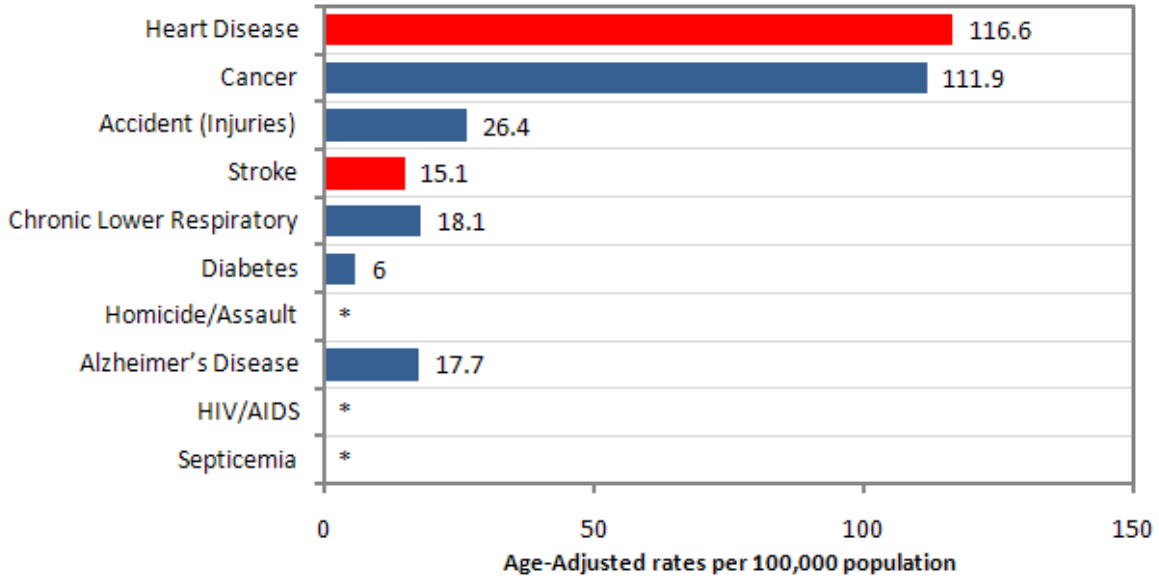
The age-adjusted mortality rate due to cerebrovascular disease (stroke) was more than three times higher among Black DC residents, 51.5 per 100,000 (Figure 6-2) as compared to their white counterparts, 15.1 per 100,000 (Figure 6-3). The age-adjusted rate among black residents was 45% higher than the District's total stroke mortality rate and 31% higher than the national rate (Table 6-2).The age-adjusted rate of deaths due to stroke among Blacks was higher than Accident (Injuries), making it the third leading cause of death among Blacks in DC in 2010. Among Whites, the age-adjusted rate of stroke was lower than Accidents (Injuries), Chronic Lower Respiratory Diseases, and Alzheimer's Disease.

Figure 6-2: Age-Adjusted Death Rates by Ten Leading Causes of Death, Black or African Americans: DC, 2010



Source: Data Management and Analysis Division, Center for Policy, Planning and Evaluation, DC Department of Health.
*Indicates that Alzheimer's disease was not among the 10 leading causes of death for Black or African Americans in DC, 2010.

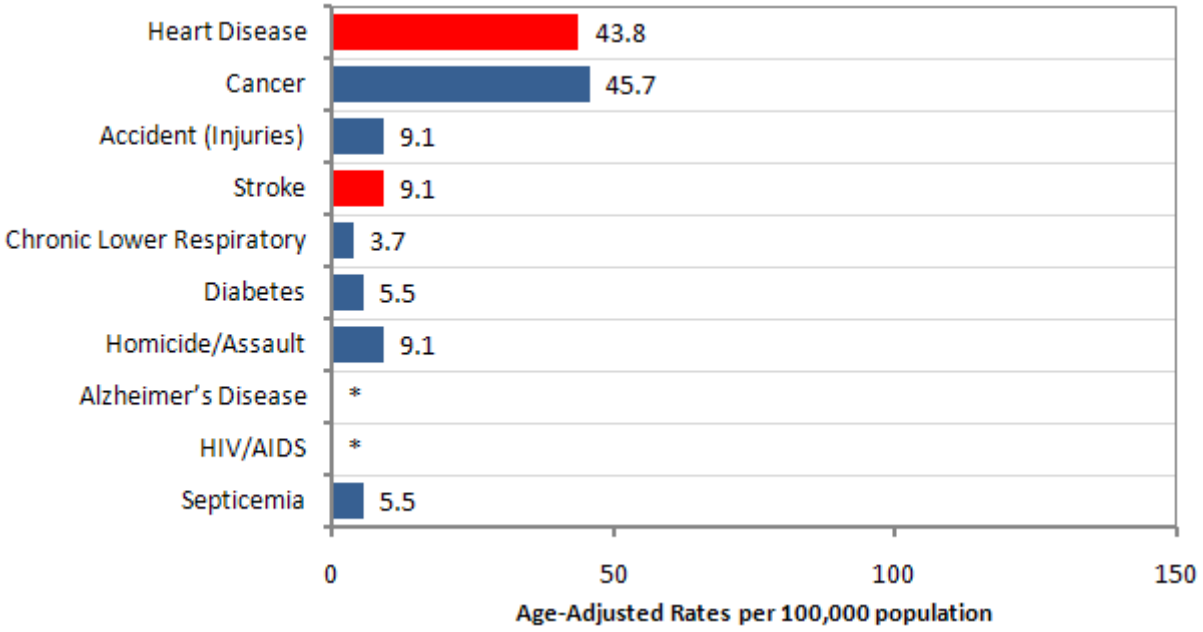
Figure 6-3: Age-Adjusted Death Rates by Ten Leading Causes of Death, Whites: DC, 2010



