

The Burden of Cardiovascular Disease in Hawaii 2007



HAWAII STATE DEPARTMENT OF HEALTH

The Burden of Cardiovascular Disease in Hawaii 2007

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MESSAGE FROM THE DIRECTOR OF HEALTH

Aloha Kakou,

The Hawaii Department of Health is pleased to present the publication of *The Burden of Cardiovascular Disease in Hawaii 2007*. The report, produced under the leadership of the Community Health Division, compiles surveillance information, vital statistics, and other various data sources into a comprehensive document.

Cardiovascular disease (CVD) is the leading cause of death in Hawaii and in the nation. It poses a significant public health burden to the people of Hawaii. In 2005, more than 2,900 people died from CVD in Hawaii. It is also responsible for activity limitations due to disability, a large portion of health care costs including hospitalization, and indirect costs due to lost wages and decreased productivity. Healthcare costs associated with CVD are staggering. According to the Hawaii Health Information Corporation, total charges associated with hospitalizations due to a primary diagnosis of CVD amounted to more than \$604 million in 2005 alone.

The Burden of Cardiovascular Disease in Hawaii 2007 provides information on the prevalence of CVD, associated risk factors and risk markers, hospitalizations, and deaths in the state of Hawaii. This report is a valuable resource for use in planning programs and initiatives in communities most affected by this disease.

CVD is a serious, common, and very costly disease, but by working together, we can create a healthier Hawaii. I invite you to join us in that effort.

Kuikahi kakou i ka puuwai

Let us work together from the heart

Chiyome Leinaala Fukino, M.D.

Director, Hawaii State Department of Health

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EXECUTIVE SUMMARY

Cardiovascular disease (CVD) continues to be the leading cause of death in the United States and in Hawaii for the past several years. Nationally, over 800,000 deaths were attributed to CVD in 2004. In Hawaii, more than 2,900 people died from CVD in 2005. Within certain counties, and among certain ethnic groups and socioeconomic levels, the burden of CVD is disproportionately high. CVD mortality rates per 100,000 persons among Hawaii County residents were consistently higher than the other counties in the state between 1999 and 2005. Hawaii County currently experiences the highest CVD mortality rates in the state, followed by Kauai and Maui. In 2005, the mortality rate in Hawaii County due to stroke alone (51.4/100,000), was higher than the state average (43.5/100,000).

The burden of CVD in Hawaii also varies by ethnicity and socioeconomic status. When compared to the state's mortality rate for Major CVD in 2005 (205.3/100,000), Filipinos have a disproportionately higher mortality rate (396.3/100,000), as do Native Hawaiians (313.1/100,000). Filipinos also had a very high mortality rate for stroke (84.4/100,000) in 2005, which was almost double the state rate (43.5/100,000). Those in the lowest socioeconomic brackets (i.e. based on household income, education, and employment status) consistently reported the highest proportions with CVD-associated risk factors (i.e. high blood pressure, smoking, obesity, physical inactivity, and diabetes) in 2005.

CVD is also responsible for a large portion of health care costs in the state due to hospitalizations. In 2005, the total charges associated with hospitalizations due to a primary diagnosis of CVD amounted to more than \$604 million.

There are very distinct geographic and ethnic disparities in CVD mortality in Hawaii, with (1) Filipinos and Native Hawaiians experiencing high age-adjusted mortality rates, and (2) Hawaii's rural counties also experiencing high mortality rates. Similar ethnic and geographic disparities, as well as those based on socioeconomic status, are also reflected in the prevalence rates of some of the risk factors for CVD and co-morbidities (diabetes and disability) from the Behavioral Risk Factor Surveillance System and the Hawaii Health Survey.

CVD is a serious public health issue in Hawaii. The Hawaii Department of Health is committed to preventing the development of, and reducing the burden of this disease in the state, but it cannot do this alone. This report is intended to be utilized as a guide and reference for partnership development, program development and evaluation. In addition, it is intended to foster collaborative community-based initiatives to address CVD and its associated risk factors. Further, the Department encourages individuals, communities, organizations, and agencies to work on this issue together for a healthier Hawaii.

INTRODUCTION AND PURPOSE

In the United States, CVD continues to be the leading cause of death. More deaths are attributed to CVD than motor vehicle crashes, HIV/AIDS, homicide, suicide, alcohol and drug use combined. CVD describes diseases of the heart (cardio), and diseases of the blood vessels (vascular) that impair the vital transport of blood and oxygen to the brain and body. Two of the most common and deadly forms of CVD include coronary heart disease (CHD) and stroke.

CHD occurs when the coronary arteries become narrowed or clogged by fat and cholesterol deposits (plaques) and cannot supply enough blood to the heart. As the arteries narrow, or as the plaques rupture, the flow of blood to the heart can slow or stop, causing chest pain (angina), shortness of breath, a heart attack or other symptoms. Nationally, CHD makes up the majority of heart disease deaths. In 2002, over 494,000 Americans died of coronary heart disease, 71% of all heart disease deaths that year¹. Heart disease is also very costly economically with projected costs in 2006 of \$258 billion on health care services, medications, and lost productivity².

Another common form of CVD is cerebrovascular disease or stroke. A stroke occurs when blood flow to the brain is interrupted by a blocked or burst blood vessel, and is often referred to as a brain attack. Stroke can be subdivided into three types: ischemic, hemorrhagic, and transient ischemic attack (TIA). Ischemic strokes account for 85% of all cases, and occur when an artery that supplies blood to the brain becomes blocked. Hemorrhagic strokes are more severe, and occur when an artery in the brain bursts. A TIA is sometimes called a mini-stroke. It starts just like a stroke, but clears within 24 hours often leaving no symptoms or obvious deficits. Each year in the United States, over 700,000 people suffer a stroke, of which 500,000 are first-time events. Stroke leads to over 160,000 deaths each year, making it the third leading cause of death in the nation³.

In addition to the burden of disease associated with CVD, there are also several risk factors and risk markers. Risk factors such as tobacco use and physical inactivity, as well as risk markers such as age and ethnicity, will be discussed in the *CVD Risk Factors & Risk Markers* section.

The purpose of this burden report is to: 1) promote education and awareness of the burden of stroke and stroke care issues in Hawaii, and 2) engage partners to solicit interest from public, private, professional and voluntary organizations and community leaders to participate in the statewide process of developing a Hawaii State Stroke plan and join as members in Hawaii Stroke System of Care committees.

BACKGROUND - CVD IN HAWAII

CVD causes the most deaths in the State of Hawaii, with heart disease and stroke being the first and third leading causes of death respectively. CVD can further result in serious long-term disability. Overall, the population of the State of Hawaii, when compared to other states, is viewed as healthy on indicators of risk factors, CVD morbidity and mortality. **Yet, very distinct geographic, ethnic and socioeconomic health disparities persist.**

In response to physician and community concerns about the number of stroke-related deaths in the state (especially on the island of Hawaii), a Hawaii State Stroke System of Care Initiative was established. This involved a partnership between the North Hawaii Outcomes Project, the Hawaii State Department of Health Community Health Division, the Hawaii Chapter of the American Heart Association/ American Stroke Association (AHA/ ASA), and other community groups. The goal of this Initiative is to develop a Hawaii State Stroke Plan that will increase stroke prevention and improve stroke care in Hawaii.

In 2005, the Hawaii State Stroke System of Care Initiative convened a multidisciplinary planning group from various public and private organizations involved with stroke care in Hawaii. Per the recommendations of the ASA Task Force on the Development of Stroke Systems Report: *Recommendations for the Establishment of Stroke Systems of Care*, the planning group recommended the formation of the following four committees: Data/surveillance, Prevention/Early Detection/Screening, Pre-hospital/ Acute Care and Secondary Prevention/Rehabilitation.

In October 2005, the Stroke Data Subcommittee was formed with a variety of Departmental and relevant community partners and began to assess stroke related data for Hawaii. Subsequently the group decided that a focus on all relevant CVD data would be warranted, particularly since the last CVD burden report and plan in Hawaii was produced in 1997⁴. Hence, all relevant data would be examined and an updated CVD state burden report for Hawaii would be developed.

Membership of the re-named CVD Data Workgroup consists of Department of Health (DOH) chronic disease epidemiologists, research statisticians, planners, and other professionals from health organizations, businesses, and health insurance companies. The goals of the group were to:

1. Assess the available data sources in Hawaii for CVD,
2. Assess the availability and form of data for analysis, and
3. Develop and disseminate relevant CVD information from each data source.

METHODS - DATA SOURCES

Data on the overall burden of cardiovascular diseases in Hawaii from the following sources have been summarized (*refer to Appendices for more detail*):

- 1) Mortality data from vital records (death certificates)
- 2) Telephone survey data (BRFSS and HHS) on
 - a) Heart disease and stroke prevalence (morbidity)
 - b) Risk factors for heart diseases (tobacco use, high blood pressure, high cholesterol, overweight/obesity, physical inactivity, and poor dietary habits),
 - c) Risk markers for CVD (age and ethnicity)
 - d) Co-morbidities (diabetes, disability)
- 3) Hospital discharge data.

Vital Records

The management of birth certificates, marriage licenses, and death certificates is handled by the Office of Health Status Monitoring (OHSM) within the DOH. This office collects, processes, analyzes and disseminates relevant, population-based data in order to assess the health status of Hawaii's population and to fulfill health statistics legal requirements. OHSM also provides vital statistics and demographic and health data for use in identifying state and community health trends, identifying population groups at risk for serious health problems, and evaluating program effectiveness. OHSM provides a repository for vital event records within the State such as births, deaths, and marriages and provides copies to the general public. In the last two years an electronic death certificate system has been implemented for a more streamlined and efficient process. (<http://www.hawaii.gov/health/statistics/vital-statistics/index.html>)

Hawaii Health Survey (HHS)

The Office of Health Status Monitoring within DOH also is in charge of the Hawaii Health Survey (HHS), a unique annual statewide survey conducted in Hawaii since 1968. Although originally modeled after the National Health Interview Survey (NHIS) as a house-to-house survey, the HHS became a telephone survey in 1996. Based on self-reported information from adult household members, OHSM provides estimates of demographic, socioeconomic, and health conditions for the adult population, households, as well as children of Hawaii. Detailed data are collected on insurance, ethnicity, and poverty variables among others. Health conditions measured include chronic conditions and mental and physical health. The HHS provides intercensal estimates for ethnicity for Hawaii's population. Data are utilized by Department of Health programs to determine eligibility for services. In addition, information is provided to other state programs, university and college researchers and students, community health centers, and national organizations. The survey consists of core variables that are constant among years and modules or questions added on a variety of topics by programs, researchers, and outside organizations. Selected reports and standard output tables are published on the DOH Website and other information is available upon request.

(<http://www.hawaii.gov/health/statistics/hhs/index.html>)

Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS is the largest continuously conducted telephone health survey in the world. The annual telephone survey of non-institutionalized adults (>18 years) has been conducted in all states and territories in the United States since 1988. The BRFSS, based on self-reports, assesses risk factors for disease(s) and conditions related to the ten leading causes of death in the U.S. population. Hawaii has been an active participant in the BRFSS since the early 1990's. The BRFSS enables the Centers for Disease Control and Prevention (CDC), state health departments, and other health and education agencies to monitor risk behaviors related to chronic diseases, injuries and death. State health departments use BRFSS data to create annual and periodic reports, fact sheets, press releases, and other publications. These materials are then used to educate the public, health professionals, and policymakers about modifiable risk factors and preventive health practices. In 2005, several questions on the prevalence of CVD and their risk factors were included on the BRFSS. Comparison of BRFSS and HHS data allow for cross-validation of findings and the discovery of health trends and disparities.

<http://www.hawaii.gov/health/statistics/brfss/index.html>

Hawaii Health Information Corporation (HHIC)

HHIC is a private, not-for-profit corporation established in 1994. It maintains one of Hawaii's largest healthcare databases, which contains nearly 1,000,000 inpatient discharge records collected from Hawaii's 22 acute care hospitals for each year since 1993. These discharge records contain patient demographic information, hospital visit costs and duration, and patient diagnosis using the International Classification of Diseases (ICD), Version 9 codes. These data provide details on the burden of heart disease and stroke on Hawaii's healthcare system. The Hawaii Department of Health has a subscription to view aggregated and de-identified patient data, and has obtained permission to present the data in this report. (<http://www.hhic.org>)

METHODS - DATA TERMINOLOGY

This report uses a number of terms from the fields of statistics and epidemiology to describe the burden of CVD on the state of Hawaii. The most common used terms are defined below.

AGE-ADJUSTED RATES

The risk of developing CVD and some associated risk factors generally increases with age (e.g. high blood pressure). As a result, various groups within a population that have an older age structure or distribution will have higher rates of disease. To address this issue, the mortality and prevalence rates presented in this report have been “age-adjusted.” This statistical technique allows comparison of rates between groups by applying a standard weight to the age distributions that may exist between these groups. Age-adjustment also enables comparison of the rates in this report to rates from other states and the nation that use similar methods. In this report, mortality and prevalence rates are adjusted using the direct method to the 2000 U.S. standard population. Data comparisons should be limited to data adjusted to the same standard population. Rates that are not age-adjusted are considered *crude*.

HEALTH DISPARITIES

Health disparities refer to differences in the burden and impact of disease among different populations. In this report, disparities are presented by geography, ethnicity, and socioeconomic status.

HEALTHY PEOPLE 2010

Healthy People 2010 (HP2010) is a disease prevention and health promotion initiative started by the U.S. Department of Health and Human Services. It presents a comprehensive set of objectives designed to identify the most significant preventable threats to health and to establish national goals to reduce these threats by the year 2010. By striving to achieve these objectives, the life expectancy and quality of life for all individuals will be increased, and health disparities among the population will decrease. In this report, HP2010 objectives are displayed as dotted red lines in the prevalence figures under the *CVD Risk Factors & Risk Markers* section.

MORTALITY RATE

The number of deaths within a defined population and specified time interval. In this report, mortality rates are presented in deaths per 100,000 people.

MOVING AVERAGE

Data collected over time inherently possess some form of random variation. A moving average is a technique that smoothes this variation and shows any underlying trends in the data. In this report, the Hawaii Health Survey uses a *three-year moving average* for risk factor prevalence trends. Instead of showing data from single years, the HHS presents data averaged from three-year intervals.

PREVALENCE

The number of persons with a self-reported disease or condition at a specific point in time divided by the total number of persons in the population at that same point in time. In this report, prevalence is presented as the **percent** of adults with a disease or condition (e.g. diabetes, high blood pressure) within a given year.

P-VALUE (STATISTICAL SIGNIFICANCE)

A p-value represents the probability that the observed result from a sample is due to chance alone (occurred at random). A p-value less than 0.05 is considered statistically significant. This means that the observed differences between two values have less than a 5% probability of occurring by chance, assuming that the two values should not be different at all. In this report, statements of statistical significance are followed by $p<.05$ to denote the p-value.

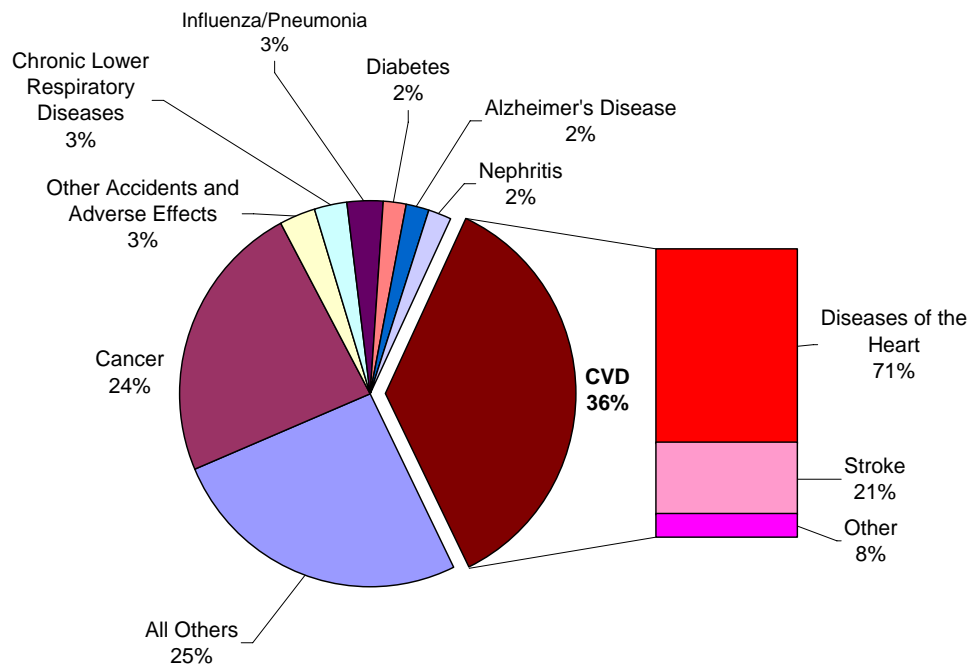
CVD MORTALITY

CVD-related mortality information is collected from death certificates and analyzed by the Office of Health Status Monitoring. Deaths are coded using the International Classification of Diseases (ICD), Version 10. The information presented in Figure 1 represents underlying causes of death in Hawaii for 2005. OHSM also provides age-adjusted mortality rates (deaths per 100,000) for various forms of CVD, and groups the information by county and ethnicity. This information is presented in Figures 2-9, which include Major Cardiovascular Diseases (ICD-10 codes I00-I78), Coronary Heart Disease (ICD-10 codes I11, I20-I25), and Stroke (ICD-10 codes I60-I69). The term *Major Cardiovascular Diseases* refers to a group of diseases which include Coronary Heart Disease and Stroke. This grouping of diseases constitutes the majority of CVD deaths in Hawaii, and is thus detailed in this report (*refer to Appendix A for more detail*). As shown in Figure 1, the two forms of CVD which caused the most CVD-related deaths were Diseases of the Heart and Stroke.

Figure 1. Leading Causes of Death in Hawaii, 2005

FINDING:

CVD was the leading cause of death among Hawaii residents in 2005, causing over 1/3 of total deaths that year.



