The Burden of Cardiovascular Disease in Arizona

Arizona Department of Health Services

“This document provides a snapshot of the current cardiovascular disease burden in Arizona. It identifies the mortality rates, prevalence rates, and hospitalization rates and estimated costs for cardiovascular disease risk factors and diseases.”

i Acknowledgements

Authors

Jessica Han, MSc
Arizona Department of Health Services

Ross Merrit, M.P.H
Arizona Department of Health Services

Nicole Olmstead, M.P.H
Arizona Department of Health Services

Reviewers

Ben Bobrow, M.D.
Arizona Department of Health Services
Mayo Clinic, Scottsdale

Pam Ferguson
American Heart Association/American
Stroke Association

Tim Flood, M.D.
Arizona Department of Health Services

Tim Ingall, M.D., Ph.D.
Mayo Clinic, Scottsdale

Beth Malasky, M.D.
University Medical Center

Virginia Warren, M.P.A.
Arizona Department of Health Services

Steering Committee:

Bart Demaerschalk, M.D.
Mayo Clinic, Scottsdale

June Estrada
TriZetto Group, Inc

James Frey, M.D.
Barrow Neurological Institute

Alicia Gonzales
American Heart Association/American
Stroke Association

Mary Lee Hyatt
American Heart Association/American
Stroke Association

Julie Jackson, RN
Summit Healthcare Cardiopulmonary Rehabilitation

Nancy Keane
American Heart Association/American
Stroke Association

Margaret McConnell
Maricopa Community Colleges

Kim Mostoller, M.S.
Arizona Heart Institute

Daphne Phillips, PhD, CCC-SLP
Scottsdale Healthcare, Shea

John Raife, M.D.
St. Joseph's Hospital

Adriana Rivera, MS RN
Catholic Healthcare West

Paul Underwood, M.D.
North Phoenix Heart Center

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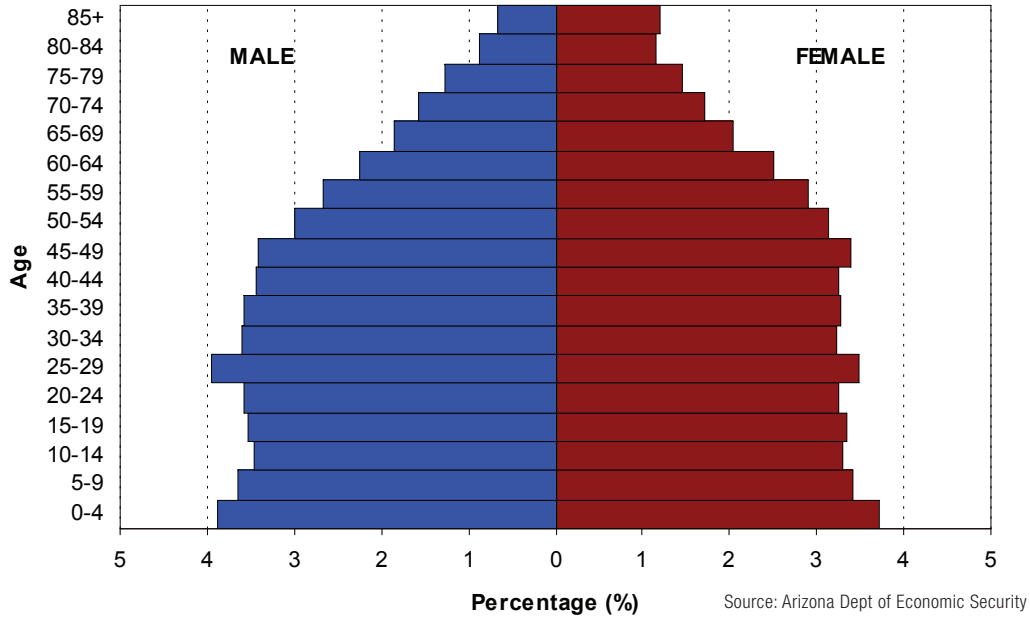
I Executive Summary

Cardiovascular disease is the leading cause of death both nationally, and in Arizona. The main components of cardiovascular disease are coronary heart disease, congestive heart failure, and stroke. Each year, nearly 1,000,000 Americans die of cardiovascular disease nationwide. In Arizona, heart disease and stroke claim the lives of more than 13,000 people each year. Efforts to reduce the large number of lives lost to heart disease and stroke led to the Healthy People 2010 initiative, that established specific goals to target heart disease, stroke, blood pressure and blood cholesterol. The goal for heart disease is to decrease the mortality rate to less than 166 deaths per 100,000 population and the goal for stroke is to decrease the mortality to below 48 deaths per 100,000 population. As a whole, the Arizona population has met some of these goals, yet there are some groups in the population that are still far from meeting the HP2010 goal.

This document provides a snapshot of the current cardiovascular disease burden in Arizona. It identifies the mortality rates, prevalence rates, and hospitalization rates and estimated costs for cardiovascular disease risk factors and diseases. This document seeks to identify trends in disease over time; it also seeks to identify disparities in disease burden so that resources can be appropriately allocated. Many sources were used to collect the data, each with their own limitations. Despite these limitations, this document provides the most comprehensive and current data for the state with regard to burden of heart diseases and stroke.

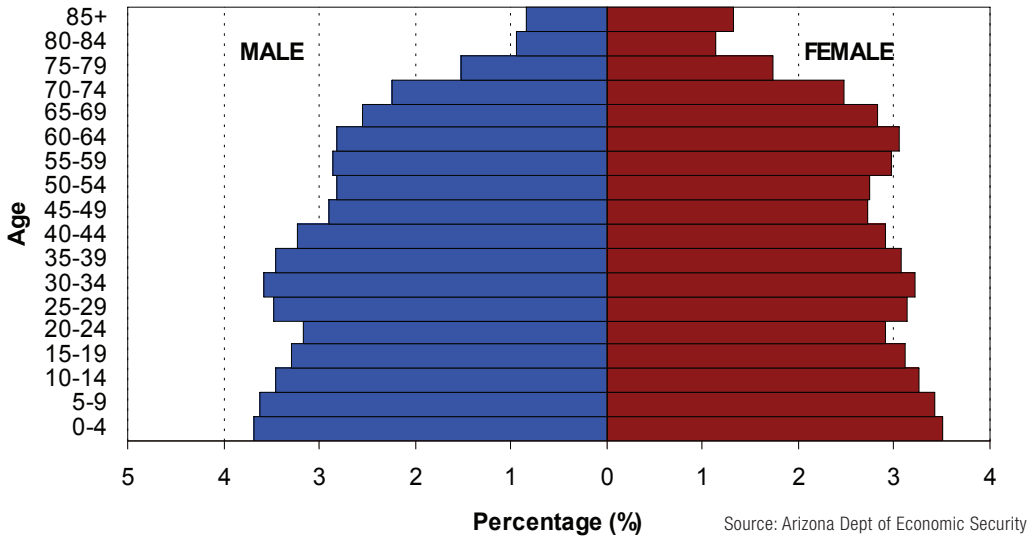
Similar to other states, Arizona has an aging population. According to the Arizona Department of Economic Services, approximately 14% of the 2007 population in Arizona is age 65 and older. By 2020 those over the age of 65 are expected to comprise 17.6% of the population and by 2055 they are expected to comprise 21.3% of the population (figures 1,2, & 3). Since age is one of the primary risk factors for developing cardiovascular disease, the burden will increase as the population ages.

FIGURE 1 **Arizona Demographic Population 2007** (n=6,432,007)



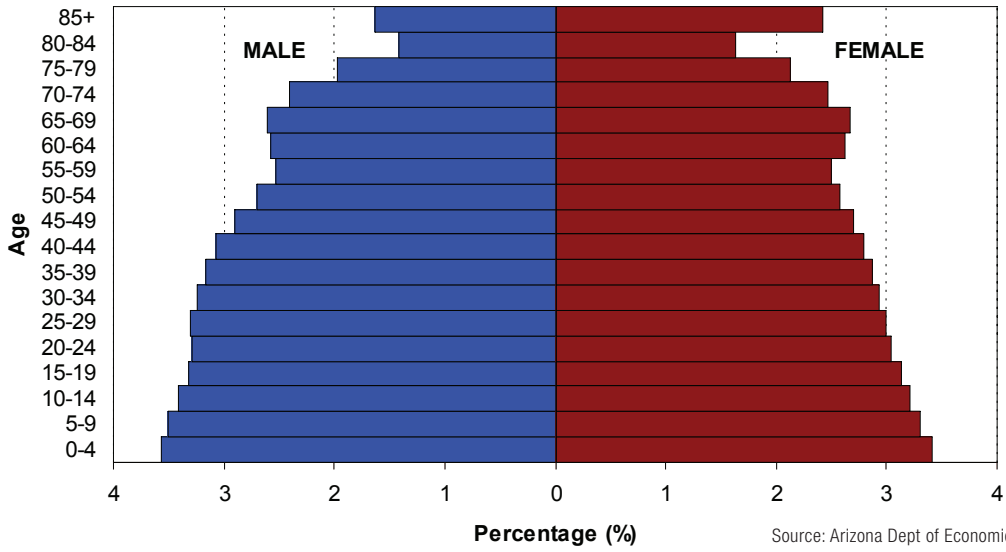
Source: Arizona Dept of Economic Security

FIGURE 2 **Arizona Population Projections 2020** (n=8,779,567)



Source: Arizona Dept of Economic Security

FIGURE 3 **Arizona Population Projection, 2055** (n=13,340,646)



Source: Arizona Dept of Economic Security

In Arizona, nearly 83 percent of the deaths for those 65+ are from heart disease and stroke, and much of the cost is paid through Medicare. If better prevention strategies for cardiovascular disease are not implemented within the aging population of Arizona, the healthcare costs of treating heart disease and stroke will continue to increase.

Additionally, Arizona is the 6th largest land mass in the US, and is divided into 15 large counties. Many of these counties are still considered frontier areas. With the exception of the 3 major metropolitan areas, Phoenix, Tucson, and Yuma, many people have to drive hundreds of miles to receive specialized care. The counties with the highest rates of coronary heart disease are Cochise, Maricopa and Mohave Counties. The counties that have the highest mortality rate from stroke are Greenlee, Navajo and Yavapai Counties.

Through this document, the following disparities were found:

- African American women suffer the highest mortality rates for coronary heart disease and stroke in Arizona, compared to men or women of any race.
- Among males, Hispanic men had the highest mortality rates for congestive heart failure and stroke, whereas African American men had the highest mortality rate for coronary heart disease.
- While stroke mortality rates are decreasing among most groups, they are rising among Arizona's Asian population.
- Asian and Hispanic females have the highest mortality rates from heart failure compared to other racial/ethnic groups and genders.
- American Indians have the highest percentage of premature deaths from all forms of cardiovascular disease compared to other racial/ethnic groups.

This document will be used in conjunction with the Arizona Cardiovascular Disease State Plan to determine priority populations and develop strategies to provide care for CVD patients with the greatest need. Through the collaboration with other organizations, it will be possible to have a positive impact on the burden of CVD in Arizona.

II Methodology

Crude rates

The *crude incidence rate* reports the number of people per 100,000 population per year who have been newly diagnosed with the disease of interest. The crude rate has the advantage that it is a simple, easily calculated measure that gives a broad picture of the extent of new disease in a particular area in a particular time period. It does not reflect the variation in the risk of disease due to factors, such as age, which also affect risk. The development of most diseases and cancer especially, is highly related to age: the older you get, the higher your chance of developing the disease. This means that a population with a higher proportion of older people will have a higher crude rate even if the risk of disease in the population is the same as another population with a lower proportion of older people.

Information from: http://www.trentcancer.prestel.co.uk/statexpl.htm

Crude Mortality Rates

Like the crude incidence rate, the crude mortality rate is not adjusted to age distribution of a standard population. It simply counts the number of deaths that have occurred and is divided by the number of persons in the population, then expressed per 100,000 persons.

Age-Adjustment

Age adjustment is used to compare risks of two or more populations at one point in time or one population at two or more points in time. Age-adjusted rates are computed by the *direct method* by applying age-specific rates in a population of interest to a standardized age distribution, in order to eliminate differences in observed rates that result from age differences in population composition. Age-adjusted rates should be viewed as relative indexes rather than actual measures of risk.

Rates have been adjusted according to the US 2000 Standard population to more accurately reflect the US population as it is now and to allow comparisons. Arizona figures are calculated and computed using a standard population in order for it to be comparable to the US as well as other rates using the US 2000 standard population.

Information from: http://www.cdc.gov/nchs/datawh/nchsdefs/ageadjustment.htm

Hospitalization Calculations

Hospital data was calculated using hospital inpatient discharges and emergency department visits from the *Arizona Health Status and Vital Statistics: 2005*. An inpatient discharge occurs when a person who was admitted to a hospital leaves that hospital. A person who has been hospitalized more than once in a given calendar year will be counted multiple times as a discharge and included more than once in the hospital inpatient discharge data set; thus, the statistics in this report are for discharges, not persons (ADHS Vital Statistics, 2005). For the purposes of this document unadjusted rates were obtained by taking the number of discharges or emergency visits by the reference population per 10,000. For example, the number of discharges by racial/ethnic group was divided by the reference population (American Indian, White, African American…) for the same year. The figure or rate was then calculated per 10,000 population.

Race/Ethnicity

The racial/ethnic groups that are discussed throughout the text have been summarized as follows:

White (non, Hispanic) – includes people having origins in any of the original peoples of Europe, the Middle East, or North Africa.

African American – includes people having origins in any of the black racial groups of Africa. The two terms have been used interchangeably throughout the document.

American Indians – includes American Indians and Alaska Natives (AI/ANs) and are people having origins in any of the original peoples of North and South America (including Central America), and who maintain tribal affiliation or community attachment.

Asians – includes both the Asians/Pacific Islanders and are people having origins in any of the aboriginal peoples of the Far East, Southeast Asia, the Indian subcontinent, Hawaii, Guam, Samoa, or other Pacific Islands, even if they do not live in the Pacific Islands.

Hispanics – people of Cuban, Mexican, Puerto Rican, South or Central-American, or other Spanish culture or origin, regardless of race.

Information from: CDC according to http://www.cdc.gov/omhd/

Life Expectancy

Median age at death and premature mortality calculations are according to the 2004 US life expectancy of 77.9 years.

Notes:

*Rates per 100,000 are age-adjusted to the 2000 U.S. standard population.

**Based on expected years of life for all US residents, which is 77.9 years in 2004

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V Abbreviations

BRFSS	Behavioral Risk Factor Surveillance System
CDC	The Centers for Disease Control and Prevention
CHD	Coronary Heart Disease
CHF	Congestive Heart Failure
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular Disease
GED	General Educational Development
HDL	High Density Lipoprotein
HP2010	Health People 2010
LDL	Low Density Lipoprotein
MMWR	Morbidity and Mortality Weekly Report

VI Introduction

Cardiovascular disease (CVD) refers to conditions and diseases of the heart and blood vessels, including, but not limited to, coronary heart disease (CHD), heart attack, stroke, high blood pressure, congestive heart failure (CHF) and congenital heart disease. These diseases can be interrelated and usually have the same risk factors (see Appendix A). CVD has been the leading cause of death every year since the early 1900's, with the exception of 1918 where influenza was the leading cause of death. Despite the increase in scientific knowledge and health awareness that occurred since that time, CVD continues to be the most prevalent health problem in the US, surpassing other diseases such as diabetes and all forms of cancer combined. According to the Centers for Disease Control and Prevention (CDC), approximately 950,000 Americans die from CVD each year, which is one death every 33 seconds (http://www.cdc.gov/, accessed July 18, 2007). Additionally, approximately 31 million Americans, or one-fourth of the US population, are currently living with some form of CVD.

Arizona has the 6th largest land mass in the United States, and is comprised of 15 counties total: Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai and Yuma. Some of these counties still have areas that qualify as frontier areas. According to the 2006 census population estimates, the population in Arizona is over 6.1 million individuals. Approximately 76% of the population lives in Maricopa or Pima Counties, leaving 24% of the Arizona population living in rural parts of the state. (http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=&geo_id=04000US04&_geoContext=01000US%7C04000US04&_street=&_county=&_cityTown=&_state=04000US04&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=040&_submenuId=factsheet_1&ds_name=null&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=, 2005)

According to the 2005 Census data, the median age for the Arizona population is 34.5 and 12.1 percent of the population is over the age of 65. Approximately 3 percent of the population is African American, 4.7 percent is American Indian, 2.2 percent of the population is Asian, and 76.2 percent of the population is White. The Hispanic population comprises 28.6 percent of the population as well. Arizona is home to 21 separate sovereign American Indian nations located on 24 reservations throughout Arizona. The American Indian population comprised approximately five percent of the population.

This document defines the burden of CVD in Arizona and identifies which populations are at most risk. This document focuses on coronary heart disease, congestive heart failure and cerebrovascular disease (which for the purposes of this document is referred to as stroke). This document, when used in conjunction with the Arizona Cardiovascular Disease State Plan, will help guide the actions and interventions of the state and local health departments and the communities and organizations that conduct activities in and around CVD.

CHAPTER 1

Cardiovascular Disease Mortality, Prevalence, and Hospitalizations

Cardiovascular Disease

In Arizona, diseases of the heart are the first and stroke is the fourth leading causes of death, respectively. In the United States (US), diseases of the heart and stroke are the first and third leading causes of death (table 1).

TABLE 1 **Top 10 Causes of Death, Arizona and US, 2004**

Arizona Rank	Cause of Death	Arizona Age - Adjusted Rate	US Age - Adjusted Rate	US Rank
1	***Diseases of the Heart***	***186.7***	***217.0***	***1***
2	Cancer	164.7	185.8	2
3	Unintentional Injuries	46.0	37.7	5
4	***Stroke***	***43.6***	***50.0***	***3***
5	Chronic Lower Respiratory Disease	41.9	41.1	4
6	Alzheimer's Disease	31.3	21.8	7
7	Diabetes Mellitus	20.7	24.5	6
8	Influenza and Pneumonia	20.1	19.8	8
9	Suicide	14.9	10.9	11
10	Chronic Liver Disease and Cirrhosis	11.1	9.0	12

Source: Arizona Vital Statistics 2004, CDC Compressed Mortality File

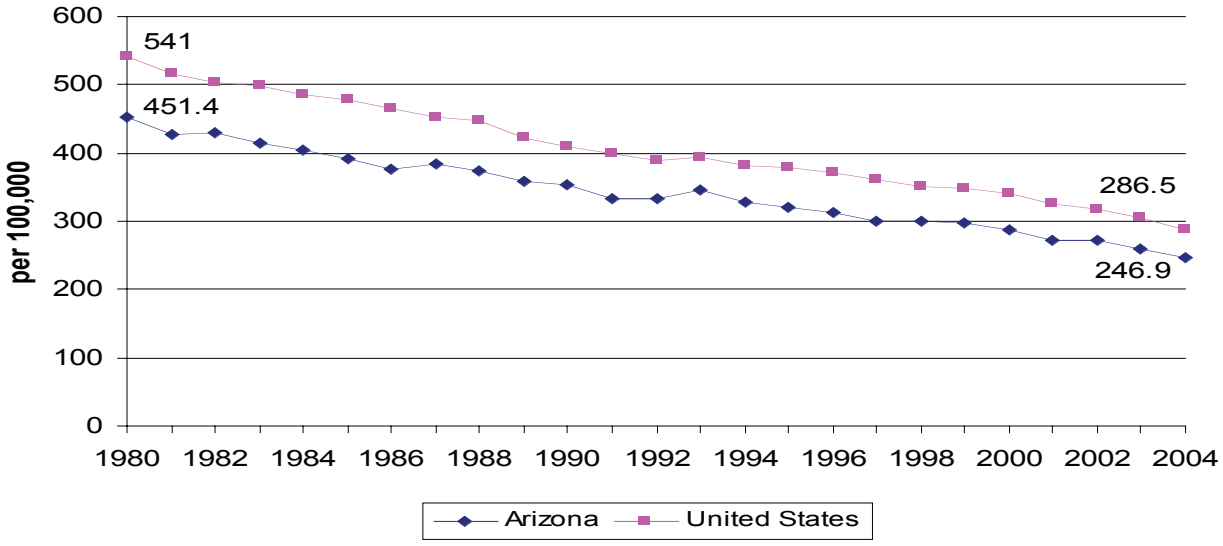
These chronic diseases cause major disability and contribute to high costs associated with health care and hospitalizations.

CVD Mortality

From 1980 to 2004, the CVD mortality trend in Arizona has decreased by almost 50 percent (figure 4).

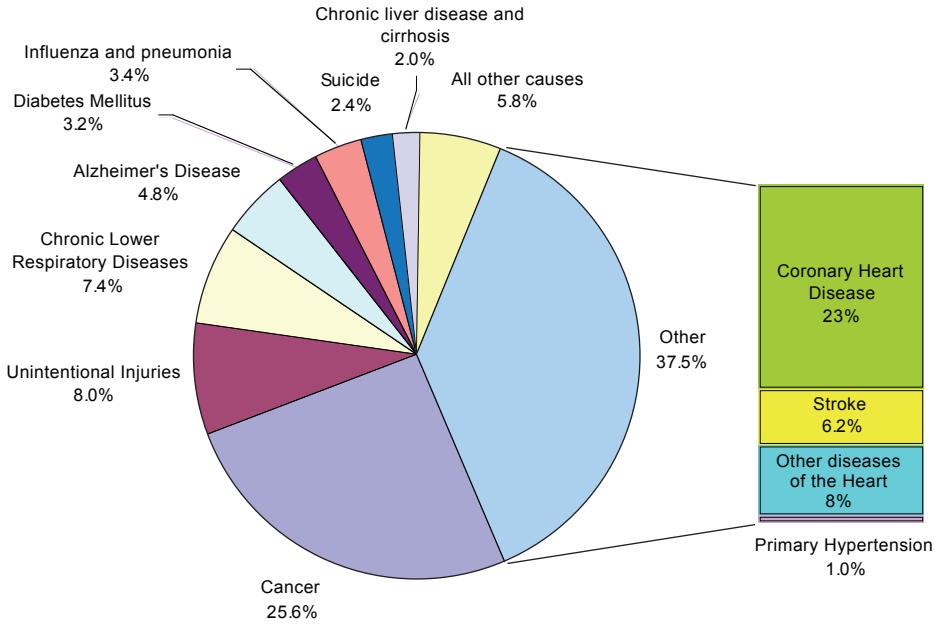
Despite this marked decrease, CVD still remains the leading cause of death in both the US and Arizona. In Arizona, CVD accounts for roughly 40 percent of the leading causes of death of which 20 percent is due to CHD, six percent is due to stroke and 14 percent from other diseases of the heart such as heart failure (figure 5).

FIGURE 4 Trends in Age-Adjusted Mortality Rates of Deaths due to Cardiovascular Disease, Arizona and US, 1980-2004



Source: CDC Mortality File (http://wonder.cdc.gov/mortSQL.html)

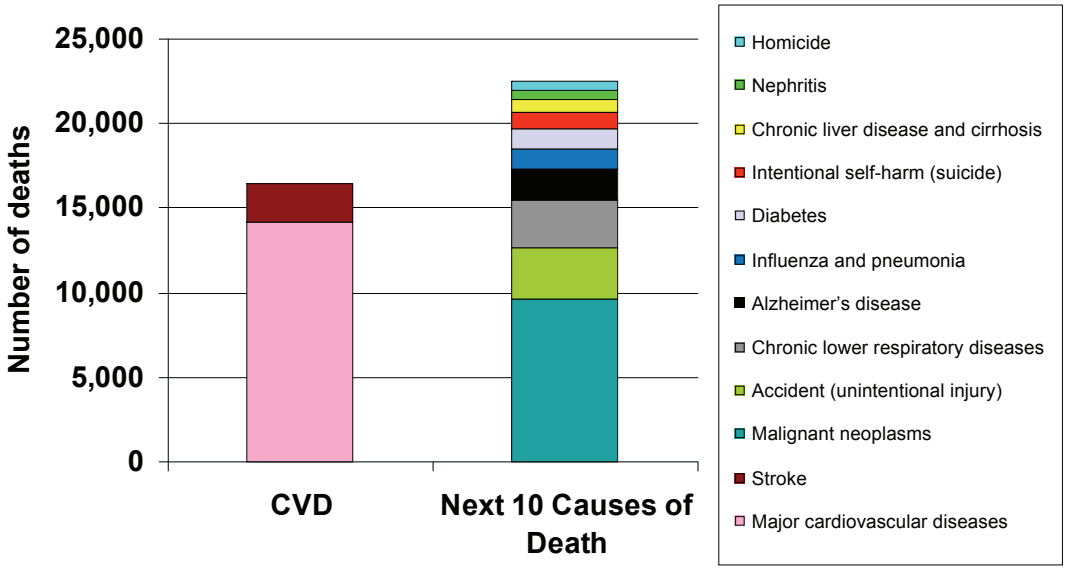
FIGURE 5 Leading Causes of death Among Arizona Residents, Arizona, 2005



Source: Arizona Vital Statistics, 2005

Mortality rates from CVD greatly outnumber the death rates from cancer, accidents (unintentional injury), and chronic lower respiratory diseases combined (figure 6).

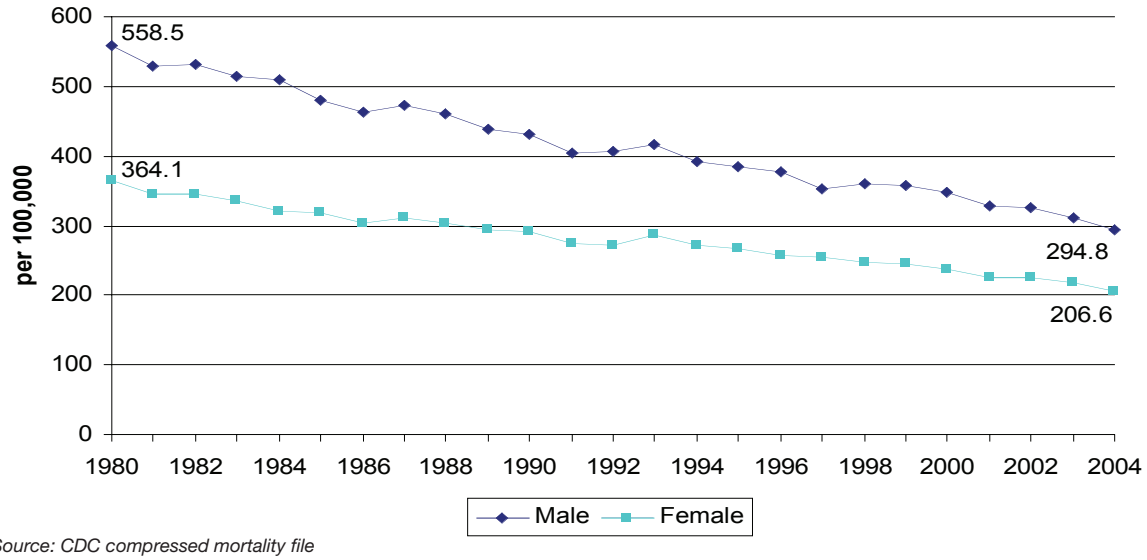
FIGURE 6 **Burden of Cardiovascular Disease Compared to Other Leading Causes of Death, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

The CVD death rates in males and females from 1980-2004 decreased by 47.2 percent and 43.3 percent (figure 7).

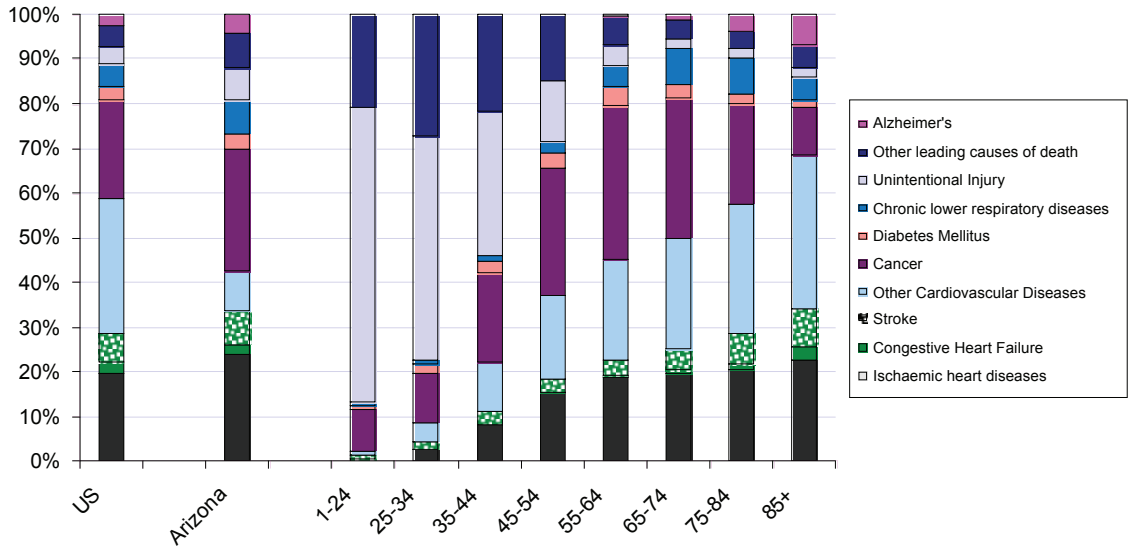
FIGURE 7 **Cardiovascular disease mortality trend by year and gender, Arizona, 1980-2004**



Source: CDC compressed mortality file

Deaths from CVD occur in all age groups and the mortality rate increases with age. Over 60 percent of deaths in Arizonans aged 85 and older were due to CVD (figure 8).