Source: Data Management and Analysis Division, Center for Policy, Planning and Evaluation, DC Department of Health.
*The indicated diseases or conditions were not among the 10 leading causes of death for whites in DC, 2010.

Hispanics of any race in the District, had an age-adjusted rate of heart disease mortality equal to 43.8 per 100,000, in 2010 (Figure 6-4). The age-adjusted mortality rate for heart disease was more than five times higher among non-Hispanic residents (230 per 100,000) as compared to Hispanic (43.8 per 100,000) residents. Further, Hispanics of any race in the District, had an age-adjusted rate of stroke mortality equal to 9.1 per 100,000, in 2010 (Figure 6-4). The stroke mortality rate was almost four times higher among non-Hispanic residents than Hispanics. Notably, these rates are subject to sampling and random variation; they should be considered with caution due to smaller numbers of Hispanic deaths in the DC population.

Figure 6-4: Age-Adjusted Death Rates by Ten Leading Causes of Death, Hispanic of Any Race: DC, 2010

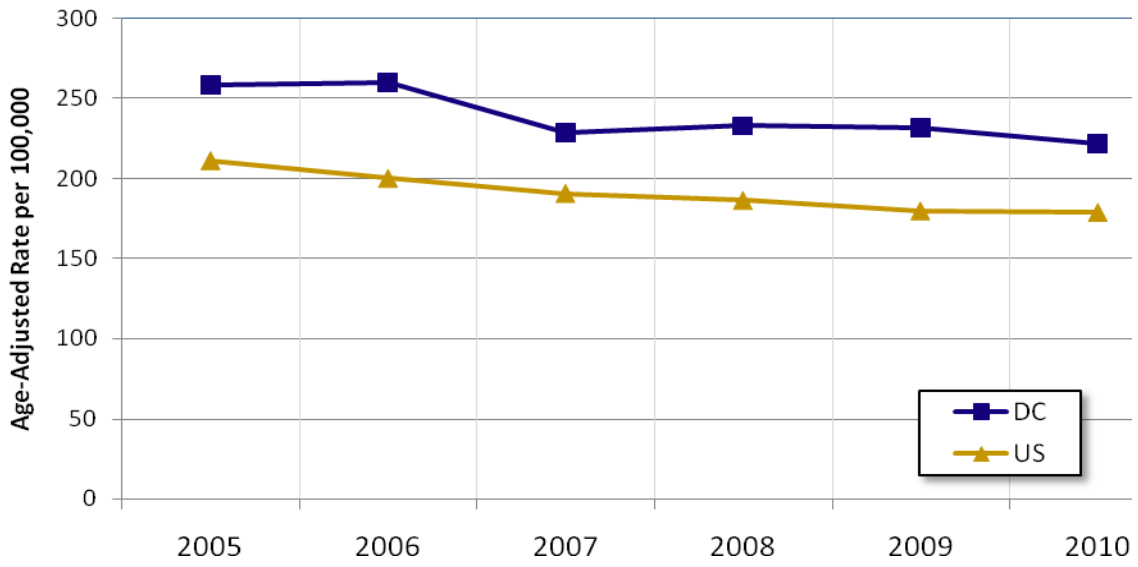


Source: Data Management and Analysis Division, Center for Policy, Planning and Evaluation, DC Department of Health.
* Indicates that Alzheimer's disease and HIV/AIDS were not among the 10 leading causes of death for Hispanics in DC, 2010.