SOURCE: Hawaii Department of Health, Office of Health Status Monitoring

FINDING:

- ◆ Table 1 suggests that deaths due to CVD generally increase with age. That is, people are more likely to die from CVD as they get older.
- ◆ Also, deaths due to CVD increase dramatically after age 65.

| Age at Death | Number of Deaths | | | Mortality Rate (per 100,000) | | |
|---------------------------|------------------|------------|--------------|------------------------------|-------------|--------------|
| | CHD | Stroke | TOTAL CVD | CHD | Stroke | TOTAL CVD |
| Less than 40 | 11 | 6 | 46 | 1.6 | 0.9 | 6.8 |
| 40 to 44 | 23 | 10 | 58 | 24.6 | 10.7 | 62.0 |
| 45 to 49 | 30 | 17 | 76 | 31.4 | 17.8 | 79.5 |
| 50 to 54 | 60 | 20 | 125 | 64.4 | 21.5 | 134.2 |
| 55 to 59 | 59 | 22 | 137 | 70.3 | 26.2 | 163.3 |
| 60 to 64 | 88 | 29 | 186 | 138.8 | 45.8 | 293.5 |
| 65 to 69 | 83 | 32 | 196 | 202.0 | 77.9 | 477.1 |
| 70 to 74 | 111 | 49 | 244 | 299.6 | 132.2 | 658.6 |
| 75 to 79 | 156 | 84 | 378 | 399.1 | 214.9 | 967.0 |
| 80 and over | 615 | 410 | 1,711 | 1,073.0 | 715.3 | 2,985.2 |
| TOTAL | 1,236 | 679 | 3,157 | 96.9 | 53.2 | 247.6 |
| Age-Adjusted TOTAL | | | | 81.3 | 43.5 | 205.3 |

SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Average age at death

FINDING:

- ◆ Table 2 suggests that men die from Major CVD at a younger age than women.
- ◆ Native Hawaiians/Part-Native Hawaiians die at a younger average age from Major CVD compared to other major ethnic groups.
- ◆ **NOTE:** Major CVD includes Coronary Heart Disease, Stroke, and other common forms of CVD.

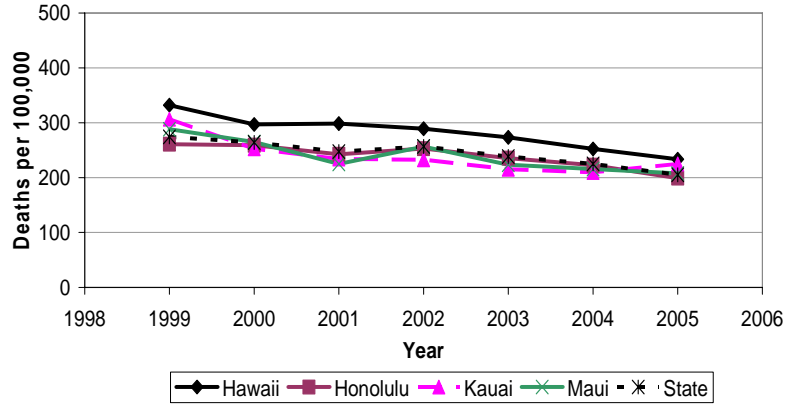
| MAJOR CARDIOVASCULAR DISEASES* | | | | |
|---------------------------------------|--------------|-------------|--------------|-------------|
| Ethnicity | Male | | Female | |
| | Number | Average Age | Number | Average Age |
| Chinese | 102 | 79.8 | 95 | 84.6 |
| Filipino | 319 | 77.1 | 204 | 78.2 |
| Japanese | 500 | 78.6 | 467 | 84.8 |
| Native Hawaiian/Part-Native Hawaiian | 256 | 65.2 | 267 | 72.3 |
| White | 406 | 74.8 | 343 | 82.5 |
| All Others | 102 | 62.9 | 96 | 75.1 |
| TOTAL | 1,685 | 73.1 | 1,472 | 79.6 |

SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring
*Includes ICD-10 Codes I00-I78

Figure 2. Trends in Major Cardiovascular Diseases Mortality Rate by County, Hawaii 1999-2005*

FINDING:

- ◆ The mortality rates due to major cardiovascular diseases have decreased between 1999 and 2005.
- ◆ Hawaii County consistently experienced higher mortality rates than other counties during those years.



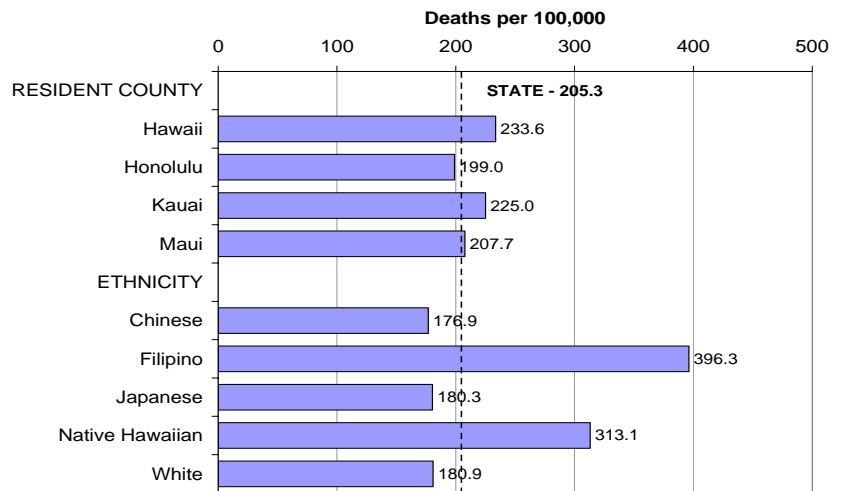
*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health – Office of Health Status Monitoring

Figure 3. Mortality Rate for Major Cardiovascular Diseases by Selected Characteristics, Hawaii 2005*

FINDING:

- ◆ Hawaii County had the highest mortality rate compared to the other counties.
- ◆ Filipinos and Native Hawaiians experienced a higher mortality rate due to major cardiovascular disease compared to other ethnic groups.

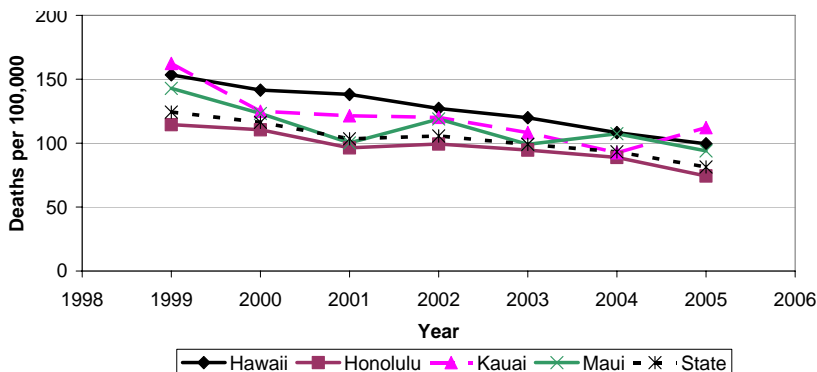


*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health – Office of Health Status Monitoring

CVD MORTALITY - CORONARY HEART DISEASE

Figure 4. Trends in Coronary Heart Disease Mortality Rate by County, Hawaii 1999-2005*



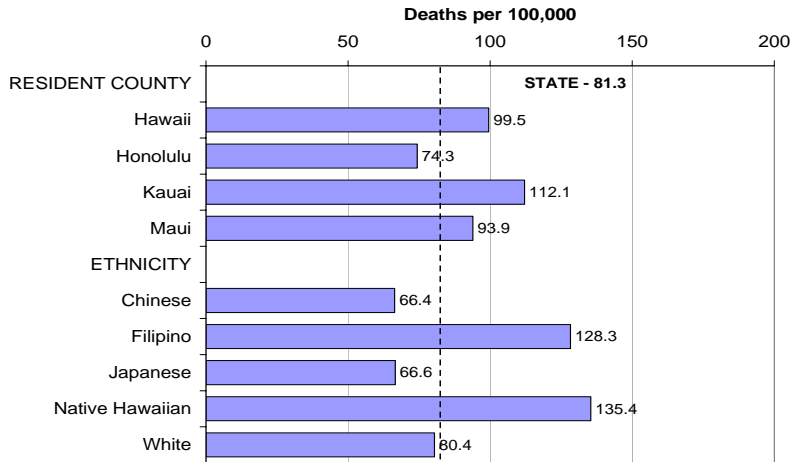
FINDING:

- ◆ The mortality rate for coronary heart disease has decreased overall between 1999 and 2005.
- ◆ Hawaii County had the highest mortality rate from 2000-2004.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring

Figure 5. Mortality Rate for Coronary Heart Disease by Selected Characteristics, Hawaii 2005*



FINDING:

- ◆ Kauai County had a slightly higher mortality rate compared to the other counties.
- ◆ Native Hawaiians and Filipinos had higher mortality rates compared to the other ethnic groups.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring

CVD MORTALITY - STROKE

Figure 6. Trends in Stroke Mortality Rate by County, Hawaii 1998-2005*

FINDING:

- ◆ Stroke mortality rates have been decreasing since 1999.
- ◆ With the exception of 2004, Hawaii County had the highest stroke mortality rate in the state.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring

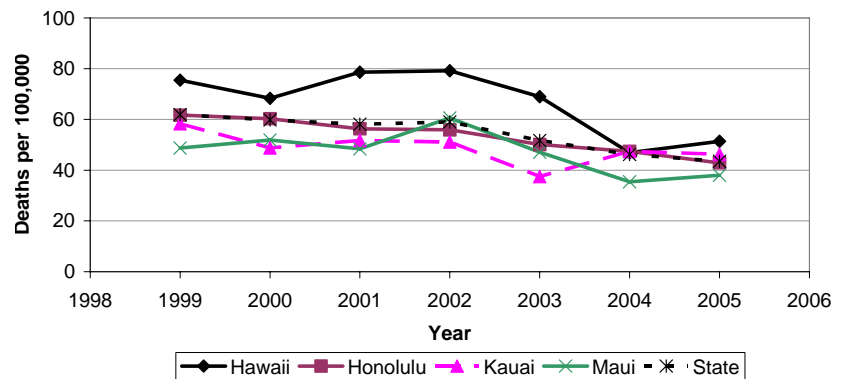


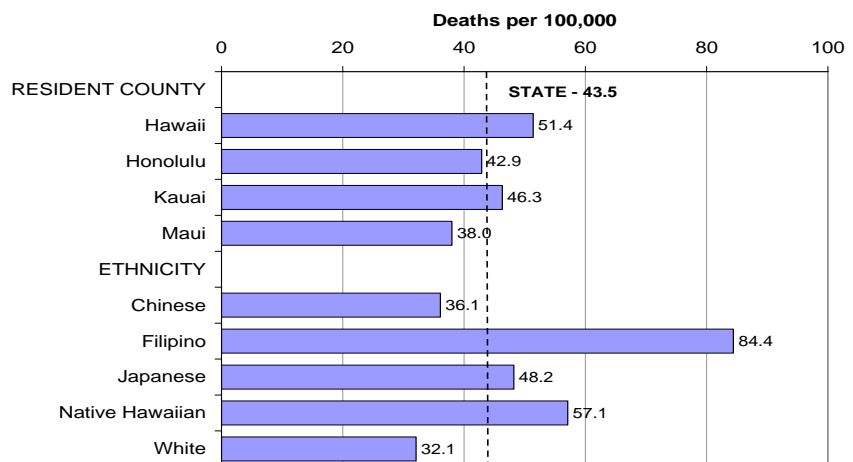
Figure 7. Mortality Rate for Stroke by Selected Characteristics, Hawaii 2005*

FINDING:

- ◆ In 2005, Hawaii County had the highest stroke mortality rate in the state.
- ◆ Filipinos had the highest stroke mortality rate compared to the other major ethnic groups.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring



CVD MORTALITY - SUMMARY

FINDING:

- ◆ Hawaii County had higher mortality rates due to Major CVD and stroke in 2005 compared to other counties.
- ◆ Kauai County had the highest mortality rate due to CHD.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring

Figure 8. CVD-Associated Mortality Rate by County, Hawaii 2005*

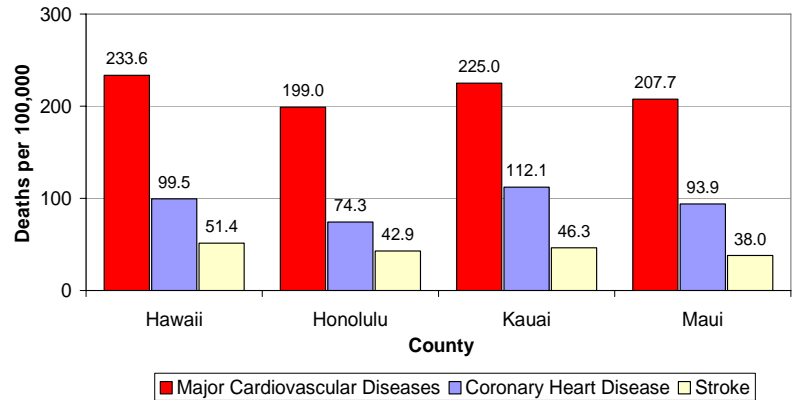


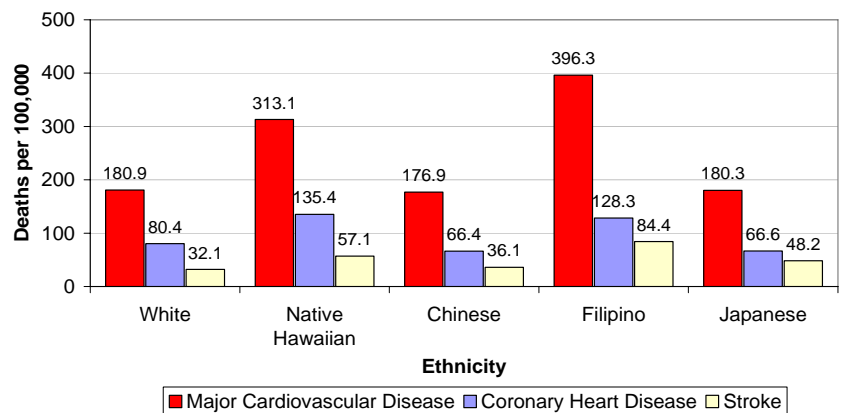
Figure 9. CVD-Associated Mortality Rate by Ethnicity, Hawaii 2005*

FINDING:

- ◆ Filipinos had the highest mortality rates due to major CVD and stroke compared to the other ethnic groups.
- ◆ For Filipinos, stroke comprised the majority of CVD-associated deaths.
- ◆ Native Hawaiians had the highest mortality rates due to CHD.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Department of Health, Office of Health Status Monitoring



CVD PREVALENCE

The prevalence of CVD in Hawaii for the purpose of this report is measured by the number of adults who report a previous experience with myocardial infarction (MI), angina or coronary heart disease, or stroke on the BRFSS. Overall, the percent of adults who reported a history of a myocardial infarction (3.6%) and angina/coronary heart disease (3.4%) in 2005 were among the lowest in the nation. Nationally, the reported prevalence of MI was at 4.0%, and angina/coronary heart disease was at 4.4% in 2005⁵. Hawaii had a slightly higher prevalence of stroke (2.9%) compared to the nation (2.6%)⁶. However, despite these numbers, there continue to be groups within the state that reported a high prevalence of CVD. Table 1 presents a state profile of adults who reported a history of CVD. It is important to note that the data reflects individuals who have survived one of these cardiovascular events. Adults who did not survive a first-time event are not captured in the data.

FINDING:

- ◆ More men reported a history of MI, CHD and stroke compared to women.
- ◆ Native Hawaiians reported a higher proportion of CVD compared to other ethnic groups.
- ◆ Those with the least education and household income reported a higher proportion of CVD compared to those with the highest.
- ◆ Maui County had the highest reported proportion of MI and CHD. Hawaii County had the highest reported proportion of stroke.

Table 3. Prevalence of Adults who Reported a History of Myocardial Infarction (MI), Angina/Coronary Heart Disease (CHD), or Stroke, by Selected Characteristics, BRFSS, Hawaii 2005

| Characteristic | MI (%) | Angina/CHD (%) | Stroke (%) |
|---|--------|----------------|------------|
| Sex* | | | |
| Male | 4.6 | 4.1 | 3.2 |
| Female | 2.7 | 2.7 | 2.6 |
| Race/Ethnicity* | | | |
| Filipino | 2.7 | 2.4 | 2.1 |
| Japanese | 3.5 | 2.7 | 3.5 |
| Native Hawaiian | 4.4 | 4.6 | 4.9 |
| White | 4.0 | 4.2 | 2.7 |
| Others | 3.2 | 2.9 | 1.9 |
| Education* | | | |
| Less than high school diploma | 11.1 | 6.3 | 8.8 |
| High school graduate | 3.5 | 2.9 | 2.7 |
| Some college | 3.1 | 2.9 | 2.5 |
| College graduate | 2.9 | 3.9 | 2.3 |
| Household Income* | | | |
| Less than \$15,000 | 5.4 | 7.4 | 11.0 |
| \$15,000-24,999 | 4.6 | 4.2 | 3.3 |
| \$25,000-49,999 | 4.1 | 3.3 | 2.1 |
| \$50,000-74,999 | 3.4 | 3.2 | 2.0 |
| More than \$75,000 | 2.4 | 2.8 | 1.7 |
| Unknown/Refused | 3.8 | 3.0 | 4.1 |
| County* | | | |
| Honolulu | 3.5 | 3.3 | 2.8 |
| Hawaii | 4.0 | 3.8 | 3.2 |
| Kauai | 3.1 | 3.0 | 2.8 |
| Maui | 4.3 | 4.1 | 3.1 |
| TOTAL* | 3.6 | 3.4 | 2.9 |
| SOURCE: Hawaii BRFSS - Hawaii Department of Health | | | |
| *Percentages are weighted to population characteristics | | | |

CVD RISK FACTORS & RISK MARKERS

Behaviors that increase the chance of developing a disease are often referred to as risk factors. Some (physical inactivity, tobacco use, diet) can be modified by lifestyle changes, while others (high blood pressure, high cholesterol, diabetes) can be managed through regular use of medication (i.e. modification through risk reduction for death, acute events, and hospitalizations). There are also non-modifiable risk markers (genetic predisposition, age, gender, race/ethnicity) that can affect chances of developing disease. Other factors such as education, occupation, or income are also risk markers and are potentially modifiable. This report will focus on the following risk factors: High Blood Pressure, High Cholesterol, Smoking, Physical Inactivity, Overweight/Obesity, and Diabetes, along with the effects posed by risk markers. According to data from the Hawaii Health Survey, about 7 out of 10 adults in Hawaii possess at least one of these risk factors for CVD (Table 4).

FINDING:

- ◆ Table 4 suggests over 70% of adults in Hawaii reported having at least one risk factor for CVD.
- ◆ More than 12% of Hawaii adults reported having heart disease and more than 2 risk factors for CVD.