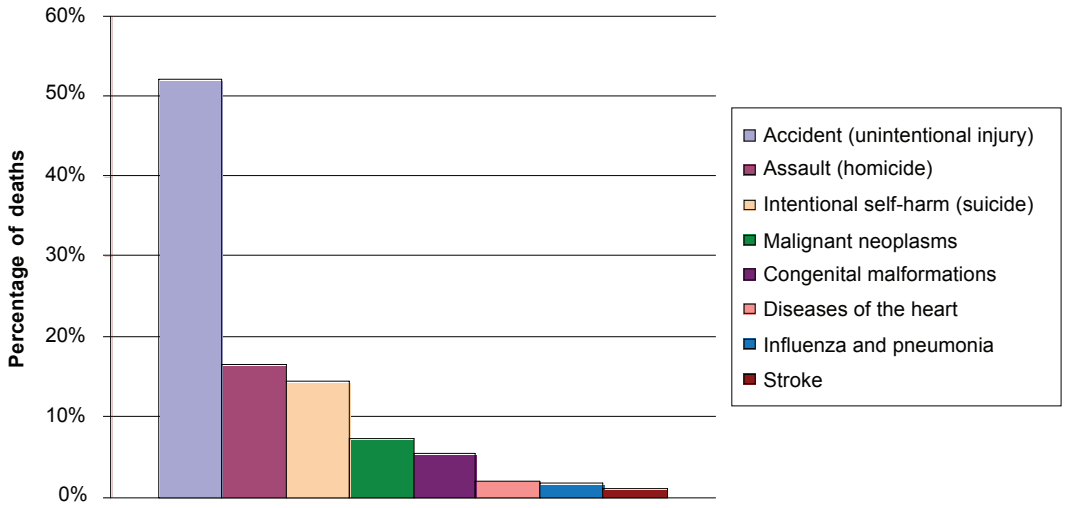
FIGURE 8 **Leading Causes of Death by Age Group, Arizona & US, 2005**



Source; Arizona Vital Statistics, 2005

Even for those under the age of 20 years, CVD still ranks as one of the top eight leading causes of deaths (figure 9)

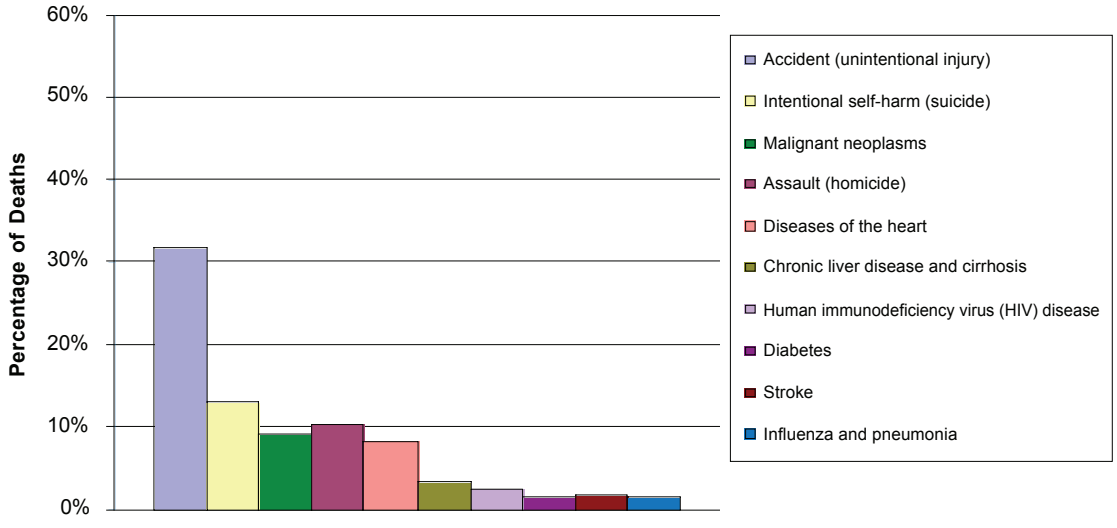
FIGURE 9 **Leading Causes of Death Among Adolescents (Ages 1-19), Arizona, 2005**



Source: Arizona Vital Statistics, 2005

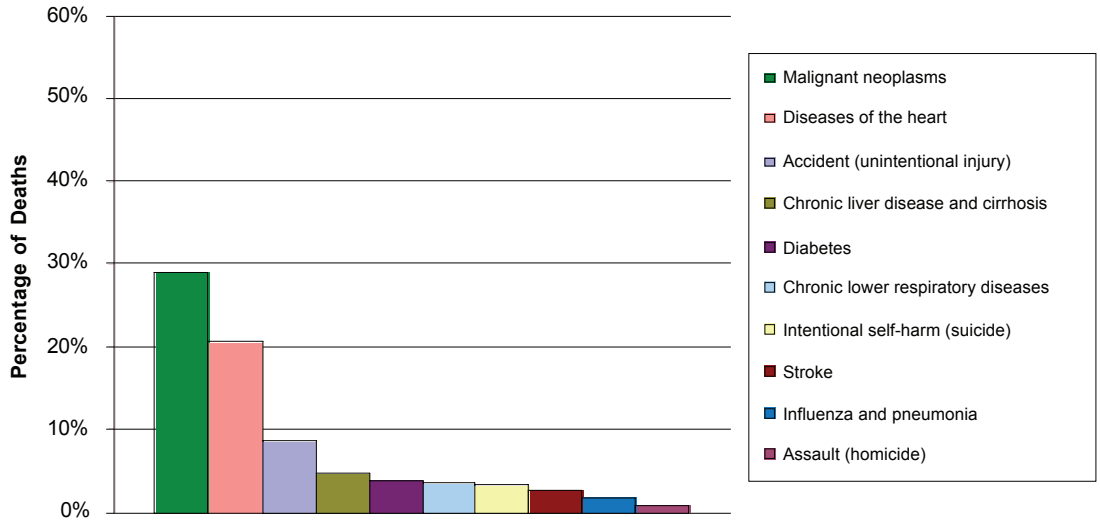
Deaths attributed to both diseases of the heart and strokes greatly increase with age (figures 10, 11, 12).

FIGURE 10 **Leading Causes of Death Among Young Adults (Ages 20-44), Arizona, 2005**



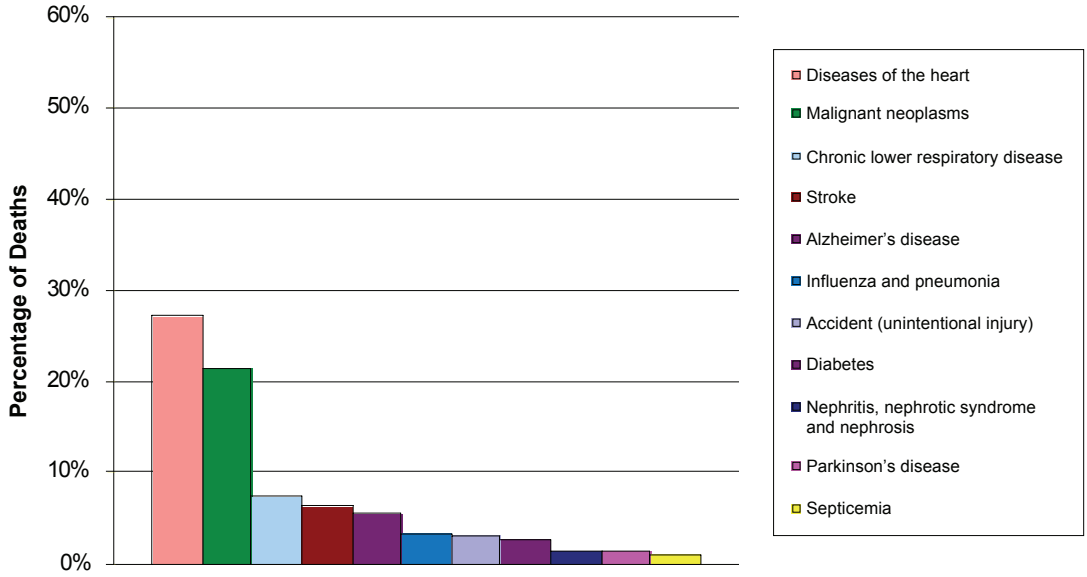
Source: Arizona Vital Statistics, 2005

FIGURE 11 **Leading Causes of Death Among Middle-Aged Adults (Ages 45-65), Arizona, 2005**



Source: Arizona Vital Statistics, 2005

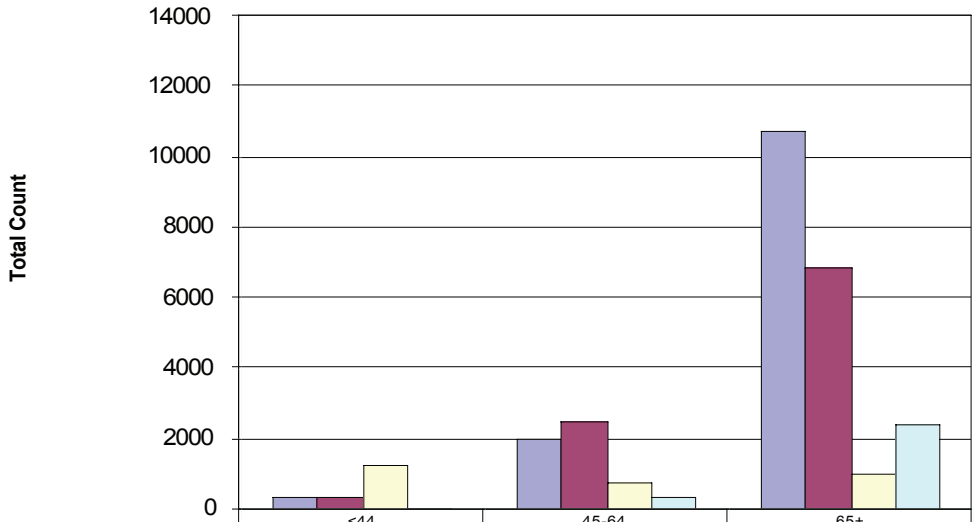
FIGURE 12 Leading Causes of Death Among Elderly Adults (Ages 65+), Arizona, 2005



Source: Arizona Vital Statistics, 2005

There are 34 times more deaths among those in the 65+ age group compared to the 45-64 age group, indicating that age is a major risk factor for CVD mortality (figure 13).

FIGURE 13 Five Leading Causes of Death by Age Group, Arizona, 2005

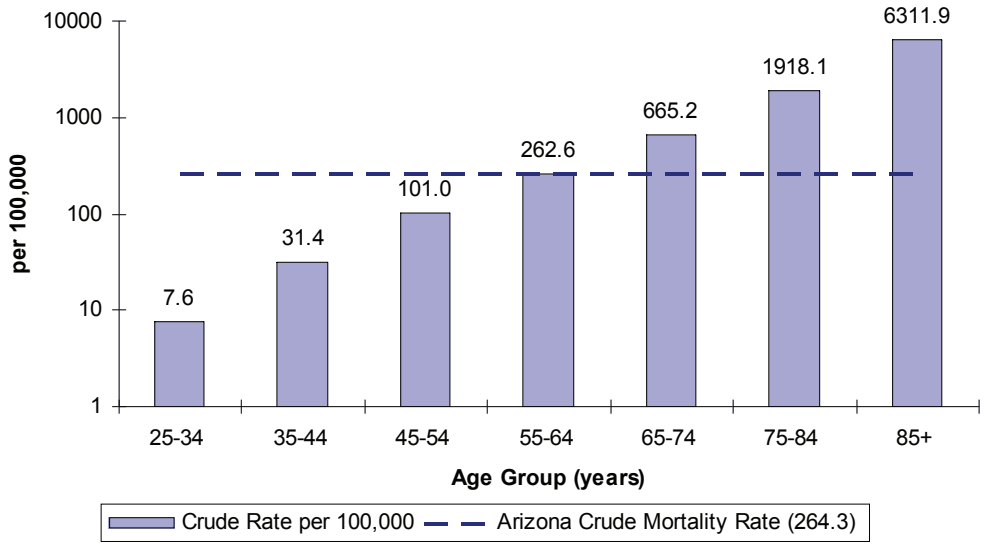


	<44	45-64	65+
Diseases of the Heart & Stroke	333	1991	10775
Cancer	317	2482	6874
Unintentional injuries	1272	745	986
Chronic Low er Respiratory Disease	34	340	2403

Source: Arizona Vital Statistics, 2005

Crude mortality rates show that age begins to affect risk of death starting between ages 25-34 (figure 14).

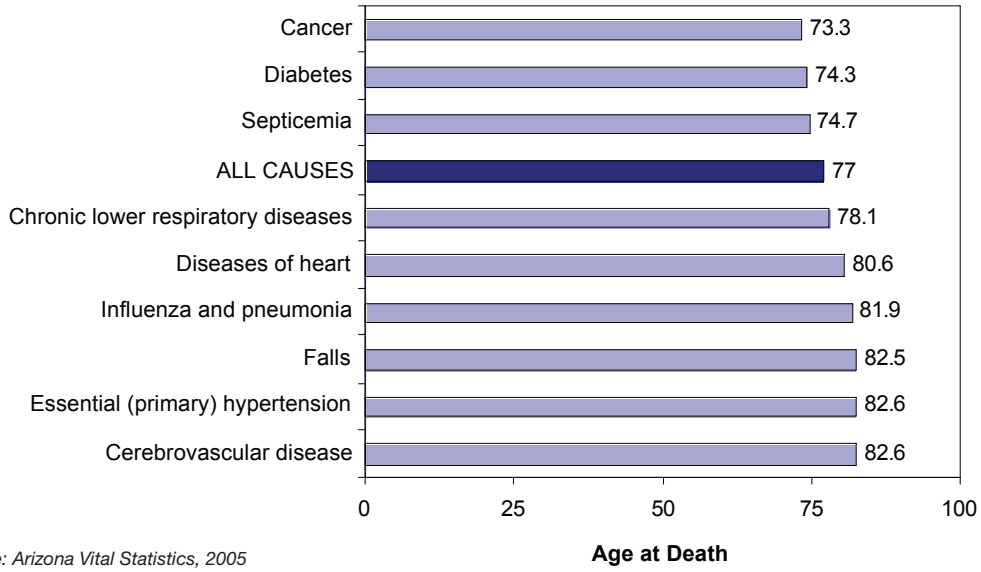
FIGURE 14 **Cardiovascular Crude Mortality Rate by Age Group, Arizona, 1999-2004**



Source: CDC Compressed Mortality File

For all CVDs combined, the median age at death is 81.1 years; for diseases of the heart the median age at death was 80.6 years, and for stroke it was 82.6 years (figures 15, 16).

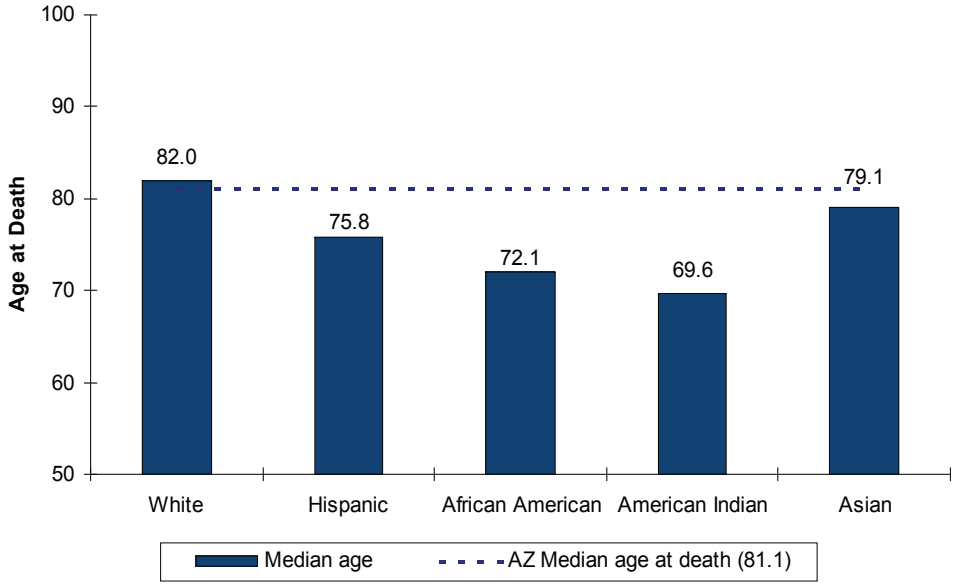
FIGURE 15 **Median Age at Death for Selected Leading Causes, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

FIGURE 16 **Median Age at Death for Cardiovascular Disease by Race/Ethnicity, Arizona, 2005**

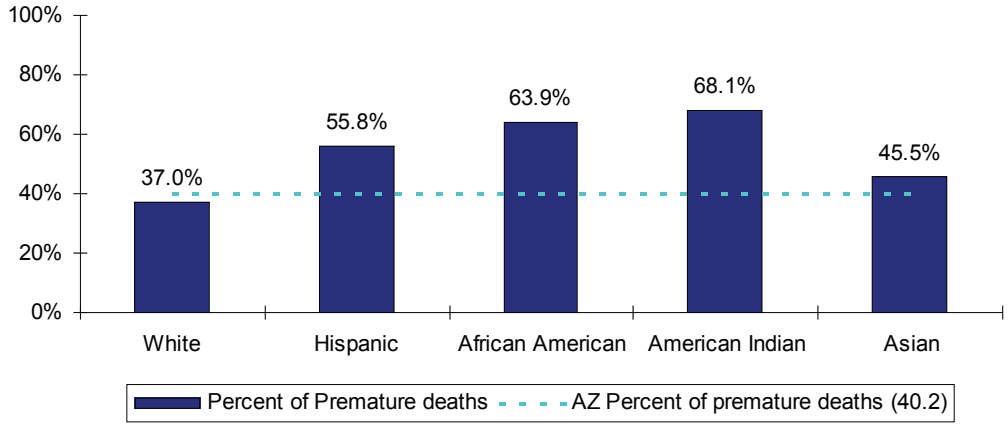
(Based on expected years of life for all US residents, which is 77.9 years in 2004)



Source: Arizona Vital Statistics, 2005

Compared to other selected leading causes of death the median age at death for CVD is higher, but this differs significantly by race/ethnicity. The median ages for CVD deaths are 75.8 years for Hispanics, 72.1 years for African Americans, 69.6 years for American Indians, and 79.1 years for Asians (see figure 16). Racial and ethnic minorities have higher rates of premature death from CVD than the White population. About 68 percent of American Indians and about 64 percent of African Americans die prematurely compared to only 37 percent for Whites (figure 17).

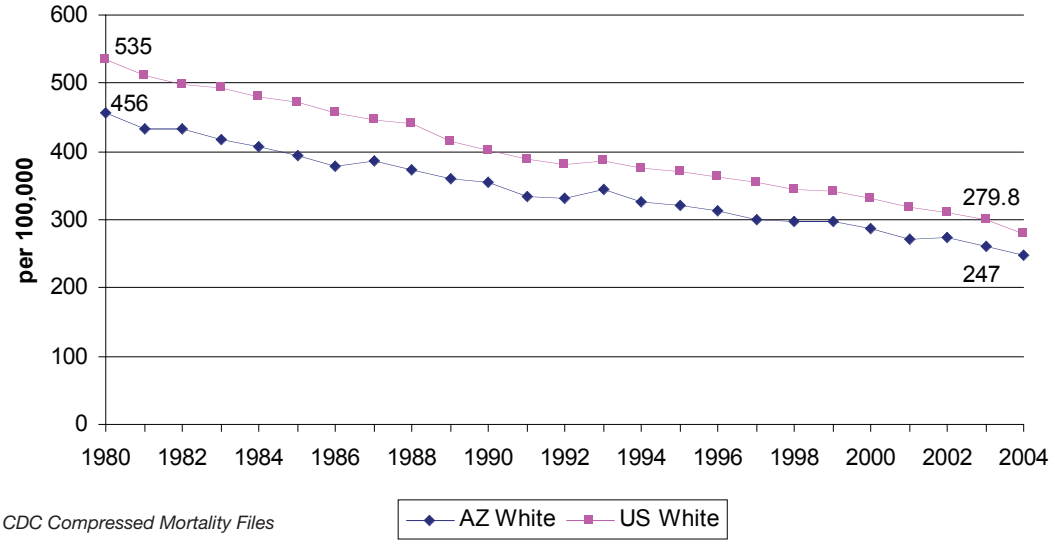
FIGURE 17 **Percent of Premature Deaths for Cardiovascular Disease by Race/Ethnicity, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

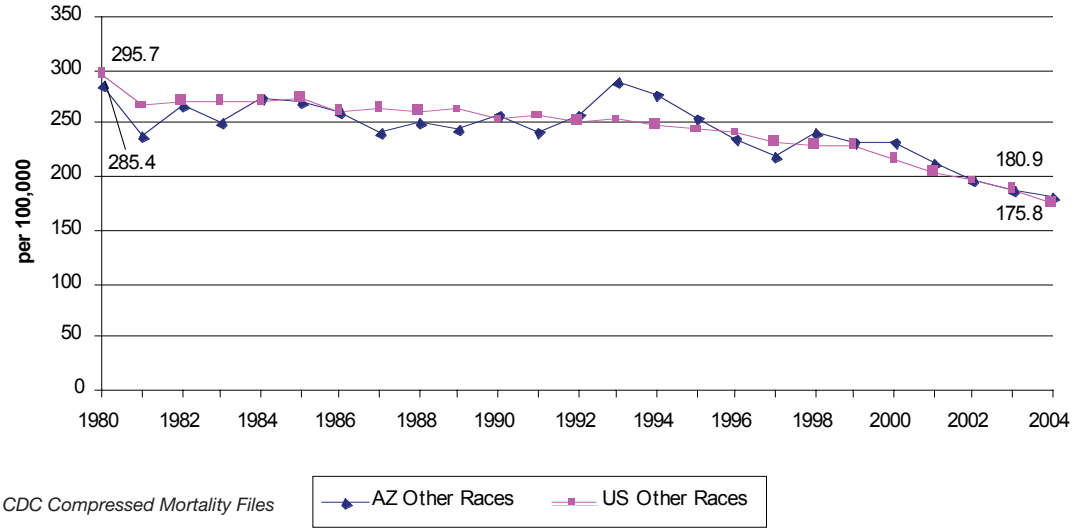
Other differences or disparities in the burden of CVD mortality are measurable across several characteristics including sex, race/ethnic group, age, education and household income. While mortality rates trended down for all groups from 1980 – 2004, there were still significant differences in the mortality impact on racial/ethnic minorities in Arizona. African Americans had the highest CVD death rate throughout that time period, which was at least 25 percent higher than Whites by 2004 (figures 18, 19 and 20).

FIGURE 18 **Cardiovascular Disease Age-Adjusted Mortality Rate Trends for Whites, Arizona and US, 1980-2004**



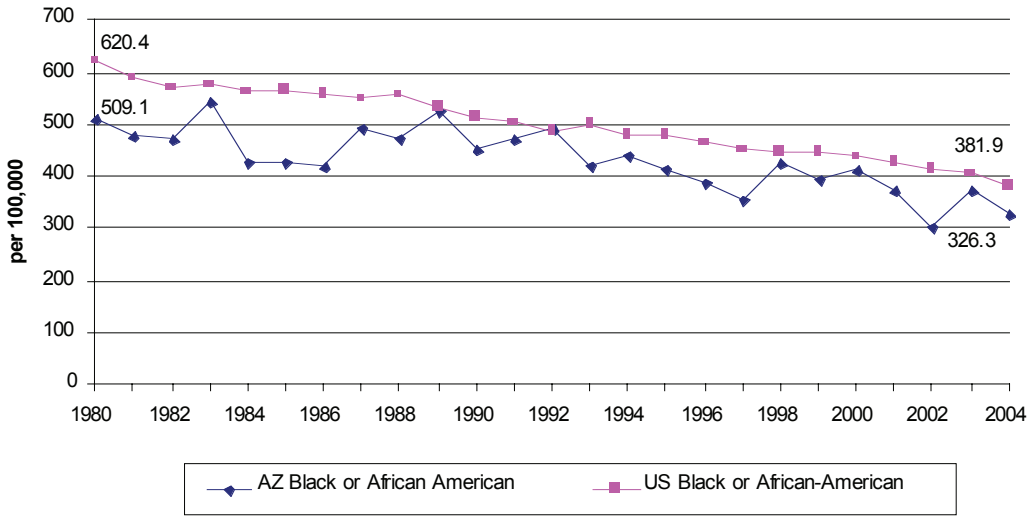
Source: CDC Compressed Mortality Files

FIGURE 19 **Cardiovascular Disease Age-Adjusted Mortality Rate Trends for Other Races, Arizona and US, 1980-2004**



Source: CDC Compressed Mortality Files

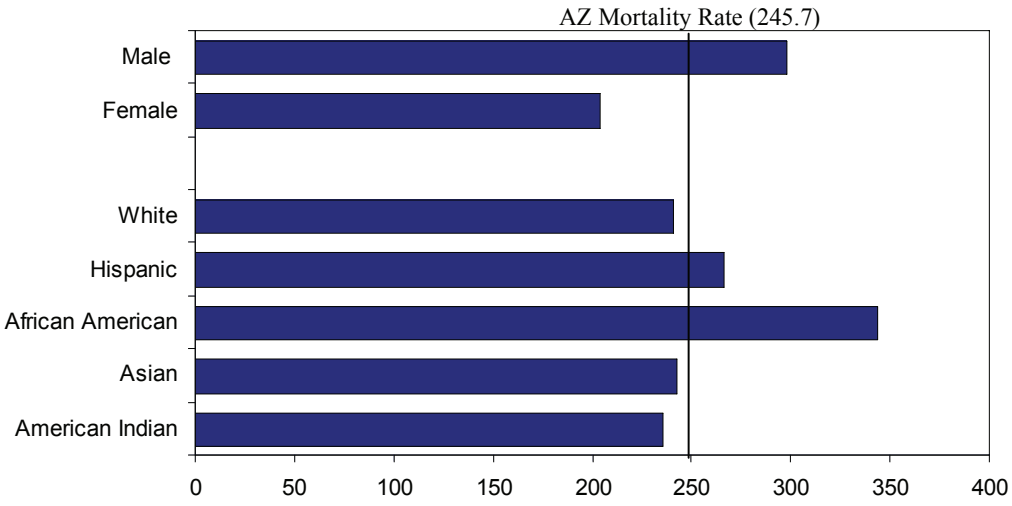
FIGURE 20 **Cardiovascular Disease Age-Adjusted Mortality Rate Trends for Blacks or African-Americans, Arizona and US, 1980-2004**



Source: CDC Compressed Mortality Files

Additionally, in 2005, African Americans again had the highest age adjusted rate of death (figure 21).

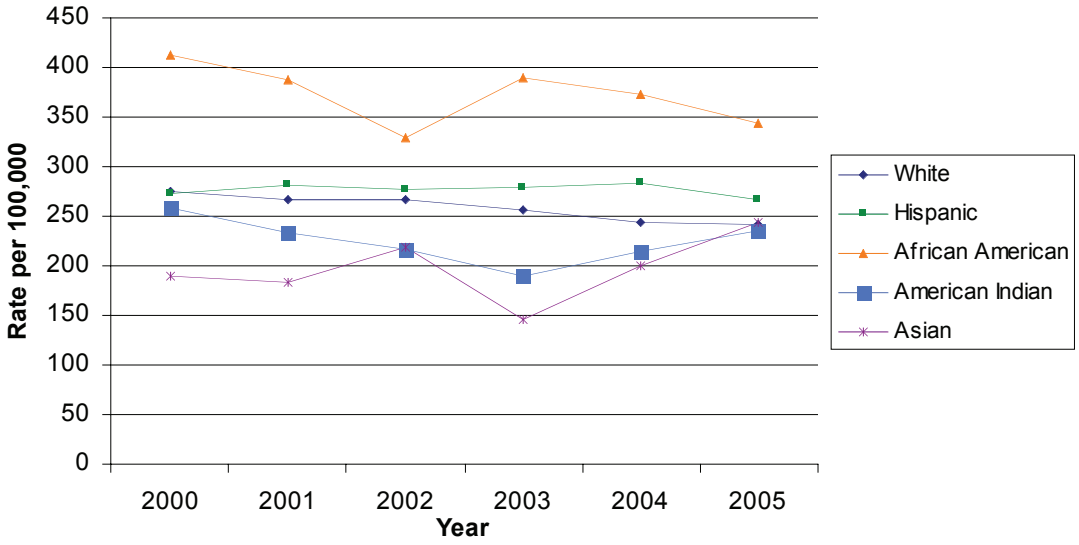
FIGURE 21 **Cardiovascular Disease Age-Adjusted Mortality Rates, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

Despite decline in CVD mortality rates for African Americans, they still have the highest CVD mortality rates in Arizona. Since 2001, Hispanics have the second highest mortality rates (figure 22).

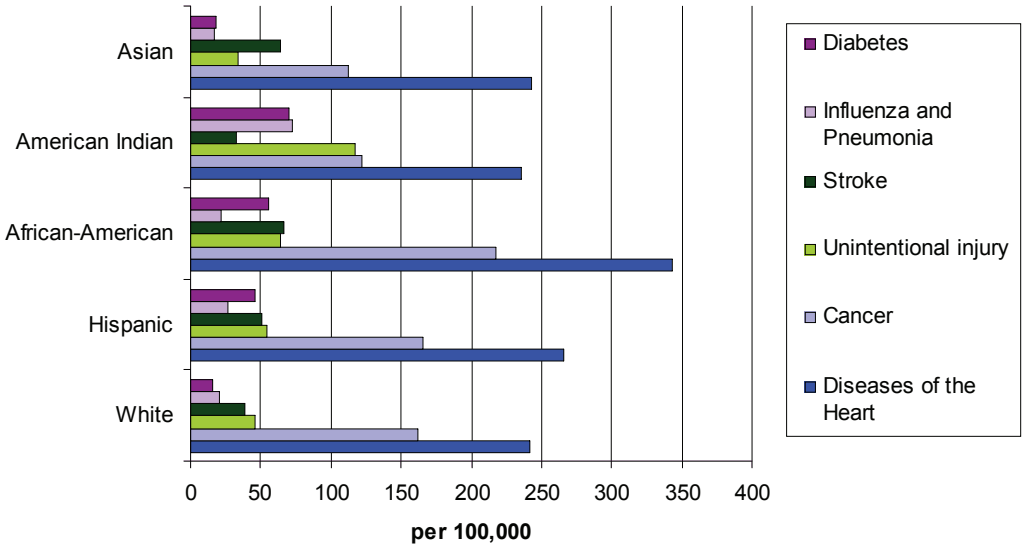
FIGURE 22 **Age-Adjusted Mortality Rates for Cardiovascular Disease by Race/Ethnicity, Arizona, 2000-2005**



Source: Arizona Vital Statistics, 2000-2005

The Asian population had the lowest CVD mortality rate from 2000 to 2005, but recent trends show an increasing CVD mortality that is approaching those of other racial/ethnic groups. Although the lowest mortality rate occurs in American Indians, it is similar to the other mortality rates and not much lower than the average (see figure 21). When comparing the leading causes of death within each racial/ethnic group, diseases of the heart far exceed any other disease mortality rate. Stroke is the third leading cause of death for African Americans and Asians and fourth for American Indians, Hispanics and Whites (figure 23).