6.3. Trends in Heart Disease and Stroke Mortality, 2005-2010

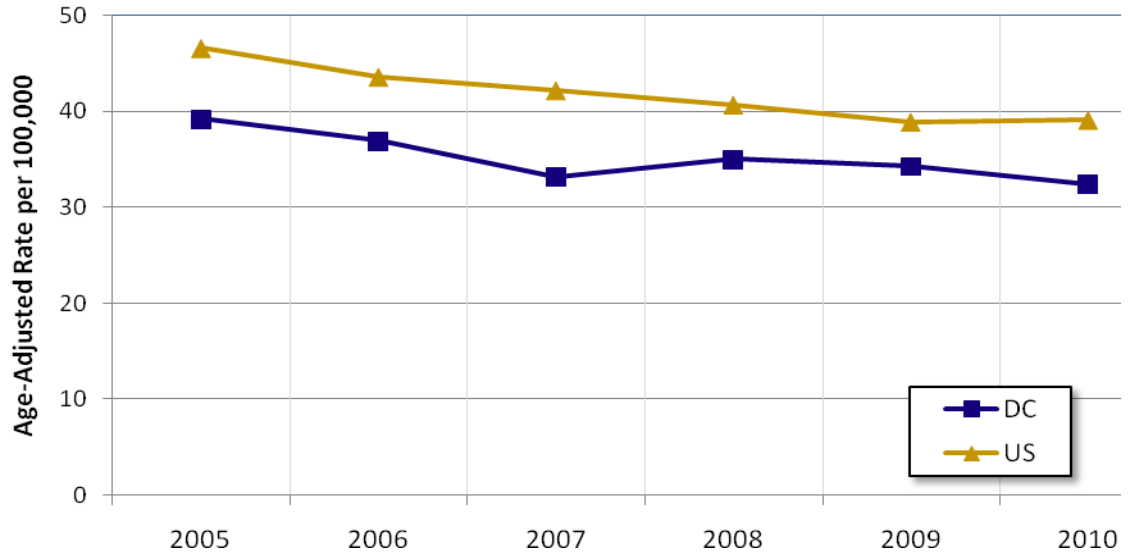
From 2005 to 2010, the number one leading cause of death among District and U.S. residents was heart disease. The District heart disease mortality rate was higher for all years and, in 2010, it was approximately 24% higher than the national rate. However, between 2005 and 2010, the heart disease mortality rate decreased by 14% among District residents (Figure 6-5).

Figure 6-5: Age-Adjusted Heart Disease Mortality Rates: the District of Columbia and United States, 2005-2010



Cerebrovascular Diseases, which include stroke, were the third leading cause of death in the District and nationally, from 2005 to 2010 (Table 6-1 and Table 6-2). Unlike heart disease, the District mortality rate for stroke was lower than the U.S. rate for 2005 to 2010 (Figure 6-6). In 2010, the age-adjusted mortality rate due to stroke was 17% lower than the national rate. Additionally, from 2005 to 2010, there was a 17% decrease in the stroke mortality rate in the District (Figure 6-6).

Figure 6-6: Age-Adjusted Stroke Mortality Rates: the District of Columbia and United States, 2005-2010



7. Conclusions

Overall Trends

The burden of cardiovascular disease in the District of Columbia is high. Although there have been considerable declines in mortality rates over the years, heart disease and stroke remained the first and fourth leading causes of death in 2010. Between 2005 and 2010, the District heart disease mortality rate was steadily higher than the national rate, whereas the stroke mortality rate in the District was lower than the U.S. rate. On the other hand, from 2005 to 2010, the District prevalence of heart attacks and coronary heart disease was consistently below the U.S. Median percent and decreased over time. Meanwhile, the prevalence of stroke was higher than the U.S. Median percent and showed an increasing trend.

Risk factors for heart disease and stroke are highly prevalent in adults in DC, though many could be reduced by way of behavioral and lifestyle modifications as well as through policy and environmental approaches. Over the years examined in this report, the overall prevalence of hypertension, high cholesterol, and diabetes increased, which could signify an increase in diagnosis and monitoring of CVD risk factors among DC adults. Moreover, prevalence of smoking and physical inactivity declined and fruit and vegetable consumption increased slightly, a possible reflection of the efforts by the DC DOH to prevent CVD.

High Risk Groups

Non-Hispanic Black Adults. There are prominent disparities in CVD mortality between the Black and White populations, with Black adults experiencing the greatest burden. Non-Hispanic Black adults had the highest prevalence of heart attacks, CHD, and strokes, with three, two, and eight times higher rates, respectively, compared to non-Hispanic White adults in DC. There were also notably higher rates of CVD risk factors among non-Hispanic Blacks compared to non-Hispanic Whites, including obesity, smoking, hypertension, high cholesterol, and diabetes. Hypertension and diabetes, especially, are often undiagnosed or sub-optimally controlled in African American communities. However, between 2005 and 2010 there was a substantial decrease in the prevalence of physical inactivity, in other words, an increase in physical activity, among non-Hispanic Black adults in DC.