Table 4. Percent of Adults with CVD-Associated Risk Factors, HHS 3-year average, Hawaii 2003-2005

| Number of Risk Factors | Percent of Hawaii Adults | Percent of Adults with Heart Disease* |
|------------------------|--------------------------|---------------------------------------|
| 0 | 29.9 | 1.9 |
| 1-2 | 57.9 | 3.9 |
| >2 | 12.2 | 12.1 |

*2004-2005 age-adjusted average only
SOURCE: Hawaii Health Survey, Department of Health, Office of Health Status Monitoring

Table 5. Risk Factors Among Adults Reporting History of MI, Angina/CHD, or Stroke, BRFSS, Hawaii 2005*

| | MI | Angina/CHD | Stroke |
|----------------------------|------------|-------------|------------|
| DIABETES | | | |
| % With Diabetes | 9.3 | 10.3 | 6.9 |
| % Without Diabetes | 2.9 | 2.8 | 2.4 |
| HIGH BLOOD PRESSURE | | | |
| % With HBP | 6.7 | 7.1 | 5.5 |
| % Without HBP | 1.7 | 1.8 | 1.6 |
| HIGH CHOLESTEROL | | | |
| % With High Cholesterol | 4.9 | 6.0 | 3.9 |
| % Without High Cholesterol | 2.9 | 2.3 | 2.5 |
| OBESITY | | | |
| % Obese | 5.4 | 5.5 | 4.3 |
| % Overweight | 3.7 | 3.1 | 1.9 |
| % Not Obese/Overweight | 2.5 | 2.4 | 2.7 |
| PHYSICAL INACTIVITY | | | |
| % Physically Inactive | 5.1 | 3.6 | 4.9 |
| % Not Physically Inactive | 3.0 | 3.2 | 2.3 |
| SMOKING | | | |
| % Current Smoker | 5.9 | 4.5 | 4.1 |
| % Former Smoker | 4.2 | 3.4 | 3.1 |
| % Non-Smoker | 2.3 | 2.7 | 2.3 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS – Hawaii Department of Health

FINDING:

- ◆ The shaded cells in Table 5 highlight significant (p<.05) differences.
- ◆ Table 5 suggests that each risk factor is significantly associated with MI, CHD, or stroke.
- ◆ Each risk factor is significantly associated with a reported history of MI.
- ◆ Diabetes and HBP are significantly associated with all three diseases.

HIGH BLOOD PRESSURE

High blood pressure (HBP) or hypertension is a major risk factor for both heart disease and stroke. As shown in Table 5, it is a significant risk factor for MI, CHD, and stroke among Hawaii adults. Nationally, people with high blood pressure are at least four times more likely to develop stroke⁷, 2-4 times more likely to develop CHD, and almost six times more likely to develop congestive heart failure than people with normal blood pressure⁸. Figures 10-16 show the burden of HBP on adults in Hawaii.

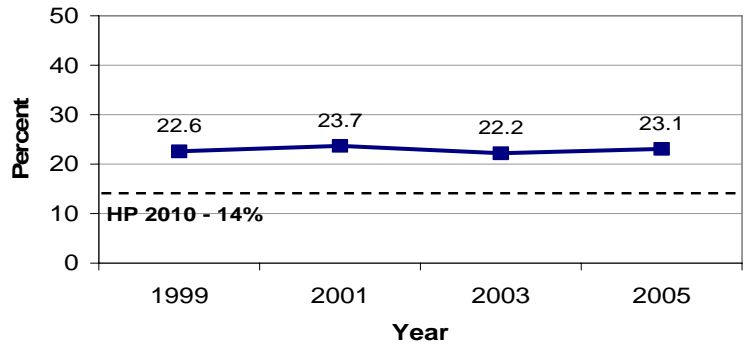
FINDING:

- ◆ The percent of adults in Hawaii who reported high blood pressure has increased slightly between 1999 and 2005.
- ◆ Hawaii is still above the Healthy People 2010 (HP 2010) goal of 14% adult prevalence.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 10. Trends in Adult High Blood Pressure Prevalence, BRFSS, Hawaii 1999-2005*



FINDING:

- ◆ The Hawaii Health Survey also shows that the percent of adults who report high blood pressure in Hawaii increased slightly between 1998 and 2005.
- ◆ This is consistent with the BRFSS findings.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 11. Trends in Adult High Blood Pressure Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

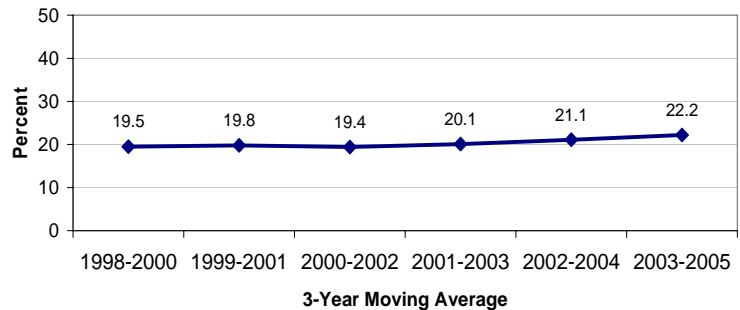
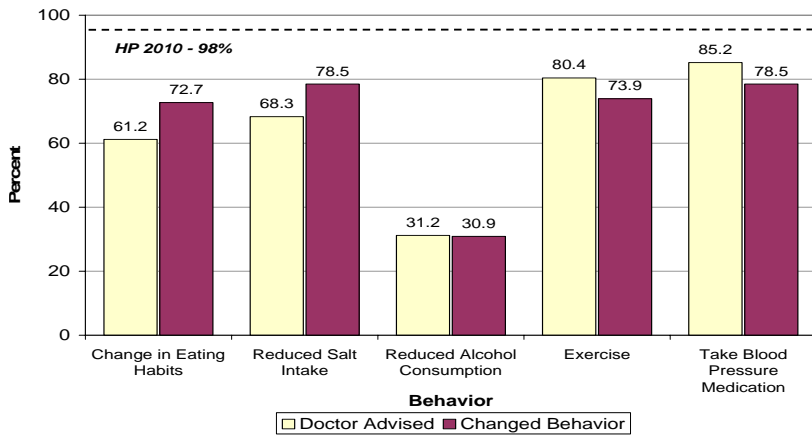


Figure 12. Prevalence of Physician-Advised Behavior Changes to Control High Blood Pressure and Self-Reported Behavior Changes, BRFSS, Hawaii 2005



FINDING:

- ◆ More than 70% reported changing eating habits, reducing salt, exercising, and taking medication after a doctor advised them to.
- ◆ Less than 1/3 of adults with self-reported HBP reported that their doctor advised them to reduce their alcohol intake, and less than 1/3 changed their behavior.

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 13. Adult High Blood Pressure Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*

FINDING:

- ◆ Native Hawaiians, Filipinos, and Japanese had significantly ($p < .05$) higher proportions of self-reported high blood pressure compared to Whites.
- ◆ There were no other significant differences seen between genders or counties.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

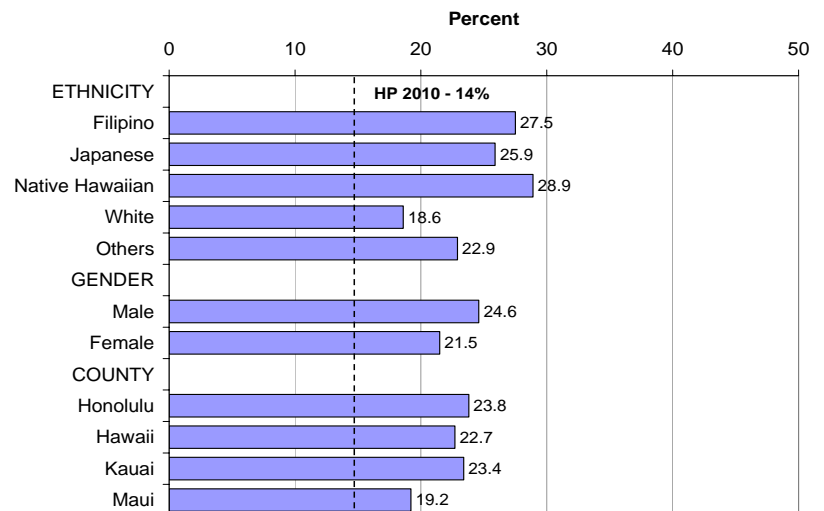


Figure 14. Adult High Blood Pressure Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*

FINDING:

- ◆ Adults in the lowest socioeconomic levels (household income, employment, education) reported significantly ($p < .05$) higher proportions of high blood pressure than those at the highest levels.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

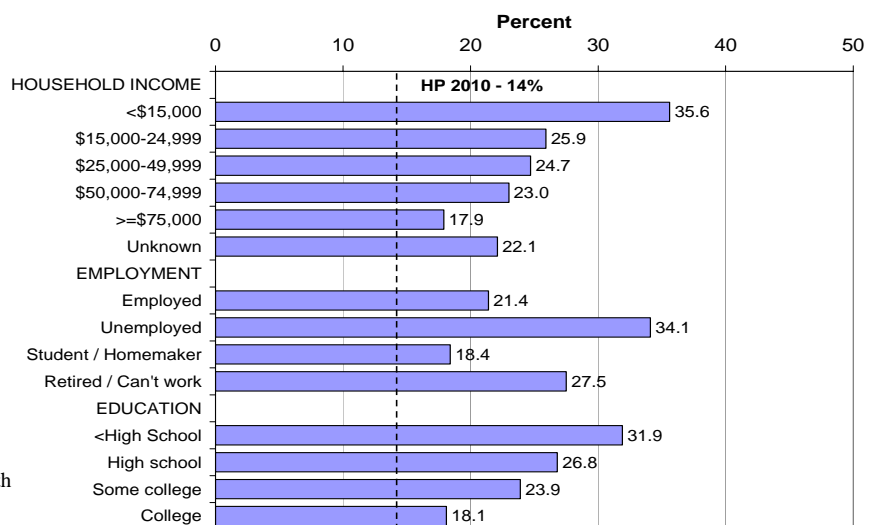


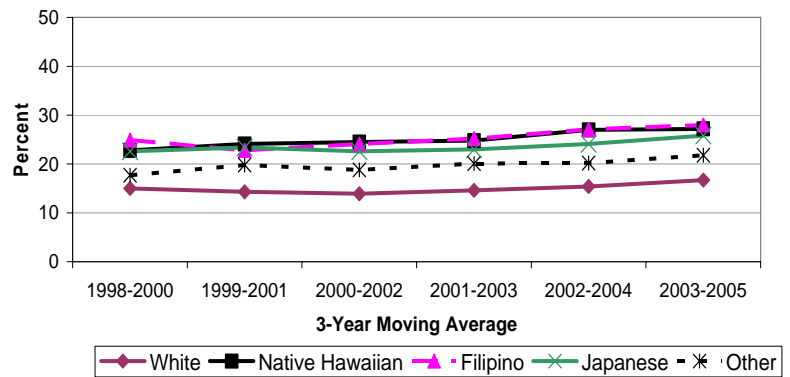
Figure 15. Trends in High Blood Pressure Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*

FINDING:

- ◆ Reported HBP proportions for all ethnic groups increased slightly between 1998 and 2005.
- ◆ Whites reported the lowest proportions of high blood pressure during that time period.

*Adjusted by age to 2000 U.S. Standard

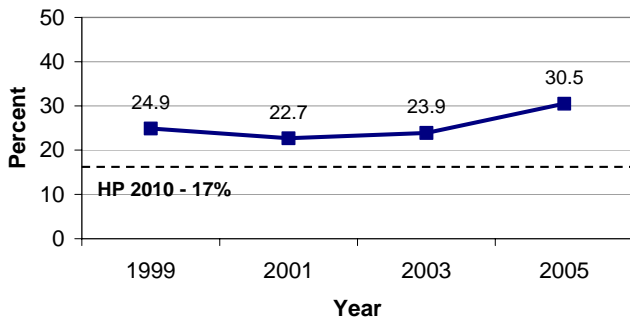
SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring



HIGH CHOLESTEROL

Each year, an estimated 106.9 million American adults have high cholesterol, which is a total blood cholesterol level of 200 mg/dL and higher. Of these, 37.7 million have levels of 240 mg/dL or higher, which is considered high risk for CVD⁹. Cholesterol levels are influenced by a diet high in saturated fat, cigarette smoking, obesity, and physical inactivity. Studies suggest that populations whose diet is lower in fat also have lower cholesterol levels, and it is possible to reduce or reverse risk of coronary heart disease (CHD) by lowering saturated fat intake, thereby lowering cholesterol levels¹⁰.

Figure 16. Trends in Adult High Blood Cholesterol Prevalence, BRFSS, Hawaii 1999-2005*



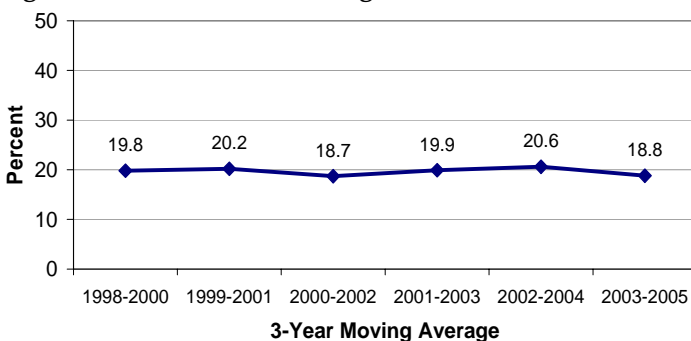
FINDING:

- ◆ Since 1999, the state proportion of reported high cholesterol has been higher than the HP 2010 goal of 17%.
- ◆ The proportion of reported high cholesterol among adults in 2005 was the highest seen in 6 years.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 17. Trends in Adult High Blood Cholesterol Prevalence, HHS 3-year Moving Average, Hawaii 1998-2005*



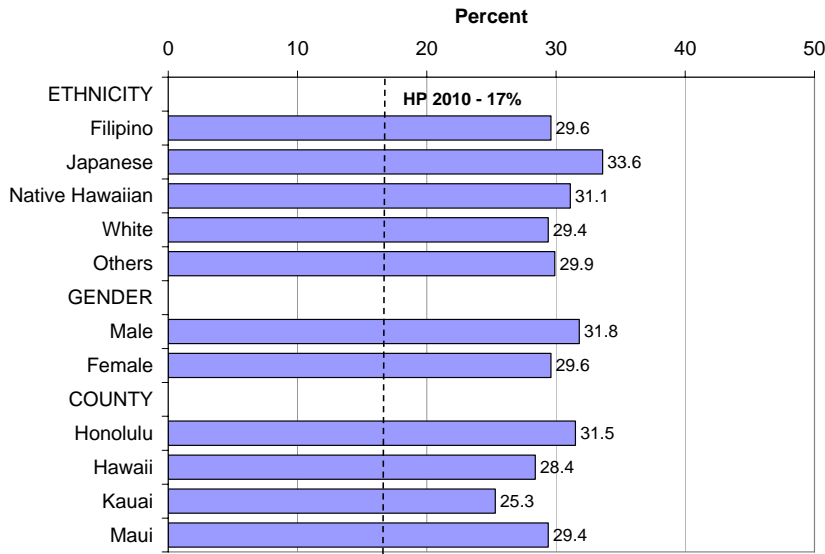
FINDING:

- ◆ The age-adjusted proportion of reported high cholesterol on the HHS has remained fairly steady since 1998, with a slight decrease in 2003-2005.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 18. Adult High Blood Cholesterol Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*



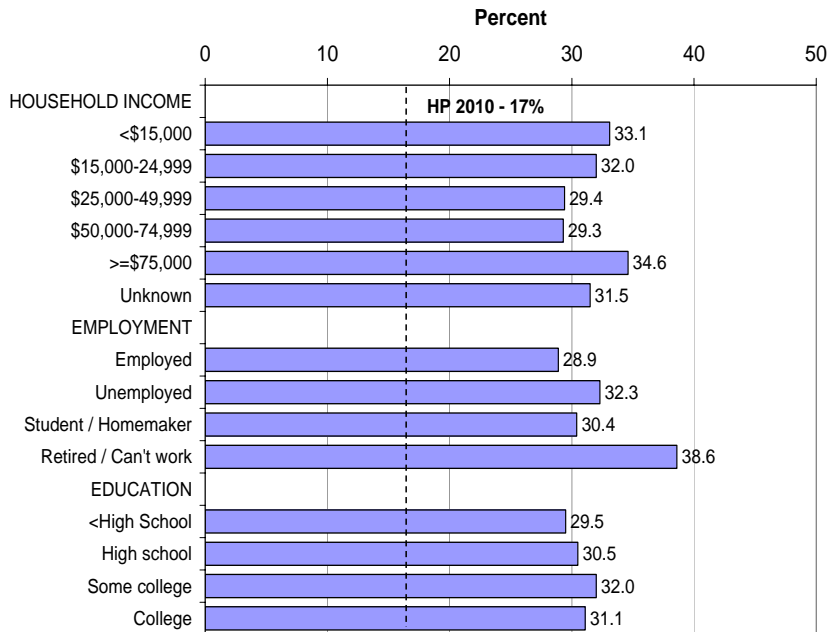
FINDING:

- ◆ Overall, the state has a higher proportion of reported high cholesterol compared to the HP 2010 goal of 17%.
- ◆ No significant ($p < .05$) differences were found between ethnicities, genders, or counties.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 19. Adult High Blood Cholesterol Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*



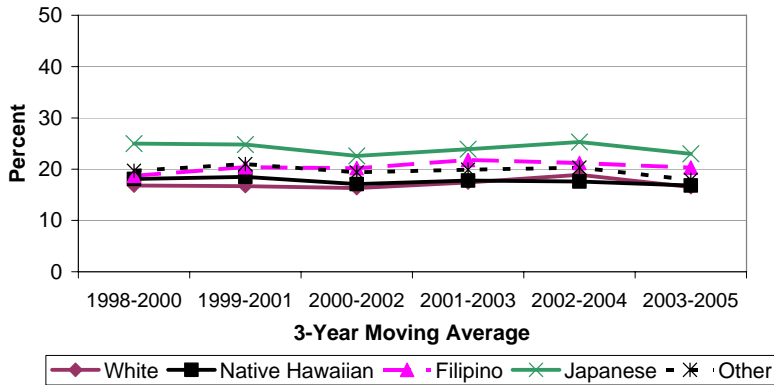
FINDING:

- ◆ There were no significant ($p < .05$) differences in reported high cholesterol proportions within any of the socioeconomic status measures.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 20. Trends in Adult High Blood Cholesterol Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*



FINDING:

◆ Between 1998 and 2005, Japanese reported consistently higher proportions of high cholesterol compared to the other ethnic groups.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

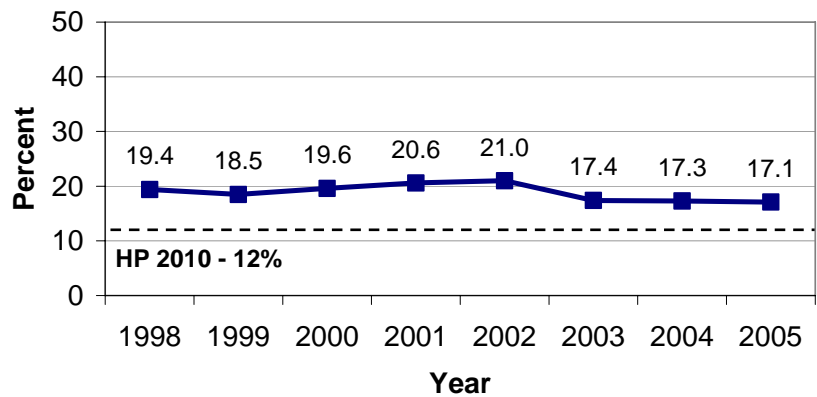
SMOKING

Smoking has been linked to a number of severe heart conditions including coronary heart disease, congestive heart failure, and atherosclerosis. A smoker’s risk of developing coronary heart disease is 2-4 times higher that of a non-smoker¹¹, and cigarette smoking nearly doubles a person’s risk for stroke¹². Each year, cigarette smoking accounts for nearly 440,000 deaths in the United States, resulting in more deaths than HIV/AIDS, drug use, alcohol use, motor vehicle injuries, suicides, and murders combined¹³. Tobacco use is the leading preventable cause of death in the United States and is also one of the most costly. Approximately \$75 billion is spent on direct medical expenses each year, resulting in almost \$82 billion in lost productivity¹⁴.