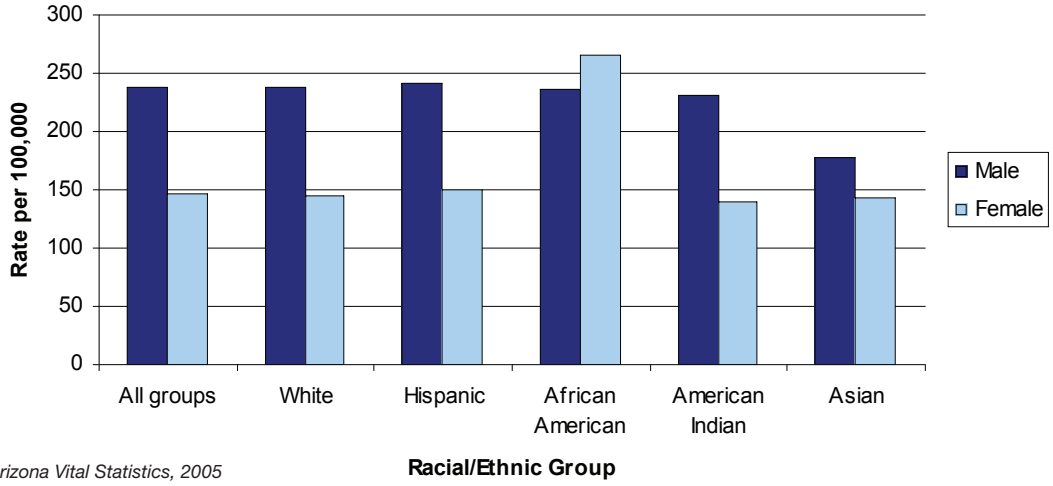
FIGURE 23 Leading Causes of Death by Race/Ethnicity, Arizona, 2005



Source: Arizona Vital Statistics, 2005

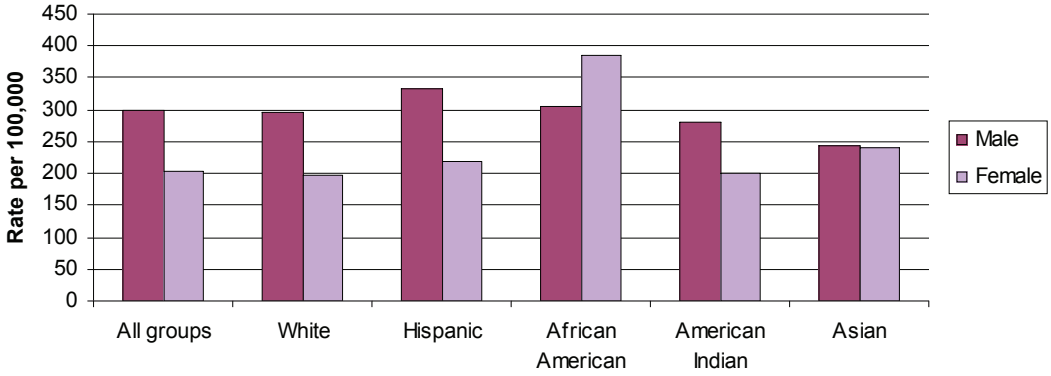
Males had higher age-adjusted mortality rates from cardiovascular diseases than females in all racial/ethnic groups, except among African Americans. Compared to all other races/ethnicities and gender, African American females suffer the highest rates of death from CVD (figures 24, 25).

FIGURE 24 Diseases of the Heart Age-Adjusted Mortality Rates by Race/Ethnicity and Gender, Arizona, 2005



Source: Arizona Vital Statistics, 2005

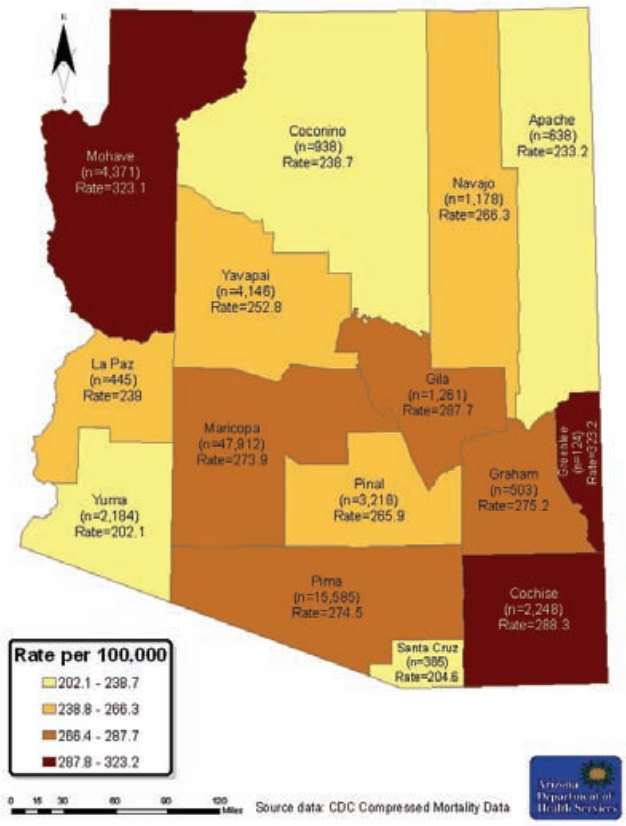
FIGURE 25 **Age-Adjusted Mortality Rates for Cardiovascular Disease by Race & Gender, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

Cardiovascular diseases are the leading killer of Arizonans, regardless of where they live throughout the state. However, the counties with the highest rates of death are Greenlee, Mohave, and Cochise respectively (figure 26).

FIGURE 26 **Cardiovascular Disease Age-Adjusted Mortality Rate per 100,000 by County, Arizona, 1999-2004**



CVD Prevalence

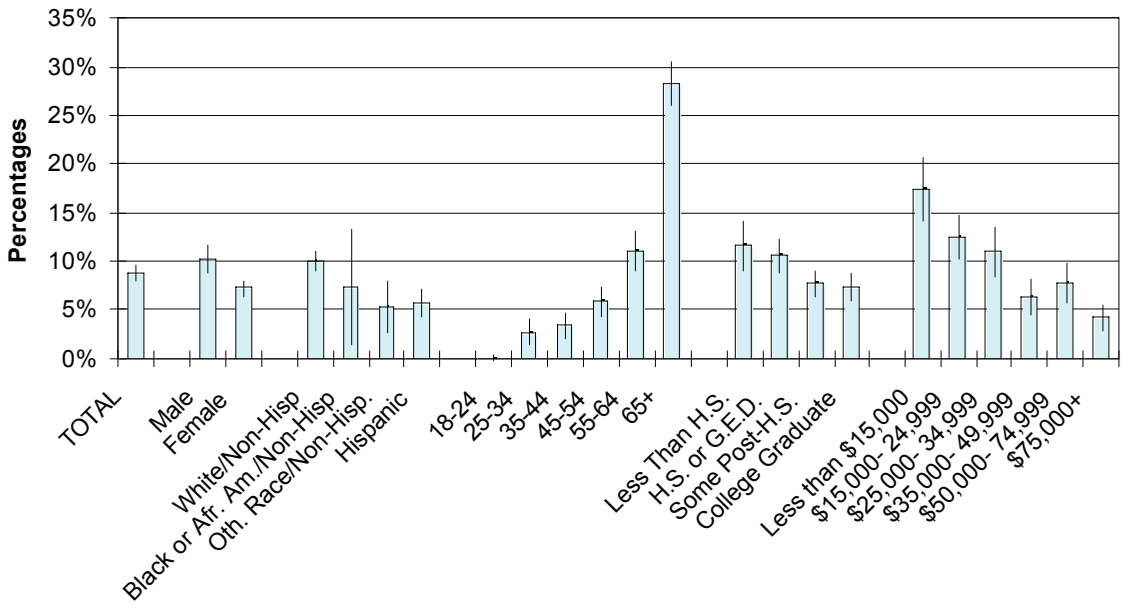
According to the 2006 Behavior Risk Factor Surveillance System (BRFSS), a self-reported questionnaire administered to Arizona adults, the percentage of those affected by at least one or more CVD was about eight percent. The BRFSS included three questions related to CVD:

- Has a doctor, nurse, or other health care professional ever told you that you had a heart attack, also called a myocardial infarction?
- Has a doctor, nurse or other health care professional ever told you that you had angina or coronary heart disease?
- Has a doctor, nurse, or other health care professional ever told you that you had a stroke?

In Arizona, males are more likely to have suffered a heart attack, angina, and/or stroke than females. White Arizonans were more likely than other race/ethnic groups to report having experienced at least one type of CVD. Increasing age is a major risk factor for CVD. Between the age groups 55-65 and 65+ the CVD prevalence increased from approximately 11 percent to 28 percent.

Socioeconomic status is associated with CVD prevalence. Those with a household income of $35,000 or less reported having more CVD-related health conditions than those from households with incomes greater than $35,000. Persons with household incomes of less than $15,000 were four times more likely to have CVD than persons with a household income of more than $75,000 (figure 27).

FIGURE 27 **Self-Reported Prevalence of Cardiovascular Disease in Arizona Adults, 2006**



Source; BRFSS, 2006

Education level also seems to be associated with CVD prevalence. Those who have achieved a higher level of education are less likely to report having CVD. A higher number of those who did not complete a high school education reported having more CVD related health conditions than those who had some post high school or college graduate education.

Coronary Heart Disease (CHD)

Coronary heart disease, previously referred to as coronary artery disease, occurs when the arteries that supply blood to the heart muscles become hardened and narrowed from a buildup of plaque on the inner walls. (http://www.nhlbi.nih.gov/, 2007) Plaque is comprised of fat, cholesterol, calcium, and other substances from the blood. Plaque buildup usually begins in childhood. As plaque buildup occurs, there are three possible outcomes:

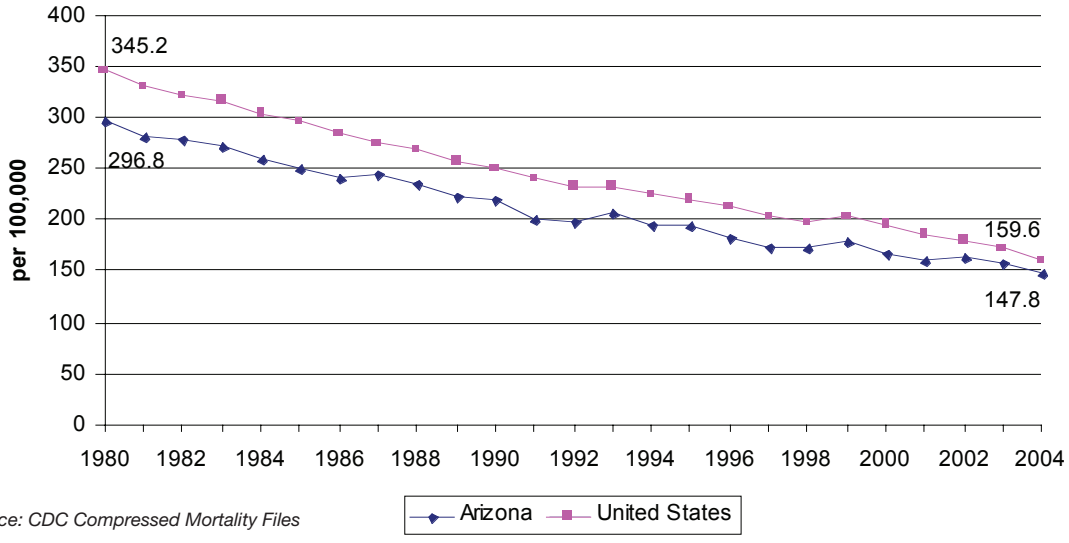
- The arteries narrow and reduce the amount of blood and oxygen that reach the heart muscle.
- The plaque completely blocks the arteries and stops the flow of blood to the heart muscle.
- Blood clots form and can possibly block the arteries that supply blood to the heart muscle.

As plaque continues to buildup within the arteries, the coronary arteries narrow, thus restricting blood flow. Eventually blood flow to the heart muscle is reduced compromising the supply of oxygen necessary for normal function. This can lead to other cardiovascular problems such as angina or heart attacks.

CHD Mortality

Similar to the overall trend in deaths from CVD, deaths from coronary heart disease (CHD) have decreased by half since 1980 (figure 28).

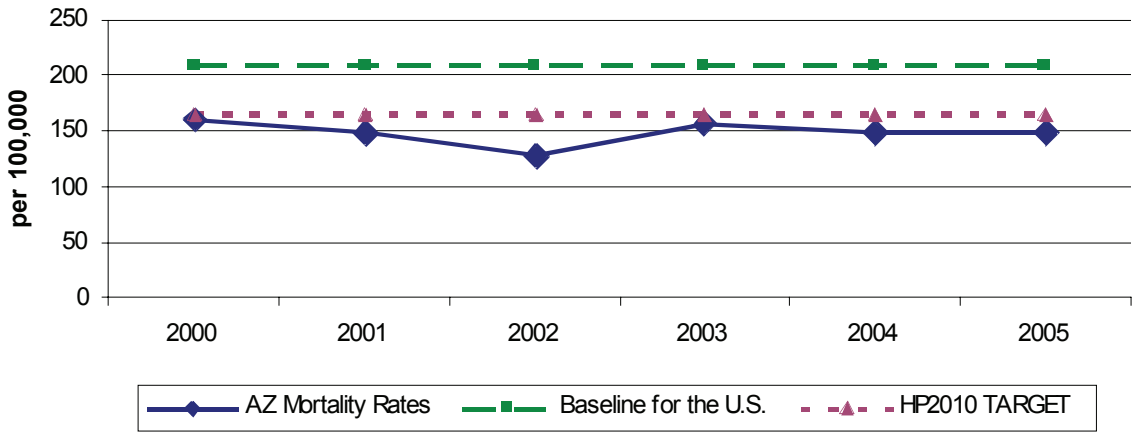
FIGURE 28 **Trends in Coronary Heart Disease Mortality Rates, Arizona and US, 1980-2004.**



Source: CDC Compressed Mortality Files

Although the decrease in mortality is significant, CHD remains a leading cause of death in both Arizona and the US. According to the 2000-2005 trends, the mortality rate from CHD in Arizona (147.8) is lower than the US rate (159.6). Although the overall state rate is below the HP2010 goal of 166 deaths per 100,000, the rates are not uniform and several counties have higher rates and do not meet this goal (figure 29).

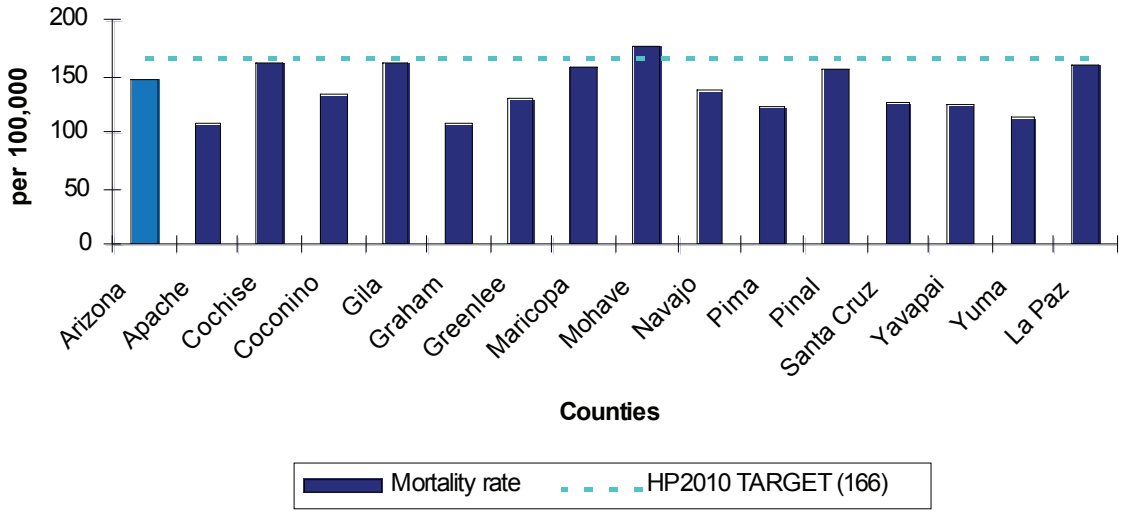
FIGURE 29 **HP2010 Coronary Heart Disease Death Reduction Goals by Year, Arizona, 2000-2005**



Source: Arizona, Vital Statistics, 2005

When looking at county level data, Mohave County has not met the Healthy People 2010 goal, and has the highest CHD mortality rate in Arizona (figure 30).

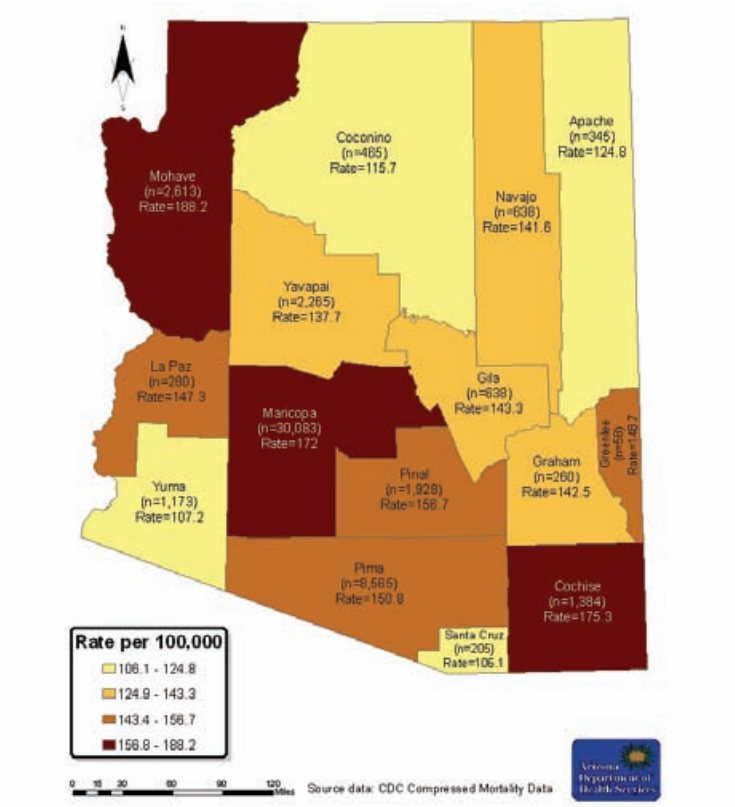
FIGURE 30 **HP2010 Coronary Heart Disease Death Reduction Goals by County, Arizona, 2005**



Source: Arizona, Vital Statistics, 2005

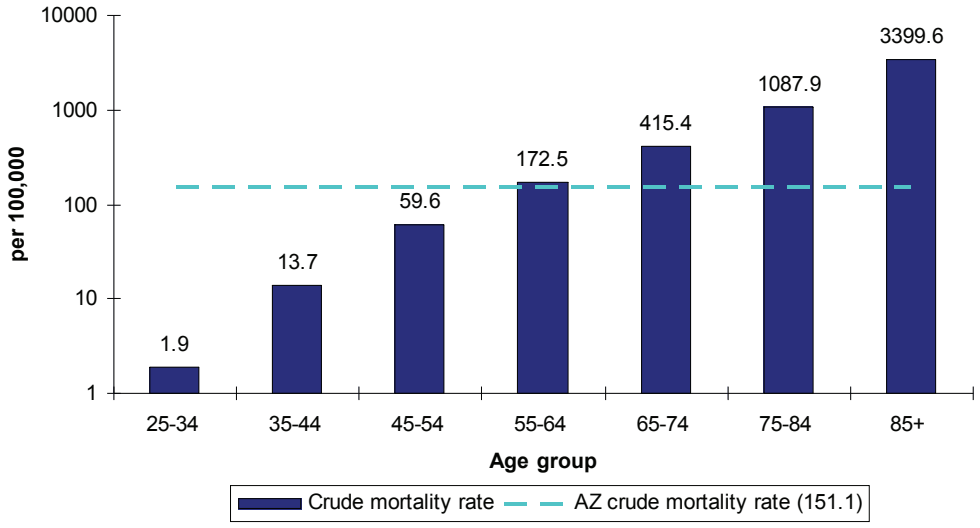
Cochise and Maricopa counties also have high mortality rates compared to the rest of the state (figure 31).

FIGURE 31 **Coronary Heart Disease Age-Adjusted Mortality Rate per 100,000 by County, Arizona, 1999-2004**



Crude mortality rate from CHD increases with age, especially after age 55 (figure 32).

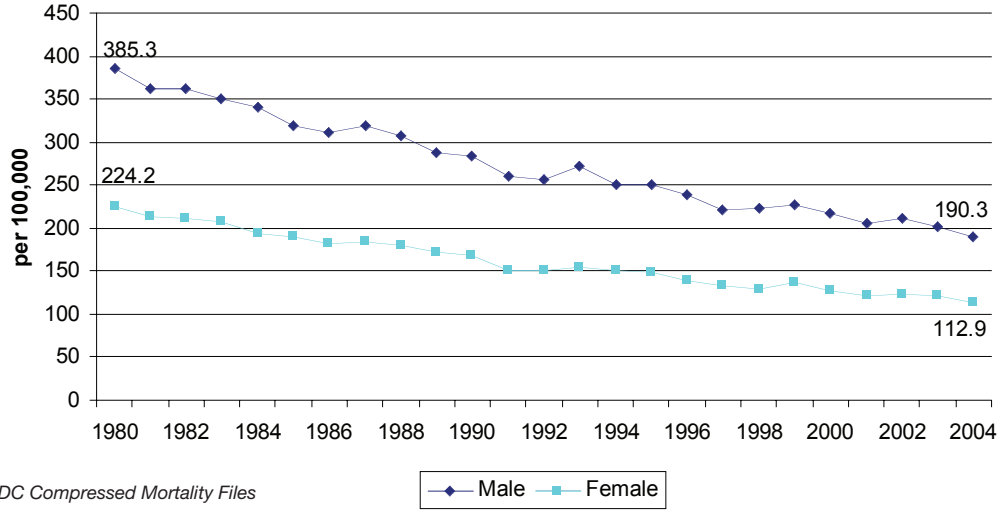
FIGURE 32 **Coronary Heart Disease Crude Mortality Rates by Age, Arizona, 1999-2004**



Source: CDC Compressed Mortality Files

Similar to the patterns observed for CVD, more males than females die from CHD. In 2004, the age-adjusted mortality rate among males was about 69 percent higher than females (figure 33).

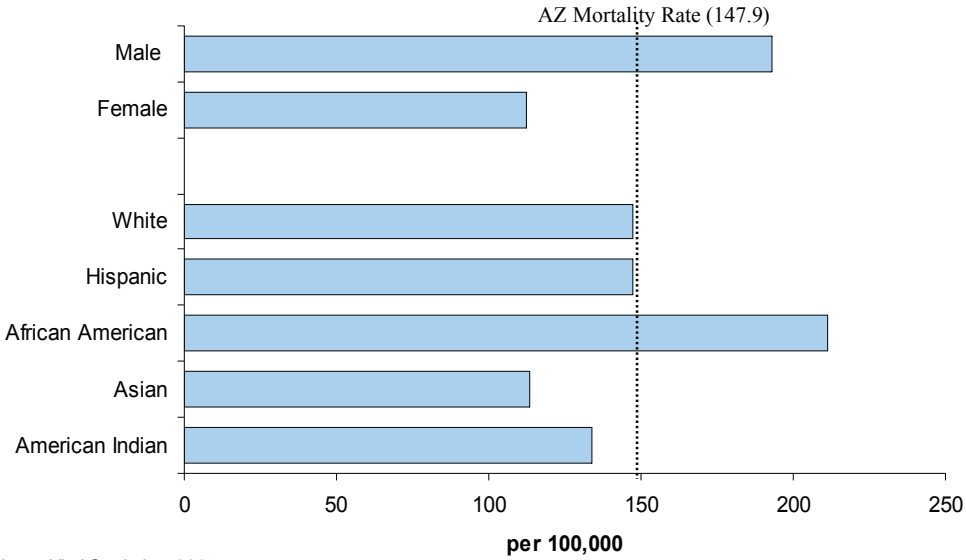
FIGURE 33 **Coronary Heart Disease Mortality Trend by Year and Gender, Arizona, 1980-2004**



Source: CDC Compressed Mortality Files

As seen in figure 34, the CHD death rate in African Americans is higher than any other race/ethnicity by at least 44 percent, and nearly double the CHD death rate of the Asian population. In each ethnic group, men had higher CHD mortality rates than their female counterparts, with the exception of African Americans.

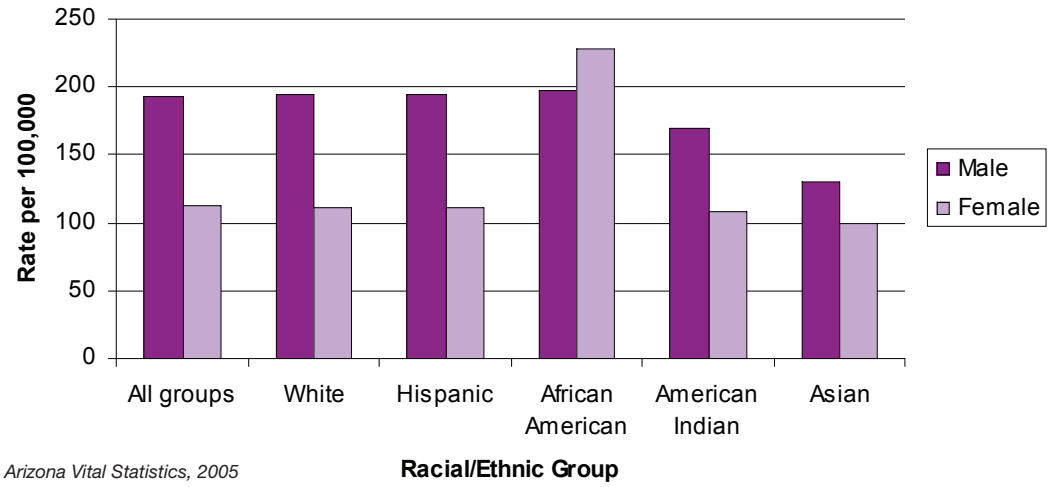
FIGURE 34 **Coronary Heart Disease Age-Adjusted Mortality Rates, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

African American women have the highest mortality rates, at more than double the rate among White women (figure 35).

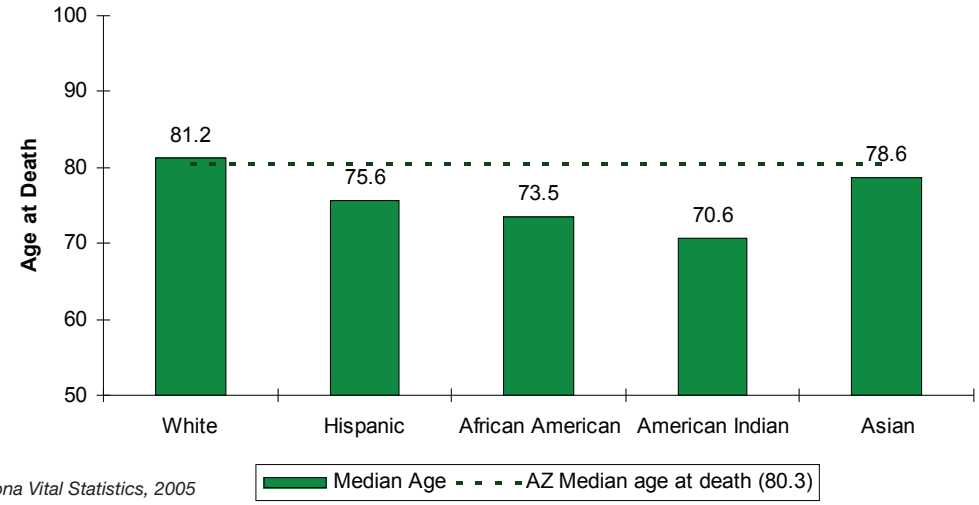
FIGURE 35 **Coronary Heart Disease Age-Adjusted Mortality Rates by Race/Ethnicity and Gender, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

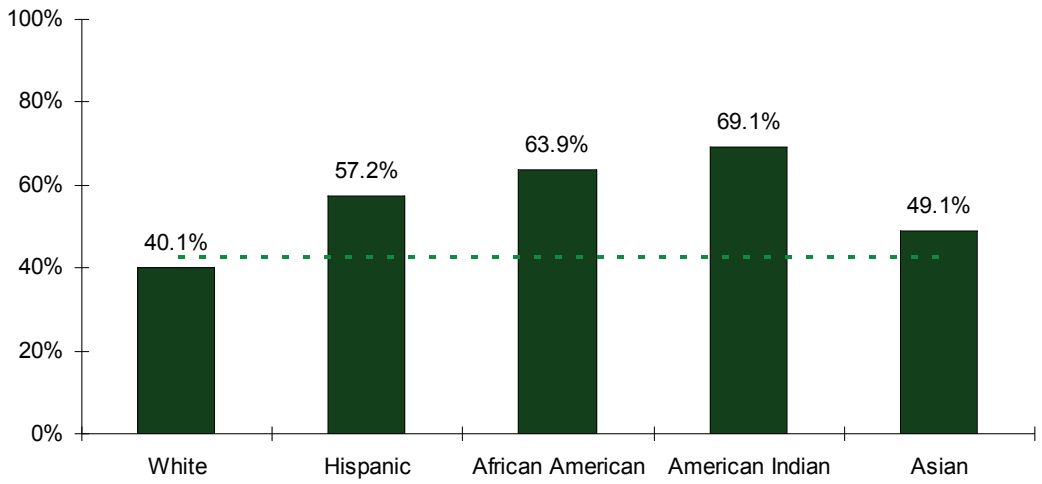
The Arizona median age at death for those who die from CHD is 80.3 years. Although the age-adjusted mortality rates are highest among African Americans, American Indians shoulder the greatest burden of CHD and die at an earlier age than all the other racial/ethnic groups. American Indians in Arizona have a median age of death from CHD of 70.6 years, which is at least 10 years younger than Whites in Arizona. (81.2 years). Over half of premature deaths from CHD in Arizona occur among the ethnic minority groups in the state (figure 36 and 37).