Low Socioeconomic Status Adults. There were also major disparities in CVD prevalence by socioeconomic status, with adults with a low education level or low household income experiencing a greater burden of CVD compared to those in higher education and income groups. The prevalence of heart attacks, CHD, and stroke was highest among those with less than a high school education and a household income less than $15,000, compared to those who graduated from college and those with household incomes between $35,000 and $49,999 or above $50,000, respectively. Additionally, all CVD risk factors showed a decrease in prevalence with increasing education levels and income groups, with one exception; high cholesterol was more prevalent among adults with college degrees compared to those with some post high school education and among adults with household incomes above $50,000 compared to between $35,000 and $49,999. Adults with low socioeconomic status are concentrated in certain areas of the District, possibly with low access to fruit and vegetables and health care facilities, or inadequate opportunities for physical activity, compared with other parts of the District.

Older Working Adults (55-64 years old). Consistent with many other chronic disease conditions that develop over the lifespan, heart attack, CHD, and stroke prevalence increased with increasing age groups among DC adults. However, from 2005 to 2010, the prevalence of heart attacks, CHD, and stroke increased substantially among residents aged 55 to 64 years, whereas, the prevalence declined for adults aged 65 years and older. Moreover, overweight and obesity were highest among adults aged 55 to 64 years. Notably, smoking was highest among

adults aged 45 to 54 years. This may indicate a need for a more CVD interventions targeting older aged, working populations.

Males versus Females. Although, heart disease was the leading cause of mortality among males and females alike, mortality due to stroke was more than 51% higher among females. Conversely, male adults had a significantly higher prevalence of CHD compared to females, but the prevalence of heart attacks and stroke was similar for both genders. The prevalence of modifiable risk factors was high among both males and females, yet males experienced a greater number of risk factors with adverse levels. A greater proportion of males in DC were overweight, smoked, had high cholesterol, and had low fruit and vegetable intake, compared to females. In contrast, a greater percent of DC females were obese, had higher rates of physical inactivity, and diabetes, compared to males.

Cardiovascular Health Program Outlook

The CDC National Heart Disease and Stroke Prevention Program provided the District of Columbia Cardiovascular Health Program (CHP) an opportunity to develop many partnerships, pilot several interventions, and identify key priorities for the future of CVD prevention and control efforts. A combination of the data, lessons learned, and the existing evidence-based practices; has led us to identify policy and environmental approaches, health system interventions, and community-clinical linkages as key priority areas for the CHP at the DC DOH.

Future program activities of the CHP will focus on increasing access for physical activity and healthy food options. We will continue to promote increasing utilization of health information technology (HIT) to improve disease management, quality of care, and use of preventive services, as well as increasing engagement of non-physician team members in hypertension and diabetes management in health care systems. In addition, program activities will increase access to chronic disease prevention and self-management education and support, by way of increasing use of health care extenders in the community in support of self-management of high blood pressure and diabetes. These priority areas align well with the Million Hearts™ strategies to *Expand Community Initiatives to Support Healthier Behaviors, Enhance Health Information Technology, and Foster Clinical Innovations.*

In late 2013, DC DOH established the District of Columbia Million Hearts Learning Collaborative (DC MHLC) made up of multi-sector multidisciplinary partners, to address heart disease and stroke with an integrated clinical and public health approach. Funded by the Association of State and Territorial Health Officials (ASTHO) in cooperation with the CDC, the learning collaborative is an innovative, evidence-based, culturally competent, team-based approach that presents promising interventions to control hypertension, pre-diabetes and diabetes.

The DC MHLC objectives for interventions are:

1) Reduce high blood pressure and high cholesterol;
2) Reduce undiagnosed and unmanaged pre-diabetes and diabetes;
3) Educate African Americans about hypertension, pre-diabetes, and diabetes;
4) Promote monitoring of blood pressure;
5) Chronic Disease Self-Management (CDSM) and lifestyle change programs; and
6) Promote healthy behaviors such as diet, exercise, and smoking cessation.

The DC MHLC aims to prevent heart disease, stroke, and unmanaged diabetes by:

1) Improving access to optimal care;
2) Improving the quality of care for ABCS;
3) Focusing clinical attention on the prevention of these conditions;
4) Mobilizing District residents to lead a heart-healthy lifestyle;
5) Improve the prescription and adherence to appropriate medications for ABCS; and
6) Improving access and referrals to Chronic Disease Self-Management Programs, the Diabetes Prevention Program and other evidence-based lifestyle change programs.

The premise of DC MHLC is to sustain population-wide behavior change that successfully increases hypertension control rate in the District. Combining stakeholder resources and a comprehensive, cooperative, patient-centered care approach will achieve culture change in delivery of health care services, as well as greater awareness of the health benefits of lifestyle change programs.

8. Appendix

8.1. Overview of Changes in BRFSS Methodology in 2011

The BRFSS survey uses standardized interviewing methods and the questionnaire consists of three parts: core questions, optional modules, and state-added questions. The 2011 data, reflects changes in weighting methodology due to the addition of cell/mobile phone users, providing a broader reflection of the demographic and population health status of the United States. Because of these changes, the data from 2011 and later years cannot be accurately compared to previous findings in prevalence estimates. This appendix was included to supplement this report with more recent CVD prevalence and risk factor data from 2011.