Figure 21. Trends in Adult Smoking Prevalence, BRFSS, Hawaii 1998-2005*

FINDING:

◆ Reported adult smoking in Hawaii has decreased since 1998, but still remains above the HP 2010 goal of 12%.



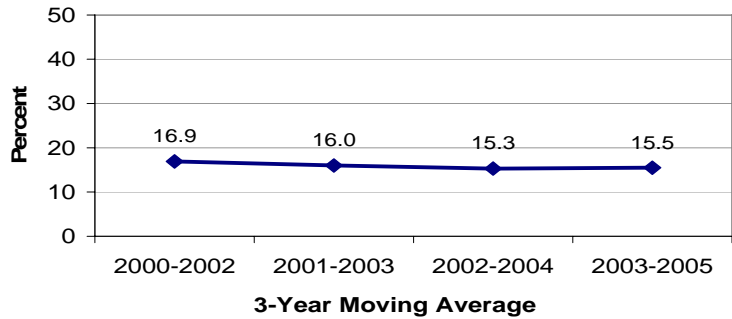
*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 22. Trends in Adult Smoking Prevalence, HHS 3-year Moving Average, Hawaii 2000-2005*

FINDING:

- ◆ The 3-year moving average also shows a decrease in reported smoking proportions between 2000 and 2005 as also seen in the BRFSS.



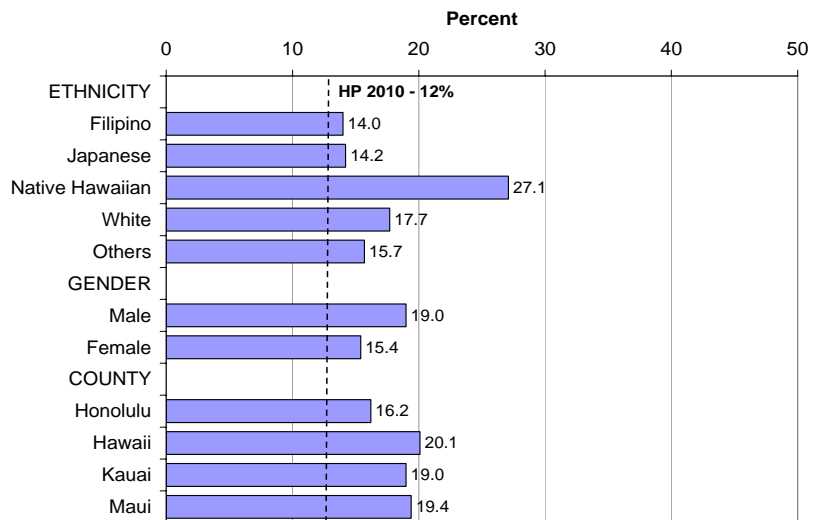
*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 23. Adult Smoking Prevalence by Selected Characteristics, BRFSS Hawaii 2005*

FINDING:

- ◆ Native Hawaiians reported significantly ($p < .05$) higher smoking proportions compared to all other ethnic groups.
- ◆ Otherwise, no significant differences were seen between genders or counties.



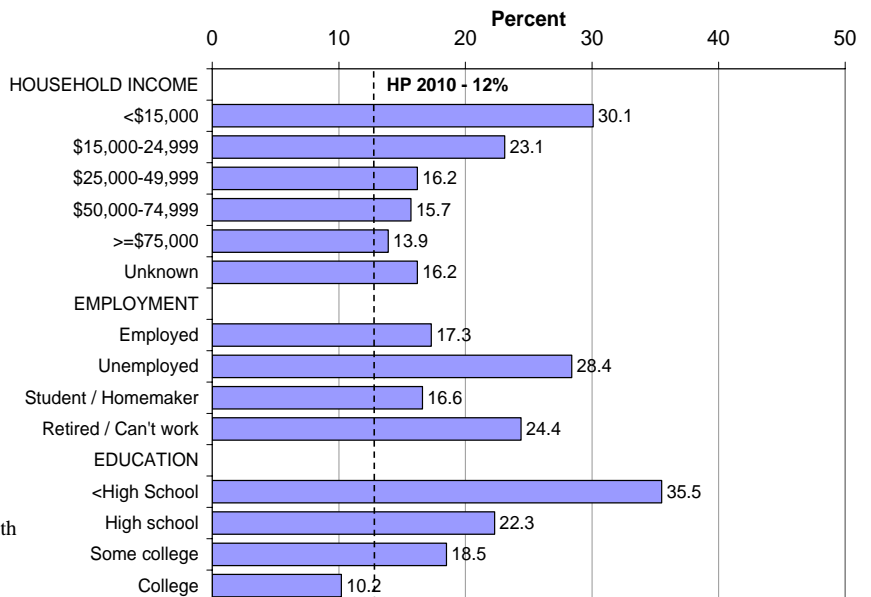
*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 24. Adult Smoking Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*

FINDING:

- ◆ On the BRFSS, adults with the lowest reported household income and the least amount of education reported significantly ($p < .05$) higher proportions of smoking compared to those with the most income and education.



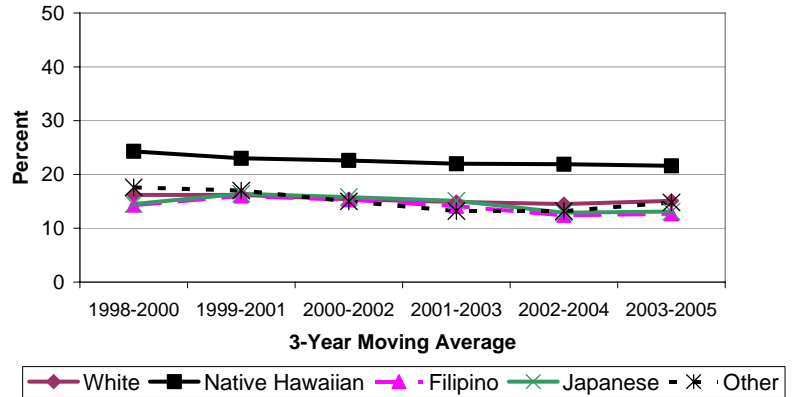
*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 25. Trends in Adult Smoking Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*

FINDING:

- ◆ Between 1998 and 2005, Native Hawaiians consistently reported the highest proportions of adult smoking compared to the other ethnic groups.



*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

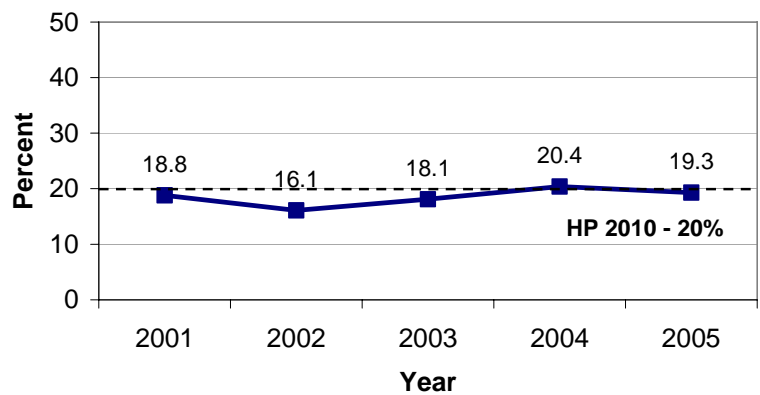
PHYSICAL INACTIVITY

The lack of regular, moderate or vigorous physical activity can increase one’s risk for CVD. Physical inactivity is a significant risk factor as both a direct contributor to CVD, and in conjunction with other CVD risk factors such as obesity, HBP, diabetes, and HBC¹⁵. Regular physical activity can successfully reduce one’s risk of CVD, as well as other CVD risk factors such as obesity, high blood pressure, high cholesterol, and diabetes. In the BRFSS, people are asked if they engaged in “leisure-time” physical activity in the past month. This includes physical activities or exercise outside of their regular job. Figures 26-28 present the state profile of physical activity from the BRFSS.

Figure 26. Trends in Adults Reporting No Leisure-Time Physical Activity, BRFSS, Hawaii 2001-2005*

FINDING:

- ◆ Reported physical inactivity of adults has slightly increased since 2001.



*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 27. Prevalence of Adults Reporting No Leisure-time Physical Activity by Selected Characteristics, BRFSS, Hawaii 2005*

FINDING:

- ◆ Native Hawaiians, Filipinos and Japanese reported significantly ($p < .05$) higher proportions of physically inactive adults compared to Whites.
- ◆ Otherwise, no differences were seen between genders or counties.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

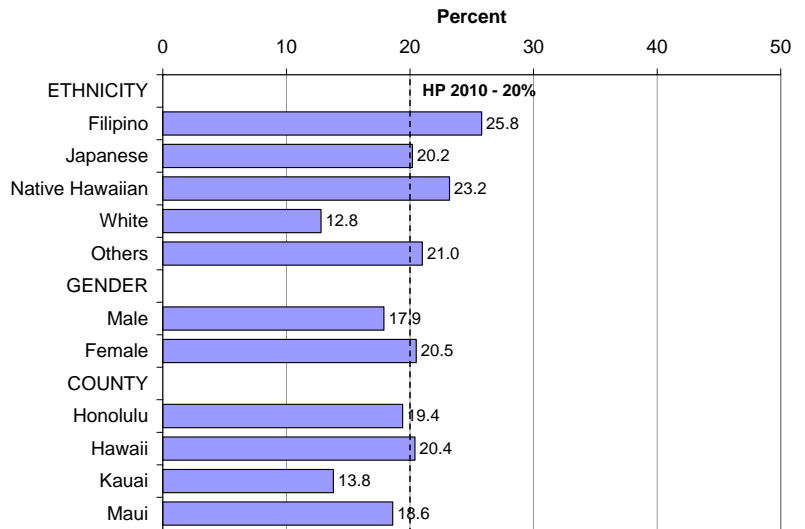


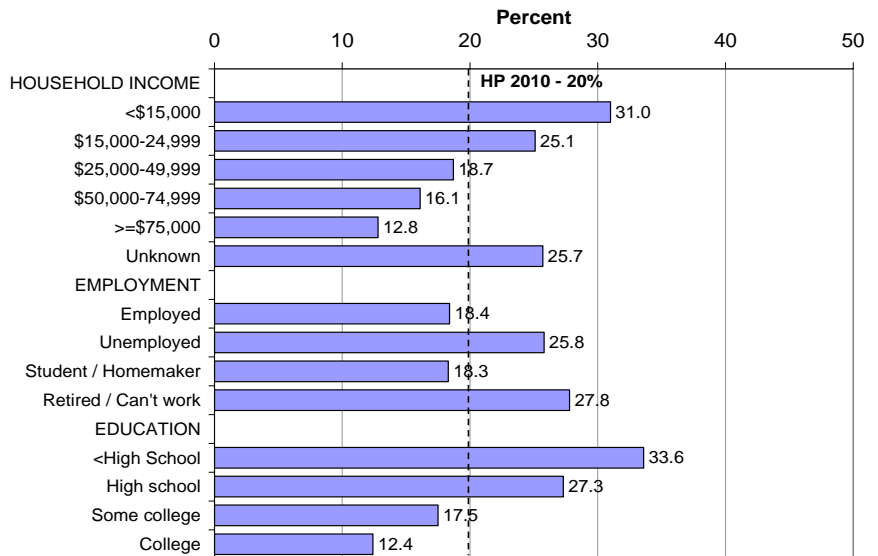
Figure 28. Prevalence of Adults Reporting No Leisure-time Physical Activity by Socioeconomic Status, BRFSS, Hawaii 2005*

FINDING:

- ◆ Reported proportions of adult physical inactivity decreases as household income and education increases.
- ◆ Adults with the lowest income and education reported significantly ($p < .05$) higher physical inactivity proportions than those with the highest income and education.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

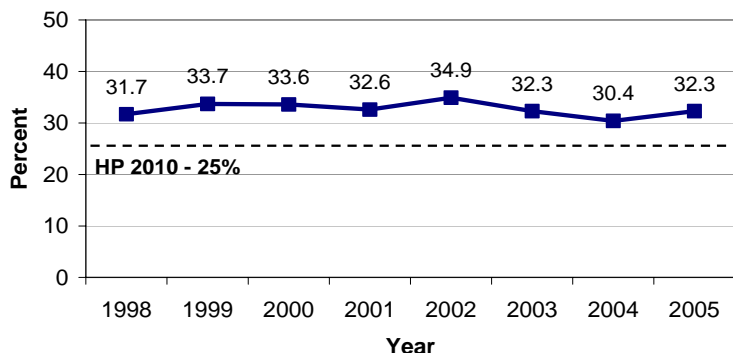


OVERWEIGHT/OBESITY

Overweight adults are defined by the CDC as having a Body Mass Index (BMI) between 25 and 29.9. Obese adults have a BMI above or equal to 30¹⁶. Overweight and obesity continue to be of growing concern to public health professionals in Hawaii and in the nation. There is a strong association between being overweight and obese, and having an increased risk for CVD, and some associated risk factors. The prevalence of high blood pressure and high blood cholesterol are three times higher in overweight persons than in those with normal body weight¹⁷. Research has shown

that adults who are overweight or obese can have as much as a 72% increased risk for non-fatal or fatal coronary heart disease¹⁸. Other studies have shown a strong association between high BMI and other forms of CVD such as atherosclerosis and congestive heart failure. Reducing the prevalence of adults who are overweight and obese could have significant impact on the reduction of both disease and death for CVD.

Figure 29. Trends in Adult Overweight (BMI≥25-29.9) Prevalence, BRFSS, Hawaii 1998-2005*



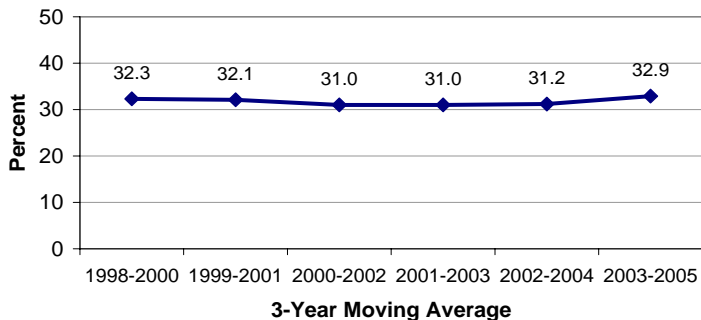
FINDING:

- ◆ The percent of adults who reported being overweight has remained above the HP 2010 goal of 25% since 1998.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 30. Trends in Adult Overweight Prevalence, HHS 3-year Moving Average, Hawaii 1998-2005*



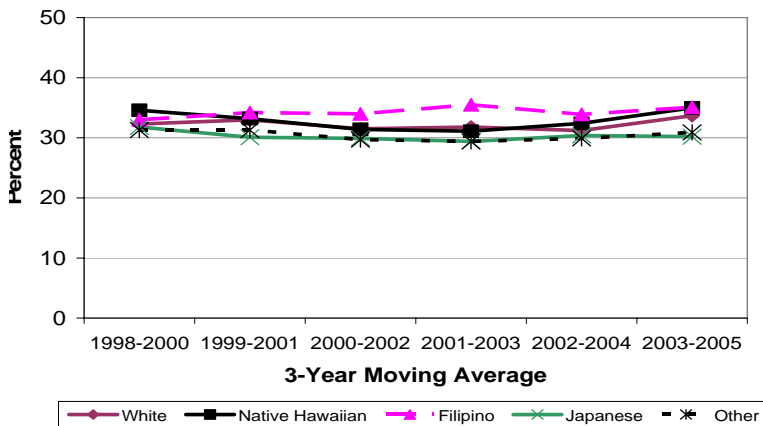
FINDING:

- ◆ The trend in reported proportions of overweight adults has remained steady since 1998.
- ◆ This mirrors the findings from the BRFSS.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 31. Trends in Adult Overweight Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*



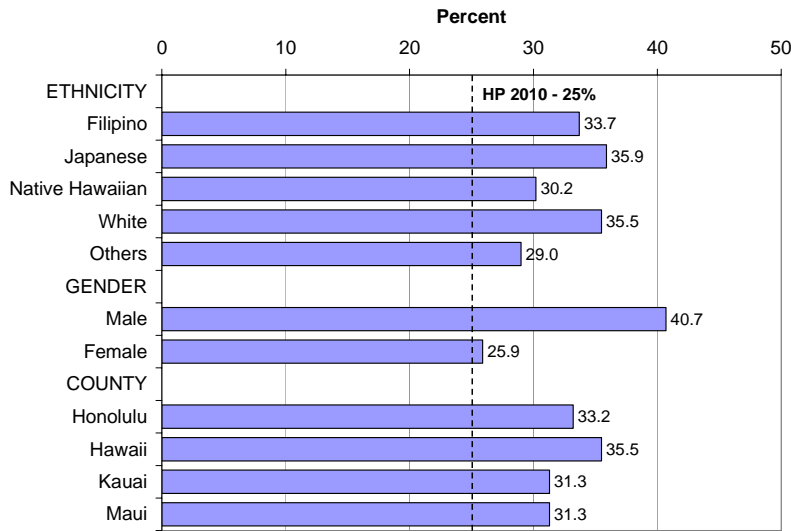
FINDING:

- ◆ The reported proportions of overweight adults have remained fairly consistent across the major ethnic groups since 1998.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 32. Adult Overweight Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*



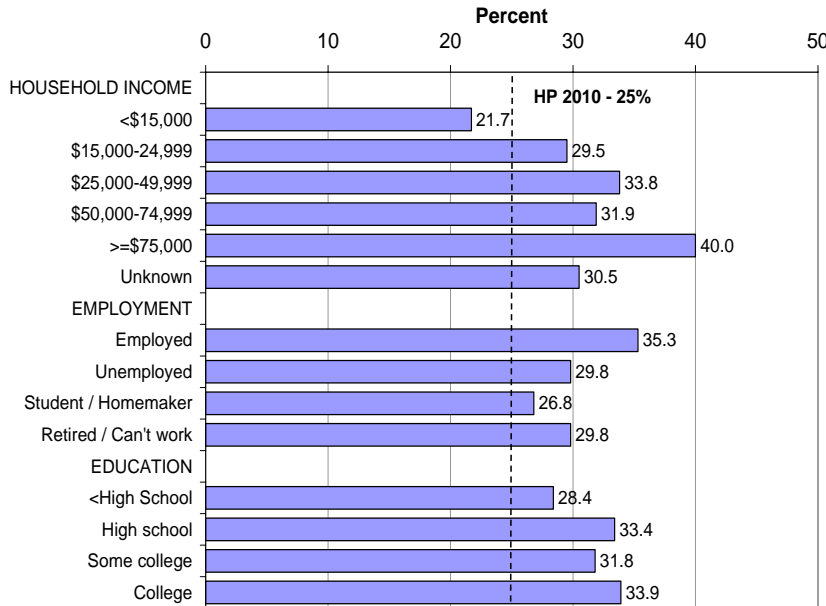
FINDING:

- ◆ Significantly ($p < .05$) more adult men reported being overweight than women.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 33. Adult Overweight Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*



FINDING:

- ◆ Adults with the highest household income were significantly ($p < .05$) more likely to report being overweight than adults with the lowest income.
- ◆ The opposite trend is seen with obesity (see Fig 38).