FIGURE 36 **Median Age at Death for Coronary Heart Disease by Race/Ethnicity, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

FIGURE 37 **Percent of Premature Deaths for Coronary Heart Disease by Race/Ethnicity, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

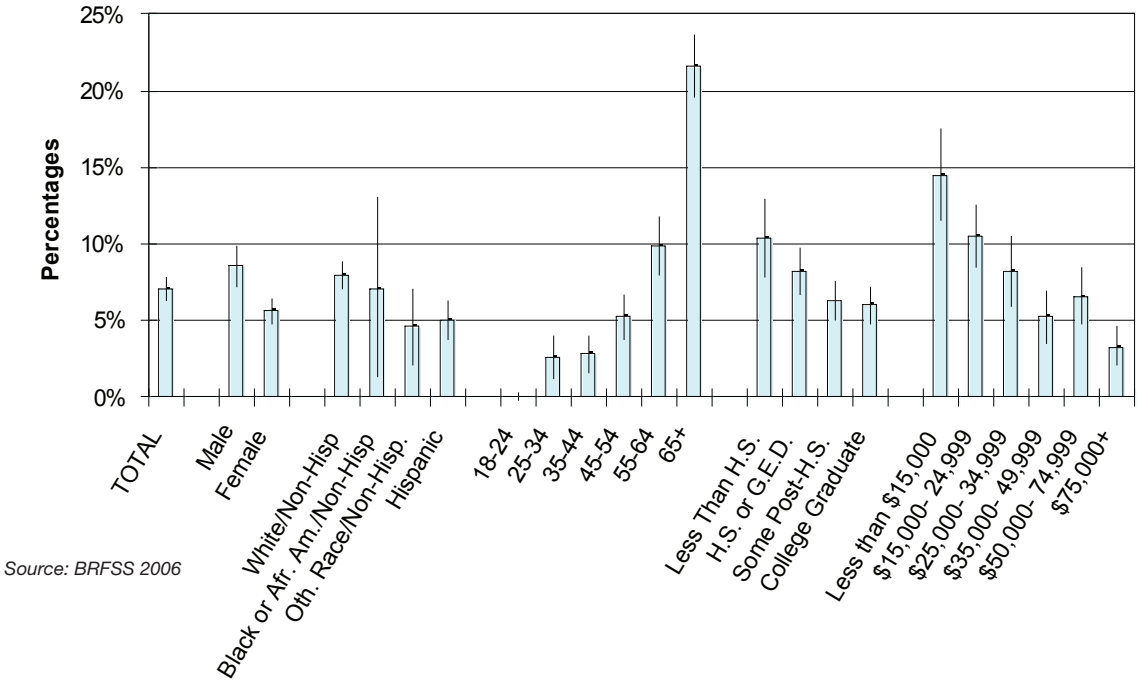
CHD Prevalence

The following CHD related questions were included in the 2006 BRFSS:

- Has a doctor, nurse, or other health professional ever told you had a heart attack or myocardial infarctions?
- Has a doctor, nurse, or other health professional ever told you that you had angina or coronary heart disease?

More males than females reported having experienced CHD, and more Whites have experienced CHD compared to Hispanics. Arizona adults suffer more from CHD as age increases. About three percent of those between the ages of 35-44 compared to approximately 22 percent of those 55-64 years old reported having CHD. The prevalence of CHD was inversely related to education; those who had more education (post high school and college graduate) were less likely to report having CHD than those who had less than a high school education. There were also significant disparities among different income groups. As household income increases, the prevalence of CHD decreases. The largest difference occurs between those with a household income less than $15,000 compared to those with a household income greater than or equal to $75,000 (14 percent vs. 3 percent). As with all cardiovascular diseases, CHD poses a heavier burden on populations with lower levels of education and household incomes (figure 38).

FIGURE 38 **Self-Reported Prevalence of Coronary Heart Disease in Arizona Adults, 2006**



Source: BRFSS 2006

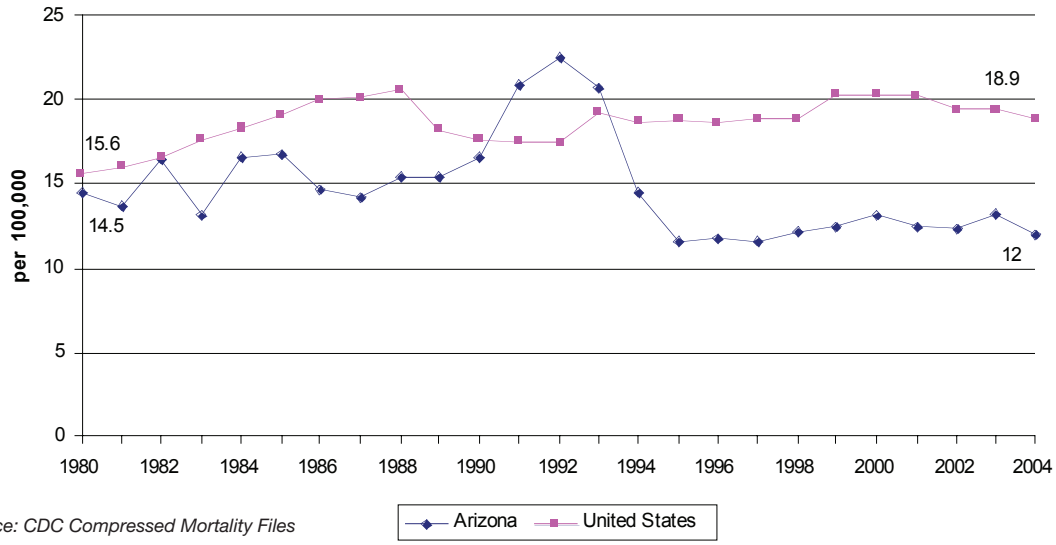
Congestive Heart Failure (CHF)

Congestive heart failure occurs when the heart is unable to pump enough blood throughout the body either because it cannot fill with enough blood or it cannot pump with enough force, and in some cases, for both of these reasons. This disease progresses over time as the pumping action of the heart grows weaker. It can affect either side of the heart at one time or both sides of the heart simultaneously. This weakening of the heart's pumping can cause blood and fluid to "back up" into the lungs, buildup of fluid in the feet, ankles and legs, and tiredness and/or shortness of breath. The primary causes of CHF are CHD, high blood pressure and diabetes. CHD is the leading underlying cause for CHF in the US. (http://www.nhlbi.nih.gov/health/dci/Diseases/Hf/HF_Causes.html, 2007)

CHF Mortality

The overall CHF mortality rate from 1980 to 2004 has been unsteady in Arizona, with the highest rate in 1992 at 22.4 and the lowest rate in 1995 at 11.6. The US mortality rate from CHF increased from 15.6 in 1980 to 18.9 in 2004 (figure 39).

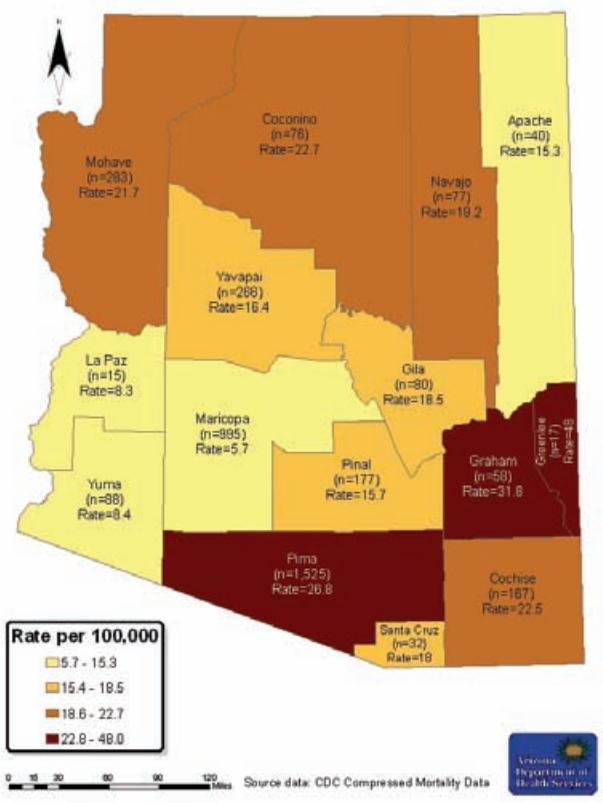
FIGURE 39 **Trends in Congestive Heart Failure Mortality Rates, Arizona and US, 1980-2004**



Source: CDC Compressed Mortality Files

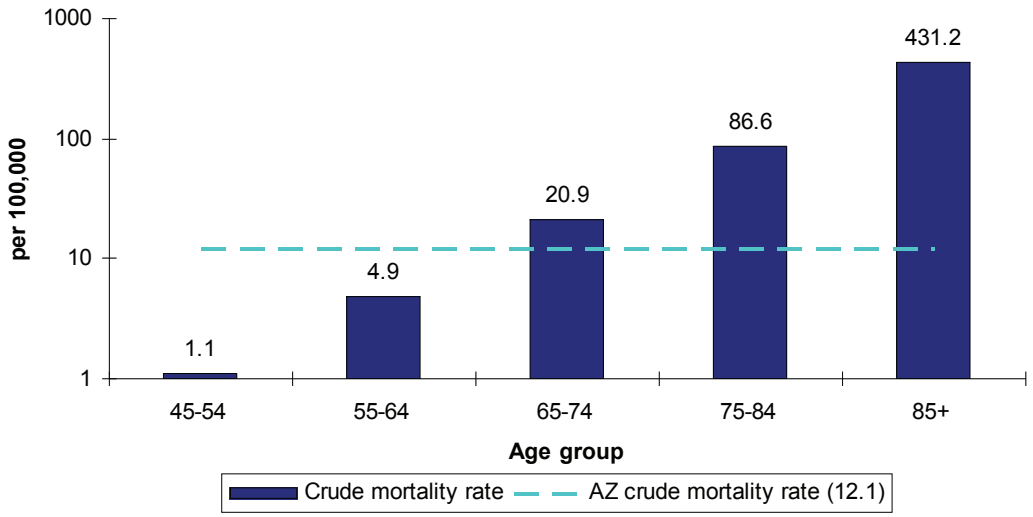
Age-adjusted mortality rates from CHF are highest in the southern Arizona counties of Greenlee, Graham, and Pima (figure 40).

FIGURE 40 **Congestive Heart Failure Age-Adjusted Mortality Rate per 100,000 by County, Arizona, 1999-2004**



As with other cardiovascular diseases, crude mortality rates from CHF increase with age (figure 41).

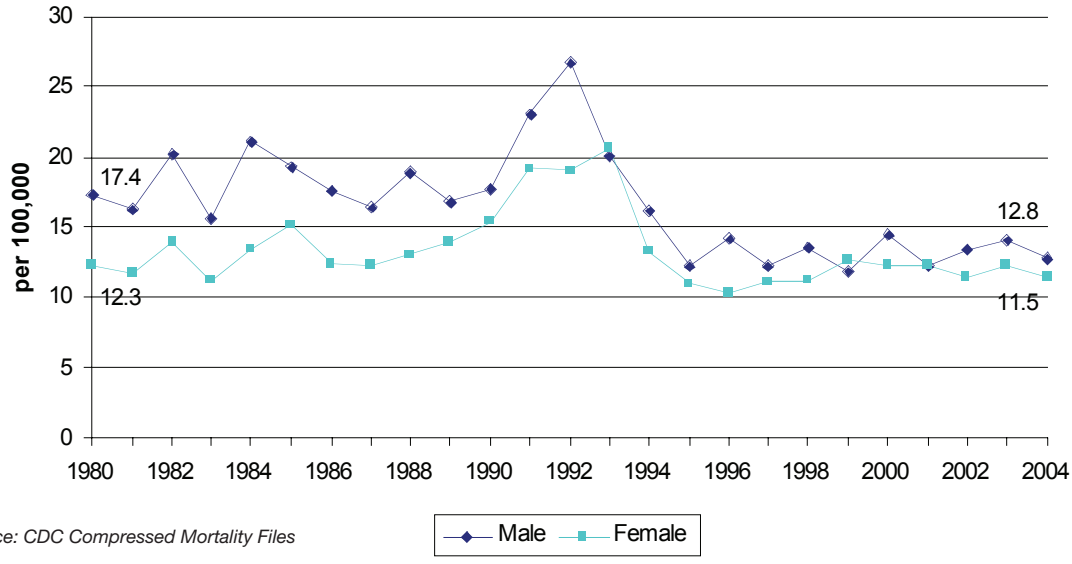
FIGURE 41 **Congestive Heart Failure Crude Mortality Rates by Age, Arizona, 1999-2004**



Source: CDC Compressed Mortality Files

Contrary to the patterns observed in other CVD types, for CHF age-adjusted mortality rates are similar between males and females (figure 42).

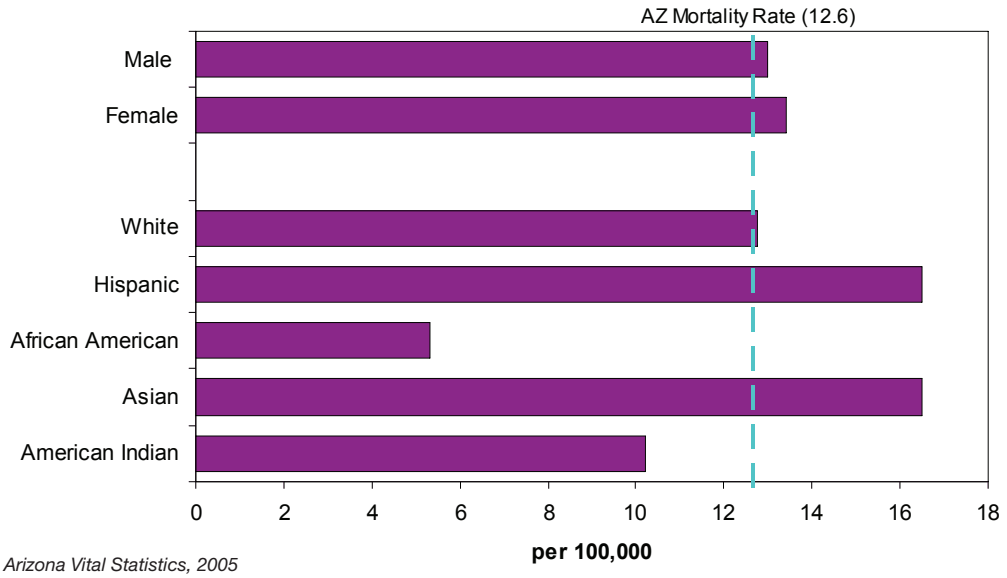
FIGURE 42 **Congestive Heart Failure Mortality Trend by Year and Gender, Arizona, 1980-2004**



Source: CDC Compressed Mortality Files

Hispanics and Asians have the highest mortality rates compared to other racial/ethnic groups. Their rates are at least three times higher than the African Americans, who have the lowest CHF mortality rate (figure 43).

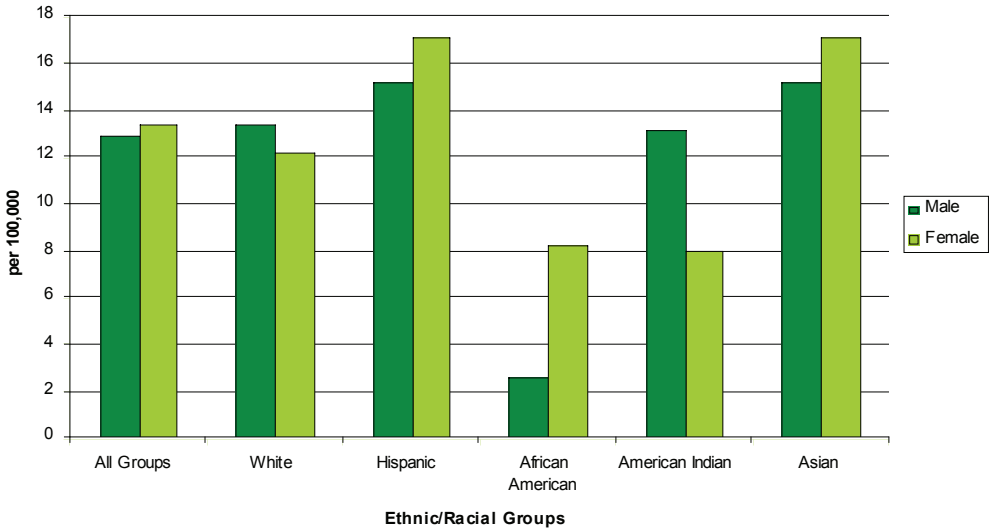
FIGURE 43 **Congestive Heart Failure Age-Adjusted Mortality Rate, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

Hispanic, Asian, and African American females have higher CHF mortality rates than their male counterparts, but White and American Indian males had CHF higher mortality rates than their female counterparts (figure 44).

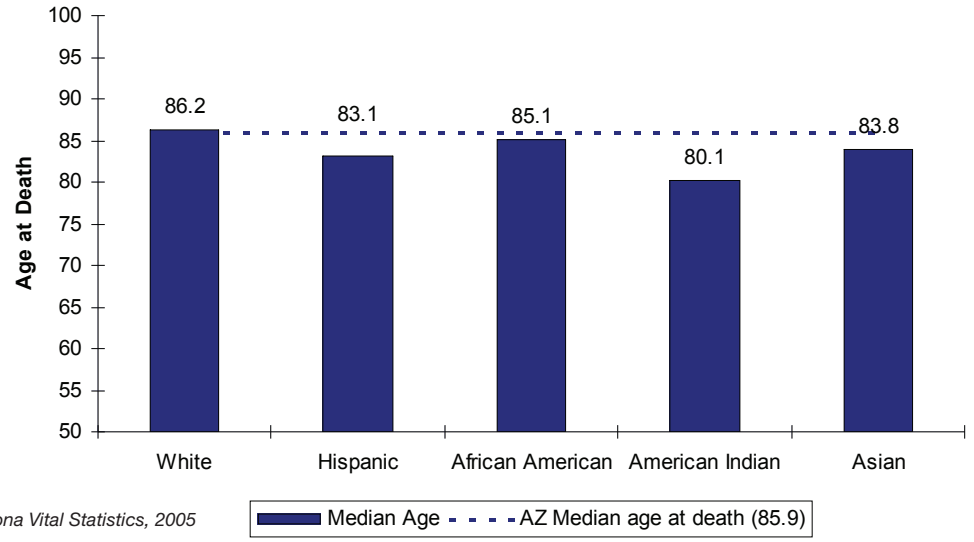
FIGURE 44 **Age-Adjusted Mortality Rate for Congestive Heart Failure by Race/Ethnicity and Gender, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

The median age at death from CHF in Arizona is 85.9 years. American Indians die at younger ages than other ethnic groups, approximately five years sooner than the Arizona median age at death (figure 45).

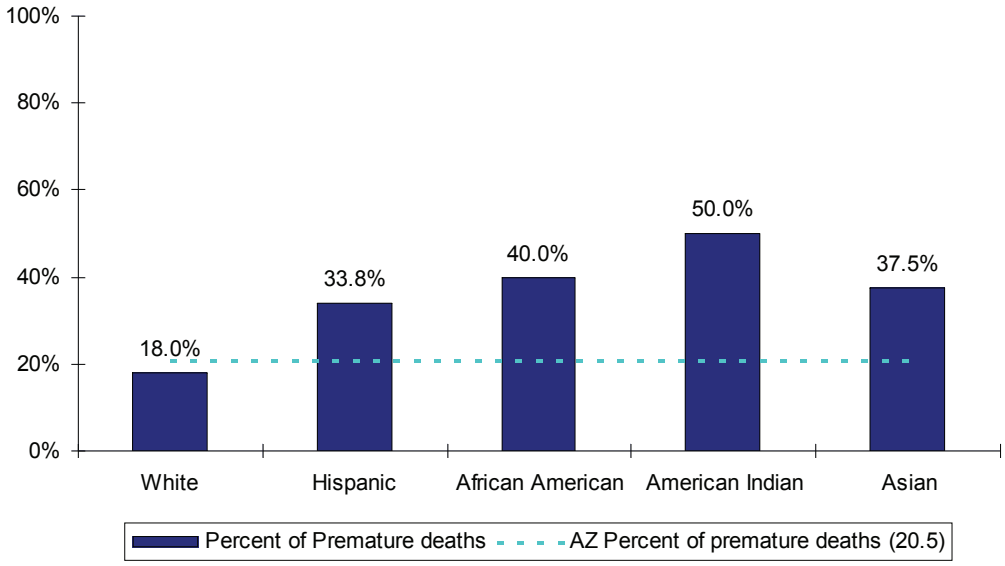
FIGURE 45 **Median Age at Death for Congestive Heart Failure Mortality by Race/Ethnicity, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

American Indians and African Americans are more likely to die prematurely from CHF with percentages ranging from 40-50 percent (figure 46).

FIGURE 46 **Percent of Premature Deaths for Congestive Heart Failure by Race/Ethnicity, Arizona, 2005**

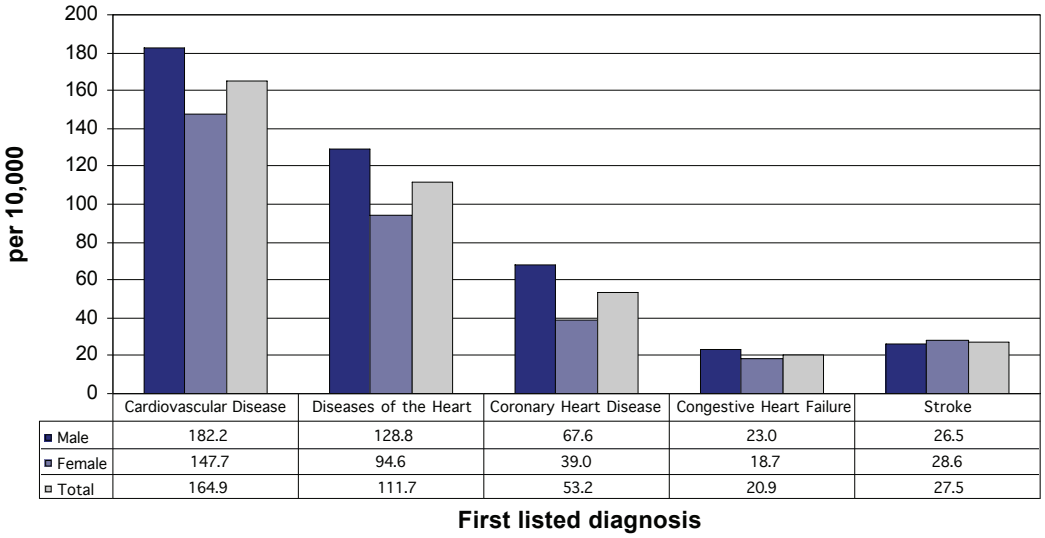


Source: Arizona Vital Statistics, 2005

CHF Prevalence

Questions relating directly to CHF were unavailable from BRFSS, therefore, the 2005 hospitalization data on the number of discharges were utilized to analyze CHF prevalence. Although the difference is small, more males (23 per 10,000) than females (18.7 per 10,000) were diagnosed with CHF and more African Americans (36.7 per 10,000) were diagnosed with CHF than any other racial/ethnic groups. The group with the lowest crude rate was the American Indians (7.7 per 10,000). As with many of the other cardiovascular diseases, CHF increased with age and was a more common discharge diagnosis in older age groups compared to younger age groups. For example, the rate of discharges among those age 65 and older was 117 per 10,000 compared to those between the ages 45-64 at 22.4 per 10,000. Compared to the prevalence of other cardiovascular diseases, CHF has similar patterns to CHD with regards to sex, race/ethnicity, and age (figures 47, 48, 49).

FIGURE 47 **Discharge Rate by First-Listed Diagnosis and Gender, Arizona, 2005**

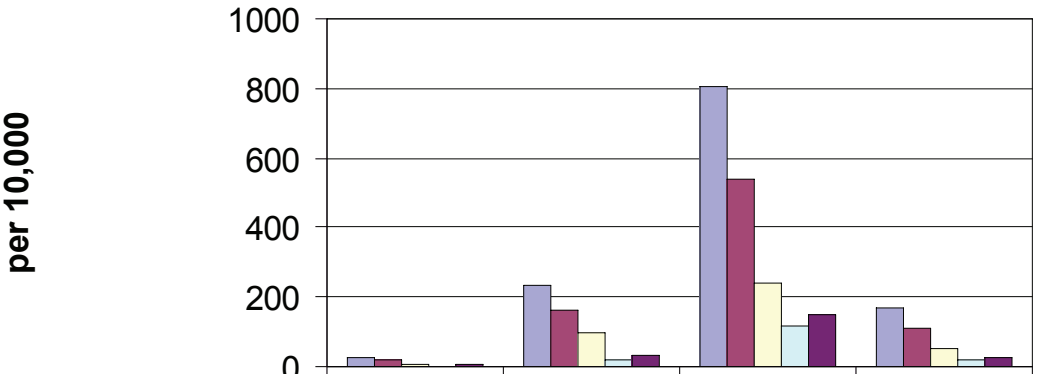


	Cardiovascular Disease	Diseases of the Heart	Coronary Heart Disease	Congestive Heart Failure	Stroke
Male	182.2	128.8	67.6	23.0	26.5
Female	147.7	94.6	39.0	18.7	28.6
Total	164.9	111.7	53.2	20.9	27.5

First listed diagnosis

Source: Vital Statistics, 2005

FIGURE 48 Discharge Rate by First-Listed Diagnosis and Age Group, Arizona, 2005

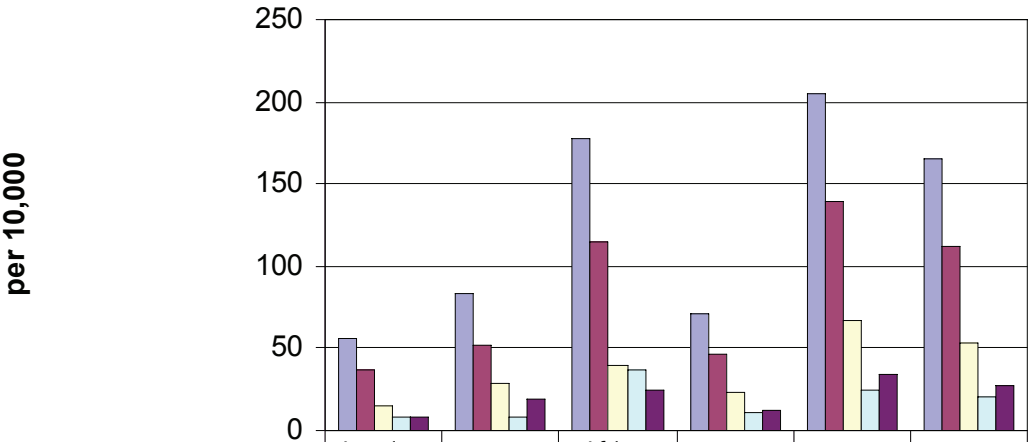


	20-44	45-64	65+	Total
Cardiovascular Disease	28.5	234.1	805.0	166.0
Diseases of the Heart	17.4	165.1	540.3	112.4
Coronary Heart Disease	5.6	95.6	239.9	53.6
Congestive Heart Failure	2.5	22.4	117.0	21.0
Stroke	3.8	32.9	147.3	27.7

Age group

Source: Vital Statistics, 2005

FIGURE 49 Discharge Rate by First-Listed Diagnosis and Race/Ethnicity, Arizona, 2005



	American Indian	Asian	African American	Hispanic	White	Total
Cardiovascular Disease	56.4	83.3	177.1	70.6	204.8	164.9
Diseases of the Heart	36.2	52.6	114.5	46.7	139.6	111.7
Congestive Heart Disease	15.4	28.6	40.1	22.7	66.8	53.2
Congestive Heart Failure	7.7	8.1	36.7	10.6	24.9	20.9
Stroke	8.0	19.2	24.9	11.7	34.1	27.5

Race/Ethnicity

Source: Vital Statistics, 2005

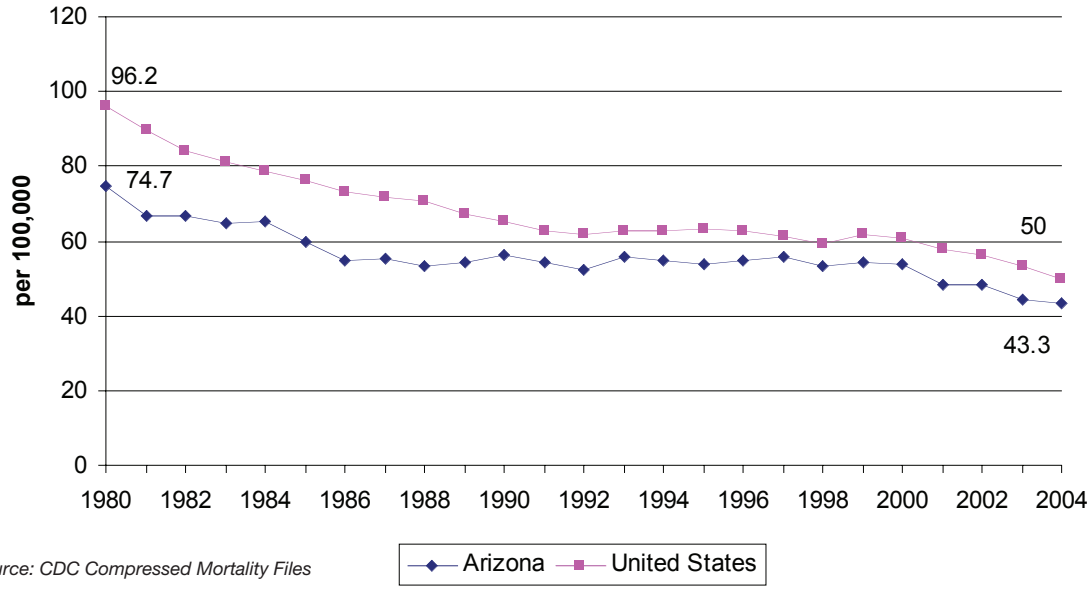
Stroke (Cerebrovascular Disease)

Cerebrovascular disease, or stroke, is a type of cardiovascular disease that affects the arteries leading to and within the brain (http://www.strokeassociation.org/presenter.jhtml?identifier=3030066, 2007). A stroke occurs when a blood vessel in the brain that carries oxygen and nutrients is either blocked by a clot or plaque, or ruptures. Similar to a heart attack, when this occurs the affected area of the brain cannot get the oxygen and nutrients that it needs and begins to die. There are two different forms of a stroke: ischemic and hemorrhagic. Ischemic strokes occur as a result of an obstruction within a blood vessel supplying blood to the brain. The underlying condition for this type of obstructions is the development of fatty deposits lining the vessel walls. Hemorrhagic stroke occurs results from a weakened blood vessel ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surround brain tissue. Ischemic strokes account for 83 percent and hemorrhagic strokes make up 17 percent of all strokes (http://www.strokeassociation.org/presenter.jhtml?identifier=1014#Ischemic, 2007)

Stroke Mortality

Overall stroke mortality decreased by almost half in the US from 1980-2004. The decrease in Arizona has been almost as steep (figure 50).