8.2. CVD Prevalence in the District, 2011

Heart Attack

In 2011, the heart attack prevalence in DC was 1% lower than the US Median percent (Figure 8-3). Males had a slightly higher heart attack prevalence rate than females. The prevalence of heart attack among Non-Hispanic Blacks was 76% higher than the prevalence among Non-Hispanic Whites—this gender difference was statistically significant. There were too few DC residents aged 18-44 years with heart attack to estimate the prevalence rate. Additionally, heart attack prevalence increased with increasing age. Adults aged 65+ years had significantly higher prevalence of heart attack compared to all other age groups. Figure 8-4 shows heart attack prevalence decreased with increasing level of education, and college graduates had significantly lower prevalence of heart attack than DC adults with less than H.S. and H.S. or G.E.D. education levels. Adults with a household income less than $15,000 had lower heart attack prevalence than those with a household income between $15,000-24,999, but both groups had significantly higher heart attack prevalence than the $50,000+ income level. Again, those with an income between $25,000-34,999 and $35,000-49,999 also had too few persons surveyed to calculate reliable prevalence estimates.

Figure 8-1: Prevalence of Heart Attacks Overall and by Gender, Race, and Age, DC, 2011

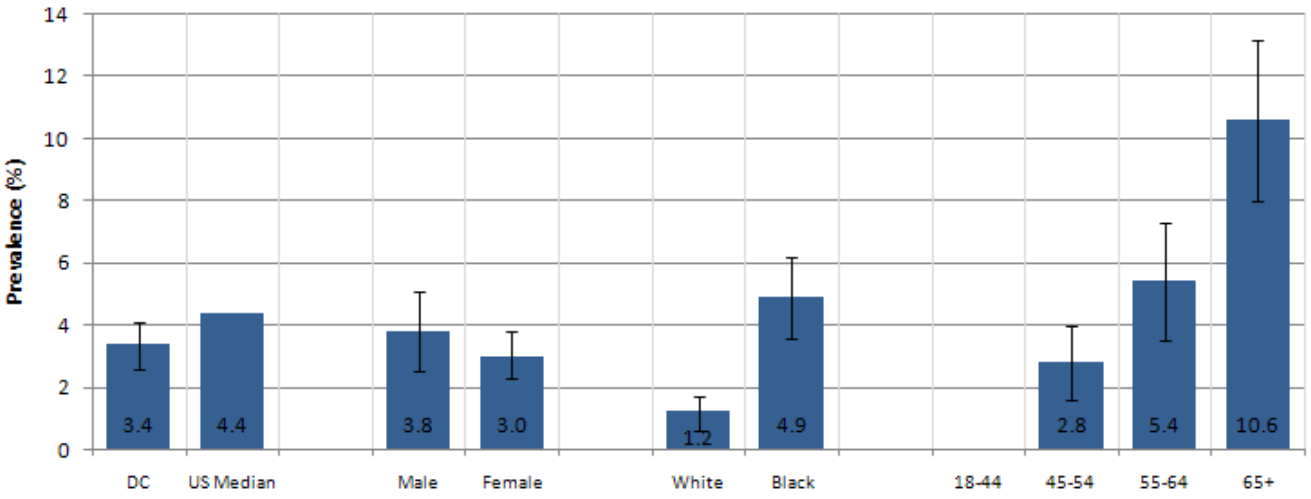
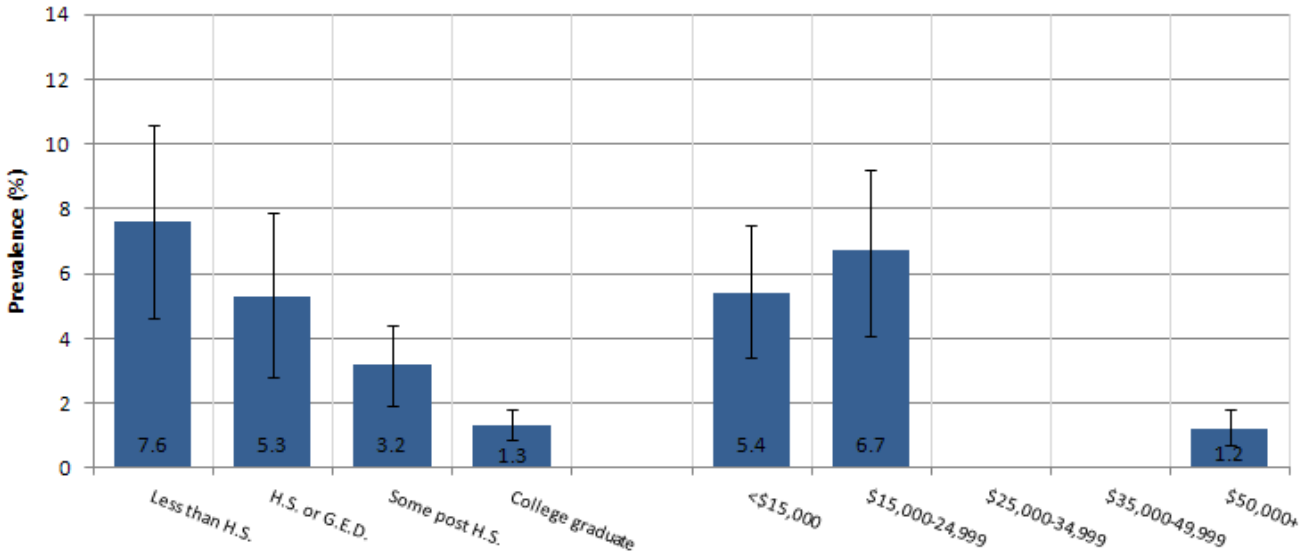