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 34. Trends in Adult Obesity (BMI ≥30) Prevalence, BRFSS, Hawaii 1998-2005*

FINDING:

- ◆ Between 1998 and 2005, the percent of adults in the state who reported being obese has increased and remains higher than the HP 2010 goal of 15%.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

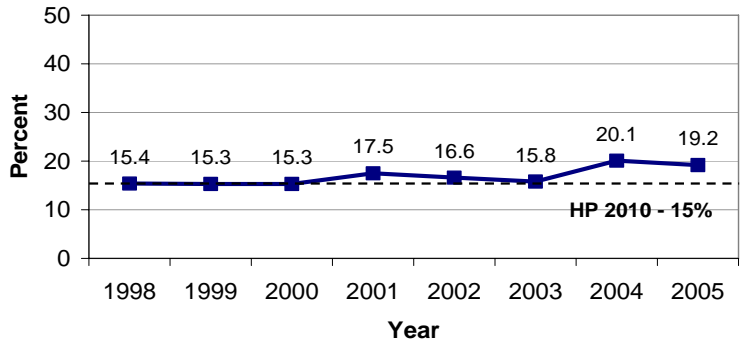


Figure 35. Trends in Adult Obesity Prevalence, HHS 3-year Moving Average, Hawaii 1998-2005*

FINDING:

- ◆ The HHS confirms the BRFSS findings that reported adult obesity prevalence has steadily increased since 1998.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

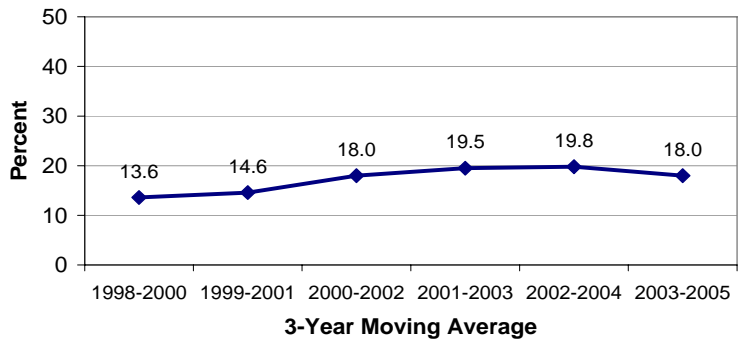


Figure 36. Trends in Adult Obesity Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*

FINDING:

- ◆ The reported proportion of obese adults has increased for all ethnic groups between 1998 and 2005.
- ◆ Native Hawaiians consistently reported the highest proportions of obesity among all ethnic groups between 1998 and 2005.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

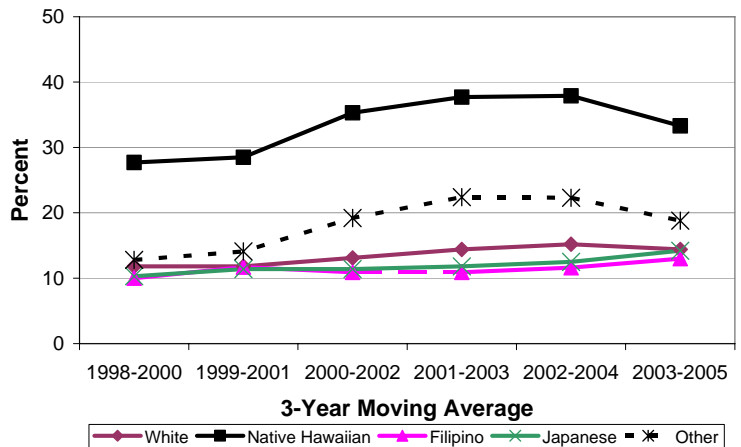


Figure 37. Adult Obesity Prevalence by Selected Characteristics, Hawaii 2005*

FINDING:

- ◆ Native Hawaiian adults were significantly ($p < .05$) more likely to report being obese compared to all the other ethnic groups in 2005.
- ◆ Men were also significantly ($p < .05$) more likely to report being obese than women.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

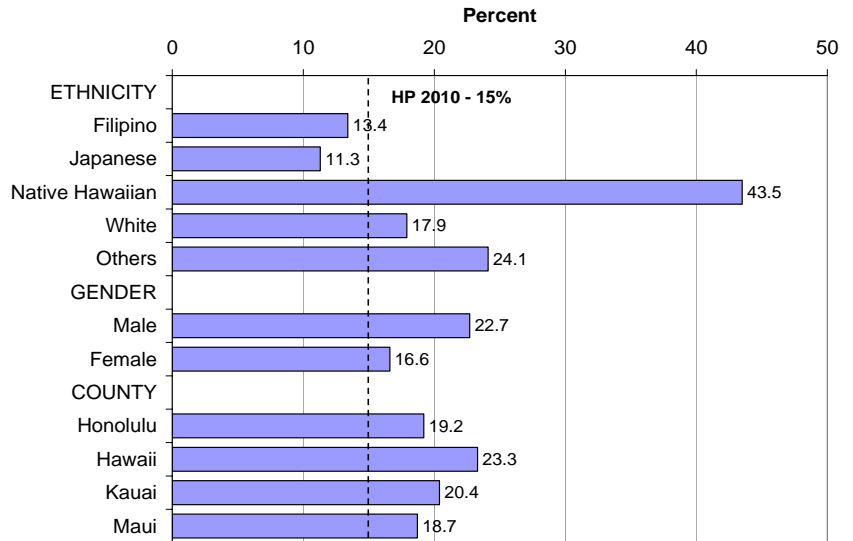


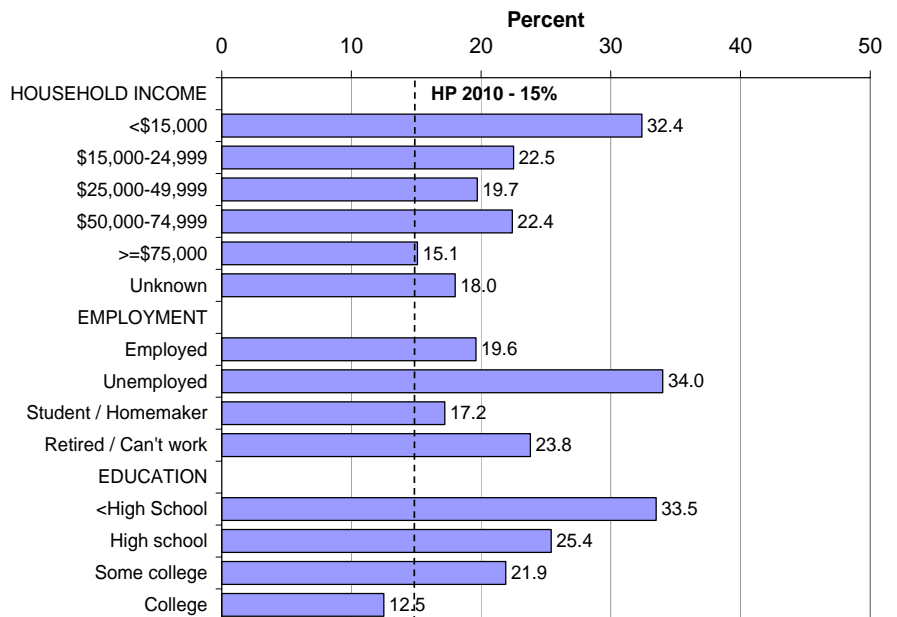
Figure 38. Adult Obesity Prevalence by Socioeconomic Status, Hawaii 2005*

FINDING:

- ◆ Adults with the lowest income and education reported a significantly ($p < .05$) higher proportion of reported obesity than adults in the highest income and education levels.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

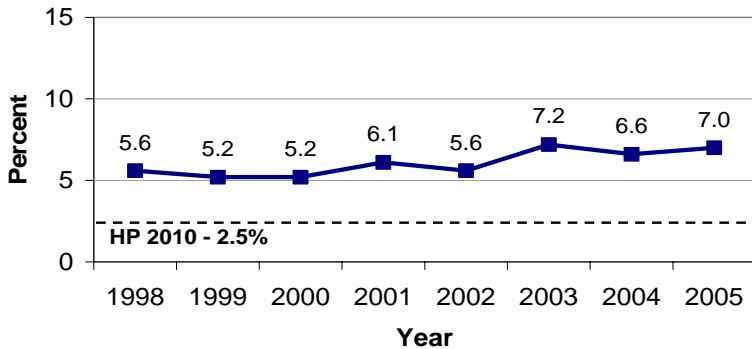


DIABETES

When coupled with HBP and HBC, diabetes is a strong risk factor for CVD. Almost 65% of people with diabetes die from CVD. This rate is 2-3 times higher than those without diabetes. People with diabetes have 2-4 times the risk of coronary heart disease or stroke compared to people without diabetes¹⁹. In Hawaii, of the deaths where diabetes was an underlying or contributory cause of

death, 72.7% had heart disease, 21.2% had cerebrovascular diseases, and 13.8% had hypertension²⁰. Diabetes is also responsible for many CVD-related hospitalizations. In Hawaii, more than one-third of all stroke and coronary heart disease hospitalizations in 2005 was diabetes-related²¹. This disease can be prevented by eating healthy, and engaging in regular physical activity.

Figure 39. Trends in Adult Diabetes Prevalence, BRFSS, Hawaii 1998-2005*



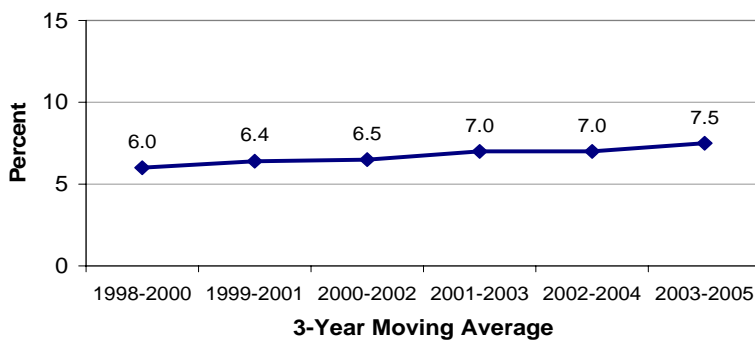
FINDING:

- ◆ The proportions of adults reporting a diabetes diagnosis has increased since 1998.
- ◆ Statewide reported prevalence of diabetes in 2005 is the 2nd highest seen in the last eight years.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 40. Trends in Adult Diabetes Prevalence, HHS 3-year Moving Average, Hawaii 1998-2005*



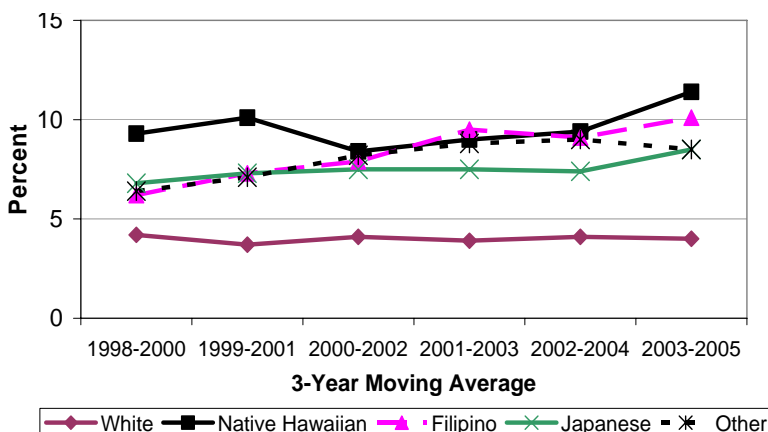
FINDING:

- ◆ The proportion of adults reporting diabetes diagnoses between 1998 and 2005 is similar to the trend seen in the BRFSS.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 41. Trends in Adult Diabetes Prevalence by Ethnicity, HHS 3-year Moving Average, Hawaii 1998-2005*



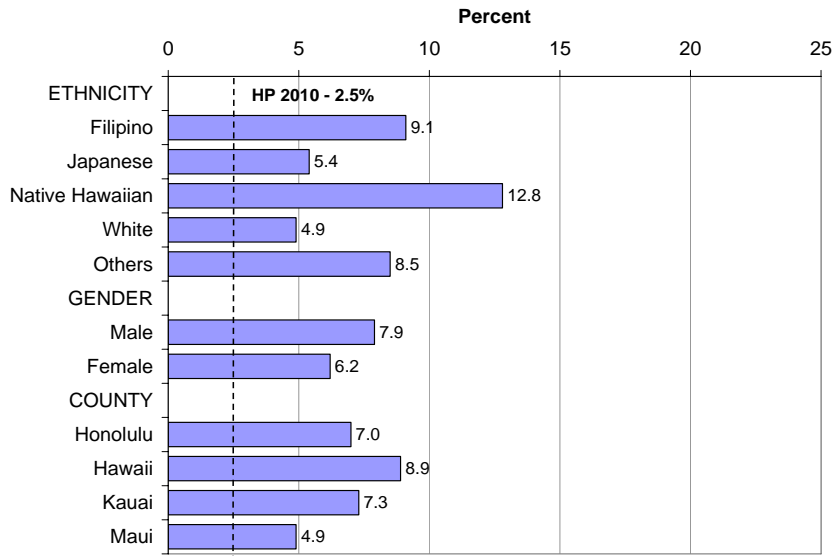
FINDING:

- ◆ White adults had consistently the lowest reported proportions of a diabetes diagnosis between 1998 and 2005.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii Health Survey - Hawaii Department of Health, Office of Health Status Monitoring

Figure 42. Adult Diabetes Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*



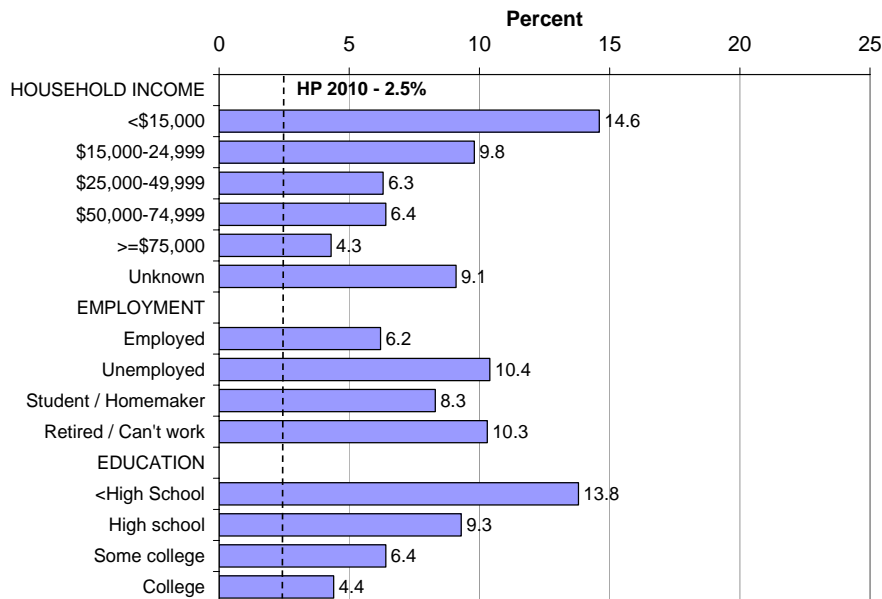
FINDING:

◆ Native Hawaiians reported a significantly ($p < .05$) higher proportion of adult diabetes diagnoses compared to Whites and Japanese.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 43. Adult Diabetes Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*



FINDING:

◆ Adults who had the lowest household income and the least amount of education reported significantly ($p < .05$) higher proportions with adult diabetes than adults with the highest income and education.

*Adjusted by age to 2000 U.S. Standard

SOURCE: Hawaii BRFSS - Hawaii Department of Health

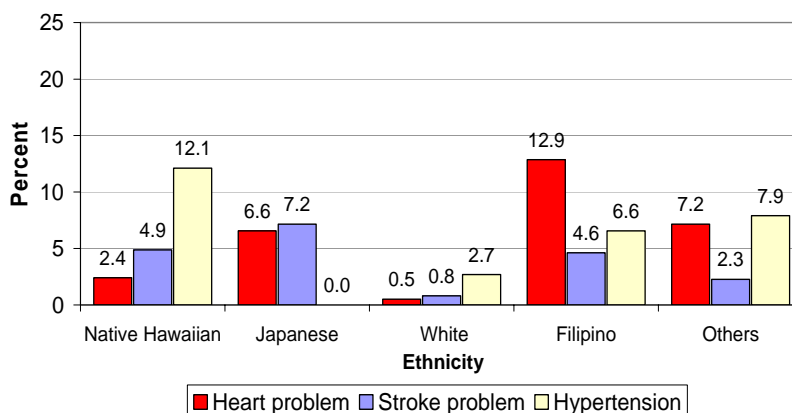
CVD-ASSOCIATED DISABILITIES

CVD often causes a level of disability among victims. After suffering a cardiovascular event, victims may experience activity limitations. In 2002, the BRFSS asked respondents if they have ever experienced activity limitations due to a health condition. Those who answered *yes* were then asked to identify the reason for their limitation. Three reported CVD-associated reasons for activity limitations were *heart problem, stroke problem, and hypertension*²². Figures 45 and 46 display the percentages of people who identified a CVD-related condition as a reason for their activity limitation. The data are grouped by age and ethnicity.

Figure 44. Self-Reported Conditions Causing Activity Limitation (Disability) Among Adults (18-64) by Ethnicity, BRFSS, Hawaii 2002

FINDING:

- ◆ Among Native Hawaiians, hypertension was the most reported reason given for CVD-associated activity limitations.
- ◆ For Filipinos, heart problem was the most reported reason given for CVD-associated activity limitation.