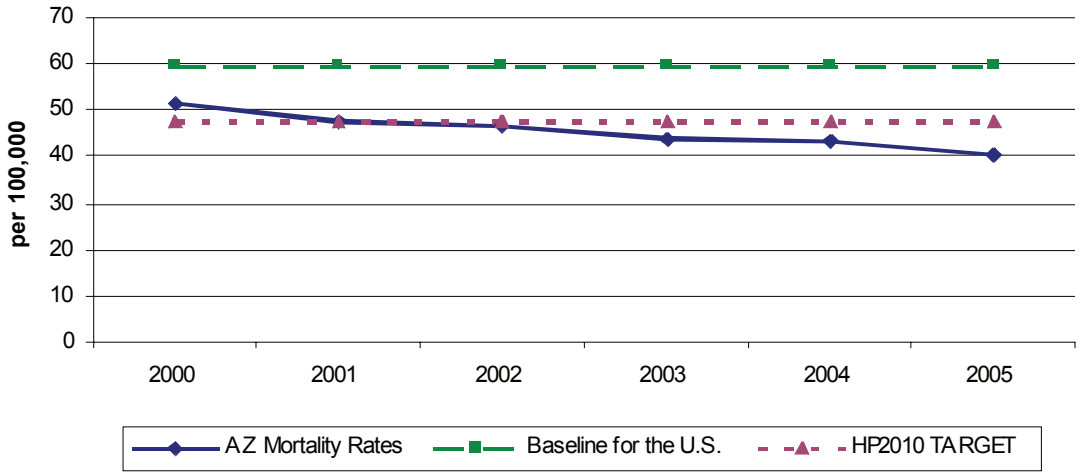
FIGURE 50 **Trends in Stroke Mortality Rate, Arizona and US, 1980-2004**



Source: CDC Compressed Mortality Files

Stroke, however, is still a leading cause of death, third in the US and fourth in Arizona. From 2000-2005, the Arizona stroke mortality rate remained lower than the US rate. Since 2000, the stroke mortality rate has continued to decrease, and the Healthy People 2010 goal was reached in 2001 (figure 51).

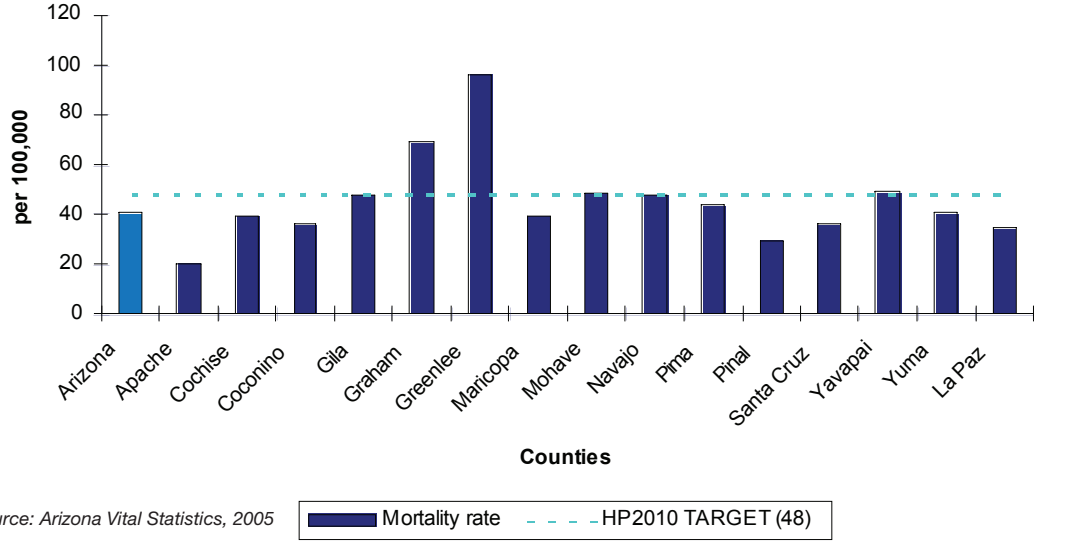
FIGURE 51 **HP2010 Stroke Death Reduction Goals by Year, Arizona, 2000-2005**



Source: Arizona Vital Statistics, 2005

Comparing age-adjusted stroke mortality rates from 1999-2004 among the 15 counties in Arizona, the counties with the highest rates were Greenlee, Navajo, and Yavapai (figure 52).

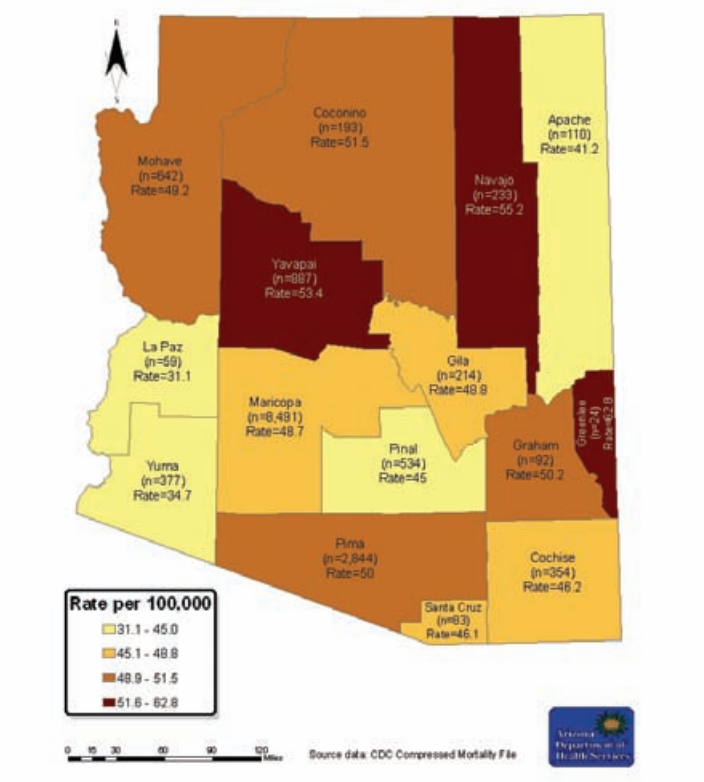
FIGURE 52 **HP2010 Stroke Death Reduction Goals by County, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

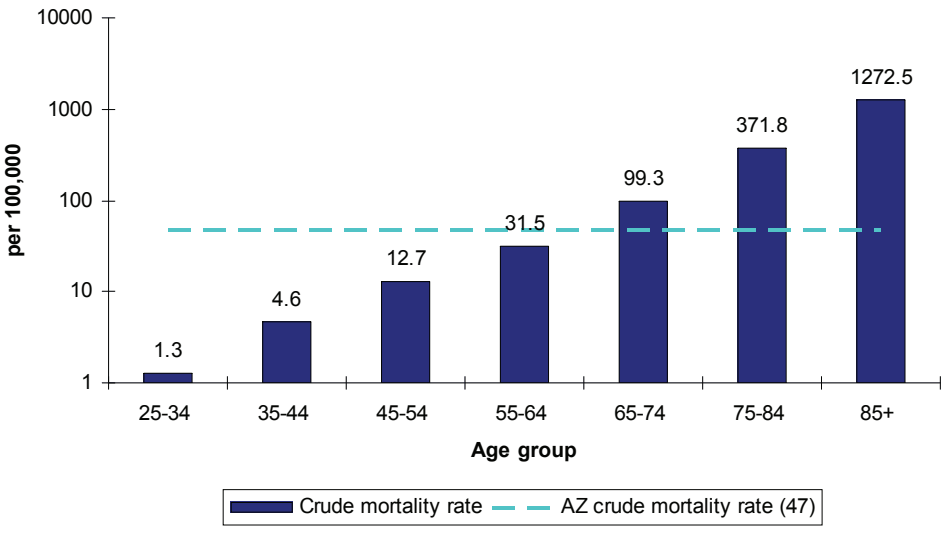
The stroke mortality rates for Graham and Greenlee counties had mortality rates far above the HP2010 goal in 2005 (figure 53).

FIGURE 53 **Stroke Age-Adjusted Mortality Rate per 100,000 by County, Arizona, 1999-2004**



Like other cardiovascular diseases, the crude stroke mortality rate is greatest among persons ages 65-74 (figure 54).

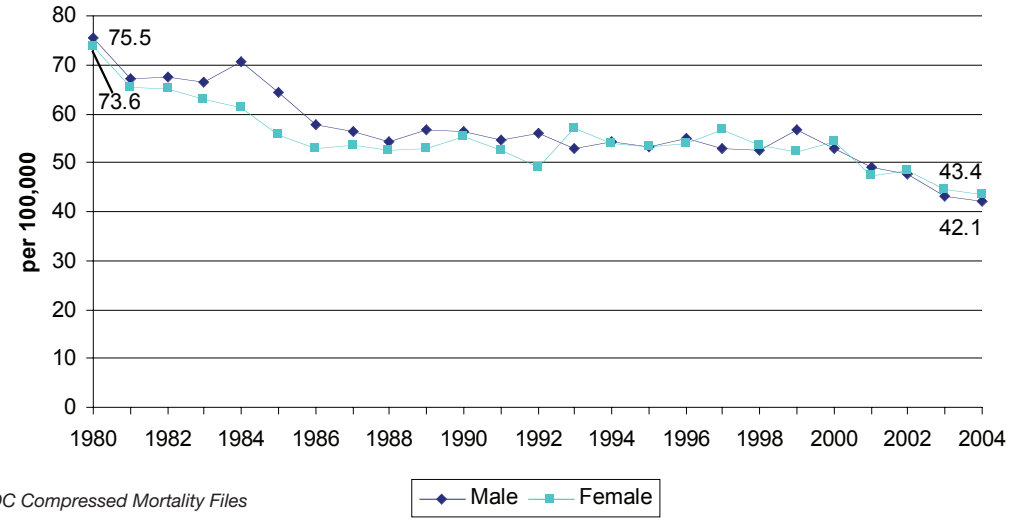
FIGURE 54 **Stroke Crude Mortality Rates by Age, Arizona, 1999-2004**



Source: CDC Compressed Mortality Files

In contrast to the CHD trend, the age-adjusted mortality rates from stroke between males and females in Arizona are very similar (figure 55).

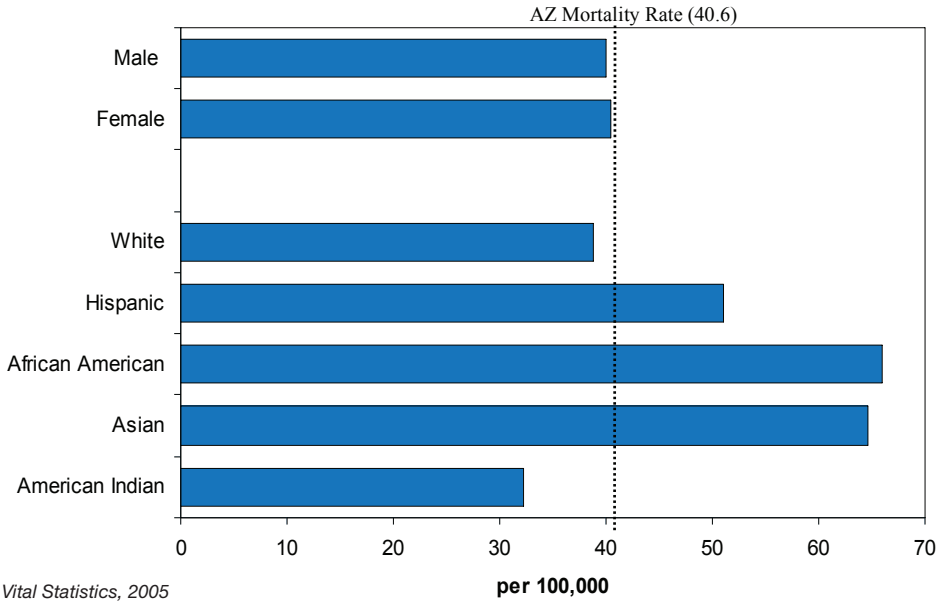
FIGURE 55 **Stroke Mortality Trend by Year and Gender, Arizona, 1980-2004**



Source: CDC Compressed Mortality Files

The race/ethnic groups with the highest age-adjusted mortality rates are Hispanics, African Americans, and Asians (figure 56).

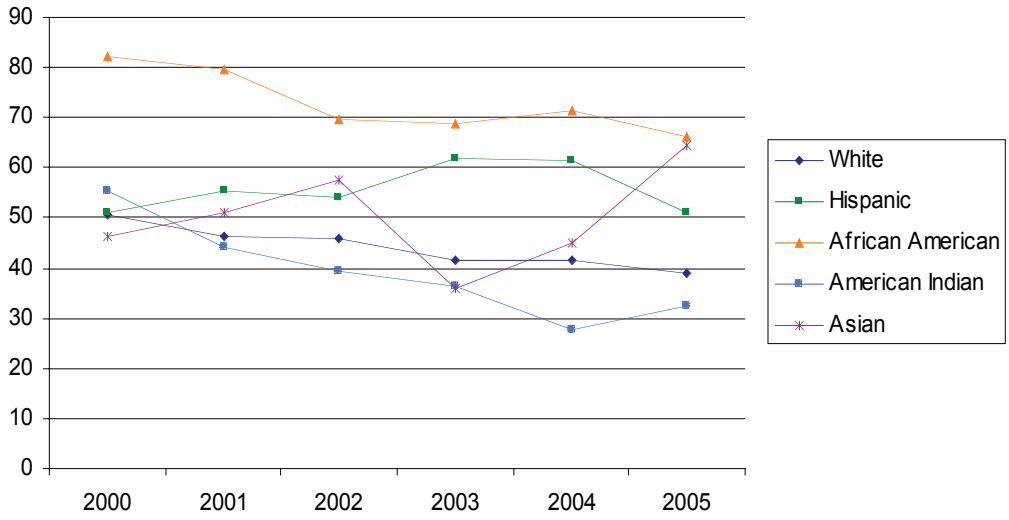
FIGURE 56 **Stroke Mortality Age-Adjusted Mortality Rates, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

In each year from 2000-2005, African Americans had the highest death rates from stroke. However, the death rate among Asians has rapidly increased since 2003. In 2000, Asians had the lowest mortality rate, but in 2005 the rate is nearly the highest in Arizona, almost equal to the African American mortality rate. The most significant decrease in stroke mortality has been among American Indians, but that decrease has appeared to slow in 2004. Whites have also seen a decline in stroke mortality rates in Arizona, decreasing by 25 percent from 2000 to 2005. Among Hispanics, the death rate from stroke increased between 2000 and 2004, but decreased from 2004 to 2005 (figure 57).

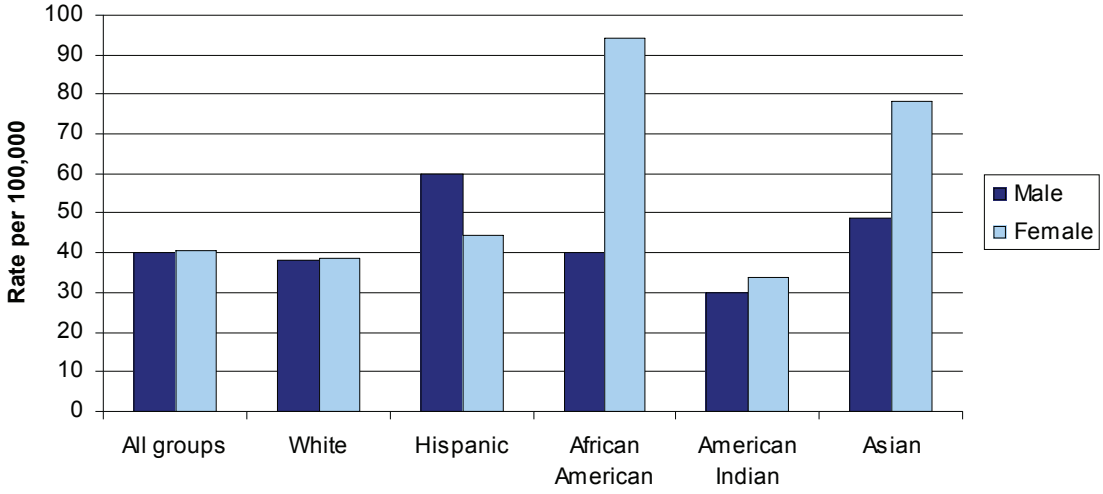
FIGURE 57 **Age-Adjusted Mortality Stroke Trend by Year, Arizona, 2000-2005**



Source: Arizona Vital Statistics, 2005

Gender differences exist in stroke mortality among different race/ethnic groups. Hispanic males have the highest death rate among males. African American and Asian females suffer the highest stroke mortality rates among females (figure 58).

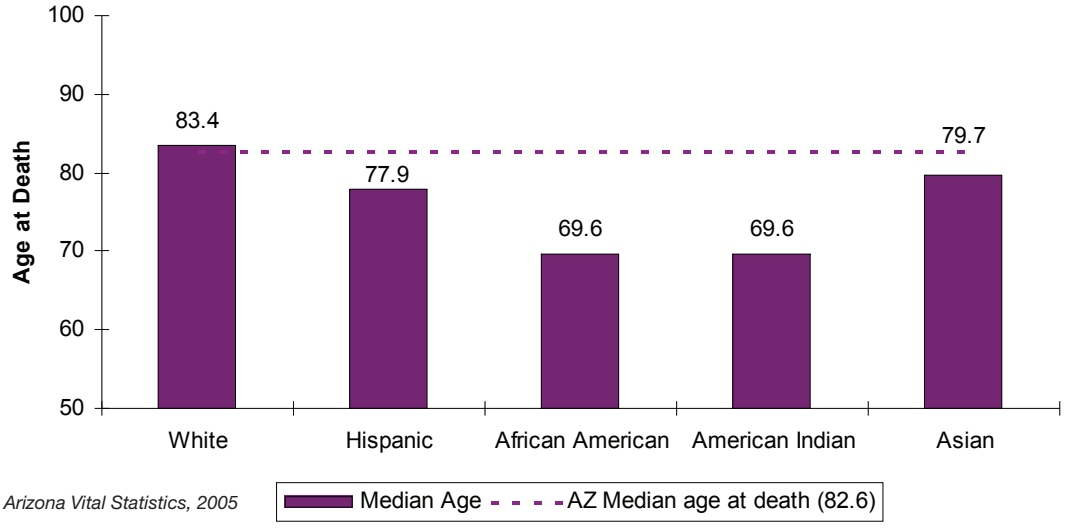
FIGURE 58 **Stroke Age-Adjusted Mortality Rates by Race and Gender, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

While the median age of death from stroke mortality for all Arizonans is 82.6, African Americans and American Indians die at least 12 years earlier (figure 59).

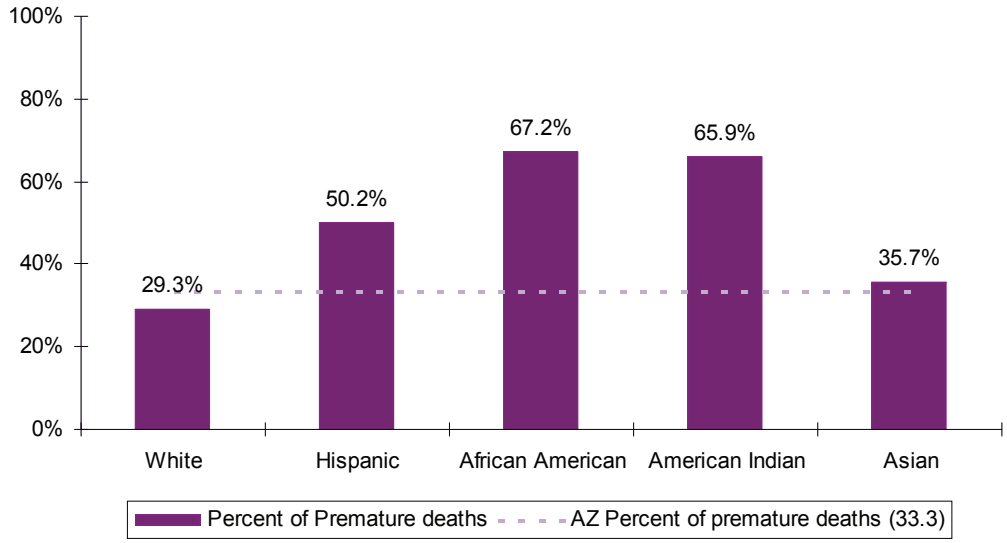
FIGURE 59 **Median Age at Death for Stroke by Race/Ethnicity, Arizona, 2005**



Source: Arizona Vital Statistics, 2005

In other words two-thirds of American Indians and African Americans die prematurely from stroke (figure 60).

FIGURE 60 **Percent of Premature Deaths for Stroke by Race/Ethnicity, Arizona, 2005**



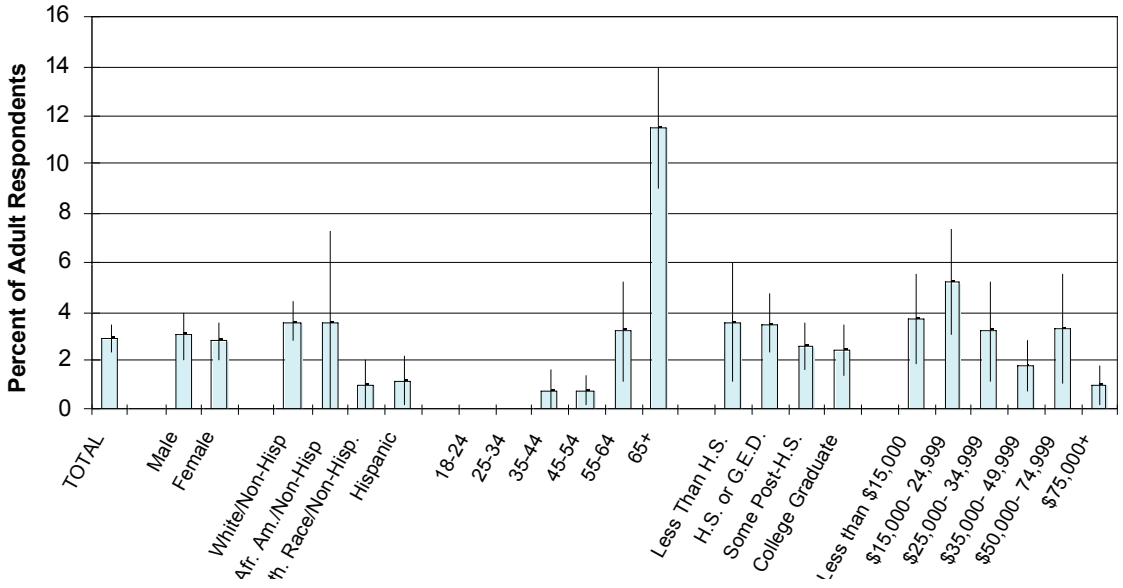
Source: Arizona Vital Statistics, 2005

Stroke Prevalence

In the 2006 BRFSS, the question, "Has a doctor, nurse, or other health professional ever told you that you had a stroke?" was used to analyze trends in stroke prevalence. According to the results of the questionnaire, approximately three percent of Arizona adults had a stroke. More Whites reported having had a stroke than Hispanics or other races. Strokes occur more often in those who are older, with a marked increase in age groups 55-64 and 65 and older. Although the literature has not found an association between stroke prevalence and education, our data suggests that those with more education were less likely to have a stroke.

There is a distinction between those who identified themselves as belonging to a household with an income of less than $15,000 compared to households that earn over $75,000. Individuals with lower household incomes are more likely to have experienced a stroke than those who have household incomes of more than $75,000. Characteristics that seem to be associated with having a stroke are race, age, and income (figure 61).

FIGURE 61 Self-Reported Prevalence of Stroke, Arizona Adults, 2006

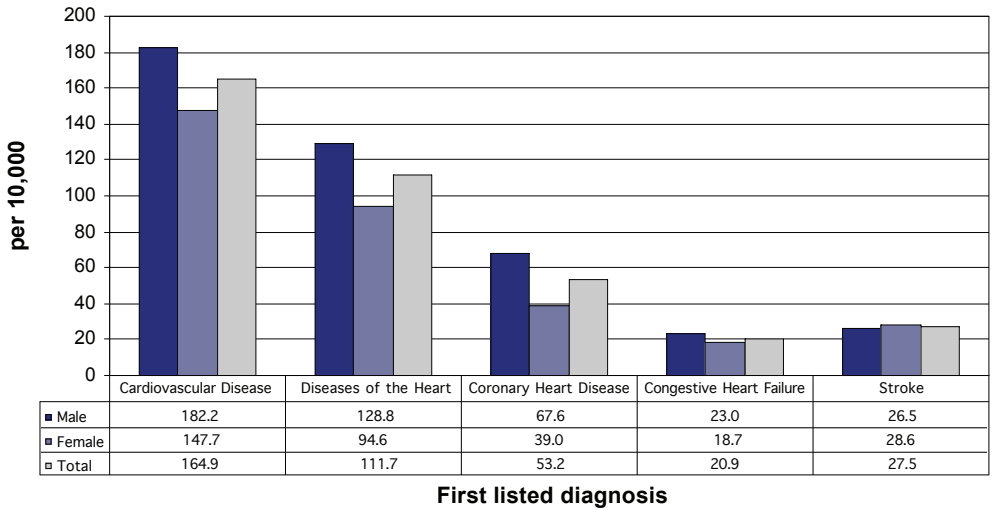


Source: BRFSS 2006

Hospitalizations

There are nearly twice as many discharges for CHD than there are for strokes, and hospitalizations for stroke outnumber those for CHF. The number of discharges per 10,000 for a primary diagnosis of CVD shows that more males than females were discharged with CVD in Arizona during 2005. This pattern repeats itself for diseases of the heart, CHD, and CHF. Although the figures are small, the rate of hospitalization for stroke per 10,000, is higher for females (28.6) than males (26.5) (shown again for reference, figure 47).

FIGURE 47 Discharge Rate by First-Listed Diagnosis and Gender, Arizona, 2005

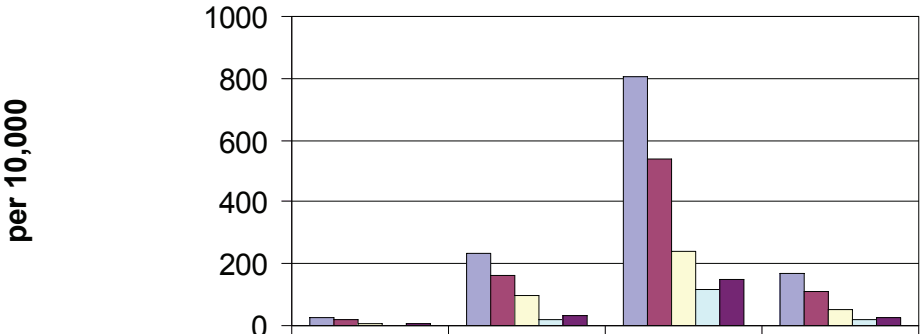


	Cardiovascular Disease	Diseases of the Heart	Coronary Heart Disease	Congestive Heart Failure	Stroke
Male	182.2	128.8	67.6	23.0	26.5
Female	147.7	94.6	39.0	18.7	28.6
Total	164.9	111.7	53.2	20.9	27.5

Source: Vital Statistics, 2005

The rate of patients discharged with a diagnosis of CVD increases with age. Among Arizonans 45-64 years of age, the discharge rates for CVD are at least 8 times higher than for Arizonans 20-44 years of age. From age groups 45-64 and age 65 and older, mortality rates increase at least 3 times. Thus, age is a risk factor for being discharged with a CVD related condition (shown again for reference figure 48).

FIGURE 48 **Discharge Rate by First-Listed Diagnosis and Age Group, Arizona, 2005**



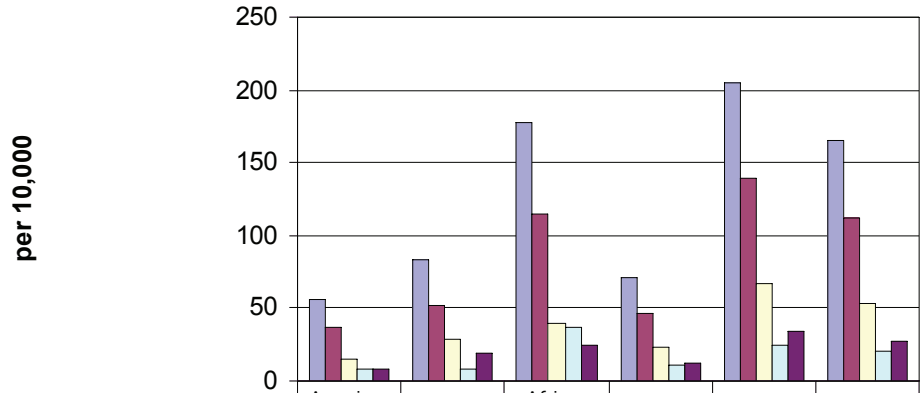
	20-44	45-64	65+	Total
Cardiovascular Disease	28.5	234.1	805.0	166.0
Diseases of the Heart	17.4	165.1	540.3	112.4
Coronary Heart Disease	5.6	95.6	239.9	53.6
Congestive Heart Failure	2.5	22.4	117.0	21.0
Stroke	3.8	32.9	147.3	27.7

Age group

Source: Vital Statistics, 2005

Whites have higher discharge rates per 10,000 than any other racial/ethnic group except for CHF where the African Americans have the highest discharge rate (shown again for reference figure 49).

FIGURE 49 **Discharge Rate by First-Listed Diagnosis and Race/Ethnicity, Arizona, 2005**



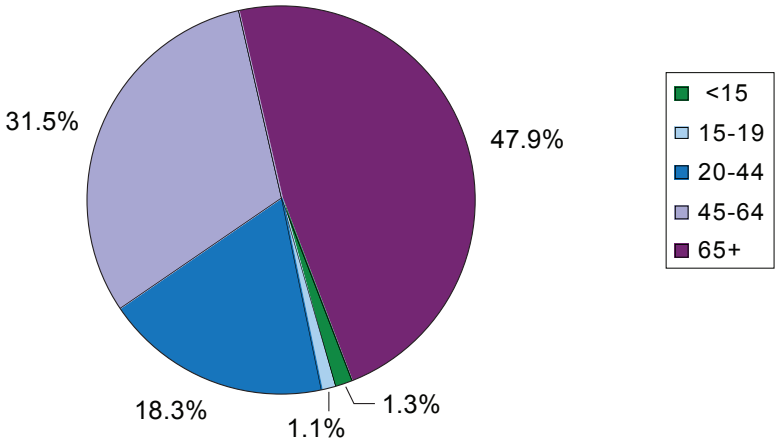
	American Indian	Asian	African American	Hispanic	White	Total
Cardiovascular Disease	56.4	83.3	177.1	70.6	204.8	164.9
Diseases of the Heart	36.2	52.6	114.5	46.7	139.6	111.7
Congestive Heart Disease	15.4	28.6	40.1	22.7	66.8	53.2
Congestive Heart Failure	7.7	8.1	36.7	10.6	24.9	20.9
Stroke	8.0	19.2	24.9	11.7	34.1	27.5

Race/Ethnicity

Source: Vital Statistics, 2005

Nearly half of emergency room visits due to CVD were among individuals age 65 and older. An additional 31.5 percent were from those between ages 45-64 (figure 62).