Figure 8-2: Prevalence of Heart Attacks by Education and Income, DC, 2011



Coronary Heart Disease

In 2011, the overall CHD prevalence in the District was lower than the US Median. Adult males had a higher prevalence rate of CHD than females in DC (Figure 8-1). Non-Hispanic Blacks had a significantly higher prevalence of CHD compared to Non-Hispanic Whites. The numbers for DC residents aged 18-44 years, who were surveyed by the BRFSS, were too small to calculate reliable prevalence estimates. Figure 8-2 shows the prevalence of CHD increased with increasing age. Further, persons with higher education and income levels observed a lower prevalence of CHD. Similarly, those with a household income between $25,000-34,999 and $35,000-49,999 also had too small of numbers surveyed to calculate reliable prevalence estimates.

Figure 8-3: Prevalence of CHD Overall and by Gender, Race, and Age, DC, 2011

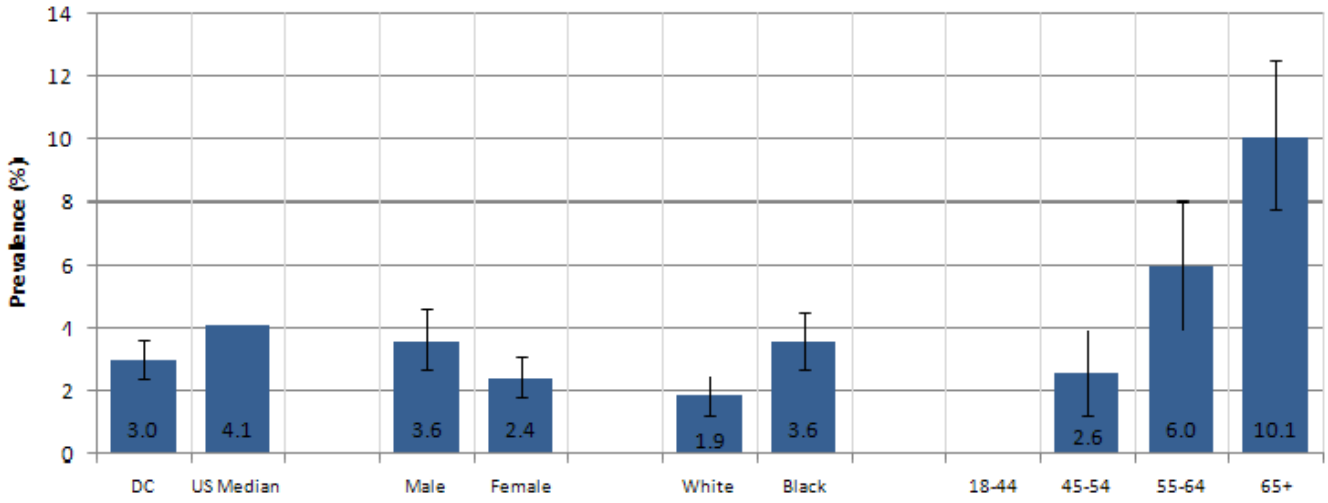
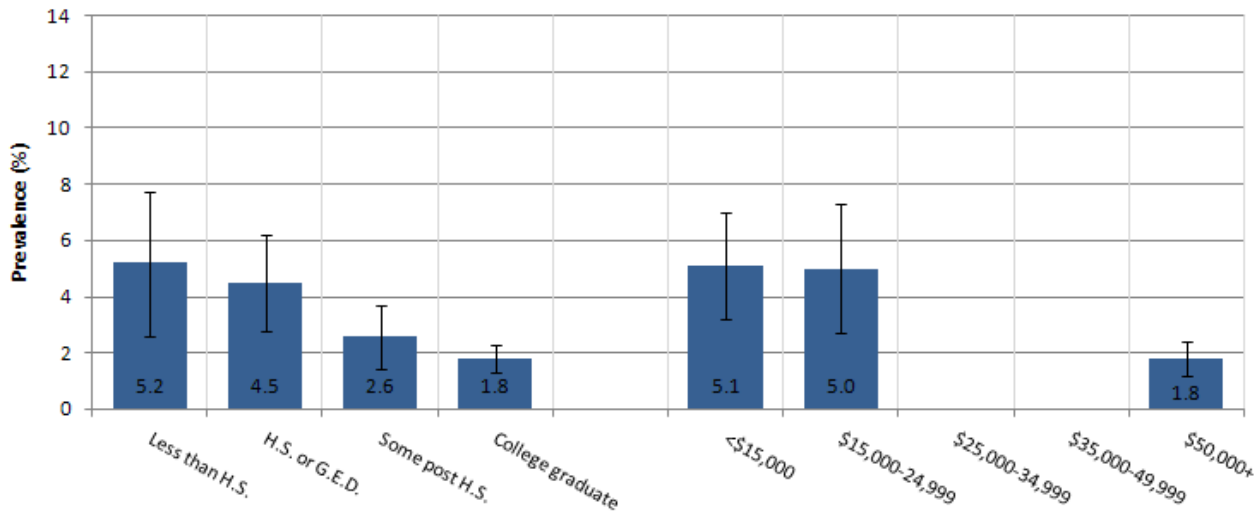