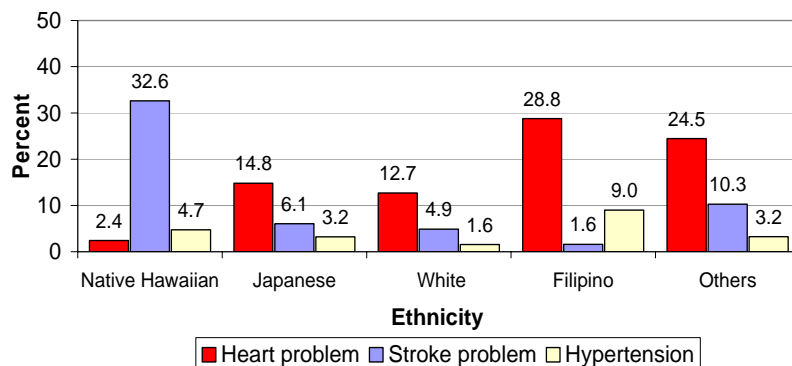


SOURCE: Hawaii BRFSS - Hawaii Department of Health

Figure 45. Self-Reported Conditions Causing Activity Limitation (Disability) Among Elderly Adults (65+) by Ethnicity, BRFSS, Hawaii 2002

FINDING:

- ◆ More elderly Native Hawaiian adults reported stroke as a reason for activity limitation.
- ◆ Filipino elderly adults reported more disability due to heart problems than other ethnic groups.



SOURCE: Hawaii BRFSS - Hawaii Department of Health

HOSPITAL DISCHARGES AND CHARGES

The toll of CVD can also be assessed through its impact on the healthcare system by examining the number of hospital discharges, length of stay, and associated charges for CVD hospital treatment. In 2005, the amount in hospital charges due to CVD totaled over \$604 million. The following tables and figures display this information for 2005. Note that these charges do not reflect the total monetary impact of CVD. They only include charges that were incurred in a hospital setting and do not account for rehabilitation costs or work productivity loss. The monetary charges are also not adjusted for inflation over time.

FINDING:

- ◆ Most of the CVD hospital discharges in 2005 involved Coronary Heart Disease.
- ◆ Stroke patients stayed in the hospital the longest.
- ◆ Acute Myocardial Infarctions was the most expensive form of CVD to treat.
- ◆ Total CVD hospital charges exceeded \$604 million in 2005.

| | Coronary Heart Disease | Stroke | Acute Myocardial Infarction | TOTAL CVD |
|--|------------------------|--------------|-----------------------------|----------------------|
| Total Discharges | 6,101 | 2,854 | 2,940 | 19,103 |
| Total Charges | \$223,827,188 | \$92,323,422 | \$119,267,813 | \$604,793,282 |
| Average Length of Stay | 5.0 | 7.7 | 6.4 | 5.7 |
| Average Charge per discharge | \$36,686.97 | \$32,348.78 | \$40,567.28 | \$31,659.60 |
| SOURCE: Hawaii Health Information Corporation | | | | |
| NOTE: Cardiovascular Diseases include the following primary ICD-9 definitions: Total cardiovascular diseases (390-459); Coronary heart disease (402, 410-414, 429.2); Stroke (430-434, 436-438); Acute myocardial infarction (410) | | | | |

Table 7. CVD-Associated Hospital Discharges by Selected Characteristics, HHIC, Hawaii 2005

| Discharged | Coronary Heart Disease | | Stroke | | Acute Myocardial Infarction | | TOTAL CVD | |
|------------------------|------------------------|-------------|--------------|-------------|-----------------------------|-------------|---------------|-------------|
| | | % | | % | | % | | % |
| Males | 3,929 | 64.4% | 1,482 | 51.9% | 1,834 | 62.4% | 11,086 | 58.0% |
| Females | 2,172 | 35.6% | 1,372 | 48.1% | 1,106 | 37.6% | 8,017 | 42.0% |
| Filipino | 886 | 14.5% | 405 | 14.2% | 442 | 15.0% | 2,593 | 13.6% |
| Japanese | 1,173 | 19.2% | 729 | 25.5% | 572 | 19.5% | 3,864 | 20.2% |
| Native Hawaiian | 725 | 11.9% | 283 | 9.9% | 325 | 11.1% | 2,565 | 13.4% |
| White | 1,516 | 24.8% | 613 | 21.5% | 733 | 24.9% | 4,582 | 24.0% |
| Other | 1,059 | 17.4% | 513 | 18.0% | 503 | 17.1% | 3,303 | 17.3% |
| Unknown/Not Applicable | 742 | 12.2% | 311 | 10.9% | 368 | 12.5% | 2,196 | 11.5% |
| Honolulu County | 4,861 | 79.7% | 2,177 | 76.3% | 2,274 | 77.3% | 14,809 | 77.5% |
| Hawaii County | 676 | 11.1% | 296 | 10.4% | 431 | 14.7% | 2,010 | 10.5% |
| Kauai County | 183 | 3.0% | 127 | 4.4% | 88 | 3.0% | 723 | 3.8% |
| Maui County | 381 | 6.2% | 254 | 8.9% | 197 | 6.7% | 1,561 | 8.2% |
| TOTAL | 6,101 | 100% | 2,854 | 100% | 2,940 | 100% | 19,103 | 100% |

SOURCE: Hawaii Health Information Corporation
NOTE: Cardiovascular Diseases include the following primary ICD-9 definitions: Total cardiovascular diseases (390-459); Coronary heart disease (402, 410-414, 429.2); Stroke (430-434, 436-438); Acute myocardial infarction (410)

FINDING: More men were discharged for CVD compared to women in 2005. Whites made up the highest percentage of hospital discharges for coronary heart disease, acute myocardial infarction, and total CVD. Japanese made up the highest percentage of hospital discharges for stroke. The majority of hospital discharges for total CVD were in Honolulu County.

Table 8. CVD-Associated Hospital Discharges and Average Length of Stay (ALOS) by Payer, HHIC, Hawaii 2005

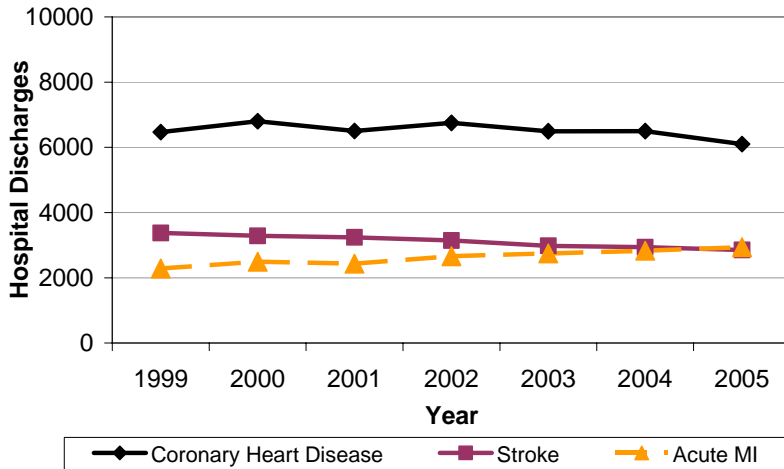
FINDING:

- ◆ The majority of CVD-associated hospital discharges were paid by Medicare.
- ◆ The number of discharges paid for by Medicare for Total CVD is more than double the next payer (Private Insurance).
- ◆ Those who *self pay* had the lowest average length of hospital stay due to CVD.

| Payer | Coronary Heart Disease | | Stroke | | Total CVD | |
|-----------------------|------------------------|------------|--------------|------------|---------------|------------|
| | Discharges | ALOS | Discharges | ALOS | Discharges | ALOS |
| Department of Defense | 301 | 5.3 | 92 | 8.6 | 998 | 5.5 |
| Medicaid/Quest | 461 | 5.0 | 210 | 8.3 | 1,691 | 6.0 |
| Medicare | 3,208 | 5.6 | 1,795 | 7.5 | 11,032 | 6.2 |
| Private Insurance | 2,034 | 4.0 | 701 | 8.2 | 5,059 | 4.9 |
| Self Pay | 84 | 3.0 | 43 | 5.3 | 268 | 3.9 |
| Others | 13 | 4.2 | 13 | 5.9 | 55 | 5.4 |
| TOTAL | 6,101 | 5.0 | 2,854 | 7.7 | 19,103 | 5.7 |

SOURCE: Hawaii Health Information Corporation
NOTE: Cardiovascular Diseases include the following primary ICD-9 definitions: Total cardiovascular diseases (390-459); Coronary heart disease (402, 410-414, 429.2); Stroke (430-434, 436-438)

Figure 46. Trends in CVD-Associated Hospital Discharges, HHIC, Hawaii 1999-2005

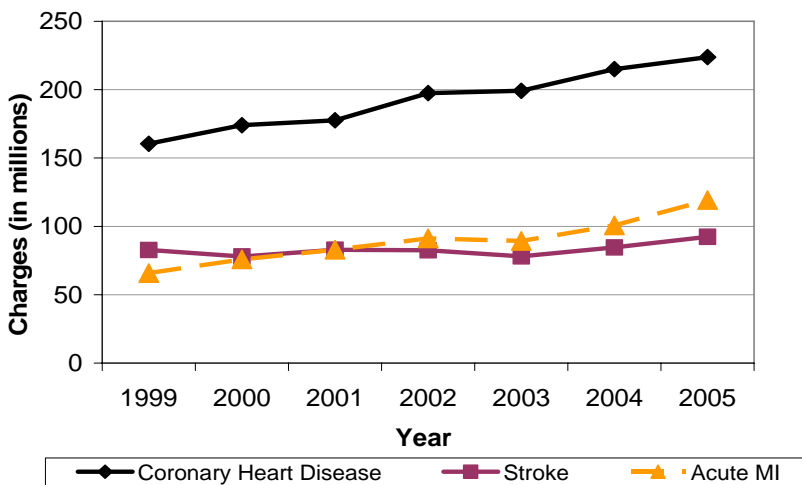


FINDING:

- ◆ Since 1999, most CVD-related hospital discharges were for coronary heart disease.
- ◆ Discharges due to heart failure and acute myocardial infarction have slightly increased since 1999.

SOURCE: Hawaii Health Information Corporation

Figure 47. Trends in CVD-Associated Hospital Charges, HHIC, Hawaii 1999-2005



FINDING:

- ◆ Hospital charges due to CVD have increased since 1999.
- ◆ Charges associated with coronary heart disease have increased the most.
- ◆ Increasing charges are seen despite decreasing trends in discharges seen in Fig 43.

SOURCE: Hawaii Health Information Corporation

NEXT STEPS/CONCLUSIONS

As noted in the introduction, the CVD Data Workgroup studied mortality, prevalence, hospital, emergency medical services (EMS), and rehabilitation data. While acquisition of all CVD-related data has not been completed due to lack of resources and funding, this CVD burden document presents Hawaii's morbidity/mortality data, risk factor and risk marker data, and hospital discharge data. It is anticipated that other data (hospital discharge data, EMS/pre-hospital data, additional CVD-related modules for the Behavioral Risk Factor Surveillance System) will be analyzed in the future, and described more fully in a subsequent burden report. The subsequent document will provide additional information on CVD burden based on assessment of the systems of response, treatment, care and rehabilitation.

This report presents the most recent data on CVD deaths, hospitalizations, and risk behaviors in Hawaii. As shown in this report, CVD continues to be a burden to the people of Hawaii and to the healthcare system. Although Hawaii has lower CVD mortality rates compared to the nation, there are a number of geographic and ethnic disparities that persist. Risk factor prevalence data from the BRFSS and HHS further highlight these geographic and ethnic differences, and also reveals disparities by socioeconomic status. Specific populations where the burden of CVD is disproportionately high include Hawaii County residents, Native Hawaiians, Filipinos, and those in the lowest socioeconomic (household income, education, and employment status) levels. The persistence of CVD burden among these groups over the past years suggests the need for targeted interventions. Programs that emphasize policy, environmental, and behavioral changes within these populations may begin to curb the impact of CVD.

Reducing CVD burden in the state involves lowering high blood pressure, reducing high cholesterol, not smoking, engaging in more physical activity, managing diabetes, and controlling weight. This requires a collaborative effort between individuals, communities, organizations, and government agencies. By working together, the people of Hawaii can fight CVD, save lives, and create a healthier Hawaii.

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APPENDIX A - GLOSSARY AND DATA DEFINITIONS

Some definitions below are taken from *A Public Health Action Plan to Prevent Heart Disease and Stroke*, published by CDC in 2003.

Age-adjusted rates

The risk of developing cardiovascular disease and its associated risk factors generally increases with age. As a result, various groups within a population that tend to be older appear to possess a higher rate. To address this issue, the mortality and prevalence rates presented in this report have been “age-adjusted.” This statistical technique allows comparison of rates between populations by removing the effect of various age distributions that may exist within those populations. Age-adjustment also enables comparison of the rates in this report to rates in other states and the nation. In this report, mortality and prevalence rates are adjusted using the direct method to the 2000 U.S. standard population. Data comparisons should be limited to data adjusted to the same standard population.

Body Mass Index (BMI)

A measure used in classifying weight categories. Equals weight in kilograms ÷ [height in meters]² with a BMI of 20-25 considered normal, 25-29.9 considered overweight and more than 30, obese.

Cardiovascular Diseases

A group of diseases affecting the heart and/or blood vessels, the two most common being heart disease and stroke. Listed in the International Classification of Diseases as *Diseases of the Circulatory System*, which includes ICD-9 codes 390-459 for hospitalizations, and ICD-10 codes I00-I99 for deaths¹.

Cerebrovascular Disease (Stroke)

Also known as a brain attack, it is the interruption of blood supply to the brain due to a blockage or rupture of a blood vessel. Three types of stroke include ischemic, hemorrhagic, and transient ischemic attack. Refers to hospitalizations with primary ICD-9 codes 430-434, 436-438, as well as deaths classified with primary ICD-10 codes I60-I69.

Cholesterol

“Fatty” molecular compounds obtained from the diet or produced in the body from fatty dietary components. High cholesterol is classified when total blood cholesterol concentration is ≥200 mg/dl.

Coronary Heart Disease (CHD)

A disease caused by impaired circulation in one or more coronary arteries. It is often diagnosed following chest pain or a heart attack. CHD is the most common type of cardiovascular disease causing over 50% of CVD deaths. Refers to hospitalizations with primary ICD-9 codes 402, 410-414, 429.2, as well as deaths classified with primary ICD-10 codes I11, I20-I25.

Diabetes (*diabetes mellitus*)

A metabolic disorder resulting from insufficient production of insulin, commonly leading to cardiovascular complications.

¹ World Health Organization. *International Classification of Diseases, Ninth (ICD-9) and Tenth (ICD-10) Revision*. <http://cdc.gov/nchs/icd9.htm>. Accessed August 2007.

Ethnicity (BRFSS)

In the BRFSS, respondents are asked to choose one race from a list to answer the question: “What is your race?” The race list includes Caucasian, Hawaiian, Chinese, Filipino, Japanese, Korean, Samoan, Black, American Indian/Alaska Native/Eskimo/Inuit, Vietnamese, Asian Indian, Portuguese, Guamanian/Chamorro, Puerto Rican, Mexican, Tongan, Laotian, Cambodian, Malaysian, Fijian, Micronesian, and other Asian. In addition, a respondent can specify his/her own ethnicity if it is not listed, or can select a “Don’t Know” or “Not Sure” option, or refuse to answer.

Ethnicity (HHS)

In the HHS, ethnicity is determined by asking the questions: “Of what ethnic background is your mother? Of what ethnic background is your father?” Four answers are accepted from the following list of races: White/Caucasian (European, German, Irish, Italian, English), Hawaiian, Chinese (Taiwanese), Filipino, Japanese (Okinawan), Korean, Vietnamese, Asian Indian, Other Asian (Laotian, Thai, Malaysian), Samoan/Tongan, Black/African American, Native American/Aleut/Eskimo/Inuit, Puerto Rican, Mexican, Portuguese, Guamanian/Chamorro, Other Pacific Islander (Polynesian, Micronesian, Fijian), Other, Don’t Know, and Refused. The responses are coded.

Health Disparities

Differences in the burden and impact of disease among different populations.

Healthy People 2010 Objectives²

- *Diabetes*
Objective 05-03: Reduce the overall rate of diabetes that is clinically diagnosed to 25 overall cases per 1,000 population
- *High Blood Cholesterol*
Objective 12-14: Reduce the proportion of adults with high total blood cholesterol levels to 17%
- *High Blood Pressure*
Objective 12-9: Reduce the proportion of adults with high blood pressure to 14%
- *Overweight/Obesity*
Objective 19-01: Increase the proportion of adults who are at a healthy weight to 60%
Objective 19-02: Reduce the proportion of adults who are obese to 15%
- *Physical Activity (leisure time activity)*
Objective 22-01: Reduce the proportion of adults who engage in no leisure-time physical activity to 20%
- *Smoking Status*
Objective 27-01: Reduce tobacco use (cigarette smoking) by adults to 12%

High Blood Pressure

A condition in which the pressure in arterial circulation is greater than desired. Blood pressure is considered high when systolic pressure is ≥ 140 mm Hg or if diastolic pressure is ≥ 90 mm Hg.

International Classification of Diseases (ICD)

An international standard used to classify diseases and other health problems recorded on many types of health and vital records including death certificates and hospital records. In addition to enabling the storage and

² U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000.

retrieval of diagnostic information for clinical and epidemiological purposes, these records also provide the basis for the compilation of national mortality and morbidity statistics. This report presents hospital discharge data using the ICD, Version 9 (ICD-9), as well as mortality data using the ICD, Version 10 (ICD-10).

| ICD CODING BY SOURCE FOR THE CIRCULATORY SYSTEM INCLUDING HEART DISEASE AND STROKE | | |
|--|----------------------|----------------------------|
| HEALTH CONDITION | PRIMARY SOURCE | |
| | ICD-9 | ICD-10 |
| Circulatory System | 390-459 | I00-I99 |
| Cardiovascular Disease | 390-448 | I00-I09,I11,I13,I20-I51 |
| All Heart Disease | 390-398, 402,404-429 | I00-I09, I11, I13, I20-I51 |
| Pertaining to Rheumatic Fever or Rheumatic Heart Disease | 390-398 | I00-I02 |
| Hypertension | 401-404 | I10-I13 |
| Coronary Heart Disease | 402, 410-414, 429.2 | I11, I20-I25 |
| (Secondary Hypertension) | 405 | (I15) |
| Ischemic Heart Disease | 410-414, (429.2) | I11,I20-I25 |
| Pulmonary Heart Disease | | I26-I28 |
| Cerebrovascular Disease (Stroke) | 430-438 (-435) | I60-I69 |
| Transient Cerebral Ischemic Attacks | 435 | G45.8, G45.9 |
| Arterial Diseases | 440-448 | I70-I78 |
| Diseases of Veins and Lymphatics and Other Diseases of Circulatory System | 451-459 | I80-I89, I95-I99 |

SOURCE: U.S. Department of Health and Human Services, Office on Women's Health
 Data 2010 Health People 2010 Database, Operational definitions for all objectives of focus area:12 Heart Disease and Stroke <http://wonder.cdc.gov/DATA2010/OD12.HTM>

Major Cardiovascular Diseases

A grouping of common types of CVD that includes coronary heart disease, stroke, heart failure, and others. Refers to deaths classified with primary ICD-10 codes I00-I78. It does not include less common forms of CVD classified by ICD-10 codes I79-I99.