FIGURE 62 **Percentage of Emergency Visits for Diseases of the Circulatory System and Age Group, Arizona, 2005**

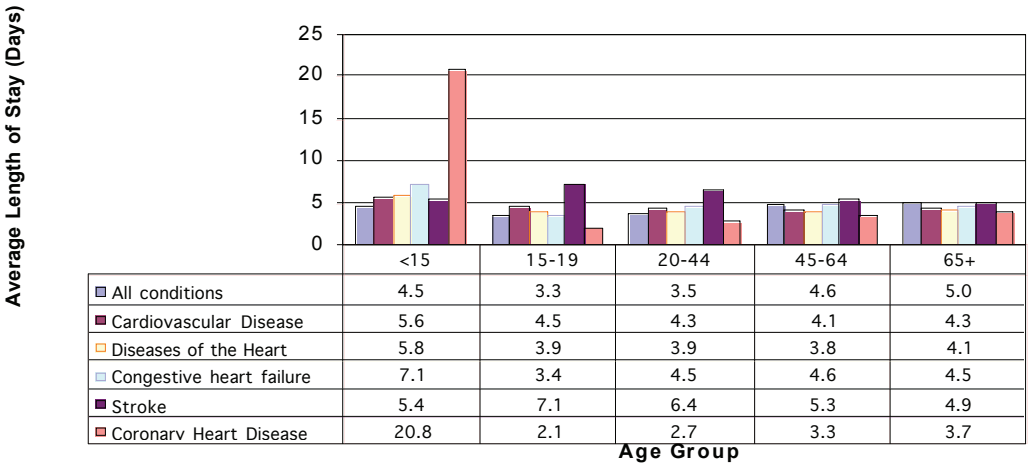


Source: Vital Statistics, 2005

Average length of stay for those hospitalized due to CVD ranged between 3-5 days. In general, the younger the individual (e.g. under 19 years of age), the longer the hospital stay. For CHD and CHF the youngest age group (under 15) had the longest hospital stay of 20.8 and 7.1 days, respectively, but it only represents a small number of discharges.

For stroke, those between the ages 15-44 (including age groups 15-19 and 20-44) had slightly longer average lengths of stay, between 6 -7 days, than other age groups (figure 63).

FIGURE 63 **Average Length of Stay for Discharges by First-Listed Diagnosis and Age Group, Arizona, 2005**



	<15	15-19	20-44	45-64	65+
All conditions	4.5	3.3	3.5	4.6	5.0
Cardiovascular Disease	5.6	4.5	4.3	4.1	4.3
Diseases of the Heart	5.8	3.9	3.9	3.8	4.1
Congestive heart failure	7.1	3.4	4.5	4.6	4.5
Stroke	5.4	7.1	6.4	5.3	4.9
Coronary Heart Disease	20.8	2.1	2.7	3.3	3.7

Source: Vital Statistics, 2005

CHAPTER 2

Cardiovascular Modifiable Disease Risk Factors

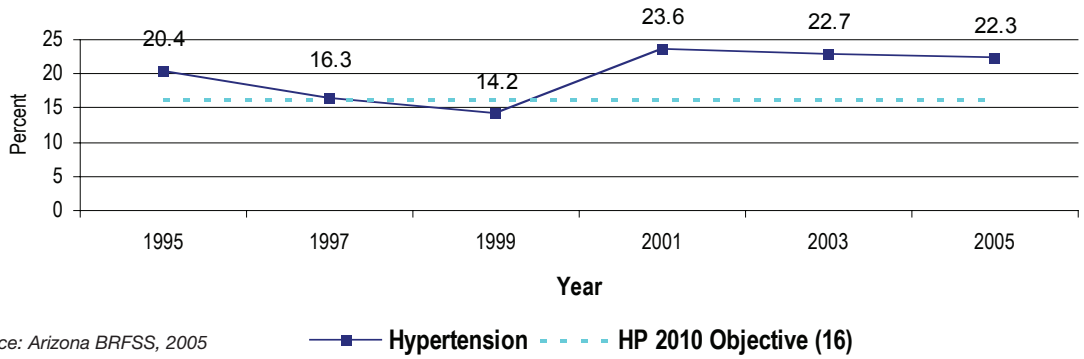
There are seven modifiable risk factors that increase the risk of developing CVD: physical inactivity, poor nutrition, smoking, high blood pressure, obesity or overweight, high blood cholesterol and diabetes. Modifying these risk factors, either by lifestyle changes or medically, has been shown to have an impact on the prevalence of CVD. Additionally, treating the risk factors also has decreased the recurrence of CVD. Regular exercise, improved nutrition, and tobacco cessation can result in lower blood pressure and cholesterol as well as reduce obesity which in turn leads to a lower risk of developing or worsening CVD.

High Blood Pressure (Hypertension)

High blood pressure is a risk factor for heart disease, stroke and other medical conditions. As many as a third are unaware that they have high blood pressure, and those with the diagnosis may not feel badly and as a result do not take their medications, hence the name "silent killer." Risk factors that may contribute or exacerbate high blood pressure are obesity, eating too much salt, drinking too much alcohol, physical inactivity, and stress. There are risk factors for high blood pressure that are non-modifiable, including race, heredity, and age (http://www.americanheart.org, 2007). It is reported that about one of every three US adults have high blood pressure and that, until age 45, more men have high blood pressure than women. Between the ages of 45-54, the trend for both genders are similar and the trend reverses where more women have high blood pressure than men after the age of 54. More African Americans than Whites are likely to develop high blood pressure. In fact, African Americans in the US have a 50 percent higher prevalence of high blood pressure than Whites (Cooper et al., 2005). High blood pressure can also be hereditary. An individual is more likely to be at risk for developing high blood pressure if it runs in the family.

According to results of the BRFSS, 22.3 percent of the adult population in Arizona reported they had high blood pressure in 2005 (figure 64).

FIGURE 64 **Prevalence of High Blood Pressure in Arizona Adults, 1995-2005, Selected Years**



Source: Arizona BRFSS, 2005

Considering that one-third of people with high blood pressure are unaware they have it, the actual prevalence of this is likely higher. This is well above the HP2010 goal of 16 percent.

Data from the 2005 BRFSS shows that men and women were equally as likely to report having high blood pressure (22.6 percent vs. 22.1). Additionally, the risk of high blood pressure increased with age. About 13 percent of those who were 35-44 years of age reported they had high blood pressure compared to 22.8 percent who were 55-64 years of age and 52.5 percent of those 65 and older. More Whites (25.3 percent) than Hispanics (14.5 percent) reported having high blood pressure. Although a higher overall percentage of those who belong to lower income families reported having high blood pressure, the difference is more evident between two specific income categories. Those who reported an income of $15,000-24,999 (28.8 percent) had a much higher percentage of being told they had high blood pressure compared to those in the $50,000 or more household income (17.6 percent). There was no overall trend in education except a higher percentage of high blood pressure (25.4 percent) was reported by those who completed high school compared to those who were college graduates (18.7 percent) (table 2).

TABLE 2 **High Blood Pressure, Arizona Adults (Ages 18 & over), 2005**

Sociodemographic Characteristics	Percent (%)	CI (95%)
Total	22.3	(20.4-24.2)
Gender		
Male	22.6	(19.5-25.7)
Female	22.1	(19.7-24.5)
Age		
18-24	2.4	(0.6-4.2)
25-34	8.5	(4.5-12.5)
35-44	13	(8.7-17.3)
45-54	22.8	(18.1-27.5)
55-64	36	(30.7-41.3)
65+	52.2	(47.9-56.5)
Race		
White	25.3	(23.0-27.6)
Black	N/A	N/A
Hispanic	14.5	(10.4-18.6)
Other	16.6	(10.0-23.2)
MultiRacial	N/A	N/A
Income		
Less than $15,000	25.1	(18.0-32.2)
$15,000- 24,999	28.8	(22.8-34.8)
$25,000- 34,999	25.3	(18.8-31.8)
$35,000- 49,999	22	(17.3-26.7)
$50,000+	17.6	(14.7-20.5)
Education		
Less than H.S.	19.9	(13.5-26.3)
H.S. or G.E.D.	25.4	(21.4-29.4)
Some post-H.S.	24.4	(20.7-28.1)
College graduate	18.7	(15.7-21.7)

Source: Arizona BRFSS, 2005

Blood pressure treatment reduces the risk of stroke, CHD, and CHF. More specifically, approximately 1/3 to 1/2 of CHD would be prevented with better blood pressure control. Unfortunately, high blood pressure is a condition that more than 90 percent of adults will experience during their lifetime (Wang & Vasan, 2005).

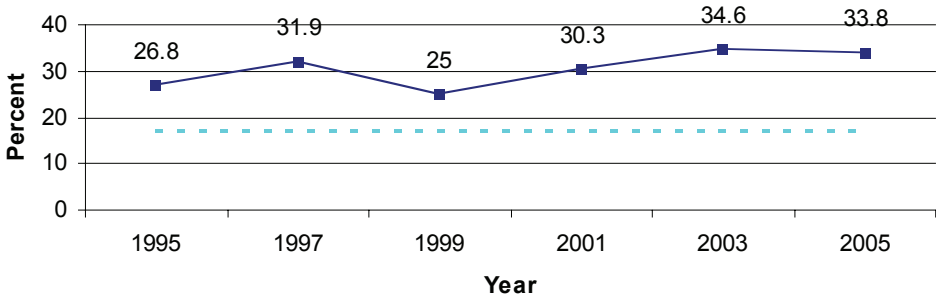
High Blood Cholesterol (Hyperlipidemia)

Cholesterol is a waxy, fat-like substance found in foods that the body uses to help make Vitamin D, hormones, and substances to aid in digestion and is found in the blood stream and in all body cells (http://www.nhlbi.nih.gov/health/dci, 2006). Cholesterol is obtained in two ways: 1) it is made by the liver; and 2) it comes from animal products such as beef, poultry, eggs, fish, butter, cheese and milk. Foods such as fruits and vegetables do not have cholesterol in them. Individuals with high cholesterol levels often have high levels of cholesterol synthesized by the liver or a high dietary cholesterol intake.

There are two forms of cholesterol in the blood. High-density lipoprotein cholesterol (HDL) is considered "good" or protective cholesterol. It helps to extract excess cholesterol from blood vessel walls and transport it back to the liver for elimination through the gastro intestinal tract (Toth, 2005). Low-density lipoprotein cholesterol (LDL) is the other form of cholesterol in the blood and is commonly referred to as "bad" cholesterol. LDL cholesterol collects inside the walls of arteries and contributes to the formation of plaque. The risk of developing CVD increases exponentially as LDL levels rise (Grundy, et.al., 2004). Even in patients with a well controlled LDL cholesterol level below the recommended guidelines, if the HDL level is lower than the recommended level, the risk of developing CVD increases. The risk factors for high cholesterol are smoking, high blood pressure, low HDL cholesterol, family history of early heart disease, and age (men over 45 years and women over 55 years). (http://www.nhlbi.nih.gov/health/public/heart/chol/wyntk.htm#risk, 2005)

The following question relating to blood cholesterol was asked on the 2005 BRFSS, "Have you ever been told by a doctor, nurse, or other healthcare professional that you have high blood cholesterol." The percentage of people who reported having high cholesterol has been increasing in Arizona since 1999. The HP2010 goal is set at 17 percent or less of the adult population having high blood cholesterol. In 2005, the prevalence of high cholesterol in Arizona was nearly double the goal (33.8 percent) (figure 65).

FIGURE 65 **Prevalence of High Blood Cholesterol Levels in Arizona Adults, 1995-2005, Selected Years**



Source: Arizona BRFSS, 2005

High Blood Cholesterol — HP 2010 Objective (17)

According to the 2005 BRFSS, more males (37.1 percent) reported having high cholesterol than females (30.9 percent). In Arizona, the risk of high cholesterol is associated with increasing age. About 24.8 percent of the respondents ages 35-44 years reported high cholesterol compared to 49.9 percent ages 65 and older. More Whites (36.8 percent) than Hispanics (22.3 percent) reported having high cholesterol. Although 36.1 percent of those in households earning between $15,000-24,999 compared to 29.1 percent of those earning $50,000 or more per household reported high cholesterol, there was no real trend that could be established between income and high cholesterol. Additionally, no real trend could be established for education and high cholesterol. However, those with less than a high school education reported high blood pressure more often than those with a high school diploma or G.E.D. (table 3).

TABLE 3 High Blood Cholesterol, Arizona Adults (Ages 18 & over), 2005

Sociodemographic Characteristics	Percent (%)	CI (95%)
Total	33.8	(31.1 -36.5)
Gender		
Male	37.1	(32.6 -41.6)
Female	30.9	(27.8 -34.0)
Age		
18 -24	2.7	(0.3 -5.1)
25 -34	17.6	(11.1 -24.1)
35 -44	24.8	(18.4 -31.2)
45 -54	36	(29.9 -42.1)
55 -64	43	(37.2 -48.8)
65+	49.9	(45.4 -54.4)
Race		
White	36.8	(33.8 -39.8)
Black	N/A	N/A
Hispanic	22.3	(15.7 -28.9)
Other	16.7	(9.4 -24.0)
MultiRacial	N/A	N/A
Income		
Less than $15,000	N/A	N/A
$15,000 - 24,999	36.1	(28.4 -43.8)
$25,000 - 34,999	33.7	(24.8 -42.6)
$35,000 - 49,999	36 .9	(30.0 -43.8)
$50,000+	29.1	(25.0 -33.2)
Education		
Less than H.S.	25	(15.6 -34.4)
H.S. or G.E.D.	38.6	(33.3 -43.9)
Some post -H.S.	36.1	(31.3 -40.9)
College graduate	30.9	(26.6 -35.2)

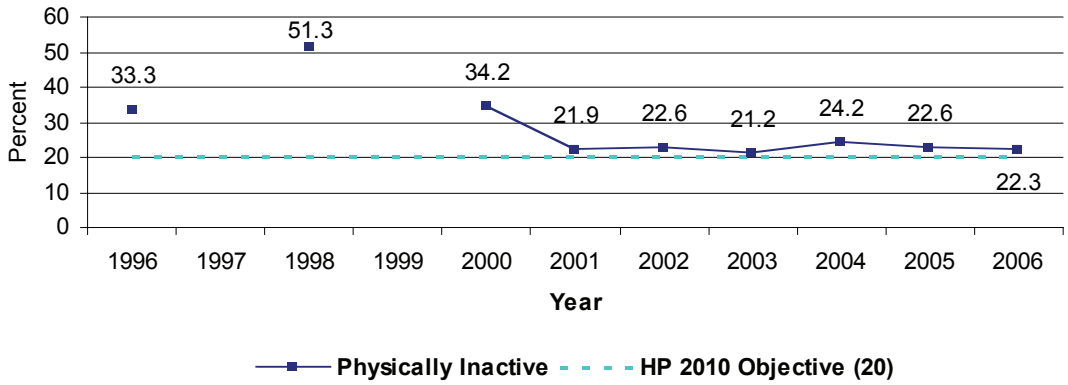
Source: Arizona BRFSS, 2005

Physical Inactivity

Physical activity has many beneficial components. It increases overall well-being and also helps decrease risk of death from CHD, stroke, colon cancer, diabetes, high blood pressure, etc. CDC recommends that adults should participate in at least 30 minutes of moderate physical activity on five or more days each week. HP2010 suggests 20 minutes of vigorous physical activity on three or more days each week. Although there are well known significant health benefits to physical activity, more than half of adults in the US do not get the recommended amount of exercise.

The HP2010 objective was to decrease the number of people who do not get enough physical activity (both moderate and vigorous exercises) to 20 percent of the adult respondents. This objective has yet to be achieved. In 2006, 22.3 percent of the adult respondents reported insufficient activity for both moderate and vigorous exercises (figure 66).

FIGURE 66 **Percentage of Physically Inactive Adults, Arizona 1996-2006**



Source: Arizona BRFSS, 1994-2004.

(Note: From 2003, the percentage represents insufficient activity for both moderate and vigorous exercise). Until 2002 the percentages mean no leisure activity.

Several questions from the BRFSS were analyzed to obtain the percentages of Arizona adult respondents who were physically inactive:

- Now, thinking about the moderate activities you do in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate?
- Now, thinking about the vigorous activities you do in a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?
- How many days per week do you do these (moderate/vigorous) activities for at least 10 minutes at a time?
- On days when you do (moderate/vigorous) activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

Answers to these questions show that women in Arizona are more likely to be inactive than men (26.2 percent vs. 18.3 respectively). Physical activity seems to decline with age. Arizonans 45-54 were more likely to be physically active than those over 65 (79.6 vs. 68.5 respectively).

Whites (81.4 percent) were much more likely to be physically active than Hispanics (69.2 percent). Socioeconomic status was related to physical activity as well. Those who belong to lower income households were more likely to be physically inactive compared to those in higher income households. Nearly 40 percent of adults in households earning less than $15,000 a year reported being physically inactive, compared to only 10.4 percent of those in households earning more than $50,000. There was also a similar trend by education level, where those who were less educated were more likely to be physically inactive compared to those who were more educated. Nearly 40 percent of those who had less than a high school education reported insufficient physical activity compared to 12.3 percent of college graduates (table 4).

TABLE 4 **Physically Inactive Arizona Adults (Ages 18 & over), 2005**

Sociodemographic Characteristics	Percent (%)	CI (95%)
Total	22.3	(20.0 -24.6)
Gender		
Male	18.3	(14.9 -21.7)
Female	26.2	(23.2 -29.2)
Age		
18-24	16.5	(8.3 -24.7)
25-34	20	(13.8 -26.2)
35-44	20	(15.0 -25.0)
45-54	20.4	(15.8 -25.0)
55-64	24.7	(20.0 -29.4)
65+	31.5	(27.5 -35.5)
Race		
White	81.4	(79.2 -83.6)
Black	N/A	N/A
Hispanic	69.2	(62.7 -75.7)
Other	N/A	N/A
MultiRacial	N/A	N/A
Income		
Less than $15,000	39.3	(30.5 -48.1)
$15,000 - 24,999	34.9	(28.1 -41.7)
$25,000 - 34,999	22	(15.4 -28.6)
$35,000 - 49,999	26.5	(19.5 -33.5)
$50,000+	10.4	(8.0 -12.8)
Education		
Less than H.S.	38.5	(30.2 -46.8)
H.S. or G.E.D.	27.9	(22.8 -33.0)
Some post -H.S.	21.9	(17.7 -26.1)
College graduate	12.3	(9.6 -15.0)

Source: Arizona BRFSS, 2005

Several questions related to physical activity were asked in the 2005 Youth Risk Behavior Surveillance System (YRBSS) to obtain percentages of high school students in Arizona who are physically inactive. Similar to the trend in Arizona adults, more girls (10 percent) than boys (7.5 percent) reported being physically inactive. Physical activity seems to decrease slightly as the children get older. More Hispanics (10.1 percent) than Whites (7.6 percent) or Blacks (5.9 percent) reported physical inactivity. However, there was no distinguishable trend between race/ethnicity and physical inactivity. Nevertheless, Arizona adolescents need to increase their levels of physical activity. This can be accomplished through better health education, more physical education and activity, and environments that encourage physical activity outside of school (table 5). (Note: link to actual questionnaire Http://www.cdc.gov/healthyyouth/yrbs/pdf/questionnaire/2007HighSchool.pdf)

TABLE 5 **Physically Inactive Arizona Adolescents (Grades 9-12), 2005**

	Physical Inactivity (2005)	
	Percent	CI (95%)
Total	8.7	±1.7
Sex		
F	10	±2.3
M	7.5	±1.8
Grade		
9th	6.7	±2.8
10th	9.5	±2.1
11th	8.6	±2.8
12th	10.4	±4.0
Race		
White	7.6	±2.2
Black	5.9	±2.7
Hispanic	10.1	±2.7
Other	10.8	±3.6

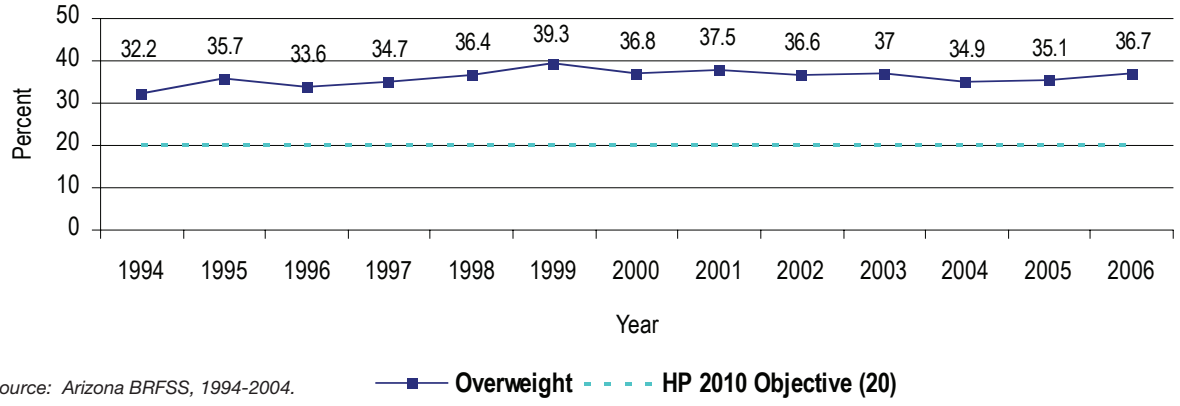
Source: Arizona YRBSS, 2005

Overweight and Obesity

The trend for overweight and obese adults in the US has been on the rise since the mid-1970's. Being overweight and obese has many detrimental health effects such as CHD, hypertension, type 2 diabetes, stroke, osteoarthritis, cancers (breast and colon) as well as sleep apnea and respiratory problems. In order to determine overweight and obese populations, health professionals use BMI scales, which are calculated using height and weight measurements. Those with a BMI of 25-29.9 are considered overweight and those with a BMI of 30 or more are considered obese (http://www.cdc.gov/nccdphp/dnpa/obesity/index.htm, 2007). Flegal et al. (2005) calculated that obesity contributed to 111,909 excess deaths in the US in 2000, with a majority (82,066 deaths) among people with a BMI of at least 35. Among obese persons in the US, CVD is the leading cause of death.

According to the 2006 BRFSS, 36.7 percent of Arizona adults are overweight but not obese, and 22.9 percent are obese (figure 67).

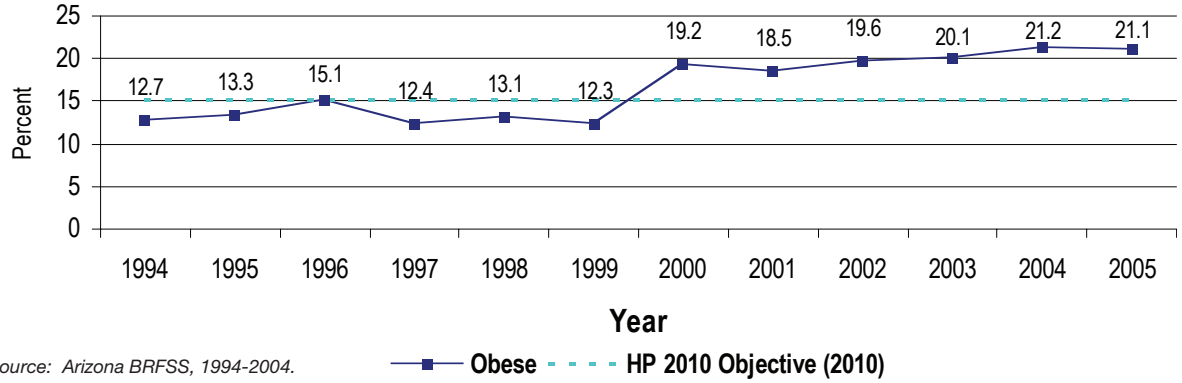
FIGURE 67 ● **Percentage of Overweight Adults, Arizona, 1994-2006.**



Source: Arizona BRFSS, 1994-2004.

The proportion of adults who are considered obese has steadily increased over the past 12 years (figure 68).

FIGURE 68 ● **Percentage of Obese Adults, Arizona, 1994-2006.**



Source: Arizona BRFSS, 1994-2004.

According to 2001 estimates, no state has reached the obesity target of 15 percent of the population (CDC, MMWR 2001). In Arizona, the percentage of those who are overweight or obese is nearly 60 percent, and there are no indications that this trend is beginning to slow.

Females, those in younger age groups, and those with more education tend to report healthier weights. More males (45.3 percent) than females (27.7 percent) indicate they are overweight. The likelihood of being overweight increases with age. There was no real difference between genders for those who were obese. However, there was a difference in later age groups among those who were obese. For example, the percentage of adults who are obese between the ages 55-64 and over 65 are 33.1 percent and 15.1 percent, respectively (table 6).

TABLE 6 ● **Weight Status in Arizona Adults, 2005**

	Healthy Weight		Overweight		Obese	
Sociodemographic Characteristics	Percent (%)	CI (95%)	Percent (%)	CI (95%)	Percent (%)	CI (95%)
Total	40.4	(37.5-43.3)	36.7	(33.9-39.5)	22.9	(20.4-25.4)
Gender						
Male	30.9	(26.4-35.4)	45.3	(40.7-49.9)	23.8	(19.9-27.7)
Female	50.3	(46.7-53.9)	27.7	(24.6-30.8)	22	(19.0-25.0)
Age						
18-24	N/A	N/A	N/A	N/A	16	(6.5-25.5)
25-34	48	(40.3-55.7)	33.2	(25.8-40.6)	18.8	(12.9-24.7)
35-44	38.8	(32.4-45.2)	33.4	(26.8-40.0)	27.8	(21.7-33.9)
45-54	36.8	(31.1-42.5)	35.8	(30.1-41.5)	27.5	(21.9-33.1)
55-64	28.4	(23.5-33.3)	38.4	(33.0-43.8)	33.1	(27.6-38.6)
65+	37.1	(33.1-41.1)	47.8	(43.5-52.1)	15.1	(12.3-17.9)
Race						
White	41.6	(38.4-44.8)	37.6	(34.4-40.8)	20.9	(18.1-23.7)
Black	N/A	N/A	N/A	N/A	N/A	N/A
Hispanic	39.6	(31.6-47.6)	33.7	(26.6-40.8)	26.6	(20.4-32.8)
Other	N/A	N/A	N/A	N/A	N/A	N/A
MultiRacial	N/A	N/A	N/A	N/A	N/A	N/A
Income						
Less than $15,000	N/A	N/A	30.4	(22.2-38.6)	29.9	(21.8-38.0)
$15,000- 24,999	38.5	(29.9-47.1)	32.2	(25.5-38.9)	29.3	(22.4-36.2)
$25,000- 34,999	33.3	(25.1-41.5)	45.4	(36.2-54.6)	21.3	(13.8-28.8)
$35,000- 49,999	47.5	(39.6-55.4)	31	(23.5-38.5)	21.5	(15.9-27.1)
$50,000+	39.4	(35.0-43.8)	38.5	(34.1-42.9)	22.1	(18.1-26.1)
Education						
Less than H.S.	36.4	(26.4-46.4)	33.6	(24.2-43.0)	30	(21.9-38.1)
H.S. or G.E.D.	35.7	(30.0-41.4)	40.9	(35.0-46.8)	23.4	(18.3-28.5)
Some post-H.S.	42.9	(37.4-48.4)	33.9	(29.1-38.7)	23.2	(19.0-27.4)
College graduate	42.4	(37.7-47.1)	37.5	(32.9-42.1)	20.1	(15.8-24.4)

Source: Arizona BRFSS, 2005

The YRBSS provides information on Arizona adolescents and breaks obesity into two categories. The first is "at risk of becoming overweight,": which is defined as students who were at or above the 85th percentile but below the 95th percentile for body mass index, by age and sex. The second is "overweight" which is defined as students who were equal to or greater than the 95th percentile for body mass index, by age and sex (http://www.cdc.gov/healthyyouth/yrbs/index.htm, 2007) Among Arizona adolescents, the risk of becoming overweight or being overweight constitutes at least 12 percent of 9th-12th graders. About 14 percent of young Arizonans are at risk of becoming overweight with more of them being males than females. Moreover, 16.5 percent of males are overweight compared to 6.9 percent of females. According to the YRBSS for Arizona 2005, 11th graders have higher percentages of being or becoming overweight, compared to the other grades. In addition, Hispanic (16 percent) adolescents had a higher percentage of being overweight (table 7) compared to White (8.4 percent) and Black (9.7 percent) adolescents.

TABLE 7 **Overweight Status in Arizona Adolescents (Grades 9-12), 2005**

	At risk for becoming overweight (2005)		Overweight (2005)	
	Percent	CI (95%)	Percent	CI (95%)
Total	13.6	±1.7	11.9	±2.0
Sex				
F	11.8	±1.9	6.9	±2.1
M	15.4	±2.9	16.5	±2.7
Grade				
9th	13.4	±3.4	10.9	±3.7
10th	14	±3.0	10.6	±2.8
11th	14.9	±3.2	13.1	±3.4
12th	12.4	±3.8	12.6	±4.4
Race				
White	12.6	±2.7	8.4	±1.6
Black	14.3	±5.7	9.7	±4.5
Hispanic	15.1	±2.6	16	±3.0
Other	14.7	±4.2	18.2	±4.1

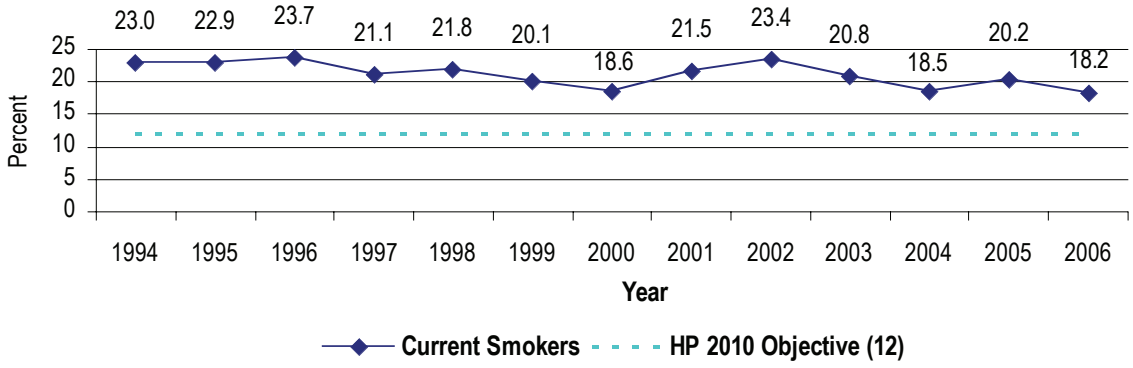
Source: Arizona YRBSS, 2005

Tobacco Use

Smoking has many harmful effects, such as the increased risk of CHD, lowering HDL cholesterol levels, and decreasing tolerance of physical exercise. Smokers are at least twice as likely to die from CHD as nonsmokers; moreover, those who are exposed to other people's smoke (secondhand smoking) are also at risk (http://www.americanheart.org, 2007). Nearly one third of CVD related deaths are caused by tobacco (Mathers & Loncar, 2006). Additionally 52 percent of those who were diagnosed with at least one circulatory condition continued to smoke (John et al., 2006).