Figure 8-4: Prevalence of CHD by Education and Income, DC, 2011



Stroke

In 2011, unlike the other CVD conditions, stroke prevalence in DC was higher than the US Median percent (Figure 8-5). Females had a slightly higher prevalence rate of stroke than males. The prevalence of stroke among Non-Hispanic Blacks was more than four times the prevalence among Non-Hispanic Whites, a statistically significant difference. Similar to CHD and heart attack, stroke prevalence increased with increasing age. There were too few DC residents aged 18-44 years with stroke to estimate the prevalence rate. Adults aged 65+ years had significantly higher prevalence of stroke compared to all other age groups. Figure 8-6 shows the lowest education and income levels had significantly higher prevalence of stroke compared with those in the highest level groups.

Figure 8-5: Prevalence of Stroke Overall and by Gender, Race, and Age, DC, 2011

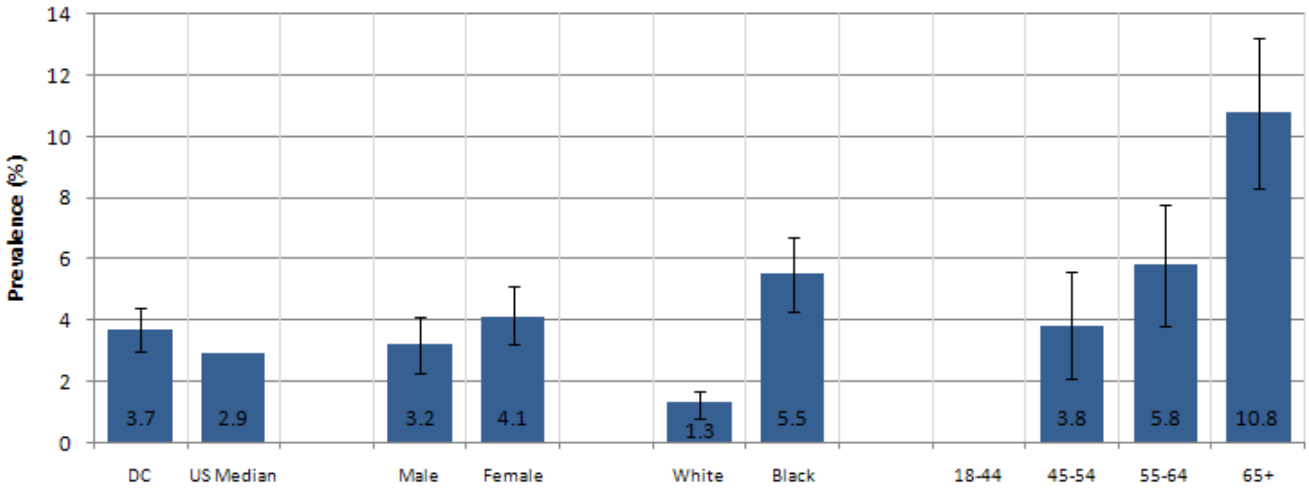
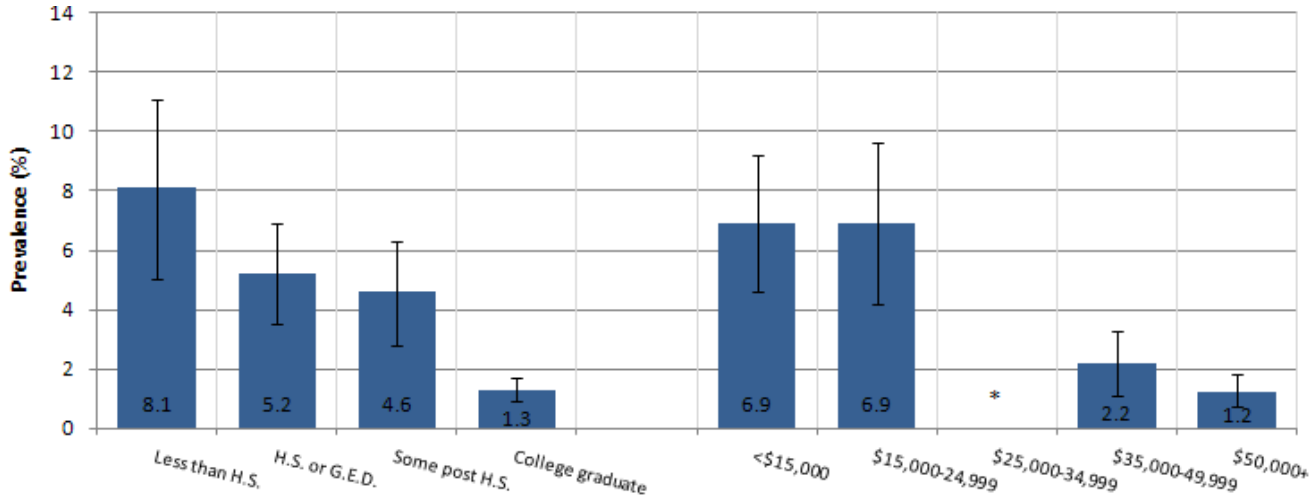