Mortality Rate

The number of deaths within a defined population and specified time interval. In this report, mortality rates are presented in deaths per 100,000 people. Population estimates by county for 1999 are from the State of Hawaii Department of Business, Economic Development and Tourism. 2000-2005 estimates by county are from the National Center for Health Statistics. Population estimates by ethnicity for 2005 are from the Hawaii Health Survey.

Myocardial Infarction (MI)

Commonly referred to as a heart attack, a MI (or acute MI) is an acute event in which the heart muscle is damaged because of a lack of blood flow from the coronary arteries. Refers to hospitalizations with primary ICD-9 code 410.

Prevalence

The number of persons with a disease or condition at a specific point in time divided by the total number of persons in the population at that same point in time. In this report, prevalence is presented as the percent of adults with a disease or condition (e.g. diabetes, high blood pressure) within a given year.

$$\frac{\text{For example: } 100 \text{ people with flu in Honolulu in 2005}}{1,000 \text{ total people in Honolulu in 2005}} \times 100 = 10\% \text{ flu prevalence in Honolulu in 2005}$$

APPENDIX B - SURVEY METHODS AND QUESTIONS

Hawaii is fortunate to have two major health surveys: the Behavioral Risk Factor Surveillance Survey (BRFSS) and the Hawaii Health Survey (HHS). The two surveys have differences in methodology.

| Characteristic | BRFSS | HHS |
|----------------------------------|--|---|
| General | National Survey conducted in all states. | Survey specific to Hawaii originally modeled after the National Health Interview Survey. |
| Focus | Behaviors affecting personal health, selected lifetime and current health conditions. Emerging public health issues and traditional demographic markers. | Assess prevalence of chronic and other health conditions, associated risk factors and demographic and socio-economic markers. Also provides intercensal estimates of Hawaii's population. |
| Interviewed | Randomly chosen adults on themselves. | Knowledgeable adult on themselves and each household member. |
| Survey Instrument | Computer Assisted Telephone Interview (CATI) system with different survey instrument. | Computer Assisted Telephone Interview (CATI) system with different survey instrument. |
| Sampling Design | Disproportionate Stratified Sampling (DSS) Follows protocols from CDC. | Disproportionate stratified, random within island and cluster sampling within household. |
| Sample Selection | CDC contractor, GENESYS, generates the phone samples. | Process through OHSM, Hawaiian Telcom, SMS Research. |
| Sample size | At least 6,000 households with one randomly selected adult as respondent. | An estimated 6,000 households per year with adult respondents and approximately 15,000 members. |
| Sample Question | Have you ever been told by a doctor that you have diabetes? | Has anyone in the household been told by a physician or medical professional that they have diabetes? What are the names (initials) of those household members? |
| Weighting Scheme | Determined by CDC. Based on the CENSUS and CLARITAS | Done by SMS Research, with Census Data, and OHSM Vital Record Data |
| Sample weighted to Hawaii | Adult Population | Adult population, households, or total population |
| Analysis | SAS, SUDAAN | SAS, SUDAAN, Arc View |

Survey (BRFSS) Questions

- *Activity Limitation*

The BRFSS uses the following question to determine activity limitation due to heart disease, stroke or hypertension: "Have you ever experienced activity limitation due to heart disease, stroke, or hypertension?"

- *Diabetes*
The BRFSS uses the following question to determine diabetes prevalence: “Have you ever been told by a doctor that you have diabetes?”
- *High Blood Cholesterol*
The BRFSS uses the following question to determine high blood cholesterol prevalence: “Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?”
- *High Blood Pressure*
The BRFSS uses the following question to determine high blood pressure, or hypertension, prevalence: “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?”
- *Overweight/Obesity*
The BRFSS uses Body Mass Index (BMI) as a measure of bodyweight. Cutoffs for weight status are defined as follows: normal weight (BMI<25), overweight (BMI≥25 and <30), and obese (BMI≥30).
- *Physical Activity (leisure time activity)*
The BRFSS defines “no leisure time activity” as those responding *no* to the question, “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”
- *Smoking Status*
The BRFSS defines a “current smoker” as a person who reports smoking at least 100 cigarettes in his/her lifetime, and still smokes either everyday or some days. A “former smoker” is a person who smoked at least 100 cigarettes in his/her lifetime, but does not smoke anymore.

Survey (HHS) Questions

- *Diabetes*
The HHS uses the following questions to determine diabetes prevalence: “Has anyone in the household been told by a physician or medical professional that they have diabetes? What are the names (initials) of those household members?”
- *High Blood Cholesterol*
The HHS uses the following questions to determine high cholesterol prevalence: “Has anyone in the household been told by a physician or medical professional that they have high cholesterol? What are the names (initials) of those household members?”
- *High Blood Pressure*
The BRFSS uses the following questions to determine high blood pressure prevalence: “Has anyone in the household been told by a physician or medical professional that they have high blood pressure? What are the names (initials) of those household members?”
- *Overweight/Obesity*
The HHS uses Body Mass Index (BMI) as a measure of bodyweight. Cutoffs for weight status are defined as follows: normal weight (BMI<25), overweight (BMI≥25 and <30), and obese (BMI≥30). To determine these numbers, the HHS asks the questions: About how much do you weigh without your shoes? About how tall are you without shoes?
- *Smoking Status*
The HHS uses the following questions to determine smoking prevalence: “Does anyone in your household smoke cigarettes? What are the names (initials) of those household members?”

APPENDIX C - DATA TABLES (NOTE: CI = Confidence Interval)

Figure 2. Trends in Major Cardiovascular Disease Deaths by County, Hawaii 1999-2005* (Deaths per 100,000)

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|--------------|-------|-------|-------|-------|-------|-------|-------|
| Hawaii | 332.2 | 296.9 | 298.5 | 289.0 | 273.5 | 252.2 | 233.6 |
| Honolulu | 261.0 | 259.0 | 242.5 | 252.9 | 235.5 | 222.6 | 199.0 |
| Kauai | 306.5 | 252.7 | 234.0 | 232.7 | 215.4 | 209.6 | 225.0 |
| Maui | 288.1 | 265.0 | 225.0 | 256.5 | 223.7 | 215.7 | 207.7 |
| STATE | 274.2 | 264.2 | 247.4 | 256.8 | 238.4 | 225.0 | 205.3 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 4. Trends in Coronary Heart Disease Deaths by County, Hawaii 1999-2005* (Deaths per 100,000)

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|--------------|-------|-------|-------|-------|-------|-------|-------|
| Hawaii | 153.4 | 141.5 | 138.1 | 127.1 | 119.9 | 108.2 | 99.5 |
| Honolulu | 114.4 | 110.4 | 96.3 | 99.3 | 94.6 | 88.8 | 74.3 |
| Kauai | 162.3 | 124.9 | 121.4 | 120.1 | 108.2 | 92.5 | 112.1 |
| Maui | 142.8 | 123.2 | 100.2 | 118.9 | 99.1 | 107.4 | 93.9 |
| STATE | 124.3 | 116.3 | 103.4 | 105.6 | 99.0 | 93.2 | 81.3 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 6. Trends in Stroke Mortality Rate by County, Hawaii 1999-2005* (Deaths per 100,000)

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|--------------|------|------|------|------|------|------|------|
| Hawaii | 75.5 | 68.3 | 78.6 | 79.2 | 69.0 | 46.9 | 51.4 |
| Honolulu | 61.7 | 60.3 | 56.3 | 55.9 | 50.1 | 47.4 | 42.9 |
| Kauai | 58.3 | 48.8 | 51.7 | 51.1 | 37.5 | 47.4 | 46.3 |
| Maui | 48.7 | 51.9 | 48.4 | 60.6 | 47.1 | 35.4 | 38.0 |
| STATE | 61.9 | 59.8 | 58.1 | 59.0 | 51.7 | 46.2 | 43.5 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 10. Trends in Adult High Blood Pressure Prevalence, BRFSS, Hawaii 1999-2005*

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 1999 | 22.6 | 20.5--24.9 |
| 2001 | 23.7 | 22.2--25.2 |
| 2003 | 22.2 | 20.8--23.6 |
| 2005 | 23.1 | 21.8--24.5 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 11. Trends in Adult High Blood Pressure Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|------------|
| 1998-2000 | 19.5 | 18.7--20.3 |
| 1999-2001 | 19.8 | 19.0--20.6 |
| 2000-2002 | 19.4 | 18.2--20.7 |
| 2001-2003 | 20.1 | 18.9--21.4 |
| 2002-2004 | 21.1 | 19.8--22.3 |
| 2003-2005 | 22.2 | 21.4--23.1 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 13. Adult High Blood Pressure Prevalence by selected characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 25.8 | 22.9--28.9 |
| Native Hawaiian | 30.3 | 27.5--33.3 |
| Japanese | 27.0 | 24.4--29.7 |
| White | 18.0 | 16.5--19.5 |
| Others | 23.0 | 20.5--25.7 |
| Gender | | |
| Male | 24.5 | 22.9--26.1 |
| Female | 21.8 | 20.7--23.0 |
| County | | |
| Hawaii | 23.6 | 21.1--24.6 |
| Honolulu | 22.8 | 22.3--24.9 |
| Kauai | 23.4 | 20.5--26.6 |
| Maui | 21.2 | 19.3--23.3 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 14. Adult High Blood Pressure Prevalence by socioeconomic status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|-----------------------|---------|------------|
| <\$15,000 | 35.6 | 29.3--42.4 |
| \$15,000-24,999 | 25.9 | 22.3--30.0 |
| \$25,000-49,999 | 24.7 | 22.2--27.3 |
| \$50,000-74,999 | 23.0 | 20.0--26.3 |
| >=\$75,000 | 17.9 | 15.3--20.9 |
| Unknown | 22.1 | 18.5--26.2 |
| Employment | | |
| Employed | 21.4 | 19.4--23.6 |
| Unemployed | 34.1 | 25.6--43.8 |
| Student/ Homemaker | 18.4 | 13.8--24.2 |
| Retired/Can't Work | 27.5 | 23.4--32.0 |
| Education | | |
| <High School | 31.9 | 25.6--39.0 |
| High school | 26.8 | 24.2--29.7 |
| Some college | 23.9 | 21.5--26.5 |
| College | 18.1 | 16.3--19.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 15. Trends in High Blood Pressure Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 24.9 | 22.8 | 22.6 | 15.0 | 17.7 |
| 1999-2001 | 22.8 | 24.1 | 23.4 | 14.3 | 19.8 |
| 2000-2002 | 24.1 | 24.5 | 22.6 | 13.9 | 18.8 |
| 2001-2003 | 25.2 | 24.8 | 23.0 | 14.6 | 20.1 |
| 2002-2004 | 27.1 | 27.0 | 24.1 | 15.4 | 20.2 |
| 2003-2005 | 28.0 | 27.2 | 25.8 | 16.7 | 21.8 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 16. Trends in Adult High Blood Cholesterol Prevalence, BRFSS, Hawaii 1999-2005

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 1999 | 24.9 | 22.1--28.0 |
| 2001 | 22.7 | 20.9--24.6 |
| 2003 | 23.9 | 22.2--25.7 |
| 2005 | 30.5 | 28.6--32.4 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 17. Trends in Adult High Blood Cholesterol Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|------------|
| 1998-2000 | 19.8 | 19.0--20.7 |
| 1999-2001 | 20.2 | 19.4--21.0 |
| 2000-2002 | 18.7 | 17.6--19.9 |
| 2001-2003 | 19.9 | 18.8--21.2 |
| 2002-2004 | 20.6 | 19.4--21.8 |
| 2003-2005 | 18.8 | 18.1--19.6 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 18. Adult High Blood Cholesterol Prevalence by selected characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 27.7 | 23.9--31.8 |
| Native Hawaiian | 30.1 | 26.7--33.8 |
| Japanese | 31.9 | 28.7--35.3 |
| White | 26.5 | 24.6--28.4 |
| Others | 27.0 | 24.1--30.1 |
| Gender | | |
| Male | 29.2 | 27.4--31.2 |
| Female | 26.9 | 25.4--28.6 |
| County | | |
| Hawaii | 26.3 | 24.2--28.6 |
| Honolulu | 28.7 | 27.1--30.3 |
| Kauai | 25.7 | 22.2--29.4 |
| Maui | 28.4 | 25.4--31.7 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 19. Adult High Blood Cholesterol Prevalence by socioeconomic status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 33.1 | 25.9--41.2 |
| \$15,000-24,999 | 32.0 | 26.1--38.6 |
| \$25,000-49,999 | 29.4 | 26.2--32.8 |
| \$50,000-74,999 | 29.3 | 25.4--33.5 |
| >=\$75,000 | 34.6 | 30.2--39.4 |
| Unknown | 31.5 | 25.9--37.7 |
| Employment | | |
| Employed | 28.9 | 26.5--31.4 |
| Unemployed | 32.3 | 21.1--46.1 |
| Student/Homemaker | 30.4 | 24.1--37.5 |
| Retired/Can't Work | 38.6 | 30.0--48.1 |
| Education | | |
| <High School | 29.5 | 21.3--39.2 |
| High school | 30.5 | 26.6--34.8 |
| Some college | 32.0 | 29.0--35.3 |
| College | 31.1 | 27.9--34.5 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 20. Trends in Adult High Blood Cholesterol Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005*

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 18.7 | 18.1 | 25.0 | 16.8 | 19.7 |
| 1999-2001 | 20.4 | 18.5 | 24.8 | 16.7 | 21.0 |
| 2000-2002 | 20.2 | 17.1 | 22.6 | 16.3 | 19.4 |
| 2001-2003 | 21.8 | 17.8 | 23.9 | 17.4 | 19.9 |
| 2002-2004 | 21.2 | 17.6 | 25.3 | 18.9 | 20.3 |
| 2003-2005 | 20.3 | 16.8 | 23.0 | 16.5 | 17.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 21. Trends in Adult Smoking Prevalence, BRFSS, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 1998 | 19.4 | 17.2--21.7 |
| 1999 | 18.5 | 16.4--20.8 |
| 2000 | 19.6 | 18.3--21.1 |
| 2001 | 20.6 | 19.0--22.3 |
| 2002 | 21.0 | 19.7--22.5 |
| 2003 | 17.4 | 16.0--19.0 |
| 2004 | 17.3 | 15.2--19.6 |
| 2005 | 17.1 | 15.8--18.4 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 22. Trends in Adult Smoking Prevalence, HHS 3-Year Moving Average, Hawaii 2000-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|------------|
| 2000-2002 | 16.9 | 15.8--18.1 |
| 2001-2003 | 16.0 | 14.9--17.2 |
| 2002-2004 | 15.3 | 14.2--16.5 |
| 2003-2005 | 15.5 | 14.7--16.3 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 23. Percent of Adult Smoking Prevalence by selected characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 14.1 | 11.6--16.9 |
| Native Hawaiian | 26.8 | 23.8--30.0 |
| Japanese | 15.1 | 12.7--17.9 |
| White | 17.5 | 15.9--19.2 |
| Others | 17.1 | 15.0--19.5 |
| Gender | | |
| Male | 19.8 | 18.2--21.4 |
| Female | 15.4 | 14.3--16.6 |
| County | | |
| Hawaii | 19.7 | 17.7--21.9 |
| Honolulu | 16.8 | 15.6--18.1 |
| Kauai | 20.7 | 17.3--24.5 |
| Maui | 19.8 | 17.3--22.4 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 24. Percent of Adult Smoking Prevalence by socioeconomic status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 30.1 | 23.9--37.0 |
| \$15,000-24,999 | 23.1 | 19.1--27.7 |
| \$25,000-49,999 | 16.2 | 13.9--18.7 |
| \$50,000-74,999 | 15.7 | 13.0--19.0 |
| >=\$75,000 | 13.9 | 11.2--17.2 |
| Unknown | 16.2 | 12.8--20.2 |
| Employment | | |
| Employed | 17.3 | 15.6--19.2 |
| Unemployed | 28.4 | 20.1--38.5 |
| Student/Homemaker | 16.6 | 12.3--21.9 |
| Retired/Can't Work | 24.4 | 18.8--31.1 |
| Education | | |
| <High School | 35.5 | 27.3--44.7 |
| High school | 22.3 | 19.6--25.2 |
| Some college | 18.5 | 16.2--21.0 |
| College | 10.2 | 8.5--12.2 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 25. Trends in Adult Smoking Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005*

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 14.3 | 24.3 | 14.5 | 16.2 | 17.6 |
| 1999-2001 | 16.0 | 23.0 | 16.4 | 16.2 | 17.0 |
| 2000-2002 | 15.3 | 22.6 | 15.8 | 15.4 | 15.0 |
| 2001-2003 | 14.1 | 22.0 | 15.1 | 14.9 | 13.2 |
| 2002-2004 | 12.4 | 21.9 | 12.9 | 14.5 | 13.2 |
| 2003-2005 | 12.7 | 21.6 | 13.1 | 15.1 | 14.8 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 26. Trends in Adults Reporting No Leisure-Time Physical Activity, BRFSS, Hawaii 2001-2005*

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 2001 | 18.8 | 17.3--20.4 |
| 2002 | 16.1 | 14.9--17.3 |
| 2003 | 18.1 | 16.7--19.6 |
| 2004 | 20.4 | 18.2--22.8 |
| 2005 | 19.3 | 17.9--20.6 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 28. Percent of Adults Reporting No Leisure-Time Physical Activity by socioeconomic status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 31.0 | 24.6--38.3 |
| \$15,000-24,999 | 25.1 | 20.9--29.9 |
| \$25,000-49,999 | 18.7 | 16.4--21.3 |
| \$50,000-74,999 | 16.1 | 13.4--19.2 |
| >=\$75,000 | 12.8 | 10.3--15.9 |
| Unknown | 21.7 | 21.5--30.4 |
| Employment | | |
| Employed | 18.4 | 16.5--20.5 |
| Unemployed | 25.8 | 16.5--37.9 |
| Student/Homemaker | 18.3 | 13.8--23.8 |
| Retired/Can't Work | 27.8 | 21.9--34.5 |
| Education | | |
| <High School | 33.6 | 25.6--42.8 |
| High school | 27.3 | 24.6--30.2 |
| Some college | 17.5 | 15.2--20.0 |
| College | 12.4 | 10.4--14.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 30. Trends in Adult Overweight Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|------------|
| 1998-2000 | 32.3 | 31.3--33.4 |
| 1999-2001 | 32.1 | 31.1--33.1 |
| 2000-2002 | 31.0 | 29.6--32.5 |
| 2001-2003 | 31.0 | 29.5--32.5 |
| 2002-2004 | 31.2 | 29.7--32.8 |
| 2003-2005 | 32.9 | 31.8--34.0 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 27. Percent of Adults Reporting No Leisure-Time Physical Activity by selected characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 27.9 | 24.6--31.4 |
| Native Hawaiian | 20.5 | 17.8--23.5 |
| Japanese | 20.0 | 17.6--22.7 |
| White | 12.7 | 11.5--14.1 |
| Others | 20.5 | 18.0--23.2 |
| Gender | | |
| Male | 17.2 | 15.7--18.8 |
| Female | 21.0 | 19.7--22.3 |
| County | | |
| Hawaii | 18.8 | 17.0--20.7 |
| Honolulu | 19.2 | 17.9--20.5 |
| Kauai | 16.8 | 14.1--19.4 |
| Maui | 20.1 | 17.6--23.0 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 29. Trends in Adult Overweight (BMI≥25-29.9) Prevalence, BRFSS, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 1998 | 31.7 | 29.1--34.4 |
| 1999 | 33.7 | 31.0--36.4 |
| 2000 | 33.6 | 32.0--35.2 |
| 2001 | 32.6 | 30.8--34.5 |
| 2002 | 34.9 | 33.3--36.5 |
| 2003 | 32.3 | 30.5--34.2 |
| 2004 | 30.4 | 27.9--33.1 |
| 2005 | 32.3 | 30.8--33.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 31. Trends in Adult Overweight Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005*