Currently18.2 percent of Arizona adults smoke, which is down 20 percent from 2002. However, it is still higher than the HP2010 goal of 12 percent (figure 69).

FIGURE 69 **Percentage of Current Adult Smokers, Arizona, 1994-2006**



Source: Arizona BRFSS, 1994 – 2006

Two questions on the 2006 BRFSS were analyzed to compute the percentage of adults who were current smokers:

- Have you smoked at least 100 cigarettes in your entire life?
- Do you now smoke cigarettes every day, some days, or not at all?

There are still a large number of individuals who are current smokers. More males (21.7 percent) than females (14.7 percent) reported that they were current smokers. As Arizonans become older the proportion of current smokers decreases, especially for those aged 65 and older. The largest numbers of smokers were between the ages of 45-54. More Blacks than Whites or Hispanics were likely to be smokers. There was no clear distinction between household income and those who were current smokers. However, there was a smaller proportion of current smokers from a household income of $50,000 or more (15.4 percent) compared to those who were from household incomes of less than $15,000 (23 percent) or between $25,000-34,999 (25.4 percent). The results showed a relationship between education and smoking. Those with less than a high school education were much more likely to be smokers, compared to college graduates (23.5 percent vs. 13.2, respectively) (table 8).

TABLE 8 Current Smokers in Arizona Adults, 2006

Adults who are current smokers		
Sociodemographic Characteristics	Percent (%)	CI (95%)
Total	18.2	(15.9 -20.5)
Gender		
Male	21.7	(17.7 -25.7)
Female	14.7	(12.3 -17.1)
Age		
18-24	N/A	N/A
25-34	17.5	(12.3 -22.7)
35-44	19.5	(14.5 -24.5)
45-54	25.1	(19.8 -30.4)
55-64	15	(11.1 -18.9)
65+	10.6	(8.1-13.1)
Race		
White	18.6	(15.9 -21.3)
Black	22.9	N/A
Hispanic	16.1	(11.1 -21.1)
Other	22.1	(4.7-20.3)
MultiRacial	N/A	N/A
Income		
Less than $15,000	23	(16.0 -30.0)
$15,000 - 24,999	19	(13.6 -24.4)
$25,000 - 34,999	25.4	(17.5 -33.3)
$35,000 - 49,999	20.9	(14.1 -27.7)
$50,000+	15.4	(11.7 -19.1)
Education		
Less than H.S.	23.5	(16.0 -31.0)
H.S. or G.E.D.	22.5	(17.6 -27.4)
Some post -H.S.	17.9	(14.0 -21.8)
College graduate	13.2	(9.2-17.2)

Source: Arizona BRFSS, 2006

Approximately 25 percent of Arizona adolescents reported they were current tobacco users. Of that 25 percent, more males (30.6 percent) than females (25 percent) reported using smoking cigarettes. Additionally, 21.6 percent of males, compared to 9.5 percent of females use smokeless tobacco or smoke cigars. An equal percentage of males (21.6 percent) and females (21.2 percent) are reported to be current cigarette users. With each consecutive school grade the proportion of tobacco users increased indicating that high school students had higher rates of tobacco use than our adult population. White adolescents were more likely use cigarettes compared to African American adolescents who were more likely to be use cigars and smokeless tobacco products (table 9).

TABLE 9 **Tobacco Use in Arizona Adolescents (Grades 9-12), 2003 & 2005**

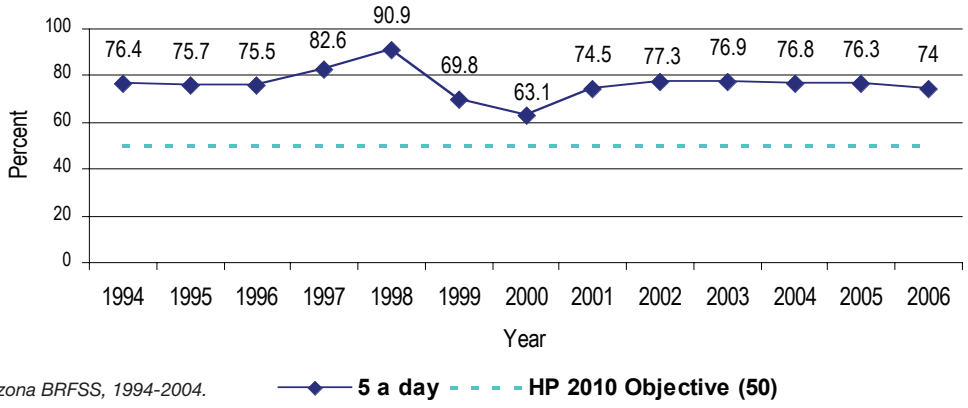
	Tobacco Use (2003)		Cigarette Use (2005)		Cigar Use (2003)		Smokeless Tobacco Use (2003)	
	Percent	CI (95%)	Percent	CI (95%)	Percent	CI (95%)	Percent	CI (95%)
Total	27.8	±3.3	21.4	±1.8	15.4	±2.5	4.7	±1.3
Sex								
F	25	±3.6	21.1	±2.8	9.5	±2.1	1.4	±0.7
M	30.6	±4.1	21.6	±2.6	21.6	±3.5	8.2	±2.4
Grade								
9th	21.1	±3.9	14.1	±2.8	10.3	±2.9	3.4	±1.7
10th	22.9	±4.5	18.4	±2.7	13.2	±3.1	4	±2.2
11th	30.7	±6.2	26.8	±5.5	15.2	±3.7	5.9	±3.1
12th	36.9	±7.4	29.1	±7.7	23.3	±5.5	6	±2.2
Race								
White	28.8	±3.9	22.9	±3.3	15.1	±3.3	5.3	±1.2
Black	22	±10.7	12.2	±5.5	20.5	±9.7	6.5	±4.6
Hispanic	25.1	±5.1	17.5	±3.4	15.8	±4.2	3.1	±1.8
Other	32.1	±13.1	27.6	±6.6	14.1	±4.7	6.9	±6.2

Source: Arizona YRBSS, 2003 & 2005

Fruit and Vegetable Consumption – Not eating 5-A-Day

Nutrition is an important element in preventing high blood pressure, cholesterol abnormalities, overweight and obesity and diabetes. Increasing the intake of fruits and vegetables to the recommended '5-A-Day' is beneficial in preventing chronic diseases and improve the quality of an individual's life. According to the 2005 BRFSS, 74 percent of Arizonans are not eating enough fruits and vegetables. For the past 13 years (1994-2006) Arizona has not achieved the HP2010 goal of having at least 50 percent of the adult population eating enough fruits and vegetables (figure 70).

FIGURE 70 **Percentage of Arizonans Not Eating '5-A-Day,' Arizona, 1994-2006**



Source: Arizona BRFSS, 1994-2004.

Several questions pertaining to fruits and vegetables were used in order to calculate fruit vegetable consumption:

- How often do you drink fruit juices such as orange, grapefruit, or tomato?
- How often do you eat (fruit, green salad, potatoes, carrots)?
- Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat?

According to the 2005 data, more males (80.1 percent) than females (71.8 percent) are getting adequate amounts of fruits and vegetables every day. Consumption of fruits and vegetables increases with age, especially for those over 65 years of age (19.9 percent) compared to those between 18-24 years of age (32.2 percent). However, there was a correlation between education levels and consuming enough fruits and vegetables. Those who had less than a high school education (21 percent) were less likely to be eating '5-A-Day' than those who were college graduates (27.2 percent) (table 10).

TABLE 10 Fruit and Vegetable Consumption in Arizona Adults, 2005

	Five or more		Five or less	
Sociodemographic Characteristics	Percent (%)	CI (95%)	Percent (%)	CI (95%)
Total	23.7	(21.4-26.0)	76.3	(74.0-78.6)
Gender				
Male	19.1	(15.9-22.3)	80.9	(77.7-84.1)
Female	28.2	(25.1-31.3)	71.8	(68.7-74.9)
Age				
18-24	19.9	(10.7-29.1)	80.1	(70.9-89.3)
25-34	22.4	(17.1-27.7)	77.6	(72.3-82.9)
35-44	19.2	(14.7-23.7)	80.8	(76.3-85.3)
45-54	20.7	(16.1-25.3)	79.3	(74.7-83.9)
55-64	28.7	(23.5-33.9)	71.3	(66.1-76.5)
65+	32.2	(28.1-36.3)	67.8	(63.7-71.9)
Race				
White	24.3	(21.8-26.8)	75.7	(73.2-78.2)
Black	N/A	N/A	N/A	N/A
Hispanic	20.7	(14.9-26.5)	79.3	(73.5-85.1)
Other	27.7	(18.9-36.5)	72.3	(63.5-81.1)
MultiRacial	N/A	N/A	N/A	N/A
Income				
Less than $15,000	23.1	(15.9-30.3)	76.9	(69.7-84.1)
$15,000- 24,999	25.2	(18.9-31.5)	74.8	(68.5-81.1)
$25,000- 34,999	25.2	(18.1-32.3)	74.8	(67.7-81.9)
$35,000- 49,999	22.4	(17.4-27.4)	77.6	(72.6-82.6)
$50,000+	25.5	(21.4-29.6)	74.5	(70.4-78.6)
Education				
Less than H.S.	21	(13.2-28.8)	79	(71.2-86.8)
H.S. or G.E.D.	18.9	(15.0-22.8)	81.1	(77.2-85.0)
Some post-H.S.	25.5	(21.5-29.5)	74.5	(70.5-78.5)
College graduate	27.2	(23.1-31.3)	72.8	(68.7-76.9)

Source: Arizona BRFSS, 2005

Among Arizona's adolescents, only 15.2 percent reported eating enough fruits and vegetables. More males (16.4 percent), 9th graders (17.1 percent) and 11th graders (15.4 percent) reported having consumed enough fruits and vegetables. In addition, White (12.5 percent) and Hispanic (15.4 percent) adolescents reported eating less fruits and vegetables compared to African American (25.4 percent) and other racial/ethnic groups (25.5%) (table 11).

TABLE 11 **Fruit and Vegetable Consumption in Arizona Adolescents (Grades 9-12), 2005**

	Five or more (2005)	
	Percent	CI (95%)
Total	15.2	±1.9
Sex		
F	14	±2.2
M	16.4	±2.7
Grade		
9th	17.1	±3.0
10th	13.7	±3.1
11th	15.4	±2.9
12th	13.6	±4.1
Race		
White	12.5	±2.4
Black	25.4	±11.7
Hispanic	15.4	±3.5
Other	25.5	±5.8

Source: Arizona YRBSS, 2005

Diabetes Mellitus

It is estimated that seven percent (21 million people) of the US population have diabetes mellitus, and that another seven million are unaware they have the disease (Rosamond et al., 2007). Although there are several types of diabetes, the two main types are type 1 (juvenile diabetes), and type 2 (adult-onset) diabetes. Type 1 diabetes is unpreventable and comprises 5-10 percent of all diagnosed cases. The risk factors associated with this type of diabetes may be autoimmune, genetic or environmental. Type 2 diabetes comprises of 90-95 percent of all diagnosed cases and is associated with many risk factors such as age, obesity, family history, gestational diabetes, physical inactivity, and race/ethnicity. In 2002 the costs associated with diabetes, both direct and indirect, were $132 billion (CDC Fact Sheet, 2005).

In order to assess the prevalence of diabetes in Arizona, the question asked in the BRFSS relating to diabetes, "Have you ever been told by a doctor that you had diabetes?" was analyzed. The prevalence of diabetes among Arizona adults in 2006 was 8.5 percent, the highest percentage ever recorded in the state, and higher than the national rate. Similar to national trends, more males (9.4 percent) than females (7.7 percent) and more Hispanics (9.2 percent) than Whites (7.8 percent) had diabetes. Nationally, 9 percent of Whites 20 years and older have diabetes; however, the prevalence increases with other racial/ethnic groups. Diabetes is almost twice as common in African Americans than Whites, and 1.7 times more likely in Hispanics than Whites. Estimates of diabetes prevalence among American Indians quite likely are less accurate than other populations, but

existing data shows that the prevalence of diabetes in this population is 1.5 to 2.2 times higher than Whites (Rosamond et al., 2007). According to the 2006 BRFSS report, individuals are more likely to report they had diabetes as they age. For example, those who are 45 and older have higher percentages (12.9 to 15.4 percent) of diabetes than those who are less than 44 years old (0.4 to 3.8 percent). Diabetes prevalence also varies by income. Persons who live in households with an income of less than $15,000 were twice as likely to be diabetic compared to those with a household income of over $50,000 (15.2 percent vs. 6.6 percent) (table 12).

TABLE 12 **Diabetes, Arizona Adults (Ages 18 & over), 2006**

Sociodemographic Characteristics	Percent (%)	CI (95%)
Total	8.5	(7.1-9.9)
Gender		
Male	9.4	(7.2-11.6)
Female	7.7	(6.0-9.4)
Age		
18-24	0.4	(0.0-0.9)
25-34	3.3	(0.2-6.4)
35-44	3.8	(1.9-5.7)
45-54	12.9	(8.5-17.3)
55-64	16	(11.8-20.2)
65+	15.4	(12.3-18.5)
Race		
White	7.8	(6.4-9.2)
Black	N/A	N/A
Hispanic	9.2	(5.6-12.8)
Other	6.9	(3.3-10.5)
MultiRacial	N/A	N/A
Income		
Less than $15,000	15.2	(9.5-20.9)
$15,000 - 24,999	9.3	(5.5-13.1)
$25,000 - 34,999	12.4	(6.8-18.0)
$35,000 - 49,999	8	(4.3-11.7)
$50,000+	6.6	(4.6-8.6)
Education		
Less than H.S.	11.3	(5.9-16.7)
H.S. or G.E.D.	9.5	(6.3-12.7)
Some post -H.S.	8.8	(6.5-11.1)
College graduate	6.2	(4.6-7.8)

Source: Arizona BRFSS, 2006

The association between diabetes mellitus and CVD has been well established. CDC reports that heart disease and stroke rates are 2 to 4 times higher in those with diabetes than those without diabetes. Two out of every three persons with diabetes will die from heart disease or stroke. (CDC, 2005).

In order to assess what percentage of Arizona adult respondents with CVD, CHD, and stroke also had diabetes, the responses to the appropriate 2006 BRFSS disease related questions were analyzed. A staggering 25 percent of those who said they had a heart attack, angina, and/or stroke also had diabetes. Approximately 22 percent reported having both CHD and diabetes, and about 8 percent reported having been told they had a stroke and diabetes (table 13).

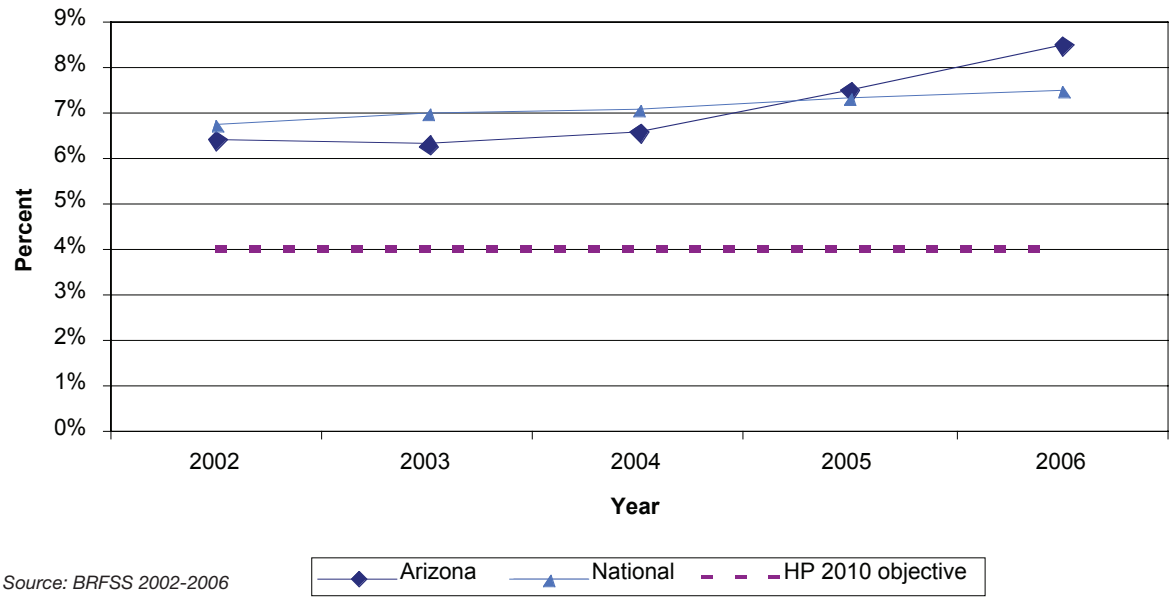
TABLE 13 **Diabetes and Cardiovascular Disease Adult Respondents Comorbidity with 95% Confidence Intervals, Arizona, 2006**

Ever been told by a doctor to have diabetes…	Cardiovascular Disease	Coronary Heart Disease	Stroke
Yes	24.7% (18.2-31.1)	26.4% (18.8-34.1)	25.2% (15.4-35.1)
No	73.9% (67.4-80.4)	72% (64.3-79.7)	74.3% (64.5-84.2)

Source: BRFSS 2006
Note: There are three questions that pertained to CVD, two of which were CHD conditions and the third related to stroke.

As the prevalence of diabetes has been on the rise the past five years from 6.4 percent in 2002 to 8.5 percent in 2006, the percentage of those with both CVD and diabetes will also increase (figure 71).

FIGURE 71 **Percentage of Those with Diabetes, Arizona Adults: 2002-2006**



Source: BRFSS 2002-2006

CHAPTER 3

Cardiovascular Disease Non-Modifiable Risk Factors

There are several non-modifiable risk factors for cardiovascular disease, such as age, gender, race/ethnicity, and family history. These risk factors, although non-modifiable, are useful in assessing one's risk for developing CVD, determining the risk thresholds for other modifiable risk factors and interpreting screening and diagnostic tests for CVD.

Race

Nationally, cardiovascular disease is the leading cause of death and disability. When looking at the diseases of the heart specifically, heart disease is the leading cause of death for all populations, regardless of race or ethnicity and gender. National data (2004) reveal that African Americans suffer the highest age-adjusted mortality rate for heart disease at 306.7 and Whites have the second highest mortality rate at 238.2. This shows that African Americans die from heart disease at a rate that is nearly 30 percent higher than Whites. This pattern is the same with the African American population in Arizona, with an even higher mortality rate from heart disease at 343.3. The Hispanic population has the second highest mortality rate for heart disease with a rate of 266.1. Figure 20, discussed earlier in this document, shows a comparison of mortality rates for heart disease and other leading causes of death in Arizona by race/ethnicity.

Figures 44 through 46, discussed on pages 51 – 52, show the 2005 hospitalization rates for heart disease in Arizona. The highest rate of hospitalization from CVD in Arizona was among Whites 139.6 per 10,000 population. The second highest rate of hospitalizations was among African Americans at 114.5 per 10,000 population. When comparing this to the mortality rates discussed in the previous paragraph, African Americans are hospitalized less for CVD, even though they have the highest mortality rate by a large margin. The lowest rate of hospitalizations occurred in the American Indian population at 36.2 per 10,000 population. The hospitalization rate for the American Indian population is artificially low because the state database for hospitalization does not capture events at Indian Health Service facilities.

The other component of CVD is stroke, and independent of heart disease, stroke is the third leading cause of death in the United States and accounted for around one out of every 14 deaths in the United States in 2000. Stroke mortality rates in the US for the year 2004 are higher for African Americans than for White (77.0 vs. 54.5). In Arizona, the highest stroke mortality rate is among African Americans, with a mortality rate that is lower than the national average for African Americans. The other population that has high stroke mortality compared to the other ethnic groups is the Asian population, with a rate of 64.6. All other racial/ethnic groups have significantly lower mortality rates compared to African Americans. Shown earlier in this document, Figure 58 shows a comparison of stroke mortality by racial/ethnic group and gender.

Figure 46 compares the hospitalization rates for stroke in Arizona among the five largest racial and ethnic groups. Whites in Arizona continue to have the highest rates for hospitalization due to stroke with a rate of 34.1 per 10,000 population. African Americans have the second highest hospitalization rate for stroke with a rate of 24.9 per 10,000 population. American Indians have the lowest hospitalization rates for stroke with a rate of 8 per 10,000 population. Again, the hospitalization rate for the American Indian population is artificially low because the state database for hospitalization does not capture events at Indian Health Service facilities.

Age

It has been shown throughout this document that age is a major risk factor for cardiovascular disease. Generally, atherosclerotic lesions are the result of a progressive process that develops over years. As a person ages, their aortic system stiffens, thus increasing the blood pressure and risk for a cardiac event. According to the NHLBI, approximately 72 percent of the people who suffer a stroke are age 65 years and older, and the incidence of stroke more than doubles in each successive decade after the age of 55.

From 1999-2004, the crude mortality rate for heart disease was highest among those aged 85 and older at 4,574.7 population. The crude mortality rate for stroke was also highest in those aged 85 and older at 1,273, as shown in figure 48. The hospitalization rate for cardiovascular disease in the 65 and older population was 805 per 10,000 in 2005 (see figure 45).

Gender

Gender is an important non-modifiable risk factor for the development of cardiovascular disease, which is the leading cause of death in both genders, in Arizona and nationwide. The age-adjusted mortality rate in 2005 for heart disease among males was more than 60 percent higher than the rate among females, 237.4 vs.147.3 respectively (see figure 18). The age adjusted mortality rate for stroke was very similar among males and females, at 40.0 and 40.5, respectively (see figure 50). These statistics show that men are much more likely than women to die of heart disease, while women and men die of strokes at about the same rate in Arizona.

In Arizona, African American women are more likely to die of heart disease than all other female populations with a mortality rate of 266.2. Within the male population, Hispanic men are most likely to die from heart disease, with a mortality rate of 242.2 (see figure 21).

Among males, the death rate from stroke is highest among Hispanics (59.8), while African American women are most likely to die from stroke by a large margin 94.1, which is 250 percent higher than in the White population.

CHAPTER 4

Economic Impact of Cardiovascular Disease

Since CVD is the leading cause of death and disability in the United States, it is not a surprise that it is a primary component of escalating health care costs as well. The American Heart Association Statistics Committee and Stroke Statistics Subcommittee (Rosamond et al, 2007) estimate that CVD (including stroke) will cost America $431.8 billion dollars in 2007. The two biggest components of these costs are those incurred in a hospital ($133 billion), and lost productivity from early deaths ($112 billion). In accounting for around 40% of all deaths, these expensive diseases pose a huge medical, economic, and social burden on society.

There is no source of accurate data on state-level costs for these diseases, but one can examine hospital discharge data for estimates of the economic burden. According to Arizona 2005 data, hospital charges from heart disease totaled nearly $3.8 billion, and charges associated with stroke were another $400 million. This does not include in-patient physician charges, non-hospital direct costs such as outpatient charges, or indirect costs associated with missed work, early deaths, etc. It is difficult to determine direct costs for Arizona, but nationally, the estimated cost of cardiovascular disease in 2006 was $403.1 billion, and includes both direct and indirect costs (http://www.americanheart.org/presenter.jhtml?identifier=4475, 2007)

The strain on the health care system due to CVD is not just economic. In 2005 alone, there were over 108,000 hospital visits for diseases of the heart, and another 14,000 for stroke. Since many of the victims of these diseases are over the age of 65 and are insured by Medicare, the tax payers bear a huge portion of the economic burden posed by these diseases.

TABLE 14 **Hospitalizations and Charges from Cardiovascular Diseases, Arizona, 2005**

Number of Stays	**122,293**
Total Charges	**$4,200,000,000**
Median Charge Per Hospitalization	**$20,414**

Source: Arizona Dept. of Health Services, hospital discharge database. Includes ICD-9 codes: 390-434, 436-459, excluding 401 and 402.

Although economists and public health researchers have found it difficult to show the cost-effectiveness of primary prevention of CVD (Schwappach et al, 2007), it is not so difficult to understand the economic benefit of CVD prevention. Wang et al. (2002) found that healthcare costs for people with CVD are more than double than for those without the disease. Druss et al (2001) found that persons with ischemic heart disease had higher annual per capita treatment costs than persons with the other four leading chronic conditions (depression, diabetes, hypertension, and asthma). According to Druss, this is because some for the procedures that are necessary are also the most expensive procedures in modern medicine. Additionally, because CVD increases with age, many of the people that are receiving these expensive treatments are Medicare eligible, which makes Medicare the primary payor for these treatments.

Stroke is one of the leading causes of disability in the United States. Not only does it pose a huge burden on the health of Americans, but it poses one of the largest economic burdens of any disease. Researchers at the University of Michigan predicted that from 2005 to 2050, the total costs from stroke in the U.S. will exceed over $1.5 trillion among the white population alone (Brown et al, 2006). The lifetime costs of ischemic stroke were more than $90,000 in 1990, nearly 20 years ago, and may have doubled today. These costs, like the burden of many diseases, are not spread evenly among the American population. Hispanics and African Americans, the two largest minority groups in the US, have a higher incidence of stroke. They are also less likely to have health insurance, have a limited access to quality health care, receive less adequate stroke prophylaxis, and have a higher incidence of ischemic stroke than Whites. Since African Americans and Hispanics have strokes at an earlier age than Whites, the lifetime loss of wages is greater. Most stroke prevention methods are cost-effective and many are cost-saving, such as smoking cessation interventions, drug therapies for hypertension, and tighter control of diabetes.

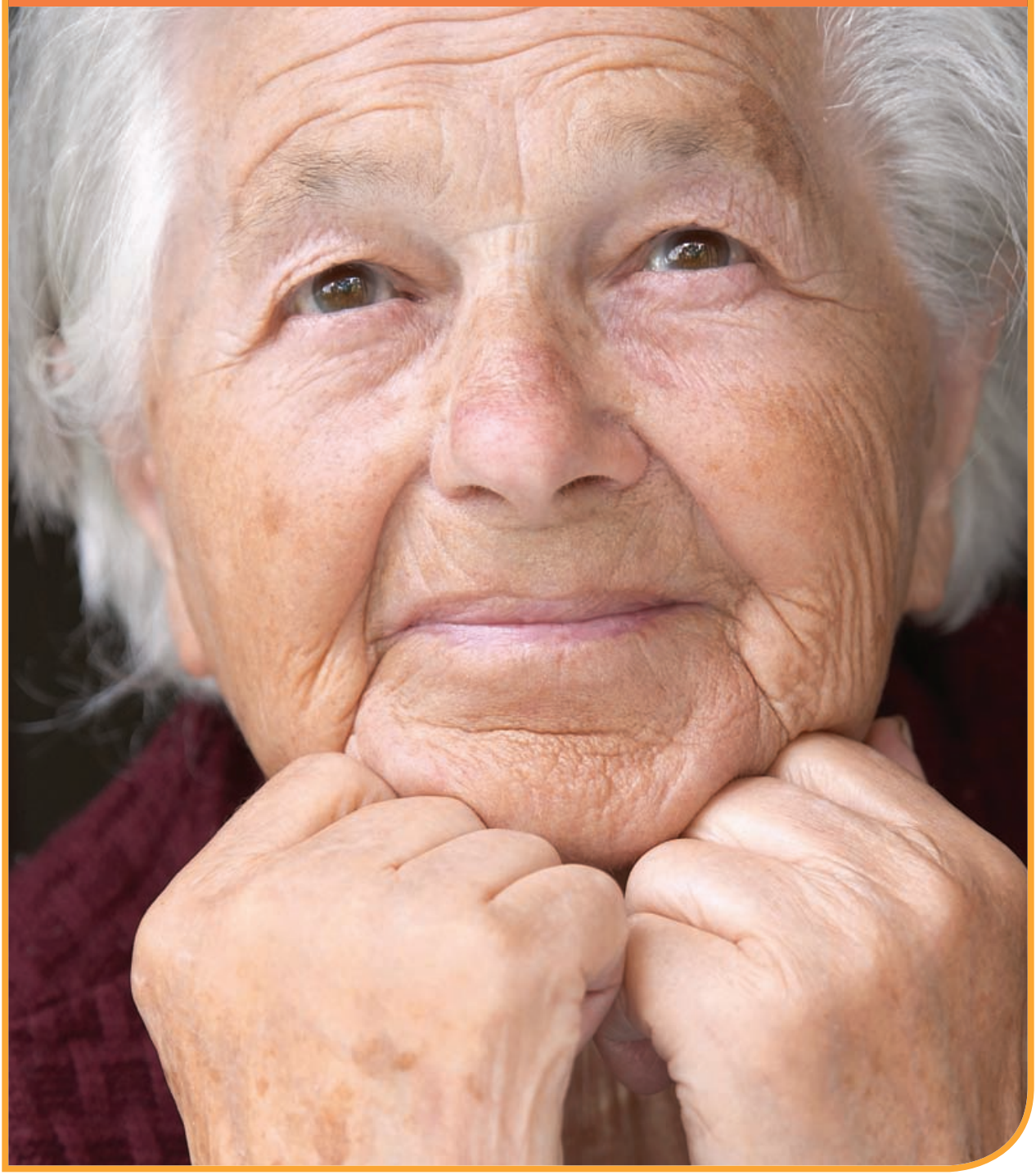
TABLE 15 **Estimated Costs (in billions of US dollars) of Cardiovascular Disease & Stroke, US, 2007**

	Heart Diseases	Stroke	All CVD
DIRECT COSTS			
Hospital	$94.2	$17.9	$133.0
Nursing Home	$22.0	$15.2	$45.3
Physicians/other	$22.2	$3.5	$43.3
DRUGS/OTHER			
Medical Durables	$20.0	$1.2	$47.2
Home Healthcare	$6.4	$3.8	$14.4
Total Expenditures	**$164.9**	**$41.3**	**$283.2**
INDIRECT COSTS			
Lost productivity/disability	$22.3	$6.5	$36.3
Lost productivity/death	$89.9	$14.6	$112.3
GRAND TOTALS	**$277.1**	**$62.7**	**$431.8**

Source: from Rosamond et. Al, 2007. " Heart Disease" include CHD, CHF, part of hypertensive disease, cardiac dysrhytmias, rheumatic heart disease, cardiomyopahy, pulmonary heart disease, and other or ill-defined "heart" diseases.

CHAPTER 5

Cardiovascular Disease and Special Populations



Similar to many other chronic diseases, cardiovascular disease does not impact all populations equally. Disparities exist on many levels whether they are by gender, age, race, ethnicity, income, education, or all of these.