Figure 8-6: Prevalence of Stroke by Education and Income, DC, 2011



8.3. Prevalence of CVD Risk Factors in 2011

Table 8-1 shows a summary of the prevalence CVD risk factors for DC adults in 2011. The BRFSS questionnaire did not include questions about Diabetes and Fruit and Vegetable intake in 2011, so those columns are blank. Overall, nearly a quarter to a third of DC residents reported they had a CVD risk factor including overweight (29.1%), obesity (23.8%), smoking (20.8%), high blood pressure (30%), high cholesterol (34.3%), and physical inactivity (19.8%). Overweight and smoking was more prevalent among males than females, whereas females were 35% more obese and 18% more physically inactive. Non-Hispanic Blacks had the highest prevalence of obesity (36.7%), smoking (30.8%), high blood pressure (40.4%), and physical inactivity (28.2%), putting them potentially at high risk for CVD. Most risk factor prevalence's generally increased with age, except for smoking. However, most risk factors prevalence decreased remarkably with education level, except overweight which was relatively similar among all education level groups. Likewise, higher income level groups had lower percents of obesity, smoking, high blood pressure, and physical inactivity, but overweight and cholesterol prevalence was similar among all income levels.

Table 8-1: CVD Risk Factors in DC, by gender, race, age group, education level, and household income level, 2011

		Overweight	Obesity	Smoke	High Blood Pressure	High Cholesterol	Diabetes	Physical Inactivity	Fruit and Vegetable
Overall		29.1	23.8	20.8	30	34.3	-	19.8	-
Gender	Male	34.9	18.6	25.1	30.3	36.4	-	17.7	-
	Female	23.9	28.4	17.1	29.8	32.6	-	21.6	-
Race	White	28.9	10.7	9.6	20.4	34.5	-	8.6	-
	Black	28.9	36.7	30.8	40.4	35.9	-	28.2	-
	Hispanic	31.6	13.3	15.2	15.8	28.6	-	23.8	-
	Other	29.5	12.2	18.6	27.8	31.4	-	19.9	-
Age Group	18-24	22.3	-	16.1	-	22.8	-	8.6	-
	25-34	24.7	20.8	26.3	12.7	21.3	-	15.2	-
	35-44	33.4	22	18.8	17.3	27.4	-	18.3	-
	45-54	28.1	34.8	28.9	34.9	33.4	-	22.6	-
	55-64	33.2	30.6	20	53.4	48.5	-	25.4	-
	65+	34.6	26.3	11	64.4	52.1	-	30.4	-
Education level	Less than H.S.	25.1	39.7	43.8	47.1	40.9	-	34.2	-
	H.S. or G.E.D.	29.5	33.1	27.2	38.6	34.3	-	28.6	-
	Some post H.S.	28.4	31	23.8	29.7	34	-	21.7	-
	College graduate	30.4	11.9	9.8	21.2	32.7	-	10.8	-
Household Income	<$15,000	25.1	41.6	37.5	41.6	38.9	-	33.3	-
	$15,000-24,999	29.1	35.3	29.1	43.4	35.9	-	32.1	-
	$25,000-34,999	28.9	30	28.8	33	35.6	-	21.5	-
	$35,000-49,999	25.6	27.6	21.9	29.3	36.4	-	24.3	-
	$50,000+	32.6	14.4	11.9	22.4	32.4	-	11.1	-

Data are percents.

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