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 33.0 | 34.6 | 31.8 | 32.3 | 31.3 |
| 1999-2001 | 34.2 | 33.2 | 30.1 | 33.0 | 31.3 |
| 2000-2002 | 34.0 | 31.4 | 29.9 | 31.5 | 29.7 |
| 2001-2003 | 35.5 | 31.1 | 29.4 | 31.8 | 29.4 |
| 2002-2004 | 33.9 | 32.4 | 30.4 | 31.2 | 29.9 |
| 2003-2005 | 35.1 | 35.0 | 30.2 | 33.7 | 30.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 32. Adult Overweight Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 33.7 | 29.3--38.5 |
| Native Hawaiian | 30.2 | 26.2--34.5 |
| Japanese | 35.9 | 32.0--40.0 |
| White | 35.5 | 32.9--38.1 |
| Others | 29.0 | 25.1--33.2 |
| Gender | | |
| Male | 40.7 | 38.1--43.3 |
| Female | 25.9 | 24.0--27.8 |
| County | | |
| Hawaii | 35.5 | 32.5--38.6 |
| Honolulu | 33.2 | 31.1--35.3 |
| Kauai | 31.3 | 26.9--36.0 |
| Maui | 31.3 | 27.8--34.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 33. Adult Overweight Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 21.7 | 17.0--27.3 |
| \$15,000-24,999 | 29.5 | 25.2--34.1 |
| \$25,000-49,999 | 33.8 | 30.8--36.9 |
| \$50,000-74,999 | 31.9 | 28.3--35.7 |
| >=\$75,000 | 40.0 | 36.1--44.0 |
| Unknown | 30.5 | 25.8--35.6 |
| Employment | | |
| Employed | 35.3 | 33.0--37.7 |
| Unemployed | 29.8 | 19.4--42.7 |
| Student/Homemaker | 26.8 | 21.5--32.8 |
| Retired/Can't Work | 29.8 | 23.8--36.5 |
| Education | | |
| <High School | 28.4 | 21.3--36.7 |
| High school | 33.4 | 30.4--36.6 |
| Some college | 31.8 | 29.0--34.8 |
| College | 33.9 | 31.2--36.7 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 34. Trends in Adult Obesity (BMI≥30) Prevalence, BRFSS, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|------|---------|------------|
| 1998 | 15.4 | 13.3--17.6 |
| 1999 | 15.3 | 13.4--17.4 |
| 2000 | 15.3 | 14.0--16.7 |
| 2001 | 17.5 | 15.9--19.2 |
| 2002 | 16.6 | 15.3--17.9 |
| 2003 | 15.8 | 14.4--17.2 |
| 2004 | 20.1 | 17.6--22.9 |
| 2005 | 19.2 | 17.8--20.6 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 35. Trends in Adult Obesity Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|------------|
| 1998-2000 | 13.6 | 12.9--14.4 |
| 1999-2001 | 14.6 | 13.9--15.3 |
| 2000-2002 | 18.0 | 16.5--19.5 |
| 2001-2003 | 19.5 | 18.0--21.0 |
| 2002-2004 | 19.8 | 18.3--21.3 |
| 2003-2005 | 18.0 | 17.1--18.9 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 36. Trends in Adult Obesity Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005*

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 10.0 | 27.7 | 10.3 | 11.8 | 12.8 |
| 1999-2001 | 11.7 | 28.5 | 11.4 | 11.8 | 14.1 |
| 2000-2002 | 10.9 | 35.3 | 11.4 | 13.1 | 19.2 |
| 2001-2003 | 10.9 | 37.7 | 11.8 | 14.4 | 22.4 |
| 2002-2004 | 11.6 | 37.9 | 12.5 | 15.2 | 22.3 |
| 2003-2005 | 13.0 | 33.3 | 14.2 | 14.4 | 18.8 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 37. Adult Obesity Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 13.4 | 10.6--16.8 |
| Native Hawaiian | 43.5 | 38.7--48.3 |
| Japanese | 11.3 | 9.0--14.1 |
| White | 17.9 | 15.7--20.3 |
| Others | 24.1 | 20.4--28.2 |
| Gender | | |
| Male | 22.7 | 20.5--25.0 |
| Female | 16.6 | 15.0--18.4 |
| County | | |
| Hawaii | 23.3 | 20.5--26.2 |
| Honolulu | 19.2 | 17.5--21.1 |
| Kauai | 20.4 | 16.3--25.2 |
| Maui | 18.7 | 15.8--22.1 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 38. Adult Obesity Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 32.4 | 25.9--39.7 |
| \$15,000-24,999 | 22.5 | 18.7--26.9 |
| \$25,000-49,999 | 19.7 | 17.1--22.5 |
| \$50,000-74,999 | 22.4 | 19.1--26.1 |
| >=\$75,000 | 15.1 | 12.6--18.0 |
| Unknown | 18.0 | 13.9--23.0 |
| Employment | | |
| Employed | 19.6 | 17.7--21.8 |
| Unemployed | 34.0 | 23.4--46.5 |
| Student/Homemaker | 17.2 | 13.0--22.4 |
| Retired/Can't Work | 23.8 | 18.5--30.1 |
| Education | | |
| <High School | 33.5 | 25.7--42.4 |
| High school | 25.4 | 22.5--28.4 |
| Some college | 21.9 | 19.4--24.6 |
| College | 12.5 | 10.6--14.7 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 39. Trends in Adult Diabetes Prevalence, BRFSS, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|------|---------|----------|
| 1998 | 5.6 | 4.4--7.2 |
| 1999 | 5.2 | 4.1--6.5 |
| 2000 | 5.2 | 4.5--5.9 |
| 2001 | 6.1 | 5.1--7.3 |
| 2002 | 5.6 | 5.0--6.4 |
| 2003 | 7.2 | 6.3--8.2 |
| 2004 | 6.6 | 5.3--8.3 |
| 2005 | 7.0 | 6.2--7.8 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 40. Trends in Adult Diabetes Prevalence, HHS 3-Year Moving Average, Hawaii 1998-2005*

| Year | Percent | 95% C.I. |
|-----------|---------|----------|
| 1998-2000 | 6.0 | 5.6--6.5 |
| 1999-2001 | 6.4 | 6.0--6.9 |
| 2000-2002 | 6.5 | 5.8--7.3 |
| 2001-2003 | 7.0 | 6.3--7.8 |
| 2002-2004 | 7.0 | 6.3--7.8 |
| 2003-2005 | 7.5 | 7.0--8.1 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 41. Trends in Adult Diabetes Prevalence by Ethnicity, HHS 3-year moving average, Hawaii 1998-2005*

| Year | Filipino | Native Hawaiian | Japanese | White | Other |
|-----------|----------|-----------------|----------|-------|-------|
| 1998-2000 | 6.2 | 9.3 | 6.8 | 4.2 | 6.4 |
| 1999-2001 | 7.3 | 10.1 | 7.3 | 3.7 | 7.1 |
| 2000-2002 | 7.9 | 8.4 | 7.5 | 4.1 | 8.2 |
| 2001-2003 | 9.5 | 9.0 | 7.5 | 3.9 | 8.8 |
| 2002-2004 | 9.1 | 9.4 | 7.4 | 4.1 | 9.0 |
| 2003-2005 | 10.1 | 11.4 | 8.5 | 4.0 | 8.5 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii State Department of Health, Office of Health Status Monitoring

Figure 42. Adult Diabetes Prevalence by Selected Characteristics, BRFSS, Hawaii 2005*

| Ethnicity | Percent | 95% C.I. |
|-----------------|---------|------------|
| Filipino | 9.1 | 6.8--11.9 |
| Native Hawaiian | 12.8 | 10.0--16.3 |
| Japanese | 5.4 | 4.0--7.2 |
| White | 4.9 | 4.0--6.1 |
| Others | 8.5 | 6.1--11.7 |
| Gender | | |
| Male | 7.9 | 6.7-- 9.4 |
| Female | 6.2 | 5.3--7.2 |
| County | | |
| Hawaii | 8.9 | 7.4--10.6 |
| Honolulu | 7.0 | 5.9--8.1 |
| Kauai | 7.3 | 5.4--9.9 |
| Maui | 4.9 | 3.8--6.4 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 43. Adult Diabetes Prevalence by Socioeconomic Status, BRFSS, Hawaii 2005*

| Household Income | Percent | 95% C.I. |
|--------------------|---------|------------|
| <\$15,000 | 14.6 | 10.5--19.9 |
| \$15,000-24,999 | 9.8 | 7.3--13.2 |
| \$25,000-49,999 | 6.3 | 5.0--7.8 |
| \$50,000-74,999 | 6.4 | 4.8--8.4 |
| >=\$75,000 | 4.3 | 3.2--5.9 |
| Unknown | 9.1 | 6.3--12.9 |
| Employment | | |
| Employed | 6.2 | 4.9--7.7 |
| Unemployed | 10.4 | 4.1--23.7 |
| Student/Homemaker | 8.3 | 4.9--13.8 |
| Retired/Can't Work | 10.3 | 7.0--14.9 |
| Education | | |
| <High School | 13.8 | 9.0--20.5 |
| High school | 9.3 | 7.7--11.3 |
| Some college | 6.4 | 5.1--8.0 |
| College | 4.4 | 3.5--5.6 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS, Hawaii State Department of Health

Figure 46. Trends in CVD-Associated Hospital Discharges, HHIC, Hawaii 1999-2005

| Year | Coronary Heart Disease | Stroke | Heart Failure | Acute MI | TOTAL CVD |
|------|------------------------|--------|---------------|----------|-----------|
| 1999 | 6,467 | 3,374 | 2,646 | 2,284 | 18,819 |
| 2000 | 6,802 | 3,288 | 2,670 | 2,495 | 19,156 |
| 2001 | 6,503 | 3,240 | 2,682 | 2,433 | 19,006 |
| 2002 | 6,749 | 3,144 | 2,792 | 2,661 | 19,498 |
| 2003 | 6,494 | 2,982 | 3,046 | 2,748 | 19,182 |
| 2004 | 6,499 | 2,939 | 3,221 | 2,831 | 19,605 |
| 2005 | 6,101 | 2,854 | 3,393 | 2,940 | 19,103 |

SOURCE: Hawaii Health Information Corporation

Figure 47. Trends in CVD-Associated Hospital Charges, HHIC, Hawaii 1999-2005

| Year | Coronary Heart Disease | Stroke | Heart Failure | Acute MI | TOTAL CVD |
|------|------------------------|--------------|---------------|---------------|---------------|
| 1999 | \$160,470,831 | \$82,679,270 | \$48,008,255 | \$65,857,059 | \$422,409,523 |
| 2000 | \$173,994,512 | \$77,962,219 | \$47,510,697 | \$75,791,028 | \$433,835,987 |
| 2001 | \$177,575,880 | \$82,941,886 | \$47,740,979 | \$82,941,886 | \$459,113,572 |
| 2002 | \$197,527,323 | \$82,535,434 | \$54,049,785 | \$91,245,277 | \$494,287,023 |
| 2003 | \$199,170,907 | \$78,051,283 | \$62,846,052 | \$89,337,740 | \$514,545,098 |
| 2004 | \$215,024,611 | \$84,613,915 | \$73,498,330 | \$100,724,780 | \$569,169,128 |
| 2005 | \$223,827,188 | \$92,323,422 | \$88,531,234 | \$119,267,813 | \$604,793,282 |

SOURCE: Hawaii Health Information Corporation

| Characteristic | MI | | Angina/ CHD | | Stroke | |
|-------------------------------|--------|-----------|----------------|-----------|--------|-----------|
| | 95% CI | 95% CI | 95% CI | 95% CI | 95% CI | 95% CI |
| Sex* | | | | | | |
| Male | 4.6 | 3.7--5.7 | 4.1 | 3.3--5.1 | 3.2 | 2.3--4.3 |
| Female | 2.7 | 2.1--3.4 | 2.7 | 2.1--3.6 | 2.6 | 2.1--3.3 |
| Race/Ethnicity* | | | | | | |
| Filipino | 2.7 | 1.6--4.8 | 2.4 | 1.3--4.3 | 2.1 | 1.1--4.0 |
| Japanese | 3.5 | 2.5--5.0 | 2.7 | 1.9--4.0 | 3.5 | 2.5--4.9 |
| Native Hawaiian | 4.4 | 2.9--6.8 | 4.6 | 3.0--7.1 | 4.9 | 2.6--8.9 |
| White | 4.0 | 3.2--5.1 | 4.2 | 3.3--5.3 | 2.7 | 2.1--3.6 |
| Others | 3.2 | 2.0--5.1 | 2.9 | 1.8--4.6 | 1.9 | 1.1--3.2 |
| Education* | | | | | | |
| Less than high school diploma | 11.1 | 7.1--16.9 | 6.3 | 3.9--10.1 | 8.8 | 5.3--14.2 |
| High school graduate | 3.5 | 2.6--4.7 | 2.9 | 2.0--4.1 | 2.7 | 2.0--3.7 |
| Some college | 3.1 | 2.2--4.2 | 2.9 | 2.1--3.9 | 2.5 | 1.5--4.1 |
| College graduate | 2.9 | 2.2--3.9 | 3.9 | 3.0--5.0 | 2.3 | 1.7--3.2 |
| Household Income* | | | | | | |
| Less than \$15,000 | 5.4 | 3.4--8.4 | 7.4 | 4.5--11.8 | 11.0 | 6.3--18.5 |
| \$15,000-24,999 | 4.6 | 3.1--6.7 | 4.2 | 2.7--6.5 | 3.3 | 2.2--4.8 |
| \$25,000-49,999 | 4.1 | 3.0--5.4 | 3.3 | 2.3--4.6 | 2.1 | 1.5--2.8 |
| \$50,000-74,999 | 3.4 | 2.2--5.1 | 3.2 | 2.1--4.7 | 2.0 | 1.1--3.4 |
| More than \$75,000 | 2.4 | 1.6--3.6 | 2.8 | 1.9--4.0 | 1.7 | 1.1--2.7 |
| Unknown/Refused | 3.8 | 2.3--6.2 | 3.0 | 1.9--4.6 | 4.1 | 2.5--6.6 |
| County* | | | | | | |
| Honolulu | 3.5 | 2.8--4.3 | 3.3 | 2.6--4.1 | 2.8 | 2.1--3.7 |
| Hawaii | 4.0 | 3.1--5.3 | 3.8 | 2.9--5.0 | 3.2 | 2.4--4.3 |
| Kauai | 3.1 | 1.8--5.1 | 3.0 | 1.8--4.9 | 2.8 | 1.6--4.8 |
| Maui | 4.3 | 3.0--6.1 | 4.1 | 2.9--5.8 | 3.1 | 2.1--4.7 |
| TOTAL* | 3.6 | 3.1--4.3 | 3.4 | 2.9--4.1 | 2.9 | 2.4--3.5 |

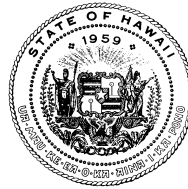
SOURCE: Hawaii BRFSS - Hawaii Department of Health
*Percentages are weighted to population characteristics

| # Risk Factors | Hawaii Adults | Adults with Heart Disease* | 95% CI |
|----------------|---------------|----------------------------|-----------|
| 0 | 29.9 | 1.9 | 1.4--2.5 |
| 1-2 | 57.9 | 3.9 | 3.4--4.4 |
| >2 | 12.2 | 12.1 | 10.0-14.7 |

*2004-2005 age-adjusted average only
SOURCE: Hawaii Health Survey, Department of Health, Office of Health Status Monitoring

| | MI | 95% CI | Angina/ CHD | 95% CI | Stroke | 95% CI |
|----------------------------|-----|-----------|----------------|-----------|--------|-----------|
| DIABETES | | | | | | |
| % With Diabetes | 9.3 | 6.0--14.1 | 10.3 | 5.3--19.2 | 6.9 | 4.0--11.7 |
| % Without Diabetes | 2.9 | 2.4--3.4 | 2.8 | 2.3--3.3 | 2.4 | 1.9--3.0 |
| HIGH BLOOD PRESSURE | | | | | | |
| % With HBP | 6.7 | 5.2--8.5 | 7.1 | 5.1--9.9 | 5.5 | 4.0--7.7 |
| % Without HBP | 1.7 | 1.3--2.3 | 1.8 | 1.3--2.3 | 1.6 | 1.1--2.2 |
| HIGH CHOLESTEROL | | | | | | |
| % With High Cholesterol | 4.9 | 3.9--6.2 | 6.0 | 4.4--8.3 | 3.9 | 2.9--5.2 |
| % Without High Cholesterol | 2.9 | 2.2--3.7 | 2.3 | 1.8--3.1 | 2.5 | 1.7--3.5 |
| OBESITY | | | | | | |
| % Obese | 5.4 | 4.0--7.3 | 5.5 | 4.1--7.5 | 4.3 | 3.0--6.1 |
| % Overweight | 3.7 | 2.9--4.8 | 3.1 | 2.3--4.0 | 1.9 | 1.3--2.6 |
| % Not Obese/Overweight | 2.5 | 1.9--3.3 | 2.4 | 1.8--3.2 | 2.7 | 1.9--3.8 |
| PHYSICAL INACTIVITY | | | | | | |
| % Physically Inactive | 5.1 | 3.9--6.6 | 3.6 | 2.5--5.1 | 4.9 | 3.1--7.7 |
| % Not Physically Inactive | 3.0 | 2.4--3.6 | 3.2 | 2.6--3.8 | 2.3 | 1.8--2.8 |
| SMOKING | | | | | | |
| % Current Smoker | 5.9 | 3.9--8.8 | 4.5 | 3.0--6.5 | 4.1 | 2.4--7.1 |
| % Former Smoker | 4.2 | 3.3--5.4 | 3.4 | 2.6--4.5 | 3.1 | 1.9--5.1 |
| % Non-Smoker | 2.3 | 1.8--3.0 | 2.7 | 2.1--3.5 | 2.3 | 1.8--3.0 |

*Adjusted by age to 2000 U.S. Standard
SOURCE: Hawaii BRFSS - Hawaii Department of Health



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