Socioeconomic status

Research has indicated that socioeconomic status is related to increased prevalence and mortality from CVD. Those in lower income households were more likely to die from CVD. Not surprisingly, access to healthcare varies greatly according to income level; this observation was found even in countries with universal health plans, indicating that insurance is not the only limitation (Kapral et al., 2002). Individuals with a lower socioeconomic status (SES) are more likely to be at risk for developing CVD, and also to be affected by the quality of care after being diagnosed with the disease. The same is true for Arizona. The prevalence of CVD, CHD, and stroke is more common among Arizona adults who are from lower income households than from higher income households. People from lower income households report having higher rates of almost every risk factor related to CVD compared to those from higher income households. At least 25 percent of those who reported having high cholesterol are from households with an income of $35,000 or less (see table 3). Similar patterns are seen in those with physical inactivity, obesity, smoking, and diabetes. Those who had less education also reported higher percentages of physical inactivity, current smoking, and diabetes compared to those who had more education.

African American

The age-adjusted mortality rate for CVD in the last six years (2000-2005) shows that African Americans have had the highest death rates compared to other race/ethnic groups , at least 1.5 times higher than the groups with the lowest death rates (see figure 19). The lowest age-adjusted rate 329.8 for African Americans during the six-year period was during 2002, in which American Indians had the lowest rate, at 216.2. African American mortality rates are unsteady compared to the other racial/ethnic groups, which may be due to the group comprising a relatively small percentage of the state population (see figure 18). According to the BRFSS, more African Americans reported that they were current smokers than other racial groups (Whites, Hispanics and others) (see table 8). Compared to national rates, mortality rates from 1980-2004 showed that overall mortality is lower in Arizona; however, there are years when rates are very similar to the national rates (see figure 16). In 2005, African Americans in Arizona were most affected by CVD, CHD and stroke mortality (see figures 17, 30, and 47). African American females have higher mortality rates for CVD than their male counterparts (see figures 20, 21, 31, 39 and 49). Additionally, African Americans die from CVD at an earlier age than all other population groups (see figures 13, 32, 40 and 50). The six-year (2000-2005) stroke trend shows that African Americans had the highest rates until 2005, when stroke rates were similar among Asians and African Americans, worse than all other populations (see figure 51).

The 50 and older population

Increasing age is a risk factor associated with CVD prevalence and mortality. Lifetime risk of developing CVD for those who are free of CVD events at age 50 were 51.7 percent for men, 39.2 percent for women, with median survivals of 30 and 36 years, respectively (Lloyd-Jones et al., 2006). These numbers change according to the number of risk factors a person has at the time. The lifetime risk of developing CHD at 40 is 48.6 percent for men and 31.7 percent for women. The lifetime risk of developing CHF ranged between 20-21.3 percent (Lloyd-Jones et al., 2002).

The risk of having a stroke for those stroke-free at 55 was 1 in 5 for women and 1 in 6 for men (Seshadri, 2006). Those with favorable risk factors in middle age will survive and have better qualify of life 25 years later (Lloyd-Jones et al., 2007). As risk factors related to CVD can begin decades before the disease is detected, it is important to take preventive measures as early in life as possible.

In Arizona, CVD related deaths start to increase somewhere between the ages of 35 and 44, and about 50 percent of leading causes of death by the 55-64 year old age group are due to CVD (see figure 5). The median age at death for CVD is approximately 81 years old, but differs among racial/ethnic groups (see figure 13). The prevalence of CVD is at least 2-9 times higher in those 65 years and older compared to those in younger age groups (see figure 23). This pattern is similar in both CHD mortality and prevalence (see figures 32 and 33). CHF crude mortality rate begins to exceed the Arizona average rate at 65-74 years of age (see figure 36).

The median age at death for those who die of stroke differs greatly among the racial/ethnic groups, by at least 10 years, especially among the African Americans and American Indians compared to the Whites (see figure 53). In addition, the prevalence of those who have experienced stroke is three times higher among those 65 years and older compared to those between 55-64 years of age (see figure 54).

Youth/Adolescents

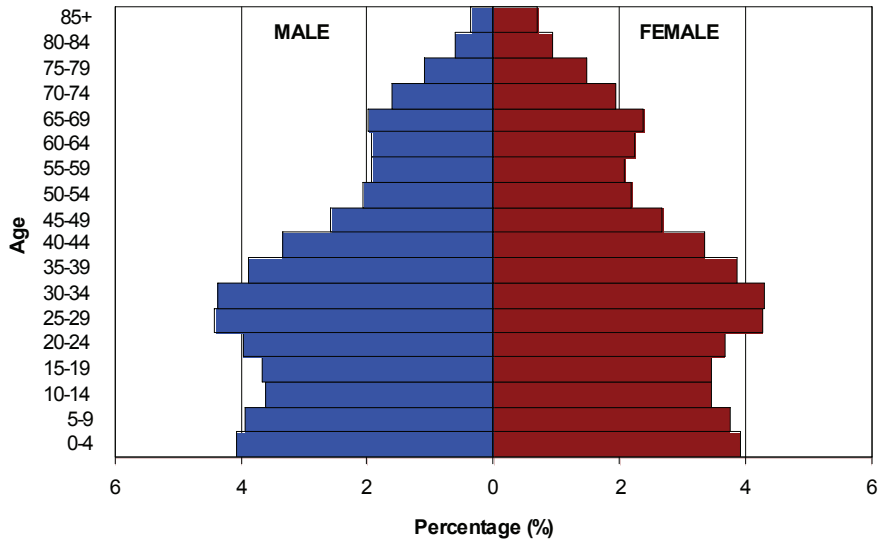
Diseases of the heart and stroke among Arizona adolescents are the fifth and eighth leading causes of death, respectively (see figure 6). Although a very small proportion of youth/adolescents are affected by CVD, prevention needs to begin as early in life as possible. Risk factors that are attributed to CVD can be modified to lower the risk of developing the disease later in life. According to the YRBSS, 12th graders were less active than 9th graders (see table 5). This could be due to the fact that physical activity is more likely to be part of the curriculum in 9th grade than 12th grade. More students are at risk for being overweight compared to those who are already overweight. Around 12-15 percent of the student respondents are either overweight or already overweight (see table 7). Being overweight is a risk factor associated with diabetes, which in itself is a risk factor for CVD. The percentage of those who consider themselves as current smokers increases with each consecutive

grade (see table 9). A small percentage (14-17 percent) of 9th-12th graders eat the recommended five or more fruits and vegetables per day. These figures show that more fruit and vegetable consumption in adolescents needs to be encouraged as this pattern is also prevalent in the Arizona adult population (see table 11). Furthermore, educating Arizona youth at risk factors and healthy behaviors may reduce disparities that exist among several racial/ethnic groups. For example, young women or Hispanic women know or hear less about heart disease than older or other racial/ethnic groups (Mosca). Herein lies an opportunity to educate young Hispanic females about CVD, and the steps they can take now to prevent the disease later in life.

Future of CVD in Arizona

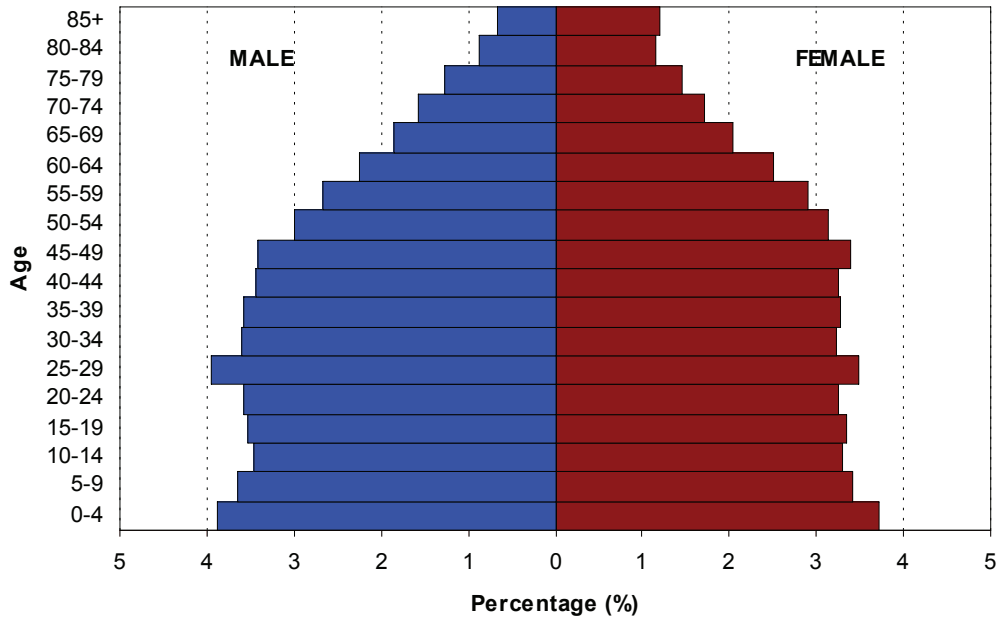
For the past 20 years, Arizona has been the second fastest growing state in the United States. The Arizona population has grown from over 3.5 million in 1990 to almost 6.5 million in 2007 (figures 72 and 1, as shown earlier in this document).

FIGURE 72 **Arizona Demographic Population 1990** (n=3,665,228)



Source: Arizona Dept of Economic Security

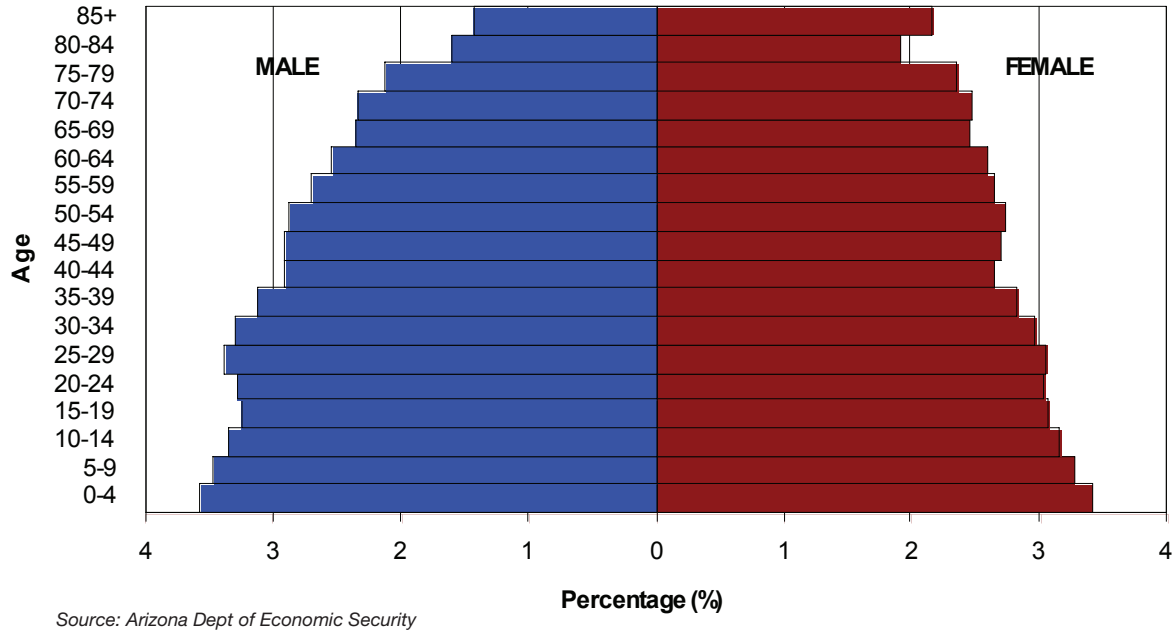
FIGURE 1 **Arizona Demographic Population 2007** (n=6,432,007)



Source: Arizona Dept of Economic Security

Improved public health, technology and medical treatments undoubtedly will continue to increase the average life expectancy, which is leading to a boom of our populations over 65 years of age. The population projection for 2040 shows that the number of individuals over 65 will be similar to the number of those in younger age groups (figure 73).

FIGURE 73 **Arizona Population Projections 2040** (n=11,693,553)



Source: Arizona Dept of Economic Security

By 2030, the four leading causes of death worldwide will be, in order, ischemic heart disease, stroke, HIV/AIDS, and Chronic Obstructive Pulmonary Disease (COPD) (Mathers & Concar, 2006). As the world's populations get older maintaining a healthy weight, blood pressure and cholesterol will become ever more important in preventing CVD. Unless blood pressure levels are maintained or reduced it is inevitable that stroke prevalence will increases with an aging population (Kuller, 2000). The number of people diagnosed with diabetes is estimated to increase by 165% from 2000 to 2050, of which the greatest increases will be seen among the minority groups and the elderly (Narayan et al., 2003). This larger population of people with diabetes will increase the percentage of people at risk for all cardiovascular diseases. An increase in the disease that is already the leading cause of death will bring with it an even more significant burden on the healthcare workforce, the economy, and communities (Flegal, 2005).

VII Glossary

Age Adjusted Rates – the number of events occurring per 100,000 population per year, calculated in accordance with a standard age structure to minimize the effect of age differences when rates are compared between populations over time.

Angina – Chest pain caused by ischemia of the heart muscle and is referred to the chest, arm, neck, jaw and/or back.

Asthma – a chronic disease of the respiratory system in which the airway occasionally constricts, becomes inflamed, and is lined with excessive amounts of mucus, often in response to one or more triggers. These episodes may be triggered by such things as exposure to an environmental stimulant (or allergen), cold air, warm air, moist air, exercise or exertion, or emotional stress.

Behavior Risk Factor Surveillance Survey – A telephone survey that is administered nationally on an annual basis, and asks standardized questions aimed at assessing the prevalence of risk factors for a variety of diseases and threats to health and quality of life and to measure changes in the population's risk.

Blood Pressure – The pressure, measured in millimeters of mercury (mmHg), exerted against the artery walls. Also considered to be the force required by the heart to move blood through the vascular system.

***Diastolic blood pressure* –** The measurement of pressure in the arterial system during the resting phase of the cardiac cycle when the coronary arteries fill and perfusion of the myocardium takes place. Diastole refers to the resting of the heart.

***Systolic blood pressure* –** The measurement of pressure in the arterial system during the contraction of the heart when blood is forced out of the left ventricle into the arterial system.

Body Mass Index – A height to weight ratio field measurement which is correlated to an increased risk of CVDs. BMI is in units of kg/m2 and is derived by taking the bodyweight of an individual in kilograms and dividing it by the height of that individual in meters squared. Absolute values are used to interpret BMI in adults and CDC's published growth charts for age and gender are used to interpret BMI in children.

Cardiovascular Disease – Refers to a broad spectrum of heart and blood vessel diseases, including heart disease, stroke, and peripheral vascular disease. Atherosclerosis is the underlying disease process of all major forms of Cardiovascular Disease.

Cerebrovascular Disease – Affecting the blood vessels supplying blood to the brain. Stroke occurs when a blood vessel bringing oxygen and nutrients to the brain bursts or is clogged by a blood clot. Because of this rupture or blockage, part of the brain does not get the flow of blood that it needs and nerve cells in the affected area dies. Small stroke-like events, such as transient ischemic attacks, which resolve in a day or less, are symptoms of cerebrovascular disease.

Cholesterol – A steroid alcohol present in animal cells and body fluids, important in physiological processes, and implicated experimentally as a factor in arteriosclerosis.

Chronic Obstructive Pulmonary Disease – A group of disorders that are almost always a result of smoking that obstructs bronchial flow. One or more of the following in varying degrees are present in COPD: emphysema, chronic bronchitis, brochospasm, and bronchiolitis.

Congestive Heart Failure – Impairment of the pumping function of the heart as the result of heart disease; heart failure often causing physical disability and increased risk for other CVD events. An inability to pump enough blood through the arterial system to supply the tissues and organs. CHF is diagnosed by measuring the percentage of blood in a chamber of the heart that is pumped out during systole. The term "heart failure" should not be confused with cardiac arrest, which is when the heart actually stops beating.

Coronary Heart Disease – this refers to a reduction of blood flow due to thickening and hardening of the arteries that supply the heart muscle. Heart cells are dependant on blood flow through these arteries to provide oxygen and to carry away metabolic products. If the supply is reduced, a person can experience angina. Complete cut off of the blood supply results in the death of heart cells, and a heart attack is experienced.

Crude Mortality Rate – The number of deaths for a specific condition in a given region, divided by the population of that region.

Current smoker – From the BRFSS, all respondents 18 and older who have ever smoked 100 cigarettes in their lifetime and reported smoking every day or some days.

Current Tobacco Use – From the YRBSS, all students who have smoked cigarettes or cigars or used chewing tobacco or snuff on ≥1 of the 30 days preceding the survey.

Depression – a state of intense sadness, melancholia or despair that has advanced to the point of being disruptive to an individual's social function and/or activities of daily living.

Diabetes Mellitus – A variable disorder of carbohydrate metabolism caused by a combination of hereditary and environmental factors and usually characterized by inadequate secretion or utilizations of insulin, by excessive urine production, by excessive amounts of sugar in the blood and urine and by thirst, hunger, and loss of weight.

Type 1 Diabetes Mellitus **–** Type 1 diabetes is a chronic, lifelong disease. It can occur at any age, but is usually diagnosed in children and young adults. In type 1 diabetes, the body's immune system has attacked certain cells in the pancreas and destroyed them. Once they are destroyed, the pancreas produces little or no insulin, so glucose stays in the blood.

Type 2 Diabetes Mellitus **–** Type 2 diabetes occurs in 2 ways, 1) the body does not produce enough insulin, or 2) the cells ignore the insulin. Type 2 diabetes is the most common form of diabetes and usually appears in adults, often in middle age.

Gestational Diabetes **–** Gestational diabetes results from when the body is not able to make and use all the insulin it needs for pregnancy. Without enough insulin, glucose cannot leave the blood and be changed to energy. Glucose builds up in the blood to high levels.

Direct Costs – Costs that are clearly and directly associated with heart disease and stroke treatment.

Disparities – refers to the gaps in the quality of health and health care across racial, ethnic, and socioeconomic groups.

Fruits and Vegetables: 5-A-Day – from the BRFSS, all respondents 18 and older who report they are consuming five or more servings of fruits and vegetables per day.

Heart Disease – any affliction that impairs the structure or function of the heart.

Healthy People 2010 – Healthy People 2010, a document created by the US Department of Health and Human Services, with targets to move the US population towards greater health.

High Blood Pressure – Blood pressure is the force of the blood pushing against the walls of arteries. Blood pressure is given as two numbers that measure systolic pressure (the first number, which measures the pressure while the heart is contraction) and diastolic pressure (the second number, which measures the pressure when the heart is resting between beats).

High Cholesterol – Cholesterol is the waxy substance that circulates in the bloodstream. When the level of cholesterol in the blood is too high, some of the cholesterol is deposited in the walls of the blood vessels. Over time these deposits can build up until they narrow the blood vessels, causing atherosclerosis, which reduces the blood flow. The higher the blood cholesterol level, the greater the risk of getting heart disease. Blood cholesterol levels of less than 200mg/dL are considered desirable. Levels of 240 mg/dL or above are considered high and require further testing and possible intervention. Levels of 200-239 mg/dL are considered borderline. Lower blood cholesterol reduces the risk of heart disease.

Hospital Discharges – The number of inpatients discharged from short-stay hospitals where some type of disease was the first listed diagnosis. Discharges include people both living and dead.

Indirect Costs – costs that are not directly related to the actual treatment of heart disease or stroke.

Medicare – the health insurance program administered by the US government, covering people who are either 65 and older, or who meet other special criteria.

Modifiable Risk Factors – attributes or characteristics of a person's lifestyle, which predisposes them to develop coronary heart disease.

Mortality – rate of death expressed as the number of deaths occurring in a population of a given size within a specified time interval.

Non-modifiable Risk Factors – Risk factors that are not amenable to modification by an individual such as increased age, family history, gender and ethnicity.

Obesity – Often defined in terms of body mass index (BMI), which is calculated as bodyweight in kilograms divided by height in meters squared: A BMI of $\geq 30 kg/m^2$ is considered "obese"

Osteoarthritis – a type of arthritis that is caused by the breakdown and eventual loss of cartilage of one or more joints.

Overweight – Often defined in terms of body mass index (BMI) which is calculated as bodyweight in kilograms divided by height in meters squared: a BMI of 25-29.9 kg/m^2 is considered overweight. In children, the CDC defines overweight as BMI greater than the 95th percentile value for the same age and gender group.

Physical Activity – bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.

***Physical Inactivity* –** From the BRFSS, all respondents 18 and older who report no leisure-time physical activity during the past month.

***Moderate Physical Activity* –** Activities that use large muscle groups and are at least equivalent to brisk walking. In addition to walking, activities may include swimming, cycling, dancing, gardening, and yard work, and various domestic and occupation activities.

***Vigorous Physical Activity* –** Rhythmic, repetitive physical activities that use large muscles at 70 percent or more of maximum heart rate for age.

Plaque – the characteristic manifestation of atherosclerosis located in the arterial wall and extending into the lumen or channel of the artery; plaque can disturb or restrict blood flow and is prone to fissure or rupture, thus precipitation formation of a blood clot that can cause an acute coronary event.

Premature Death – death occurring in the ages of 35-74

Prevalence – the frequency of a particular condition within a defined population at a designated time.

Socio-economic Status – a measure of an individual's place within a social group based on various factors, including income and education.

Stroke – Sudden interruption of blood supply to the brain caused by an obstruction or the rupture of a blood vessel.

Youth Risk Behavior Surveillance System – a survey designed to determine the prevalence of health risk behaviors in adolescents.

VIII Data Sources & Limitations

CDC Wide-ranging OnLine Data for Epidemiologic Research (WONDER): Compressed Mortality File-

- WONDER is an online resource available to public health professionals and the public.
- Data is available from 1979-2004 and can be broken down according to: number of deaths, crude or age-adjusted death rates, gender, age group, race (white, black and other), year of death and underlying cause of death.
- Mortality data based on records for all deaths that occur in the 50 states and the District of Columbia.
- Foreign residents who have died in the United States are excluded. US residents who die abroad are also excluded.
- Underlying cause of death, determined by the World Health Organization (WHO) International Classification of Disease (ICD)-9 and -10 coding, is determined by the physician when entering it onto the death certificate. [Note: ICD-9 (1979-98) or ICD-10 (99-current year)]
- Race category for American Indian or Alaskan Native race category and the Asian or Pacific Islander is classified as 'Other'.

Information from: http://wonder.cdc.gov

Arizona Department of Health Services' (ADHS) Bureau of Vital Statistics-

- Births, deaths, and fetal deaths from original documents filed with the ADHS and from transcripts of original certificates affecting Arizona residents in any other states.
- Death records/certificates of Arizonans who have died outside the US are not included.
- Cost Reporting and Discharge Data Review collect information about both hospital inpatient discharges and emergency room visits.
- The Bureau of Public Health Statistics requires short-stay nonfederal hospitals to submit uniform reports to ADHS every six months.
- A limitation to this approach is that it excludes patient information from federal, territorial, or other small hospitals/hospices (e.g. Indian Health Services).
- Population Denominators are projections from Arizona Department of Economic Security (DES) http://www.workforce.az.gov/.

Information from: http://www.azdhs.gov/plan/index.htm

CDC Behavioral Risk Factor Surveillance System (BRFSS)-

- BRFSS is on an on-going data collection system gathering information on adult health-related behaviors of non-institutionalized residents 18 years of age and older. A standardized questionnaire (~75 questions) is used. Questions determined by the state BRFSS coordinator and CDC.

- Only one adult per household is interviewed. Participants are not compensated.
- Random sampling telephone survey, using disproportionate stratified sampling, random digit dialing, and a Computer Assisted Telephone Interviewing (CATI) system.
- Sample size of 4,700 over a 12 month period surveyed (sample size 95 percent confidence interval of ±3 percent). Potential to represent 96.3 percent of all households that have telephones according to the DES for the year 2000 in Arizona.
- Monthly data files sent to the Arizona BRFS program and reports are prepared.
- Data is weighted based on Arizona population demographics.
- Takes into account number of adults and telephone lines in the household, cluster size, stratum size and age/race/sex distribution of the general population.
- References to a few articles related to the reliability and validity of the BRFSS are listed below:

1) Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack RA. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). *Social and Preventive Medicine*, 2001; 46Suppl 1: S03-S42.

2) Nelson DE, Powell- Griner E, Town M, Kovar MG. A comparison of national estimates from the National Health Interview Survey and the Behavioral Risk Factor Surveillance System. *American Journal of Public Health*, 2003; 93:1335-1341.

3) Ronaldo Iachan, Jane Schulman, Eve Powell-Griner, David E. Nelson, Peter Mariolis, and Carol Stanwyck. "Pooling state telephone survey health data for national estimates: The CDC Behavioral Risk Factor Surveillance System, 1995 Pp. 221–226 in *Conference on Health Survey Research Methods* (7th:1999:Williamsburg, VA.), Seventh Conference on Health Survey Research Methods, 2001, Marcie L. Cynamon and Richard A. Kulka (eds.), Hyattsville, MD: DHHS Publication No. (PHS) 01–1013.

4) Mokdad AH, Stroup DF, Giles WH. Public health surveillance for behavioral risk factors in a changing environment: recommendations from the Behavioral Risk Factor Surveillance team. *MMWR*, 2003;52 (RR-9):1–12.

Information from: http://www.cdc.gov/brfss and http://www.azdhs.gov/plan/brfs/

CDC Youth Risk Behavior Surveillance System (YRBSS) –

- Every two years students (grades 9-12) are selected from a representative sample of high schools in a state to take self-reported paper and pencil questionnaires.
- These questionnaires are administered to determine the prevalence of risk factors and behaviors: unintentional injuries and violence, tobacco use, alcohol and other drug use, sexual behaviors, unhealthy dietary behaviors and physical inactivity.
- In existence since 1991, last reported year was in 2005.
- A limitation is that it is a self-reported questionnaire so under or over-reporting of behaviors cannot be determined.

- Data represents only those who attend a high school. (About 6% of those aged 16-17 who are not enrolled in a high school are not taken into account.) In addition, not all 50 states participate in the survey which would affect any nationwide estimates.
- Survey takes 10 minutes for the facilitator to distribute and to read the directions. It takes 35 minutes for the students to take.
- In the YRBSS, only surveys with a scientifically drawn sample, appropriate documentation, and an overall response rate of at least 60% are weighted. (Arizona is weighted.)
- YRBS data are weighted to adjust for school and student nonresponse and to make the data representative of the population of students from which the sample was drawn. Generally, these adjustments are made by applying a weight based on student sex, grade, and race/ethnicity.

Information from: http://apps.nccd.cdc.gov/yrbss/

Arizona Department of Economic Security (DES) Population Statistics Unit-

- Population estimates and projections were used according to the methodology and figures reported by DES.

Information from: http://www.workforce.az.gov/

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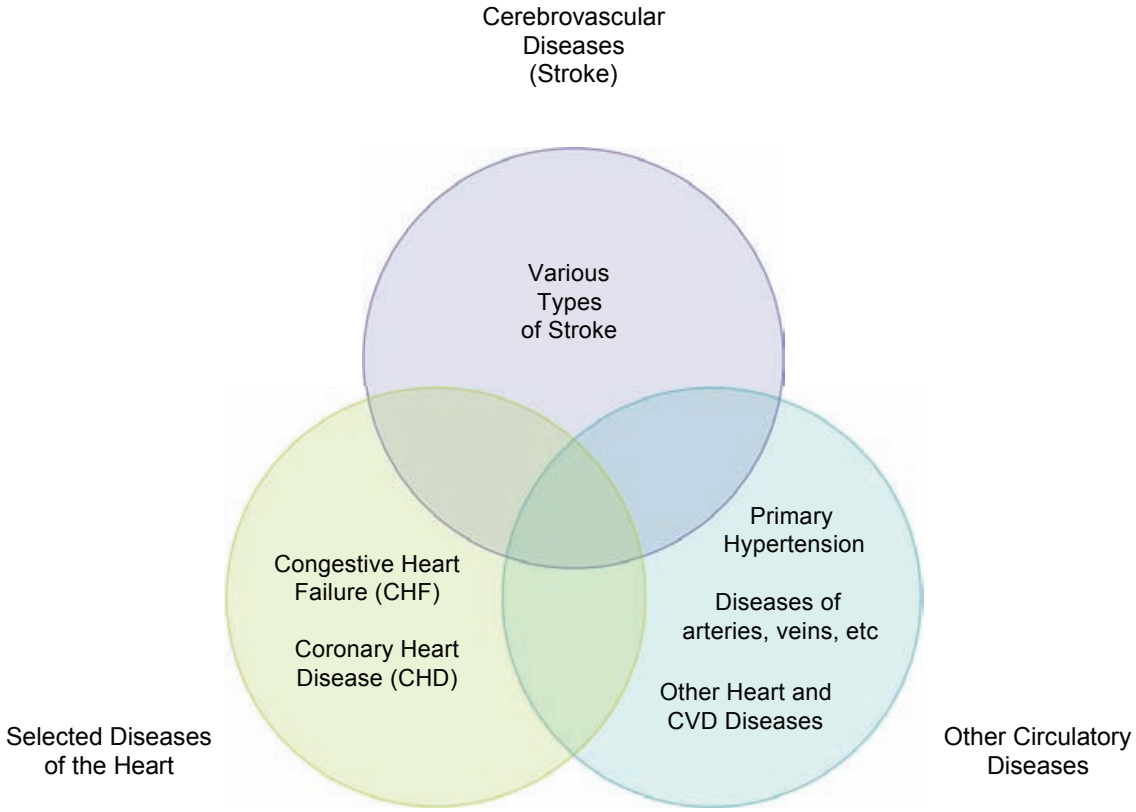
X Appendix A

Cardiovascular Diseases (CVD)



X Appendix B

International Classification of Diseases (ICD):

Causes of Death	ICD-9 (1979-1998)	ICD-10
Alzheimer's Disease		G30
Cancer		C00-C97
Cardiovascular Disease (CVD)	390-434, 436-448	I00-I78
Diseases of the Heart	390-398, 402, 404, 410-429	I00-I09, I11, I13, I20-I51
Coronary Heart Disease (CHD)	410-414, 429.2	I20-I25
Congestive Heart Failure (CHF)	428	I50
Cerebrovascular Disease (Stroke)	430-434, 436-438	I60-I69
Chronic Lower Respiratory Diseases		J40-47
Diabetes mellitus		E10-E14
Other		
Suicide		X60-X84, Y87
Chronic Liver Disease & Cirrhosis		K70, K73-K74
Influenza & Pneumonia		J10-J18
Unintentional Injuries		V01-X59, Y85-Y86

Source: Arizona Health Status and Vital Statistics 2005

Note: ICD-9 codes were used from 1979-1998 & ICD-10 codes were used from 1999-2004.

“Cardiovascular disease
is the leading cause of
death both nationally,
and in Arizona.
The main components of
cardiovascular disease
are coronary heart disease,
congestive heart failure,
and stroke.”

The Burden of Cardiovascular Disease in Arizona

Arizona Department of Health Services
Division of Public Health
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